

EMD-IT 5914 is difunon, RU 12068 is 3-(2-tetrahydropyranyl)-5,6-trimethylneuracil (Procida)

INITIAL ACTIVITY TEST

METRIBUZIN

		0.14 kg/ha (S 0.125 kg/ha)	0.58 kg/ha (S 0.50 kg/ha)	2.30 kg/ha (S 2.00 kg/ha)
DWARF BEAN	F	XXXXXXXXXXXXXXXXXX XXXXXXXX	XXXX XX	XXXX X
	S	XXXXXXXXXXXXXXXXXX XXXXXXXX	0 0	0 0
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXX	XXXXXX XX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXX XXX	XX XX
KALE	F	XXXXXX XXXXXXXXXXXXXXXXXX	0 0	0 0
	S	0 0	0 0	0 0
	P	0 0	0 0	0 0
	I	0 0	0 0	0 0
<u>POLYGONUM</u> <u>AMPHIBIUM</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXX XX
	S	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXX XXXX	XXXXXXXXXXXX XXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXX XXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXX XXXX	XXXXXXXXXXXX XXXX
PERENNIAL RYEGRASS	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXX XXXXXX	XXXXXX XX
	S	XX XX	0 0	0 0
	P	0 0	0 0	0 0
	I	0 0	0 0	0 0
<u>AVENA</u> <u>FATUA</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXX XXXX
	S	0 0	0 0	0 0
	P	0 0	0 0	0 0
	I	0 0	0 0	0 0
<u>AGROPYRON</u> <u>REPENS</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXX	XXXX XXX	XXXX XX
	P	XXXXXXXXXXXX XXXX	XXXXXXXXXXXXXXXXXX XXXX	XXXXXXXXXXXX XX
	I	XXXXXXXXXXXX XXXX	XXXXXX XXXX	XXXXXXXXXXXX XX

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



SPECIES		0.075 KG/HA		0.30 KG/HA		1.20 KG/HA
WHEAT	104	XXXXXXXXXXXXXXXXXXXXX+	59	XXXXXXXXXXXXX		0
( 1 )	93	XXXXXXXXXXXXXXXXXXXXX	29	XXXXXX		0
BARLEY	79	XXXXXXXXXXXXXXXXXXXXX	5	x		0
( 2 )	100	XXXXXXXXXXXXXXXXXXXXX	21	XXXX		0
OAT	100	XXXXXXXXXXXXXXXXXXXXX	0			0
( 3 )	71	XXXXXXXXXXXXXXXXXXXXX	0			0
PER RYGR	80	XXXXXXXXXXXXXXXXXXXXX	0			0
( 4 )	64	XXXXXXXXXXXXXXXXXXXXX	0			0
ONION	87	XXXXXXXXXXXXXXXXXXXXX	6	x	6	x
( 8 )	86	XXXXXXXXXXXXXXXXXXXXX	14	xxx	14	xxx
DWF BEAN	100	XXXXXXXXXXXXXXXXXXXXX	50	XXXXXXXXXXXXX		0
( 9 )	100	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXX		0
FLD BEAN	100	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXX	43	XXXXXXXXXXXXX
( 10 )	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	36	XXXXXXX
PEA	133	XXXXXXXXXXXXXXXXXXXXX+	133	XXXXXXXXXXXXXXXXXXXXX+	100	XXXXXXXXXXXXXXXXXXXXX
( 11 )	86	XXXXXXXXXXXXXXXXXXXXX	86	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXX
W CLOVER	24	XXXXX	0			0
( 12 )	71	XXXXXXXXXXXXXXXXXXXXX	0			0
KALE	15	xxx	0			0
( 15 )	7	x	0			0
SWEDE	0		13	xxx		0
( 17 )	0		14	xxx		0
CARROT	129	XXXXXXXXXXXXXXXXXXXXX+	43	XXXXXXXXXXXXX		0
( 18 )	100	XXXXXXXXXXXXXXXXXXXXX	50	XXXXXXXXXXXXX		0
LETTUCE	0		0			0
( 20 )	0		0			0

METRIBUZIN  
 PRE-EMERGENCE TEST



SPECIES		0.075 KG/HA		0.30 KG/HA		1.20 KG/HA	
SUG BEET ( 21 )	0 0			0 0		0 0	
AVE FATU ( 26 )	84 64	XXXXXXXXXXXXXXXXXXXX		7 x 7 x		0 0	
ALO MYOS ( 27 )	109 50	XXXXXXXXXXXXXXXXXXXXX+		9 xx 7 x		4 x 14 xxx	
POA ANN ( 28 )	105 64	XXXXXXXXXXXXXXXXXXXXX+		0 0		0 0	
SIN ARV ( 30 )	0 0			0 0		0 0	
RAPH RAP ( 31 )	13 14	xxx xxx		0 0		0 0	
GAL APAR ( 38 )	78 100	XXXXXXXXXXXXXXXXXXXX		90 86	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	84 36	XXXXXXXXXXXXXXXXXXXX XXXXXXX
CHEN ALB ( 39 )	0 0			0 0		0 0	
STEL MED ( 40 )	3 50	x XXXXXXXXXXXX		0 0		0 0	
AG REPEN ( 47 )	100 100	XXXXXXXXXXXXXXXXXXXX		83 43	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	67 29	XXXXXXXXXXXXXXXXXXXX XXXXXXX
ALL VIN ( 49 )	100 100	XXXXXXXXXXXXXXXXXXXX		100 50	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	83 43	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
CIRS ARV ( 50 )	71 93	XXXXXXXXXXXXXXXXXXXX		35 50	XXXXXXX XXXXXXXXXXXX	18 21	XXXX XXXX
TUS FARF ( 51 )	88 100	XXXXXXXXXXXXXXXXXXXX		100 100	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	100 93	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX

