LONG ASHTON RESEARCH STATION
WEED RESEARCH DIVISION

TECHNICAL REPORT No. 92

THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: SMY 1500, PPG 884, PPG 1259 and DPX-M 6316.

DPX-M 6316 is thifensulfuron-methyl, PPG 1259 is busoxinone, PPG 884 is lactofen, SMY 1500 is ethiozin

W G RICHARDSON AND T M WEST

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Long Ashton Research Station, Weed Research Division,
Begbroke Hill, Yarnton, Oxford, OX5 1PF.

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NOTE

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THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: SMY 1500, PPG 884, PPG 1259, AND DPX-M 6316

W G Richardson and T M West
Long Ashton Research Station, Weed Research Division,
Begbroke Hill, Yarnton, Oxford OX5 1PF, UK.

SUMMARY

Four herbicides were examined for post-emergence selectivity on 40 crop and weed species. Their route of action was determined on six selected species in a separate test. The safener 1,8 naphthalic anhydride (NA) was used as a seed dressing on wheat, barley and maize to see if herbicide effects could be reduced.

SMY 1500, active both pre- and post-emergence, is likely to control selectively Alopecurus myosuroides and a range of other grass and broad-leaved weeds post-emergence in cereals (wheat, barley and maize) while carrot was even more tolerant.

PPG 884, also active pre- as well as post-emergence, should control most annual broad-leaved weeds including Galium aparine, Veronica persica and Viola arvensi post-emergence in wheat, maize, oats and perennial ryegrass,

Although PPG 1259 was active pre- and post-emergence, much of the latter was due to uptake via the soil. Most annual broad-leaved weeds would be controlled post-emergence, notably Galium aparine and Viola arvensis. All monocotyledonous species tested (wheat, barley, maize, oat, perennial ryegrass and onion) were tolerant.

DPX-M 6316 controlled most annual broad-leaved weeds and Poa species. Crop tolerance, though limited to cereals (wheat, barley, oat, maize) was high however. Considerable pre-emergence activity was also found.

INTRODUCTION

The pre- and post-emergence selectivities and effects of new herbicides are investigated at LARS WRD on a large number of pot-grown crop and weed species. 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 interspecific competition. Consequently, as plant responses in pot experiments can be very different to those in the field the results should only be used as a guide for further work.

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

METHODS AND MATERIALS

(a) Activity experiment (AE)

This was carried out on six selected species as described previously (Richardson and Dean, 1974). Three annual species and perennial ryegrass were raised from seeds and two perennials from rhizome fragments. There were two replicates for each treatment. Herbicides were applied by four different methods:-

(i) post-emergence spray 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 spray to the soil surface,

(iv) pre-emergence with thorough incorporation, before planting.

(b) Post-emergence selectivity experiment

The experimental details were as previously described (Richardson and Parker, 1977). Plants were raised in 9 cm 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 open (except Solanum nigrum) on a paved area, protecting from predators and excess rainfall by means of a wire cage and movable covers.

Table 1. Plant data for activity experiments

Species	Cultivar/ source	No. per pot at spraying pre-	No. per pot at spraying post-	Depth of planting (cm)	Stage of growth at: Spraying post-em	Assessment pre-em	Assessment post-em
Dwarf bean (*Phaseolus vulgaris*)	Master-piece	3	2	2.0	1 trifoliate leaf	2 trifoliate leaves	1.5-2 trifoliate leaves
Kale (*Brassica oleracea acephala*)	Marrow-stem	8	5	0.5	2 leaves	4-4.5 leaves	3.5-4 leaves
Polygonum amphibium	WRO Clone 1	6	5	1.0	5 leaves	8 leaves	8- 9 leaves
Perennial ryegrass (*Lolium perenne*)	S23	12	10	0.5	2-3 leaves	2-3 tillers	2-3 tillers
Avena fatua	WRO 1980	10	5	1.0	2.5-3 leaves	2 tillers	2-3 tillers
Elymus repens	WRO Clone 31	6	5	1.0	2.5-3 leaves	0-1 tiller	1-2 tillers

In some cases plant material was pre-treated to improve estabishment:- seeds of *Chenopodium album* were soaked in 0.1 M potassium nitrate solution and kept in the light for two days prior to planting; *Solanum nigrum* pots were kept in the glasshouse until spraying.

