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LONG ASHTON RESEARCH STATION
WEED RESEARCH DIVISION

UNIVERSITY OF BRISTOL

TECHNICAL REPORT No. 97

THE POST-EMERGENCE SELECTIVITY IN WARM CLIMATE SPECIES OF SOME RECENTLY DEVELOPED HERBICIDES: SMY 1500, PPG 884, PPG 1259 AND DPX-M6316.

SMY 1500 is ethiozin, PPG 884 is lactofen, PPG1259 is busoxinone, DPM-M6316 is thifensulfuron-methyl

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CONTENTS

NOTE

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SUMMARY

Four herbicides were evaluated in a glasshouse pot experiment for their post-emergence selectivity as overhead sprays in 19 crop and 16 weed species from tropical or warm temperate regions. Maize was grown with and without a seed dressing of the safener 1,8-naphthalic anhydride (NA).

SMY 1500 behaved similarly to the related compound metribuzin, and controlled many annual grass weeds including Bromus pectinatus together with a range of broad-leaved weeds at a dose tolerated by tomato, pigeon pea, lentil and maize.

PPG 884 was selective in the large seeded legumes, groundnuts and soyabeans, controlling several broad-leaved weeds including Commelina diffusa and Euphorbia heterophylla.

PPG 1259 showed a lack of activity at the lower doses (and a disappointing selectivity against broad-leaved weeds amongst the cereals at these doses) but the control of Commelina diffusa at the higher dose tolerated by rice and maize + safener is of considerable interest.

DPX-M6316, an analogue of chlorsulfuron showed selectivity against several broad-leaved weeds in cereal crops, including millet.

INTRODUCTION

Until March, 1982, warm-climate crop and weed species were regularly included in the herbicide evaluation programme at the Weed Research Organization (WRO) under funding from HM Overseas Development Administration (ODA), and results were published jointly between the Herbicide and Tropical Weeds Groups in the WRO Technical Report series. After an interval during which funds were not available, it was possible in 1985 to resume herbicide evaluation on species of relevance to developing countries under a new project, partially funded by the European Economic Community. This report covers the warm-climate species of the first joint experiment to be conducted under the new arrangement. The results on the temperate species have already been published by Richardson and West (1986) together with information on the relative importance of foliar and soil activity.

The objectives of the work reported here are exactly as indicated in previous reports in this series, i.e. to provide a guide to the potential usefulness of new compounds in the crops tested. Owing to the relatively artificial conditions of glasshouse pot experiments it must be emphasised that the results are to be regarded only as a guide, and that further field testing is essential to confirm any of the interesting leads revealed.

This report gives post-emergence selectivity data for four new herbicides.

METHODS AND MATERIALS

Techniques were as described by Richardson and Parker (1977), all herbicides

being applied as foliar treatments. Plants were raised in 9cm diameter plastic pots in a sandy loam soil taken from a field near Begbroke Hill (Begbroke North). Planting dates were staggered so that the majority of species would reach a pre-determined stage (2-4 leaves) by the time of spraying. All species were raised in the tropical glasshouse except lentils, Pennisetum setosum and Bromus pectinatus which were transferred to the temperate glasshouse after germination. Species were sown as detailed in Appendix 1, each being replicated twice for each treatment and their growth stage at spraying is recorded. Soil and environmental details are given in Table 1.

Pre-planting treatments to improve germination included (a) the storage of Cyperus esculentus tubers at 5°C for two weeks before planting, and (b) the soaking of Amaranthus retroflexus seeds in 0.1M potassium nitrate.

Pennisetum setosum was sown under a thin covering of sand.

To protect against soil-borne pathogens, most seeds were pre-treated with thiram. Some seeds had been pre-dressed with unknown compounds. Those not treated at all were Pennisetum setosum, Bromus pectinatus, Euphorbia heterophylla, rice, Snowdenia polystachya, Mimosa pigra.

Maize was the only cereal crop to be included with and without herbicide safener. Before sowing the seeds were shaken up with a quantity of technical 1,8-naphthalic anhydride (NA) equivalent to 0.5% of seed weight.

Before spraying, each species was thinned to a constant number per pot.

Herbicides were applied using a laboratory sprayer embodying an 8002E Spraying Systems Tee Jet operating at a pressure of 207 kpa (30 lb/in^2) and moving at 0.54 m/sec 30 cm above the soil. Subsequent watering was from overhead.

Table 1. Soil and environmental conditions

Date of spraying	28.8.85 and 3.9.85
Main assessment completed	20-26.9.85
organic matter %	2.2
clay content %	15.0
pH (in water; 1:2 soil:water)	7.5
ammonium sulphate g/kg	0.5
superphosphate g/kg	1.0
potassium sulphate g/kg	0.5
fritted trace elements g/kg	0.1
hydrated magnesium sulphate g/kg	0.4
Temperature (°C)	
mean	22.9
maximum	32.7
minimum	13.4
Relative humidity (%)	
mean	57.4
maximum	76.4
minimum	35.6

Assessment and processing of results

Results were processed as described by Richardson and Dean (1973). Survivors were counted and scored for vigour on a 0-7 scale where 0 = dead and 7 = no different from the untreated control.

Pairs of histograms are presented for each treatment, the upper representing the plant survival and the lower vigour score, both calculated as percentages of untreated controls. Each 'x' represents a 5% increment. A '+' indicates a value in excess of 100%.

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

The perennial Cyperus spp. and Cynodon dactylon, together with Mimosa pigra, Commelina diffusa, Euphorbia heterophylla and Phalaris minor were kept for an extra period to observe later effects and/or the recovery from injury.