METRIBUZIN  
 PRE-EMERGENCE TEST  
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SPECIES	0.075 KG/HA		0.30 KG/HA		1.20 KG/HA	
CONV ARV ( 52 )	111	XXXXXXXXXXXXXXXXXXXXX+	95	XXXXXXXXXXXXXXXXXXXXX	111	XXXXXXXXXXXXXXXXXXXXX+
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX
MAIZE ( 58 )	124	XXXXXXXXXXXXXXXXXXXXX+	124	XXXXXXXXXXXXXXXXXXXXX+	83	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXXX
SORGHUM ( 59 )	102	XXXXXXXXXXXXXXXXXXXXX	102	XXXXXXXXXXXXXXXXXXXXX	6	x
	100	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXX	21	XXXX
RICE ( 60 )	108	XXXXXXXXXXXXXXXXXXXXX+	12	xx	12	xx
	100	XXXXXXXXXXXXXXXXXXXXX	14	xxx	7	x
GRNDNUT ( 64 )	104	XXXXXXXXXXXXXXXXXXXXX+	78	XXXXXXXXXXXXXXXXXXXXX	91	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	36	XXXXXXX	36	XXXXXXX
SOYABEAN ( 65 )	56	XXXXXXXXXXXXX	56	XXXXXXXXXXXXX	98	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	43	XXXXXXXXXXXXX	14	xxx
COTTON ( 66 )	96	XXXXXXXXXXXXXXXXXXXXX	24	XXXXXX	0	
	64	XXXXXXXXXXXXX	7	x	0	
JUTE ( 67 )	0		0		0	
	0		0		0	
KENAF ( 68 )	95	XXXXXXXXXXXXXXXXXXXXX	0		0	
	64	XXXXXXXXXXXXX	0		0	
SESAMUM ( 70 )	80	XXXXXXXXXXXXXXXXXXXXX	0		0	
	79	XXXXXXXXXXXXXXXXXXXXX	0		0	
ELEU IND ( 74 )	97	XXXXXXXXXXXXXXXXXXXXX	0		0	
	86	XXXXXXXXXXXXXXXXXXXXX	0		0	
ECH CRUS ( 75 )	74	XXXXXXXXXXXXXXXXXXXXX	4	x	0	
	64	XXXXXXXXXXXXX	21	XXXX	0	
DIG SANG ( 77 )	110	XXXXXXXXXXXXXXXXXXXXX+	0		5	x
	79	XXXXXXXXXXXXXXXXXXXXX	0		21	XXXX

PRE-EMERGENCE TEST  
 METRIBUZIN



SPECIES		0.075 KG/HA	0.30 KG/HA	1.20 KG/HA
AMAR RET ( 78 )	15	xxx	0	0
	71	xxxxxxxxxxxxxxxx	0	0
CYP ESCU ( 85 )	72	xxxxxxxxxxxxxxxx	108	120
	93	xxxxxxxxxxxxxxxx	86	64
CYP ROTU ( 86 )	103	xxxxxxxxxxxxxxxx+	103	94
	93	xxxxxxxxxxxxxxxx	86	71

PRE-EMERGENCE TEST  
METRJA BUZIN



CYPRAZINE

Code number: S 6115 Trade name: Outfox  
Chemical name: 2-chloro-4-cyclopropylamino-6-isopropylamino-1,3,5-triazine  
Source: Gulf Oil Corporation  
 9009 West 67th Street  
 Merriam  
 Kansas 66204  
 USA

Information available and suggested uses:

Manufacturer's literature received in 1970 reports post-emergence control of seedling grasses and broad-leaved weeds at 0.75 kg a.i./ha in maize. Pre-emergence applications are also reported as selective in maize but higher rates of herbicide are required.

Formulation used: 12% a.i. emulsifiable concentrate

Spray volume: for selectivity experiment 352 l/ha (31.3 gal/ac)  
 for initial activity test 392 l/ha (34.9 gal/ac)

RESULTS

TABLE OF SELECTIVITIES

RATE (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
1.20	maize	<u>Poa annua</u> <u>Galium aparine</u> <u>Cirsium arvense</u> <u>Tussilago farfara</u> <u>Convolvulus arvensis</u> <u>Echinochloa crus-galli</u> + species below
0.30	species above + field bean pea sorghum groundnut	<u>Avena fatua</u> <u>Alopecurus myosuroides</u> <u>Raphanus raphanistrum</u> <u>Chenopodium album</u> <u>Stellaria media</u> <u>Amaranthus retroflexus</u> + species below

(Table continued overleaf)



TABLE OF SELECTIVITIES (continued)

RATE (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
0.075	species above + wheat barley perennial ryegrass onion dwarf bean white clover kale carrot rice soyabean cotton kenaf sesamum	<u>Sinapis arvensis</u>

Comments on results

General

The results obtained in the Initial Activity Test show that the type and level of activity is similar to the other chlorotriazines, simazine and atrazine. Broad-leaved species were susceptible to the foliar spray. More activity occurred with the soil treatments however, and post-emergence soil drenches were generally more effective than pre-emergence treatments. In the latter, surface and incorporated treatments were similar in the degree of effect, with the exception of Avena fatua where incorporation of 0.14 kg/ha was more active.

In the pre-emergence selectivity test an outstanding tolerance was found with maize, in common with atrazine and simazine. At lower doses, although many crops exhibited good tolerance, weed control was also reduced.

Symptoms

Symptoms were identical to those caused by atrazine and simazine. Die-back followed a severe chlorosis which developed soon after plants reached the cotyledon stage.

Temperate weeds and crops

Sinapis arvensis was the only weed controlled at 0.075 kg/ha. A further five annual weeds were controlled at 0.30 kg/ha including two grass species. At 1.20 kg/ha Galium aparine and the three perennial species Cirsium arvense, Tussilago farfara and Convolvulus arvensis were controlled.

The leguminous crops, field bean and pea tolerated 0.30 kg/ha while dwarf bean and white clover only withstood 0.075 kg/ha. At the latter rate, several other crops were tolerant, including the cereals wheat and barley.



The cruciferous weeds, Sinapis arvensis and Raphanus raphanistrum were selectively controlled in pea and field bean as were Avena fatua and Chenopodium album. Of more interest, however, is the control of Sinapis arvensis in the botanically related kale. Although this difference in sensitivity has been observed with some other triazines it is usually less than was obtained in this experiment.

#### Tropical weeds and crops

Control of tropical weeds was limited to Echinochloa crus-galli at 1.20 kg/ha and Amaranthus retroflexus at 0.30 kg/ha. Some reduction of Rottboellia exaltata was achieved at 1.20 kg/ha but higher rates would be required for control. Only slight to moderate symptoms were visible at 0.30 and 1.20 kg/ha on Oxalis latifolia at initial assessment but after a further month symptoms at 0.30 kg/ha were severe and death occurred at 1.20 kg/ha. Bulbs retrieved were rotted. Only marginal effects were observed on Cyperus spp.

Maize exhibited outstanding tolerance to cyprazine in this experiment as it does with other related chlorotriazines. This was the only crop to withstand 1.20 kg/ha. Sorghum and groundnut were only tolerant up to 0.30 kg/ha. The remaining larger seeded species plus kenaf and sesamum tolerated 0.075 kg/ha. Jute was the only crop species tested which was susceptible at this rate.