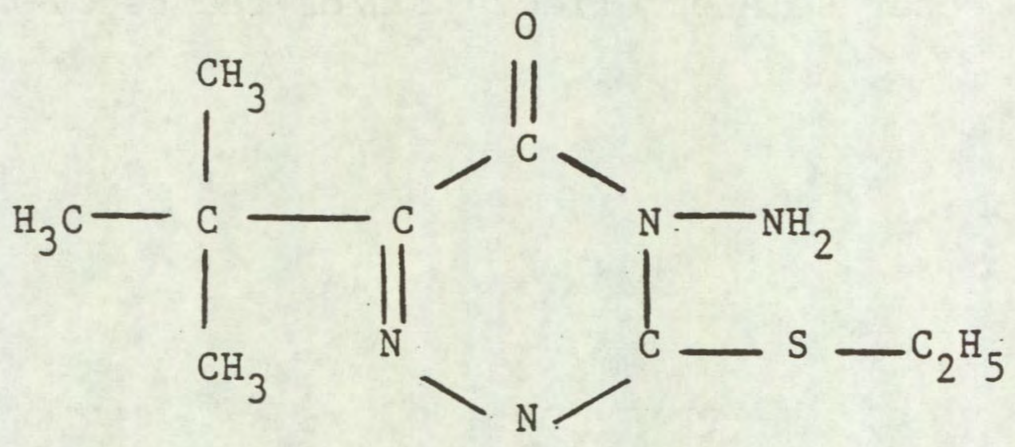
SMY 1500

Code number SMY 1500 Trade name Tycor

Common name Ebuzin (proposed)
Ethiozin (proposed)

Chemical name 4-amino-6-(1,1-dimethylethyl)-3-(ethylthio)-1,2,4-triazin-5(4H)-one

Structure



Source Bayer Agrochemicals (UK) Ltd.,
Eastern Way,
Bury St. Edmunds,
Suffolk, IP32 7AB.

Information available and suggested uses

Control of Alopecurus myosuroides, Bromus spp. and broad-leaved weeds in cereals, pre-emergence, early and late post-emergence at 1.4 to 2.1 kg/ha.

Formulation used 60% w/w a.i. wettable powder

Spray volume 300 l/ha

RESULTS

Full results are given in the histograms on pages 6-8 and potential selectivities are summarised in the following table.

Dose (kg/ha)	Crops: vigour reduced by less than 15%	Weeds: number or vigour reduced by 70% or more
2.0	None	
0.5	Maize ± NA Tomato Pigeon pea Lentil	Echinochloa crus-galli Digitaria sanguinalis Amaranthus retroflexus Portulaca oleracea Bromus pectinatus Phalaris minor Euphorbia heterophylla Mimosa pigra
0.125		No weeds controlled

Comments on results:

No crops were tolerant at the highest dose of 2.0 kg ai/ha. At the middle dose of 0.5 kg ai/ha, maize with and without safener, the leguminous crops pigeon pea and lentils and tomato were tolerant while the annual grasses Echinochloa crus-galli, Digitaria sanguinalis, Bromus pectinatus and Phalaris minor were controlled together with the broad-leaved weeds Amaranthus retroflexus, Portulaca oleracea, Euphorbia heterophylla and Mimosa pigra. Rottboellia cochinchinensis (= R. exaltata, however, was not controlled. At the lowest dose of 0.125 kg ai/ha, there was no weed control.

In general, SMY 1500 behaves similarly to the related compound metribuzin, but soyabean only tolerated the lowest dose which gave no weed control. The tolerance of tomato to SMY 1500 is not unexpected but that of the smaller-seeded legumes, pigeon pea and lentil, is interesting, and may warrant further testing in the field. The susceptibility of Bromus pectinatus to 0.5 kg ai/ha is of interest in that wheat under the temperate conditions of this experiment (Richardson and West, 1986) tolerated this dose and there is the possibility of selective control of this problem weed in highland tropical wheat.

SMY 1500

SPECIES	0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
MILLET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	20	xxxx
(55)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	7	x
MAIZE+S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(56)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	0	
(59)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
TOMATO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(60)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	0	
PIGEON P	123	xxxxxxxxxxxxxxxxxxxx+	138	xxxxxxxxxxxxxxxxxxxx+	138	xxxxxxxxxxxxxxxxxxxx+
(61)	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	0	
(62)	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
CHICKPEA	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	0	
(63)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	133	xxxxxxxxxxxxxxxxxxxx+	133	xxxxxxxxxxxxxxxxxxxx+
(64)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(65)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	0	
COTTON	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	0	
(66)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
JUTE	83	xxxxxxxxxxxxxxxxx	0		0	
(67)	36	xxxxxxx	0		0	

SMY 1500

SPECIES		0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
KENAF	100	xxxxxxxxxxxxxxxxxxxx	12	xx	0		
(68)	64	xxxxxxxxxxxxx	7	x	0		
TOBACCO	21	xxxx	0		0		
(69)	29	xxxxxx	0		0		
SESAMUM	104	xxxxxxxxxxxxxxxxxxxx+	0		0		
(70)	79	xxxxxxxxxxxxxxxx	0		0		
RICE	100	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx	0		
(72)	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0		
ELEU IND	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	0		
(74)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	0		
ECH CRUS	100	xxxxxxxxxxxxxxxxxxxx	25	xxxxx	0		
(75)	71	xxxxxxxxxxxxxx	14	xxx	0		
ROTT EXA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	
(76)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	
DIG SANG	100	xxxxxxxxxxxxxxxxxxxx	17	xxx	0		
(77)	57	xxxxxxxxxxx	14	xxx	0		
AMAR RET	95	xxxxxxxxxxxxxxxxxx	0		0		
(78)	64	xxxxxxxxxxxxx	0		0		
PORT OLE	55	xxxxxxxxxxx	0		0		
(79)	43	xxxxxxxxx	0		0		
BROM PEC	103	xxxxxxxxxxxxxxxxxxxx+	6	x	0		
(82)	57	xxxxxxxxxxx	7	x	0		
SNO POL	100	xxxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	44	xxxxxxxxx	
(83)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	

SMY 1500

SPECIES	0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
PHAL MIN	100	xxxxxxxxxxxxxxxxxxx	0		0	
(84)	71	xxxxxxxxxxxxxx	0		0	
CYP ESCU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(86)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(87)	86	xxxxxxxxxxxxxxxx	36	xxxxxxx	43	xxxxxxxxx
AUBGIN	90	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	0	
(89)	64	xxxxxxxxxxxx	43	xxxxxxxxx	0	
LENTIL	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	10	xx
(90)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	29	xxxxxx
MUNGB	100	xxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	0	
(91)	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
TEFF	100	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	19	xxxx
(92)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx	7	x
COMMEL	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	10	xx
(93)	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	7	x
EUPHOR	100	xxxxxxxxxxxxxxxxxxx	33	xxxxxxx	0	
(94)	93	xxxxxxxxxxxxxxxxxx	14	xxx	0	
ORY BATH	100	xxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	0	
(95)	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
MIM PIG	82	xxxxxxxxxxxxxxxx	0		0	
(96)	57	xxxxxxxxxxx	0		0	
PEN SET	100	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	0	
(97)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx	0	

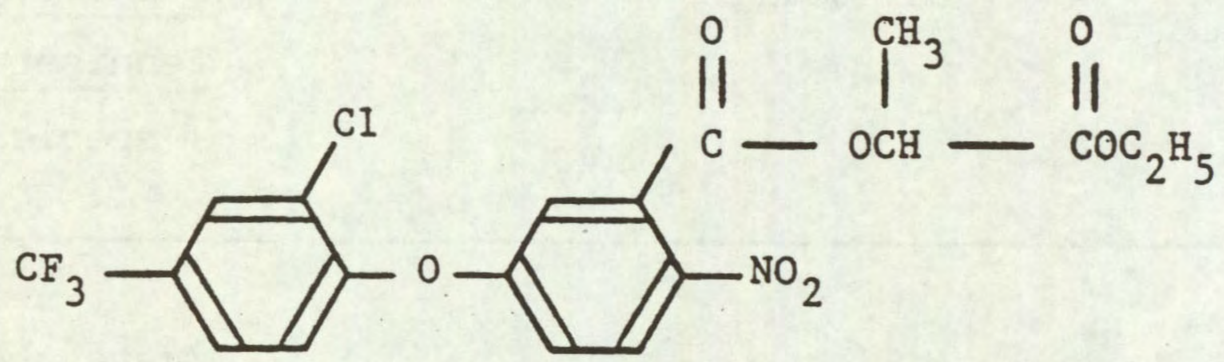
PPG 884

Code number PPG 884 Trade name Cobra

Common name Lactofen (proposed)

Chemical name 1'-(carbethoxy)ethyl 5-[2-chloro-4-(trifluoro-methyl) phenoxy]-2-nitrobenzoate.

Structure



Source PPG Industries, Inc.,
One PPG Place,
Pittsburgh,
Pennsylvania 15272,
U.S.A.

Information available and suggested uses

Broad-leaved weed control pre- and post-emergence in maize, row crops, e.g. soyabeans, peanuts, rice and cereals (0.1 to 0.25 kg/ha) and perennial crops (0.5 to 2.0 kg/ha).

Formulation used 24% a.i. emulsifiable concentrate

Spray volume 300 l/ha.

RESULTS

Full results are given in the histograms on pages 11-13 and potential selectivities are summarised in the following table.

Dose (kg/ha)	Crops: vigour reduced by less than 15%	Weeds: number or vigour reduced by 70% or more
0.80	None	
0.20	Groundnut Soyabean + species below	Commelina diffusa Euphorbia heterophylla Pennisetum setosum
0.05	Millet Maize + NA Rice + crops above	Amaranthus retroflexus Portulaca oleracea Mimosa pigra

Comments on results:

No crops were tolerant at the highest dose of 0.80 kg/ha but at 0.20 kg/ha, the large-seeded legumes, groundnut and soyabean, were tolerant, and several broad-leaved weeds were controlled, including Amaranthus retroflexus, Portulaca oleracea, Mimosa pigra, Euphorbia heterophylla, Commelina diffusa and the annual grass Pennisetum setosum. The cereals millet, maize + safener and rice also tolerated the lowest dose of 0.05 kg/ha but fewer broad-leaved weeds were controlled.

These results conform well with the manufacturer's information that PPG 884 has potential for the control of broad-leaved weeds in soyabeans, groundnuts, rice and cereals. The most interesting feature of these results is the control of Commelina diffusa and Euphorbia heterophylla. These are both difficult weeds to control in soyabeans, groundnuts and rice since they are resistant to most of the herbicides used for broad-leaved weed control. It is disappointing that more weeds are not controlled by the dose tolerated by the cereals, especially Commelina which is a problem in rice, particularly in U.S.A.

The related compound acifluorfen has been variable in its control of Euphorbia heterophylla in soyabeans and the diphenyl ethers all tend to be erratic or unreliable in the field for the control of the Commelinaceae. However, the implications of these results are still interesting for the field, due to the resistance of these two weeds to most herbicides. The treatments were applied at an early stage of development (2-3 true leaves) and it would be interesting to follow up treatments at later stages when the weeds are possibly more resistant.