Echinochloa crus-galli was selectively controlled in maize at 1.20 kg/ha as was Amaranthus retroflexus at 0.30 kg/ha in maize, sorghum and groundnut.

#### Soil persistence

Using turnip as the sensitive test species (susceptibility similar to that of swede in the selectivity experiment) applications of 0.075, 0.30 and 1.20 kg/ha showed no phytotoxicity at 5, 19 and 39 weeks respectively. This period of persistence is the same as reported for metribuzin and, as said earlier, is perhaps not so long as with atrazine and simazine.

#### Possible uses and further testing

Although there is a very impressive weed control spectrum at doses tolerated by maize, advantages over other triazines are not immediately apparent. [A post-emergence test has shown that maize is again outstandingly tolerant. Sorghum was also highly tolerant in this test and only Amaranthus retroflexus was selectively controlled.] Although selectivity was found in field bean with control of cruciferous weeds and Avena fatua the margin of selectivity is about the same as that already known for simazine in this crop.

Some difficulties were experienced in measuring small quantities of this product because of the viscous nature of the sample received.



INITIAL ACTIVITY TEST

CYPRAZINE

	0.14 kg/ha (S 0.125 kg/ha)	0.57 kg/ha (S 0.50 kg/ha)	2.28 kg/ha (S 2.00 kg/ha)
<u>DWARF BEAN</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXX XXXXXXX	XXXXXXXXXX XX
	S XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	O O	O O
	P XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	O O	O O
	I XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	O O	O O
<u>KALE</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXX	O O
	S O O	O O	O O
	P XXXXXX XXXXXX	O O	O O
	I XXXX XXXX	O O	O O
<u>POLYGONUM AMPHIBIUM</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXX	XX XXX	XX X
	S XXXXXXXXXXXX XXXX	O O	O O
	P XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXX XXXX	XXXXXXXXXX XXXX
	I XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXX XXXX
<u>PERENNIAL RYEGRASS</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX
	S XXXXXX XXXXXXX	O O	O O
	P XXXXXXXX XXXXXXX	X XXX	O O
	I XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	O O	O O
<u>AVENA FATUA</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX
	S XX XXXXX	O O	O O
	P XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	X X	O O
	I X XX	O O	O O
<u>AGROPYRON REPENS</u>	F XXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXX
	S XXXXXXXXXXXXXXXX XXXX	XXXXX XX	O O
	P XXXXXXXXXXXXXXXX (+) XXXXXXXXXXXXXX	XXXXXXXXXX XXXX	XXX XXX
	I XXXXXXXXXXXXXXXX (+) XXXXXXXXXXXXXX	XXXXXXXXXX XXXX	XXXX XXXX

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



SPECIES

0.075 KG/HA

0.30 KG/HA

1.20 KG/HA

SPECIES	0.075 KG/HA	0.30 KG/HA	1.20 KG/HA
WHEAT ( 1 )	91 xxxxxxxxxxxxxxxxxxxx 93 xxxxxxxxxxxxxxxxxxxx	98 xxxxxxxxxxxxxxxxxxxx 21 xxxx	33 xxxxxxxx 7 x
BARLEY ( 2 )	84 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	11 xx 7 x	0 0
OAT ( 3 )	100 xxxxxxxxxxxxxxxxxxxx 79 xxxxxxxxxxxxxxxxxxxx	67 xxxxxxxxxxxxxxxx 21 xxxx	7 x 7 x
PER RYGR ( 4 )	101 xxxxxxxxxxxxxxxxxxxx 86 xxxxxxxxxxxxxxxxxxxx	35 xxxxxxxx 43 xxxxxxxx	0 0
ONION ( 8 )	98 xxxxxxxxxxxxxxxxxxxx 93 xxxxxxxxxxxxxxxxxxxx	58 xxxxxxxxxxxxxxxx 71 xxxxxxxxxxxxxxxx	46 xxxxxxxx 21 xxxx
DWF BEAN ( 9 )	100 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	83 xxxxxxxxxxxxxxxxxxxx 43 xxxxxxxx	33 xxxxxxxx 7 x
FLD BEAN ( 10 )	114 xxxxxxxxxxxxxxxxxxxx+ 100 xxxxxxxxxxxxxxxxxxxx	114 xxxxxxxxxxxxxxxxxxxx+ 93 xxxxxxxxxxxxxxxxxxxx	29 xxxxxxxx 29 xxxxxxxx
PEA ( 11 )	133 xxxxxxxxxxxxxxxxxxxx+ 93 xxxxxxxxxxxxxxxxxxxx	117 xxxxxxxxxxxxxxxxxxxx+ 93 xxxxxxxxxxxxxxxxxxxx	117 xxxxxxxxxxxxxxxxxxxx+ 36 xxxxxxxx
W CLOVER ( 12 )	73 xxxxxxxxxxxxxxxx 86 xxxxxxxxxxxxxxxx	0 0	0 0
KALE ( 15 )	120 xxxxxxxxxxxxxxxxxxxx+ 86 xxxxxxxxxxxxxxxx	15 xxx 7 x	0 0
SWEDF ( 17 )	104 xxxxxxxxxxxxxxxxxxxx+ 43 xxxxxxxx	0 0	0 0
CARROT ( 18 )	104 xxxxxxxxxxxxxxxxxxxx+ 93 xxxxxxxxxxxxxxxxxxxx	98 xxxxxxxxxxxxxxxxxxxx 37 xxxxxxxx	0 0
LETTUCE ( 20 )	94 xxxxxxxxxxxxxxxxxxxx 57 xxxxxxxx	0 0	0 0

PRE-EMERGENCE TEST  
CYPRAZINE



SPECIES

0.075 KG/HA

0.30 KG/HA

1.20 KG/HA

SPECIES	0.075 KG/HA	0.30 KG/HA	1.20 KG/HA
SUG BEET ( 21 )	38 xxxxxxxx 50 xxxxxxxxxxxx	0 0	0 0
AVE FATU ( 26 )	105 xxxxxxxxxxxxxxxxxxxxxxxx+ 79 xxxxxxxxxxxxxxxxxxxx	35 xxxxxxxx 7 x	0 0
ALO MYOS ( 27 )	83 xxxxxxxxxxxxxxxxxxxx 64 xxxxxxxxxxxxxxxx	9 xx 14 xxx	0 0
POA ANN ( 28 )	154 xxxxxxxxxxxxxxxxxxxxxxxx+ 86 xxxxxxxxxxxxxxxxxxxx	69 xxxxxxxxxxxxxxxx 36 xxxxxxxx	0 0
SIN ARV ( 30 )	14 xxx 29 xxxxxx	0 0	0 0
RAPH RAP ( 31 )	78 xxxxxxxxxxxxxxxxxxxx 79 xxxxxxxxxxxxxxxxxxxx	0 0	0 0
GAL APAR ( 38 )	78 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	72 xxxxxxxxxxxxxxxx 57 xxxxxxxxxxxx	90 xxxxxxxxxxxxxxxxxxxx 21 xxxxx
CHEN ALB ( 39 )	68 xxxxxxxxxxxxxxxxxxxx 71 xxxxxxxxxxxxxxxxxxxx	0 0	0 0
STEL MED ( 40 )	30 xxxxxx 71 xxxxxxxxxxxxxxxxxxxx	0 0	0 0
AG REPEN ( 47 )	100 xxxxxxxxxxxxxxxxxxxxxxxx 93 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxxxxxx 43 xxxxxxxxxxxx	92 xxxxxxxxxxxxxxxxxxxxxxxx 36 xxxxxxxx
ALL VIN ( 49 )	83 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxxxxxx 71 xxxxxxxxxxxxxxxx	83 xxxxxxxxxxxxxxxxxxxxxxxx 50 xxxxxxxxxxxx
CIRS ARV ( 50 )	88 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	88 xxxxxxxxxxxxxxxxxxxxxxxx 64 xxxxxxxxxxxxxxxx	18 xxxxx 14 xxx
TUS FARF ( 51 )	88 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxxxxxx 57 xxxxxxxxxxxxxxxx	13 xxx 7 x

PRE-EMERGENCE TEST  
CYPRAZINE



SPECIES	0.075 KG/HA		0.30 KG/HA		1.20 KG/HA	
CONV ARV ( 52 )	95	XXXXXXXXXXXXXXXXXXXXX	111	XXXXXXXXXXXXXXXXXXXXX+	16	xxx
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	21	xxxx
MAIZE ( 58 )	114	XXXXXXXXXXXXXXXXXXXXX+	124	XXXXXXXXXXXXXXXXXXXXX+	114	XXXXXXXXXXXXXXXXXXXXX+
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX
SORGHUM ( 59 )	102	XXXXXXXXXXXXXXXXXXXXX	102	XXXXXXXXXXXXXXXXXXXXX	102	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX
RICE ( 60 )	114	XXXXXXXXXXXXXXXXXXXXX+	30	xxxxxx	6	x
	100	XXXXXXXXXXXXXXXXXXXXX	14	xxx	21	xxxx
GRNDNUT ( 64 )	104	XXXXXXXXXXXXXXXXXXXXX+	104	XXXXXXXXXXXXXXXXXXXXX+	104	XXXXXXXXXXXXXXXXXXXXX+
	93	XXXXXXXXXXXXXXXXXXXXX	86	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXXXXXXXXXX
SOYABEAN ( 65 )	70	XXXXXXXXXXXXXXXXXXXXX	42	XXXXXXXXXXXX	28	xxxxxx
	93	XXXXXXXXXXXXXXXXXXXXX	14	xxx	7	x
COTTON ( 66 )	120	XXXXXXXXXXXXXXXXXXXXX+	120	XXXXXXXXXXXXXXXXXXXXX+	108	XXXXXXXXXXXXXXXXXXXXX+
	93	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX	21	xxxx
JUTE ( 67 )	14	xxx	0		0	
	50	XXXXXXXXXXXX	0		0	
KENAF ( 68 )	90	XXXXXXXXXXXXXXXXXXXXX	70	XXXXXXXXXXXXXXXXXXXXX	5	x
	93	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX	7	x
SESAMUM ( 70 )	95	XXXXXXXXXXXXXXXXXXXXX	73	XXXXXXXXXXXXXXXXXXXXX	0	
	93	XXXXXXXXXXXXXXXXXXXXX	50	XXXXXXXXXXXX	0	
ELEU IND ( 74 )	103	XXXXXXXXXXXXXXXXXXXXX+	100	XXXXXXXXXXXXXXXXXXXXX	34	xxxxxx
	100	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXX	43	xxxxxx
ECH CRUS ( 75 )	74	XXXXXXXXXXXXXXXXXXXXX	90	XXXXXXXXXXXXXXXXXXXXX	0	
	100	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXX	0	
DIG SANG ( 77 )	90	XXXXXXXXXXXXXXXXXXXXX	75	XXXXXXXXXXXXXXXXXXXXX	95	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX	43	xxxxxx

PRE-EMERGENCE TEST  
 CYPRAZINE



SPECIES	0.075 KG/HA		0.30 KG/HA		1.20 KG/HA	
AMAR RET ( 78 )	71	XXXXXXXXXXXXXXXXXX	0		0	
	64	XXXXXXXXXXXXXXXXXX	0		0	
CYP ESCU ( 85 )	108	XXXXXXXXXXXXXXXXXXXXX+	120	XXXXXXXXXXXXXXXXXXXXX+	108	XXXXXXXXXXXXXXXXXXXXX+
	79	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXXXXXXXXXX
CYP ROTU ( 86 )	94	XXXXXXXXXXXXXXXXXXXXX	84	XXXXXXXXXXXXXXXXXXXXX	84	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	79	XXXXXXXXXXXXXXXXXXXXX	79	XXXXXXXXXXXXXXXXXXXXX

PRE-EMERGENCE TEST  
 CYPRAZINE



EMD-IT 5914

Code number: EMD-IT 5914 Trade name:  
Chemical name: Confidential  
Source: Celamerck  
 6507 Ingelheim  
 P O Box 202  
 F R Germany

Information available and suggested uses:

Manufacturer's data received in 1971 suggests good control of a range of broad-leaved and grass weed species in irrigated cotton and rice. Post-planting applications of granules are reported to be effective in rice where moisture is adequate. In cotton pre-planting incorporation is suggested.