SPECIES	0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
MILLET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx
(55)	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
MAIZE+S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(56)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	43	xxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	25	xxxxx
(57)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	7	x
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	71	xxxxxxxxxxxxxx	36	xxxxxxx	21	xxxx
TOMATO	0		0		0	
(60)	0		0		0	
PIGEON P	15	xxx	15	xxx	0	
(61)	21	xxxx	21	xxxx	0	
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx
(62)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	50	xxxxxxxxxx
CHICKPEA	93	xxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxxxx
(63)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	29	xxxxxx	14	xxx	14	xxx
JUTE	0		0		0	
(67)	0		0		0	

SPECIES		0.050 kg/ha		0.200 kg/ha		0.800 kg/ha
KENAF	87	xxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(68)	14	xxx	14	xxx	14	xxx
TOBACCO	95	xxxxxxxxxxxxxxxxxxx	32	xxxxxx	0	
(69)	79	xxxxxxxxxxxxxxx	36	xxxxxxx	0	
SESAMUM	0		0		0	
(70)	0		0		0	
RICE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(72)	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
ELEU IND	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	19	xxxx
(74)	71	xxxxxxxxxxxxx	57	xxxxxxxxxxx	14	xxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	8	xx
(75)	79	xxxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(76)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	17	xxx
(77)	71	xxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
AMAR RET	0		0		0	
(78)	0		0		0	
PORT OLE	0		0		0	
(79)	0		0		0	
BROM PEC	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+
(82)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	57	xxxxxxxxxx
SNO POL	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(83)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx

SPECIES	0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
PHAL MIN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
(84)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	14	xxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	33	xxxxxxx
(87)	86	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
AUBGIN	80	xxxxxxxxxxxxxxxx	20	xxxx	0	
(89)	43	xxxxxxxxx	14	xxx	0	
LENTIL	90	xxxxxxxxxxxxxxxxx	20	xxxx	0	
(90)	64	xxxxxxxxxxxxx	36	xxxxxxx	0	
MUNGB	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(91)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
TEFF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(92)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
COMMEL	60	xxxxxxxxxxxx	20	xxxx	0	
(93)	43	xxxxxxxxx	21	xxxx	0	
EUPHOR	100	xxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	0	
(94)	43	xxxxxxxxx	21	xxxx	0	
ORY BATH	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(95)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
MIM PIG	27	xxxxx	0		0	
(96)	36	xxxxxxx	0		0	
PEN SET	94	xxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	0	
(97)	43	xxxxxxxxx	14	xxx	0	

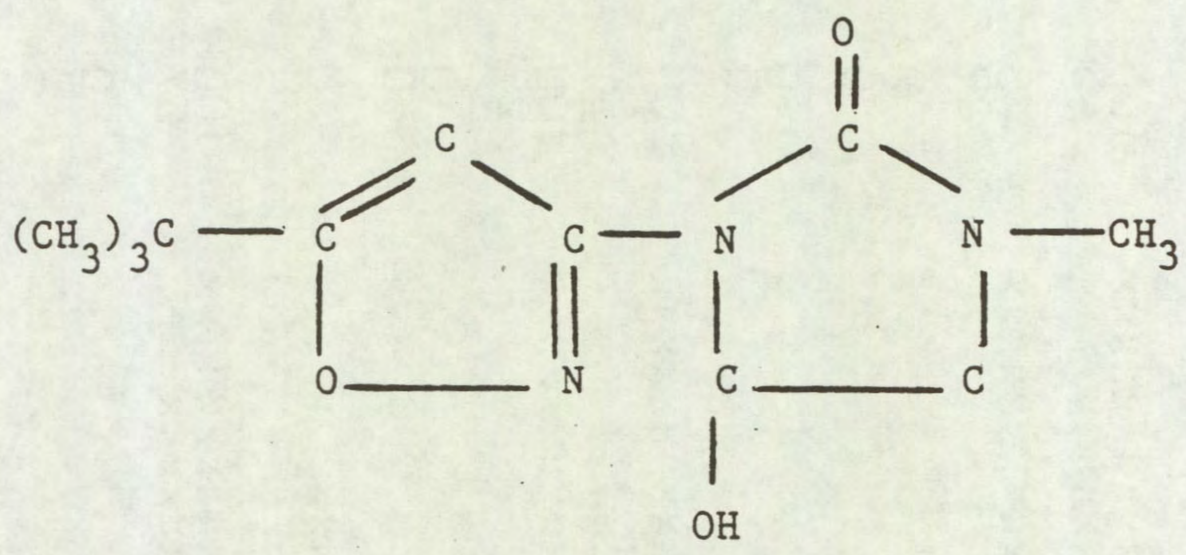
PPG 1259

Code number PPG 1259 Trade name/s -

Common name Busoxinone (WSSA approved)

Chemical name 3-[5(1,1-dimethylethyl)-3-isoxazolyl]-4-hydroxy-1-methyl-2-imidazolidinone

Structure



Source PPG Industries, Inc.,
One PPG Place,
Pittsburgh,
Pennsylvania 15272,
U.S.A.

Information available and suggested uses

Pre- and post-emergence control of broad-leaved weeds in cereals, grasses, conifers at 0.05 to 0.15 kg/ha.

Formulation used 60% a.i. emulsifiable concentrate

Spray volume 300 l/ha.

RESULTS

Full results are given in the histograms on pages 16-18 and potential selectivities are summarised in the following table.