Formulation used: 80% w/w a.i. wettable powder (EMD 7061 H)

Spray volume: for selectivity experiment 352 l/ha (31.3 gal/ac)  
 for initial activity test 398 l/ha (35.4 gal/ac)

RESULTS

TABLE OF SELECTIVITIES

RATE (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
4.00	cotton	<u>Avena fatua</u> <u>Poa annua</u> <u>Raphanus raphanistrum</u> <u>Galium aparine</u> <u>Chenopodium album</u> <u>Agropyron repens</u> <u>Allium vineale</u> <u>Eleusine indica</u> <u>Echinochloa crus-galli</u> <u>Digitaria sanguinalis</u> + species below
1.00	species above + field bean lettuce rice groundnut kenaf sesamum	<u>Alopecurus myosuroides</u> <u>Stellaria media</u> <u>Amaranthus retroflexus</u> + species below

(Table continued overleaf)



TABLE OF SELECTIVITIES (continued)

RATE (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
0.25	species above + wheat barley oat perennial ryegrass onion dwarf bean pea kale radish carrot maize sorghum soyabean	<u>Sinapis arvensis</u>

Comments on results

General

In the Initial Activity Test, phytotoxicity was caused only by the soil treatments. Pre-emergence applications were more effective than post-emergence soil drenches and incorporation into the soil increased activity compared with surface application. A leaching study has shown that mobility in the soil is low.

In the pre-emergence test, selectivity was limited, with the exception of cotton which showed outstanding tolerance. Most crops only exhibited tolerance at low rates where very few weeds were controlled.

Symptoms

Germination of seeds was not affected but seedlings developed severe albinism soon after emergence. Although affected plant tissue was apparently devoid of chlorophyll it still continued to grow until necrosis developed. Certain species, e.g. kale and Agropyron repens, exhibited a red pigmentation of the foliage. These symptoms were very similar to those caused by aminotriazole, pyrichlor and metflurazone.

Temperate weeds and crops

Sinapis arvensis was particularly susceptible and was the only weed controlled at 0.25 kg/ha. Alopecurus myosuroides and Stellaria media were also controlled, at 1.00 kg/ha. With 4.00 kg/ha, several broad-leaved and grass weeds were controlled including Avena fatua, Galium aparine and the perennials, Agropyron repens and Allium vineale.

Field bean and lettuce were the only temperate crops tolerant at 1.00 kg/ha. Perennial ryegrass was reduced in vigour by only 21% at this dose and the plants eventually recovered.



Selective control of Stellaria media and Alopecurus myosuroides was achieved at 1.00 kg/ha in field bean and lettuce. At 0.25 kg/ha an interesting selectivity within a botanical family occurred with the control of Sinapis arvensis in kale and radish.

#### Tropical weeds and crops

Most susceptible of the tropical weeds was Amaranthus retroflexus being controlled at 1.00 kg/ha. The small seeded annual grasses required 4.00 kg/ha for complete control but were severely affected at 1.00 kg/ha. Rottboellia exaltata was more resistant but did show serious symptoms at 4.00 kg/ha. Cyperus spp. showed severe chlorosis at 4.00 kg/ha initially and C. esculentus was eventually killed at this dose. C. rotundus was more resistant, however, and had almost completely recovered eight weeks after treatment. Oxalis latifolia exhibited no symptoms at 1.00 kg/ha but was eventually completely killed at 4.00 kg/ha.

Cotton exhibited outstanding tolerance of EMD-IT 5914 up to 4.00 kg/ha. Plant vigour was only marginally reduced and no further symptoms were apparent one month later. Groundnut showed marginal tolerance at this rate and, although minor symptoms were visible after a further month, new healthy regrowth was present. It showed definite tolerance at 1.00 kg/ha along with rice, kenaf and sesamum. There was some evidence of sorghum recovery from 1.00 kg/ha one month after initial assessment.

Selective control of the small annual grass species, Amaranthus retroflexus and Cyperus esculentus was achieved in cotton at 4.00 kg/ha. Amaranthus retroflexus was also selectively controlled in groundnut, kenaf and sesamum at 1.00 kg/ha.

#### Soil persistence

Using turnip as a sensitive test species (susceptibility similar to that of swede in the selectivity experiment), applications of 0.25, 1.0 and 4.0 kg/ha were not detected at 5, 17 and 26 weeks respectively.

#### Possible uses and further testing

Selectivities on the whole were marginal with the exception of cotton. Good control of the small annual weeds and C. esculentus were achieved and it may be worth testing even higher doses to determine the full tolerance of cotton and hopefully to gain improved control of species severely affected such as Rottboellia exaltata and C. rotundus. Persistence of EMD-IT 5914 at higher rates of application was adequate but not excessively long.

Further investigation in pots of control of cruciferous weeds in brassica crops may also be worth while in view of the selectivities found.



INITIAL ACTIVITY TEST

EMD-IT 5914

	0.58 kg/ha (S 0.50 kg/ha)	2.30 kg/ha (S 2.00 kg/ha)	9.20 kg/ha (S 8.00 kg/ha)	
<u>DWARF BEAN</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXX XXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXX XX	0 0
<u>KALE</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXX XXXX	XXXX XX
	I	XXXXXXXXXXXXXXXXXX (+) XXXXXXXXXXXX	XXXX X	0 0
<u>POLYGONUM AMPHIBIUM</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
<u>PERENNIAL RYEGRASS</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX (+) XXXXXXXXXXXX	XXXXXXXXXX XXXXXX	X XX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	0 0
<u>AVENA FATUA</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX (+) XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXX	XXXX XX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	X XX	X X
<u>AGROPYRON REPENS</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX (+) XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX (+) XXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXX

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



SPECIES		0.25 KG/HA		1.00 KG/HA		4.00 KG/HA
WHEAT ( 1 )	104	xxxxxxxxxxxxxxxxxxxxx+	85	xxxxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxxx
	100	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxxxxxxxxx	14	xxx
BARLEY ( 2 )	84	xxxxxxxxxxxxxxxxxxxxx	84	xxxxxxxxxxxxxxxxxxxxx	0	
	100	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxxxxxxxxx	0	
OAT ( 3 )	107	xxxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxxx	53	xxxxxxxxxxxxx
	100	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxxxxx
PER RYGR ( 4 )	98	xxxxxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxxxx+	66	xxxxxxxxxxxxx
	100	xxxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxxxxxxx	29	xxxxxx
ONION ( 8 )	113	xxxxxxxxxxxxxxxxxxxxx+	63	xxxxxxxxxxxxx	23	xxxxxx
	86	xxxxxxxxxxxxxxxxxxxxx	36	xxxxxx	29	xxxxxx
DWF BEAN ( 9 )	100	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxxx	17	xxx
	86	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxxxxxxxxx	11	xxx
FLD BEAN ( 10 )	114	xxxxxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxxxxx+
	100	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxxx	61	xxxxxxxxxxxxx
PEA ( 11 )	83	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxxx
	93	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxxxxx
W CLOVER ( 12 )	112	xxxxxxxxxxxxxxxxxxxxx+	59	xxxxxxxxxxxxx	3	x
	79	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxxxxx	14	xxx
KALE ( 15 )	98	xxxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxxxxxx	0	
	86	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxxxxx	0	
SWEDE ( 17 )	85	xxxxxxxxxxxxxxxxxxxxx	20	xxxx	20	xxxx
	57	xxxxxxxxxxxxx	29	xxxxxx	14	xxx
CARROT ( 18 )	98	xxxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxxxxx	0	
	100	xxxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	0	
LETTUCE ( 20 )	105	xxxxxxxxxxxxxxxxxxxxx+	90	xxxxxxxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxxxxxxxxxx
	100	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxxxxx

PRE-EMERGENCE TEST  
 EMD-IT 5914



SPECIES		0.25 KG/HA		1.00 KG/HA		4.00 KG/HA
SUG BEET ( 21 )	27 43	xxxxx xxxxxxxx	0 0		0 0	
AVE FATU ( 26 )	112 100	xxxxxxxxxxxxxxxxxxxxx+ xxxxxxxxxxxxxxxxxxxxx	98 71	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	35 21	xxxxxxx xxxx
ALO MYOS ( 27 )	91 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	100 29	xxxxxxxxxxxxxxxxxxxxx xxxxxxx	26 14	xxxxx xxx
POA ANN ( 28 )	199 100	xxxxxxxxxxxxxxxxxxxxx+ xxxxxxxxxxxxxxxxxxxxx	247 71	xxxxxxxxxxxxxxxxxxxxx+ xxxxxxxxxxxxxxxxxxxxx	16 14	xxx xxx
SIN ARV ( 30 )	56 29	xxxxxxxxxxxxx xxxxxxx	0 0		0 0	
RAPH RAP ( 31 )	85 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	85 71	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	20 14	xxxx xxx
GAL APAR ( 38 )	78 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	90 71	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	120 14	xxxxxxxxxxxxxxxxxxxxx+ xxx
CHEN ALB ( 39 )	38 100	xxxxxxx xxxxxxxxxxxxxxxxxxxxx	53 64	xxxxxxxxxxxxx xxxxxxxxxxxxx	0 0	
STEL MED ( 40 )	43 71	xxxxxxx xxxxxxxxxxxxx	0 0		0 0	
AG REPEN ( 47 )	92 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	92 71	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	92 29	xxxxxxxxxxxxxxxxxxxxx xxxxxxx
ALI VIN ( 49 )	92 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	100 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	100 29	xxxxxxxxxxxxxxxxxxxxx xxxxxxx
CIRS ARV ( 50 )	106 100	xxxxxxxxxxxxxxxxxxxxx+ xxxxxxxxxxxxxxxxxxxxx	106 100	xxxxxxxxxxxxxxxxxxxxx+ xxxxxxxxxxxxxxxxxxxxx	88 57	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx
TUS FARF ( 51 )	88 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	100 100	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx

PRB-EMERGENCE TEST  
 BMD-IT 5914



SPECIES		0.25 KG/HA		1.00 KG/HA		4.00 KG/HA
CONV ARV ( 52 )	95	XXXXXXXXXXXXXXXXXXXXX	79	XXXXXXXXXXXXXXXXXXXXX	111	XXXXXXXXXXXXXXXXXXXXX+
	100	XXXXXXXXXXXXXXXXXXXXX	86	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXXXXXXXXXX
MAIZE ( 58 )	124	XXXXXXXXXXXXXXXXXXXXX+	103	XXXXXXXXXXXXXXXXXXXXX+	72	XXXXXXXXXXXXXXXXXXXXX
	93	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX	29	XXXXXX
SORGHUM ( 59 )	96	XXXXXXXXXXXXXXXXXXXXX	96	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	64	XXXXXXXXXXXXXXXXXXXXX	29	XXXXXX
RICE ( 60 )	96	XXXXXXXXXXXXXXXXXXXXX	108	XXXXXXXXXXXXXXXXXXXXX+	102	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	86	XXXXXXXXXXXXXXXXXXXXX	50	XXXXXXXXXXXXX
GRNDNUT ( 64 )	104	XXXXXXXXXXXXXXXXXXXXX+	104	XXXXXXXXXXXXXXXXXXXXX+	104	XXXXXXXXXXXXXXXXXXXXX+
	93	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX	79	XXXXXXXXXXXXXXXXXXXXX
SOYABEAN ( 65 )	153	XXXXXXXXXXXXXXXXXXXXX+	112	XXXXXXXXXXXXXXXXXXXXX+	28	XXXXXX
	93	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXXXXXXXXX	29	XXXXXX
COTTON ( 66 )	132	XXXXXXXXXXXXXXXXXXXXX+	144	XXXXXXXXXXXXXXXXXXXXX+	120	XXXXXXXXXXXXXXXXXXXXX+
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX
JUTE ( 67 )	92	XXXXXXXXXXXXX	3	x	0	
	57	XXXXXXXXXXXXX	14	xxx	0	
KENAF ( 68 )	95	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	90	XXXXXXXXXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXXX
SESAMUM ( 70 )	107r	XXXXXXXXXXXXXXXXXXXXX+	93r	XXXXXXXXXXXXXXXXXXXXX	59	XXXXXXXXXXXXX
	85r	XXXXXXXXXXXXXXXXXXXXX	99r	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXXX
ELEU IND ( 74 )	103	XXXXXXXXXXXXXXXXXXXXX+	66	XXXXXXXXXXXXX	0	
	93	XXXXXXXXXXXXXXXXXXXXX	43	XXXXXXXXXXXXX	0	
ECH CRUS ( 75 )	90	XXXXXXXXXXXXXXXXXXXXX	97	XXXXXXXXXXXXXXXXXXXXX	8	xx
	93	XXXXXXXXXXXXXXXXXXXXX	50	XXXXXXXXXXXXX	21	xxxx
DIG SANG ( 77 )	105	XXXXXXXXXXXXXXXXXXXXX+	85	XXXXXXXXXXXXXXXXXXXXX	20	xxxx
	100	XXXXXXXXXXXXXXXXXXXXX	57	XXXXXXXXXXXXX	29	xxxxxx