Dose (kg/ha)	Crops: vigour reduced by less than 15%	Weeds: number or vigour reduced by 70% or more
0.40	Maize + NA Rice	Amaranthus retroflexus Portulaca oleracea Commelina diffusa
0.10) 0.025)	None	

Comments on results:

Applied post-emergence, PPG 1259 showed little selectivity between crops and weeds. At the middle and low doses of 0.10 and 0.025 kg/ha there was no weed control. Only at the highest dose of 0.40 kg/ha was there selectivity and control of the broad-leaved weeds Amaranthus retroflexus, Portulaca oleracea and Commelina diffusa in maize + safener and rice. The broad-leaved crops such as tobacco, sesamum, jute, tomato and pigeon pea were all fairly susceptible, especially at the highest dose of 0.40 kg/ha.

The lack of activity at the lower doses in this experiment is somewhat at variance with the manufacturer's suggested doses of 0.05 to 0.15 kg/ha and it is disappointing there was not more selectivity for broad-leaved weeds among the cereals at these doses. However, the control of Commelina diffusa in maize + safener and rice is of considerable interest. This is a difficult weed to control, being fairly resistant to herbicides, so it quickly becomes a persistent weed in these crops, where it not only affects the yields, but in the case of rice the final quality of the crop.

PPG 1259

SPECIES	0.025 kg/ha		0.100 kg/ha		0.400 kg/ha	
MILLET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(55)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
MAIZE+S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(56)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
TOMATO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(60)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	0	
PIGEON P	138	xxxxxxxxxxxxxxxxxxxx+	138	xxxxxxxxxxxxxxxxxxxx+	31	xxxxxx
(61)	79	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	7	x
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
CHICKPEA	107	xxxxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxxxx+	67	xxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(65)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx
(66)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx
JUTE	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	0	
(67)	93	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	0	

PPG 1259

SPECIES	0.025 kg/ha		0.100 kg/ha		0.400 kg/ha	
KENAF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	12	xx
(68)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	36	xxxxxxx
TOBACCO	105	xxxxxxxxxxxxxxxxxxx+	95	xxxxxxxxxxxxxxxxxx	0	
(69)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
SESAMUM	80	xxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx	24	xxxxx
(70)	71	xxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(72)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
ELEU IND	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(74)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	58	xxxxxxxxxxxx
(75)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(76)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(77)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
AMAR RET	100	xxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxx	0	
(78)	64	xxxxxxxxxxxxx	57	xxxxxxxxxx	0	
PORT OLE	100	xxxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx	18	xxxx
(79)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BROM PEC	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+
(82)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SNO POL	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(83)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx

PPG 1259

SPECIES	0.025 kg/ha		0.100 kg/ha		0.400 kg/ha	
PHAL MIN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxx
(84)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(85)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(87)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
AUBGIN	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	0	
(89)	71	xxxxxxxxxxxxx	57	xxxxxxxxxx	0	
LENTIL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(90)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
MUNGB	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(91)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxx
TEFF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	19	xxxx
(92)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	36	xxxxxxx
COMMEL	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	20	xxxx
(93)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	29	xxxxxx
EUPHOR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(94)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ORY BATH	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
(95)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	36	xxxxxxx
MIM PIG	109	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxx	45	xxxxxxxxx
(96)	71	xxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
PEN SET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxxx
(97)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx

(18)

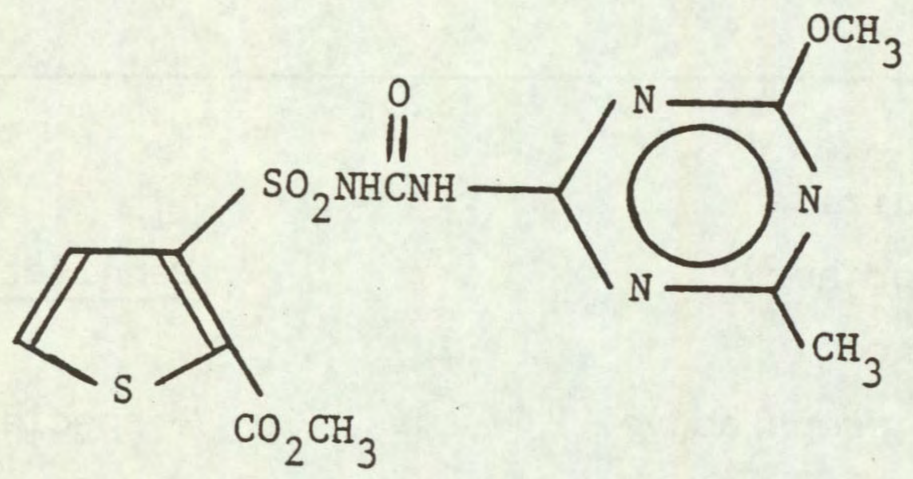
DPX-M6316

Code number DPX-M6316 Trade name Harmony

Common name

Chemical name Methyl 3-(3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl) ureidosulphonyl) thiophene-2-carboxylate

Structure



Source Du Pont (UK) Ltd.,
Wedgwood Way,
Stevenage,
Herts., SG1 4QN.

Information available and suggested uses

Post-emergence in cereals c. 0.06 kg/ha.

Formulation used 75% a.i. water dispersible granules

Spray volume 300 l/ha.

RESULTS

Full results are given in the histograms on pages 21-23 and potential selectivities are summarised in the following table.

Dose (kg/ha)	Crops: vigour reduced by less than 15%	Weeds: number or vigour reduced by 70% or more
0.160	Millet	Portulaca oleracea
	Maize + NA	Commelina diffusa
		Euphorbia heterophylla
		+ species below
0.040	Maize	
	Sorghum	Pennisetum setosum
	Rice	
	+ crops above	+ species below
0.010	Groundnut	
	Soyabean	Amaranthus retroflexus
	Teff	
	+ crops above	

Comments on results:

Amaranthus retroflexus was the most sensitive weed, being controlled at the lowest dose of 0.010 kg/ha. Other broad-leaved weeds controlled at the highest dose of 0.160 kg/ha were Portulaca oleracea, Commelina diffusa and Euphorbia heterophylla. The grass weeds were generally resistant with the only exception being Pennisetum setosum which was controlled by the medium dose of 0.040 kg/ha.

The cereal crops were the most tolerant, with a safening effect of NA on maize at the highest dose. Although not safened, millet was also tolerant of the highest dose, but without safener sorghum and rice were only tolerant at the medium dose and would probably benefit from the use of a safener. The more sensitive teff, without the use of a safener, was only tolerant of the lowest dose of 0.010 kg/ha. Two of the large-seeded legume crops, groundnut and soyabean, were also tolerant of the lowest dose, but the spectrum of weeds controlled was very poor.

DPX-M6316 is a very similar compound to chlorsulfuron and shows similar selectivity controlling the broad-leaved weeds in the cereal crops. It is not quite so active, but has the advantage of a short persistence in the soil, and it would be interesting to look in more detail at extending the spectrum of weed control by using safeners in millet, soyabean, rice and teff.

DPX M6316

SPECIES	0.010 kg/ha	0.040 kg/ha	0.160 kg/ha
MILLET	100	100	100
(55)	100	93	86
MAIZE+S	100	100	100
(56)	93	100	86
MAIZE	100	100	100
(57)	86	86	71
SORGHUM	100	100	100
(59)	100	86	71
TOMATO	100	100	100
(60)	79	79	64
PIGEON P	154	138	138
(61)	79	71	43
COWPEA	100	100	100
(62)	71	71	57
CHICKPEA	67	67	40
(63)	29	21	14
GRNDNUT	100	100	100
(64)	93	71	50
SOYABEAN	100	100	100
(65)	86	79	71
COTTON	100	100	100
(66)	43	43	29
JUTE	92	100	100
(67)	71	71	64

DPX M6316

SPECIES		0.010 kg/ha		0.040 kg/ha		0.160 kg/ha
KENAF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(68)	29	xxxxxx	29	xxxxxx	29	xxxxxx
TOBACCO	95	xxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxx+	105	xxxxxxxxxxxxxxxxxxx+
(69)	43	xxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SESAMUM	88	xxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx	32	xxxxxx
(70)	50	xxxxxxxxxx	29	xxxxxx	21	xxxx
RICE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(72)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ELEU IND	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(74)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(75)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(76)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(77)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
AMAR RET	40	xxxxxxxx	30	xxxxxx	45	xxxxxxxxx
(78)	29	xxxxxx	21	xxxx	14	xxx
PORT OLE	91	xxxxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxxx	55	xxxxxxxxxx
(79)	50	xxxxxxxxxx	43	xxxxxxxxx	21	xxxx
BROM PEC	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+
(82)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SNO POL	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx
(83)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

DPX M6316

SPECIES	0.010 kg/ha	0.040 kg/ha	0.160 kg/ha
PHAL MIN	100	100	100
(84)	100	100	64
CYP ESCU	100	100	100
(85)	100	100	86
CYP ROTU	100	100	100
(86)	93	100	93
OXAL LAT	100	100	100
(87)	93	86	64
AUBGIN	100	100	80
(89)	57	57	21
LENTIL	100	60	90
(90)	71	43	50
MUNGB	100	100	100
(91)	64	57	57
TEFF	100	100	100
(92)	93	79	71
COMMEL	100	100	30
(93)	57	57	21
EUPHOR	100	100	100
(94)	93	64	29
ORY BATH	100	100	100
(95)	93	93	71
MIM PIG	109	100	91
(96)	50	43	36
PEN SET	100	94	87
(97)	50	29	29

ACKNOWLEDGEMENTS

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RICHARDSON, W.G. and PARKER, C. (1977) The activity and post-emergence selectivity of some recently developed herbicides: KUE 2079A, HOE 29152, RH 2915, triclopyr and Dowco 290. Technical Report, Agricultural Research Council, Weed Research Organization, 42, pp. 53.

RICHARDSON, W.G. and WEST, T.M. (1986) The activity and post-emergence selectivity of some recently developed herbicides: SMY 1500, PPG 884, PPG 1259 and DPX-M 6316. Technical Report, Long Ashton Research Station, Weed Research Division, 92, pp. 42.

Appendix 1. Species, abbreviations, varieties and stages of growth at spraying and assessment for post-emergence selectivity test.

	Designation and computer serial number	Cultivar or source	Stage of growth at spraying (No. true leaves)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Millet (*Pennisetum americanum*)	MILLET (55)	ex Bornu	3	6.5
Maize + safener (NA) (*Zea mays*)	MAIZE + S (56)	LG11	3.5	6.5 - 7.5
Maize (*Zea mays*)	MAIZE (57)	LG11	3.5	6.5 - 7.5
Sorghum (*Sorghum bicolor*)	SORGHUM (59)	Tub 22	3.5	6.5 - 7.5
Pigeon pea (*Cajanus cajan*)	PIGEON P (61)	ICPL 138	2	6.5 - 7.5
Cowpea (*Vigna unguiculata*)	COWPEA (62)	TRS	2	3.0 - 4.5
Chickpea (*Cicer arietinum*)	CHICKPEA (63)	ILC 482	7	19.5
Groundnut (*Arachis hypogaea*)	GRDNUT (64)	Robut 33-1	3.5	8.5 - 9.5
Soyabean (*Glycine max*)	SOYABEAN (65)	Amsoy	2.5	4.5 - 5.5
Cotton (*Gossypium hirsutum*)	COTTON (66)	Coker 315	1	3.5 - 4.5
Jute (*Corchorus olitorius*)	JUTE (67)	JRC 7447	2.5	10
Kenaf (*Hibiscus cannabinus*)	KENAF (68)	ex Sudan	1.5	8
Tobacco (*Nicotiana tabacum*)	TOBACCO (69)	North Carolina 2326	4	6.5 - 7.5
Sesamum (*Sesamum indicum*)	SESAMUM (70)	75403-B	2	4.0 - 5.5
Tomato (*Lycopersicum esculentum*)	TOMATO (71)	Moneymaker	2	4.5 - 6.5

Appendix 1. cont'd..