PRE-EMERGENCE TEST  
 BMD-IT 5914



SPECIES	0.25 KG/HA		1.00 KG/HA		4.00 KG/HA	
AMAR RET	36	xxxxxxx	0		0	
( 78 )	50	xxxxxxxxxx	0		0	
CYP ESCU	108	xxxxxxxxxxxxxxxxxxxxxxxxx+	132	xxxxxxxxxxxxxxxxxxxxxxxxx+	84	xxxxxxxxxxxxxxxxxxxxx
( 85 )	93	xxxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxxx
CYP ROTU	94	xxxxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxxxx
( 86 )	100	xxxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxxxx

PRE-EMERGENCE TEST  
 EMD-IT 5914



BENTHIOCARB  
(proposed common name)

Code number:

Trade name: Saturn

Chemical name: S-(4-chlorobenzyl)-N,N-diethylthiolcarbamate

Source: Kumiai Chemical Industry Co  
No. 8 2-Chome Ohte-Machi Chiyoda-Ku  
Tokyo  
Japan

Information available and suggested uses:

Manufacturer's data received in 1970 reports pre- and early post-emergence control of germinating weeds especially Echinochloa crus-galli, Eleocharis acicularis and Cyperus difformis. Paddy and transplanted rice are reported to be tolerant after the one leaf stage. The herbicidal spectrum has been increased by the addition of simetryne (Saturn S) and chlornitrofen [proposed common name for 2,4,6-trichlorophenyl-4-nitrophenyl ether] (Saturn M).

Formulation used: 50% a.i. emulsifiable concentrate

Spray volume: for selectivity experiment 352 l/ha (31.3 gal/ac)  
for initial activity test 398 l/ha (35.4 gal/ac)

RESULTS

TABLE OF SELECTIVITIES

RATE (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
6.00	wheat barley onion dwarf bean field bean pea white clover kale swede carrot sugar beet radish rice groundnut soyabean	<u>Avena fatua</u> <u>Alopecurus myosuroides</u> <u>Poa annua</u> <u>Echinochloa crus-galli</u> <u>Digitaria sanguinalis</u> <u>Cyperus esculentus</u> + species below
2.00	species above + oat lettuce maize	<u>Eleusine indica</u>
0.67	None listed as no weeds controlled	None



## Comments on results

### General

In the Initial Activity Test, the foliar spray resulted in contact action on all species, but lethal effects occurred only with kale at the highest rate. Much more activity was found with the soil treatments, annual grasses being particularly susceptible and pre-emergence applications were generally more effective than post-emergence soil drenches. Pre-emergence surface sprays tended to be more phytotoxic than when the herbicide was incorporated into the soil, this difference being particularly large with perennial ryegrass. The work of Kimura (1971) and Osawa (1971) has shown that this is due to greater uptake by the mesocotyl than by the roots. This should be borne in mind when evaluating the results of the pre-emergence selectivity test, in which the herbicide was fully incorporated into the soil. A leaching study has shown that the compound has a low mobility.

The pre-emergence selectivity test confirmed the good control of grass weeds. All broad-leaved weeds, especially perennials, and crops were resistant at 6.00 kg/ha with the exception of lettuce. Tropical cereal species tended to be more susceptible than temperate cereals, with the exception of rice. Perennial ryegrass and Eleusine indica showed particular susceptibility.

### Symptoms

At higher doses, grasses sometimes failed to emerge from the coleoptile while at lower doses the main shoots were inhibited and there was occasional trapping and consequent deformity of leaves. The foliage became dark green in colour and surfaces were shiny due to lack of wax. On the few occasions when broad-leaved species showed symptoms, this took the form of stunting and inhibition of main buds and leaves, the latter becoming darker green. These symptoms were reminiscent of those caused by other thiolcarbamates e.g. tri-allate.

### Temperate weeds and crops

All the annual grass weeds were controlled at 6.00 kg/ha, the smaller seeded Poa annua and Alopecurus myosuroides being severely reduced also at 2.00 kg/ha. No control of broad-leaved species was achieved. Broad-leaved perennials were especially resistant while monocotyledonous perennials were more susceptible although not controlled.

All temperate broad-leaved and cereal crops were tolerant to 6.00 kg/ha with two exceptions - lettuce and oat, which only tolerated 2.00 kg/ha. Perennial ryegrass exhibited no tolerance.

An interesting selectivity was the control of Avena fatua and Alopecurus myosuroides in wheat and barley. In another pot experiment Avena fatua was controlled in barley with pre-emergence applications of 9.00 kg/ha. Margins of selectivity, however, were much smaller than those found using tri-allate in the same test. Selective control of annual grass species was achieved in the majority of crops tested but there was a distinct lack of activity on broad-leaved and perennial species.

### Tropical weeds and crops

As in the temperate situation annual grass weeds were generally more sensitive than broad-leaved species. Eleusine indica was the most



susceptible grass weed being severely reduced at 0.67 kg/ha and completely controlled at 2.00 kg/ha. Echinochloa crus-galli and Digitaria sanguinalis proved more resistant and Rottboellia exaltata showed only minor effects even at 6.00 kg/ha. The broad-leaved Amaranthus retroflexus also showed considerable resistance at this rate. Cyperus esculentus was controlled at 6.00 kg/ha and C. rotundus was severely affected. Both species exhibited slight to moderate symptoms two months after initial assessment but were showing evidence of recovery. Oxalis latifolia exhibited slight symptoms at 6.00 kg/ha but was recovering after a further month. No perennial species were affected at 2.00 kg/ha or lower.

Rice and the two large seeded legumes, soyabean and groundnut, all exhibited tolerance at 6.00 kg/ha. The results in rice are well in agreement with the reported activity of this compound. Maize showed marginal tolerance at 6.00 kg/ha and was definitely tolerant at 2.00 kg/ha. At this dose kenaf and sesamum also showed marginal tolerance.

The three annual grasses, Digitaria sanguinalis, Echinochloa crus-galli and Eleusine indica and C. esculentus were selectively controlled in rice, soyabean and groundnut at 6.00 kg/ha. Marginal selectivity was achieved in maize at this rate and in sesamum and kenaf against E. indica at 2.00 kg/ha.

#### Soil persistence

A relatively short persistence period was found. Using perennial ryegrass as a sensitive test species, residues could not be detected six weeks after treatment at 0.67 and 2.00 kg/ha. The higher rate of 6.00 kg/ha showed no phytotoxicity 19 weeks after application.

#### Possible uses and further testing

Good control of annual grass weeds can be expected in most temperate broad-leaved crops and cereals, rice and tropical legumes. The control of grass weeds in rice and cereals, especially Avena fatua and Alopecurus myosuroides is potentially very interesting although levels of selectivity are not so good as with the related tri-allylate.