	Designation and computer serial number	Cultivar or source	Stage of growth at spraying (No. true leaves)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Rice (*Oryza sativa*)	RICE (72)	IR 36	2.5	5.5 - 6.5
Eleusine indica	ELEU IND (74)	Zimbabwe	2.5	7.0 - 9.0
Echinochloa crus-galli	ECH CRUS (75)	S. Africa 1979	3	6.0 - 8.0
Rottboellia cochinchinensis (= *R. exaltata*)	ROT EXAL (76)	Zimbabwe 1978	2.5	7
Digitaria sanguinalis	DIG SANG (77)	USA 1979	3	Tillered
Amaranthus retroflexus	AMAR RET (78)	USA 1980	3.5	10
Portulaca oleracea	PORT OLE (79)	Israel 1973	4	6 - 8 pairs
Bromus pectinatus	BROM PEC (82)	Tanzania 1981	2.5	5.5 - 6.5
Snowdenia polystachya	SNOW POL (83)	Ethiopia 1980	3.5	6.5 - 7.5
Phalaris minor	PHAL MIN (84)	India 1979	2.5	4.5 - 6.5
Cyperus esculentus	CYP ESCU (85)	S. Africa WRO Clone 2	4	8.0 - 9.0
Cyperus rotundus	CYP ROTU (86)	Zimbabwe WRO Clone 1	5	11.0 - 11.5
Oxalis latifolia	OXAL LAT (87)	Cornwall B WRO Clone 2	5.5	15 - 23
Aubergine (*Solanum melongena*)	AUBGIN (89)	Moneymaker (F_1 hybrid)	2	4.5 - 5.5
Lentil (*Lens culinaris*)	LENTIL (90)	Syrian local ILL 4401	5	12
Mungbean (*Phaseolus aureus*)	MUNGB (91)	CES-ID-21	2	2.5 - 3.5

Appendix 1. cont'd...

	Designation and computer serial number	Cultivar or source	Stage of growth at spraying (No. true leaves)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Teff (*Eragrostis tef*)	TEFF (92)	ex Addis Ababa 1981	4	6.0 - 6.5
Commelina diffusa	COMMEL (93)	USA 1985	2 - 3	6.5 - 7.5
Euphorbia heterophylla	EUPHOR (94)	Brazil 1985	2	8
Oryza barthii	ORY BATH (95)	Senegal 1981	2.5	5.5 - 6.5
Mimosa pigra	MIM PIG (96)	Thailand 1985	3	6.5 - 7.5
Pennisetum setosum	PEN SET (97)	Thailand 1985	4	4.0 - 4.5

ABBREVIATIONS

ångström	Å	freezing point	f.p.
Abstract	Abs.	from summary	F.s.
acid equivalent*	a.e.	gallon	gal
acre	ac	gallons per hour	gal/h
active ingredient*	a.i.	gallons per acre	gal/ac
approximately equal to*	≃	gas liquid chromatography	GLC
aqueous concentrate	a.c.	gramme	g
bibliography	bibl.	hectare	ha
boiling point	b.p.	hectokilogram	hkg
bushel	bu	high volume	HV
centigrade	C	horse power	hp
centimetre*	cm	hour	h
concentrated	concd	hundredweight*	cwt
concentration	concn	hydrogen ion concentration*	pH
concentration x time product	ct	inch	in.
concentration required to kill 50% test animals	LC50	infra red	i.r.
cubic centimetre*	cm^3	kilogramme	kg
cubic foot*	ft^3	kilo ($x10^3$)	k
cubic inch*	in^3	less than	<
cubic metre*	m^3	litre	l.
cubic yard*	yd^3	low volume	LV
cultivar(s)	cv.	maximum	max.
curie*	Ci	median lethal dose	LD50
degree Celsius*	^oC	medium volume	MV
degree centigrade	^oC	melting point	m.p.
degree Fahrenheit*	^oF	metre	m
diameter	diam.	micro ($x10^{-6}$)	μ
diameter at breast height	d.b.h.	microgramme*	μg
divided by*	÷ or /	micromicro (pico: $x10^{-12}$)*	μμ
dry matter	d.m.	micrometre (micron)*	μm (or μ)
emulsifiable concentrate	e.c.	micron (micrometre)*†	μm (or μ)
equal to*	=	miles per hour*	mile/h
fluid	fl.	milli ($x10^{-3}$)	m
foot	ft	milliequivalent*	m.equiv.
		milligramme	mg
		millilitre	ml

† The name micrometre is preferred to micron and μm is preferred to μ.

millimetre*	mm
millimicro* (nano: $x10^{-9}$)	n or mμ
minimum	min.
minus	-
minute	min
molar concentration*	M (small cap)
molecule, molecular	mol.
more than	>
multiplied by*	x
normal concentration*	N (small cap)
not dated	n.d.
oil miscible concentrate	o.m.c. (tables only)
organic matter	o.m.
ounce	oz
ounces per gallon	oz/gal
page	p.
pages	pp.
parts per million	ppm
parts per million by volume	ppmv
parts per million by weight	ppmw
percent(age)	%
pico (micromicro: $x10^{-12}$)	p or μμ
pint	pint
pints per acre	pints/ac
plus or minus*	±
post-emergence	post-em
pound	lb
pound per acre*	lb/ac
pounds per minute	lb/min
pound per square inch*	lb/in^2
powder for dry application	p. (tables only)
power take off	p.t.o.
precipitate (noun)	ppt.
pre-emergence	pre-em.
quart	quart
relative humidity	r.h.
revolution per minute*	rev/min
second	s
soluble concentrate	s.c.
soluble powder	s.p.
solution	soln
species (singular)	sp.
species (plural)	spp.
specific gravity	sp. gr.
square foot*	ft^2
square inch	in^2
square metre*	m^2
square root of*	$\sqrt{}$
sub-species*	ssp.
summary	s.
temperature	temp.
ton	ton
tonne	t
ultra-low volume	ULV
ultra violet	u.v.
vapour density	v.d.
vapour pressure	v.p.
varietas	var.
volt	V
volume	vol.
volume per volume	v/v
water soluble powder	w.s.p. (tables only)
watt	W
weight	wt
weight per volume*	w/v
weight per weight*	w/w
wettable powder	w.p.
yard	yd
yards per minute	yd/min

* Those marked * should normally be used in the text as well as in tables etc.

WEED RESEARCH DIVISION

Long Ashton Research Station

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(Price includes surface mail; airmail £2.00 extra)

(* denotes Reports now out of print)

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18. A survey from the roadside of the state of post-harvest operations in Oxfordshire in 1971. November 1971. A Phillipson. Price - £0.25

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23. A survey of the presence of wild oats and blackgrass in parts of the United Kingdom during summer 1972. A Phillipson. Price - £0.25

24. The conduct of field experiments at the Weed Research Organization. February 1973. J G Elliott, J Holroyd and T O Robson. Price - £1.25

25. The pre-emergence selectivity of some recently developed herbicides: lenacil, RU 12068, metribuzin, cyprazine, EMD-IT 5914 and benthiocarb. August 1973. W G Richardson and M L Dean. Price - £1.75.

26. The post-emergence selectivity of some recently developed herbicides: bentazon, EMD-IT 6412, cyprazine, metribuzin, chlornitrofen, glyphosate, MC 4379, chlorfenprop-methyl. October 1973. W G Richardson and M L Dean. Price - £3.31

27. Selectivity of benzene sulphonyl carbamate herbicides between various pasture grasses and clover. October 1973. A M Blair. Price - £1.05

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* 29. The pre-emergence selectivity between pasture grasses of twelve herbicides: haloxydine, pronamide, NC 8438, Orga 3045, chlortoluron, metoxuron, dicamba, isopropalin, carbetamide, MC 4379, MBR 8251 and EMD-IT 5914. November 1973. A M Blair. Price - £1.30

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38. The activity and pre-emergence selectivity of some recently developed herbicides: metamitron, HOE 22870, HOE 23408, RH 2915, RP 20630. March 1976. W G Richardson, M L Dean and C Parker. Price - £3.25

39. The activity and post-emergence selectivity of some recently developed herbicides: HOE 22870, HOE 23408, flamprop-methyl, metamitron and cyperquat. May 1976. W G Richardson and C Parker. Price - £3.20

40. The activity and pre-emergence selectivity of some recently developed herbicides: RP 20810, oxadiazon, chlornitrofen, nitrofen, flamprop--isopropyl. August 1976. W G Richardson, M L Dean and C Parker. Price - £2.75.

41. The activity and pre-emergence selectivity of some recently developed herbicides: K 1441, mefluidide, WL 29226, epronaz, Dowco 290 and triclopyr. November 1976. W G Richardson and C Parker. Price - £3.40.

42. The activity and post-emergence selectivity of some recently developed herbicides: KUE 2079A, HOE 29152, RH 2915, Triclopyr and Dowco 290. March 1977. W G Richardson and C Parker. Price - £3.50

43. The activity and pre-emergence selectivity of some recently developed herbicides: dimefuron, hexazinone, trifop-methyl, fluothiuron, buthidazole and butam. November 1977. W G Richardson and C Parker. Price - £3.75.

44. The activity and selectivity of the herbicides: ethofumesate, RU 12709 and isoproturon. December 1977. W G Richardson, C Parker, & M L Dean. Price - £4.00

45. Methods of analysis for determining the effects of herbicides on soil soil micro-organisms and their activities. January 1978. M P Greaves, S L Cooper, H A Davies, J A P Marsh & G I Wingfield. Price - £4.00

46. Pot experiments at the Weed Research Organization with forest crop and weed species. February 1978. D J Turner and W G Richardson. Price - £2.70

47. Field experiments to investigate the long-term effects of repeated applications of MCPA, tri-allate, simazine and linuron - effects on the quality of barley, wheat, maize and carrots. July 1978. J D Fryer, P D Smith and J W Ludwig. Price - £1.20.

48. Factors affecting the toxicity of paraquat and dalapon to grass swards. March 1978. A K Oswald. Price - £2.90

49. The activity and post-emergence selectivity of some recently developed herbicides: NP 48, RH 5205 and Pyridate. May 1978. W G Richardson and C Parker. Price - £2.50

50. Sedge weeds of East Africa - II. Distribution. July 1978. P J Terry. Price - £1.50

51. The activity and selectivity of the herbicides methabenzthiazuron, metoxuron, chlortoluron and cyanazine. September 1978. W G Richardson and C Parker. Price - £2.20.

52. Antidotes for the protection of field bean (Vicia faba L.) from damage by EPTC and other herbicides. February 1979. A M Blair. Price - £1.35

53. Antidotes for the protection of wheat from damage by tri-allate. February 1979. A M Blair. Price - £2.00

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