A disadvantage of the compound, however, in all situations is its lack of activity against broad-leaved species. However, it has been shown to be compatible with at least two other herbicides i.e. simetryne, and chlornitrofen (Kimura, 1971, Noda and Ozawa, 1971) and the combination with simetryne is reported to be synergistic against weed species as well as broadening the spectrum of activity. Short persistence of the herbicide in the soil could possibly be a disadvantage at the lower rates but would seem adequate at 6.00 kg/ha without causing problems in following crops.



INITIAL ACTIVITY TEST

BENTHIOCARB

		0.43 kg/ha (S 0.375 kg/ha)	1.73 kg/ha (S 1.5 kg/ha)	6.90 kg/ha (S 6.0 kg/ha)
DWARF BEAN	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
KALE	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX XXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX (+)	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	I	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX (+)	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
<u>POLYGONUM AMPHIBIUM</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
PERENNIAL RYEGRASS	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXX XXXX
	P	X XXXXXXXXXX	O O	O O
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXX XXXXXX	O O
<u>AVENA FATUA</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXX XXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XX XX
	I	XXXXXXXXXXXXXXXXXX (+)	XXXXXXXXXXXXXXXXXX	XX XXXXXX
<u>AGROPYRON REPENS</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX
	P	XXXXXXXXXXXXXXXXXX (+)	XXXXXXXXXXXXXXXXXX (+)	XXXXXXXXXXXXXXXXXX (+)
	I	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXX XXXXXX

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



SPECIES	0.67 KG/HA		2.00 KG/HA		6.00 KG/HA	
WHEAT ( 1 )	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	104 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	78 86	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
BARLEY ( 2 )	68 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	79 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	79 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
OAT ( 3 )	93 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	87 86	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	80 50	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX
PER RYGR ( 4 )	87 71	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	84 14	XXXXXXXXXXXXXXXXXXXXX xxx	77 14	XXXXXXXXXXXXXXXXXXXXX xxx
ONION ( 8 )	127 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	75 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	81 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
DWF BEAN ( 9 )	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
FLD BEAN ( 10 )	114 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	114 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
PEA ( 11 )	117 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	117 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	133 86	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
W CLOVER ( 12 )	73 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	80 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	94 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
KALE ( 15 )	90 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	83 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	68 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
SWEDE ( 17 )	78 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	85 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
CARROT ( 18 )	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	116 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
LETTUCE ( 20 )	101 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	101 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	98 57	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX

BENTHIOCARB  
PRE-EMERGENCE TEST



SPECIES	0.67 KG/HA		2.00 KG/HA		6.00 KG/HA	
SUG BEET ( 21 )	84 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	80 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	110 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
AVE FATU ( 26 )	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	105 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	91 14	XXXXXXXXXXXXXXXXXXXXX xxx
ALO MYOS ( 27 )	148 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	87 36	XXXXXXXXXXXXXXXXXXXXX xxxxxxx	126 14	XXXXXXXXXXXXXXXXXXXXX+ xxx
POA ANN ( 28 )	105 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	41 43	xxxxxxx xxxxxxx	0 0	
SIN ARV ( 30 )	119 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	49 100	xxxxxxx XXXXXXXXXXXXXXXXXXXXX	84 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
RAPH RAP ( 31 )	98 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	91 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	85 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
GAL APAR ( 38 )	72 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	90 86	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	96 71	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
CHEN ALB ( 39 )	45 100	xxxxxxx XXXXXXXXXXXXXXXXXXXXX	68 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	53 93	xxxxxxx XXXXXXXXXXXXXXXXXXXXX
STEL MED ( 40 )	70 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	87 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	67 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
AG REPEN ( 47 )	92 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	83 79	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	58 50	XXXXXXXXXXXXXXXXXXXXX xxxxxxx
ALL VIN ( 49 )	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	92 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	100 64	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
CIRS ARV ( 50 )	71 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	88 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	88 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
TUS FARF ( 51 )	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	88 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX

BENTHI OCARB  
 PRE-EMERGENCE TEST



SPECIES		0.67 KG/HA		2.00 KG/HA		6.00 KG/HA
CONV ARV ( 52 )	63 100	XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	79 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	79 86	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
MAIZE ( 58 )	124 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	103 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	103 79	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
SORGHUM ( 59 )	102 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	102 71	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	0 0	
RICE ( 60 )	72 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	120 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	90 86	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
GRNDNUT ( 64 )	104 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	91 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	104 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
SOYABEAN ( 65 )	70 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	84 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	126 93	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX
COTTON ( 66 )	96 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	84 71	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	108 57	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXX
JUTE ( 67 )	99 93	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	65 57	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX	14 21	XXX XXXX
KENAF ( 68 )	100 100	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	90 79	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	100 57	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX
SESAMUM ( 70 )	51 93	XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	88 79	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX	59 57	XXXXXXXXXXXXX XXXXXXXXXXXXX
ELEU IND ( 74 )	62 43	XXXXXXXXXXXXX XXXXXXXXXXXXX	0 0		0 0	
ECH CRUS ( 75 )	109 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	101 64	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX	62 29	XXXXXXXXXXXXX XXXXXXX
DIG SANG ( 77 )	120 100	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXXXXXXXXXX	105 57	XXXXXXXXXXXXXXXXXXXXX+ XXXXXXXXXXXXX	60 29	XXXXXXXXXXXXX XXXXXXX

BENTHI OCARB  
PRE-EMERGENCE TEST



SPECIES	0.67 KG/HA		2.00 KG/HA		6.00 KG/HA	
AMAR RET ( 78 )	107	XXXXXXXXXXXXXXXXXXXXX+	127	XXXXXXXXXXXXXXXXXXXXX+	66	XXXXXXXXXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	71	XXXXXXXXXXXXXX
CYP ESCU ( 85 )	132	XXXXXXXXXXXXXXXXXXXXX+	84	XXXXXXXXXXXXXXXXXXXXX	36	XXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	93	XXXXXXXXXXXXXXXXXXXXX	29	XXXXXXX
CYP ROTU ( 86 )	103	XXXXXXXXXXXXXXXXXXXXX+	94	XXXXXXXXXXXXXXXXXXXXX	47	XXXXXXX
	100	XXXXXXXXXXXXXXXXXXXXX	100	XXXXXXXXXXXXXXXXXXXXX	36	XXXXXXX

PRE-EMERGENCE TEST  
 BENTHIOCARB



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