For protection of onion from soil-borne pathogens the seeds were dressed with 'Asmercote' (benomyl + thiram). As dwarf bean, is susceptible to "damping off" diseases, 6% gum arabic solution was included with a thiram fungicide seed dressing to improve adhesion.

A series of treatments was included to investigate possible uses for the safener NA (1,8-naphthalic anhydride). Maize, wheat and barley were treated with NA at 0.5% a.i. w/w of seeds. Before spraying, each species was thinned to constant number per pot.

Herbicides were applied using a laboratory sprayer operating at a pressure

of 207 kPa (30 lb/in^2) with a Spraying Systems 8002 Teejet spray nozzle moving at 0.5 m sec^{-1}, 45 cm above the stationary plants and delivering a volume of 300 l/ha. There were two replicates for each treatment. Stages of growth at spraying and assessment are summarised in Appendix I. After spraying, the plants were protected from rainfall for 24 hours and then watered overhead to wash any residues off the foliage, using a rose at the end of a trigger hose attached to the mains water supply. The pots were then returned to their original position in the open. Watering throughout the experiment was 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) Assessments 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 = as 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 histograms, 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 raphanistrum) which was included because it is easy to propagate, may be regarded as a crop or a weed.

Several species, notably the perennials, were kept for extra periods to observe later effects, or the degree of recovery from injury. Results for pea were not included in the histograms because plant growth was variable, but the experiment was repeated on this species at a later date and results are recorded in the tables where appropriate and referred to in the text.

Table 2. Soil and environmental conditions

Experiment number type and herbicides included	AE SMY 1500 PPG 1259	AE PPG 884 DPX-M 6316	Post-emergence selectivity test SMY 1500 PPG 884	Post-emergence selectivity test PPG 1259 DPX-M 6316
Date of spraying	17.7.85 and 7.8.85		28.8.85 and 3.9.85	
Main assessment completed	19.8.85		25.9.85	
Organic carbon (%)	2.2		2.2	
Clay content (%)	15.0		15.0	
pH (in water: 1:2 soil:water ratio)	7.5		7.5	
Ammonium sulphate (g/kg)	0.5		0.5	
Superphosphate (g/kg)	1.0		1.0	
Potassium sulphate (g/kg)	0.5		0.5	
Fritted trace elements (g/kg)	0.1		0.1	
Hydrated Mg SO_4 $7H_2O$ (g/kg)	0.4		0.4	
Temperature (°C)	Glasshouse		Outdoors	
Mean	16		16	
Maximum	18		26	
Minimum	8		6	
Relative Humidity (%)				
Mean	60		-	
Maximum	76		-	
Minimum	33		-	

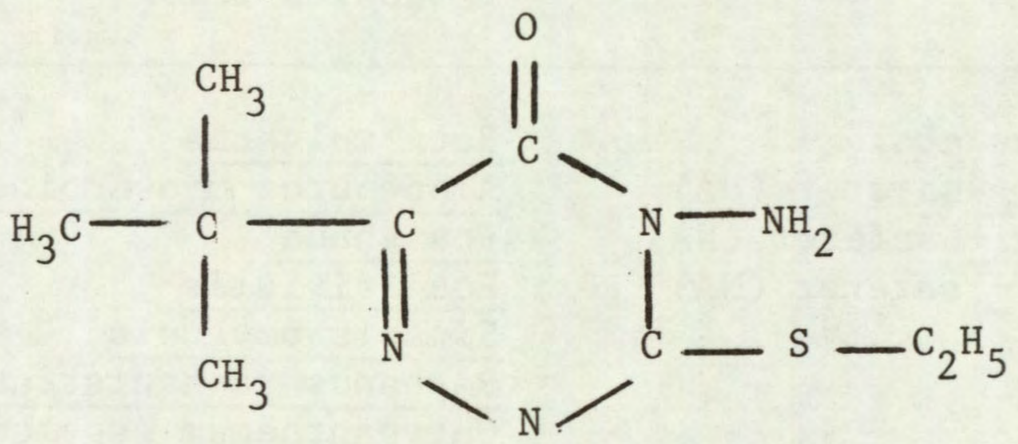
SMY 1500

Code number SMY 1500 Trade name/s 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 372 l/ha (activity experiment)
300 l/ha (post-emergence selectivity)

RESULTS

Full results are given in the histograms on pages 10-14 and potential selectivities are summarised in the following table.

RATE (kg a.i./ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
2.0	carrot	Bromus sterilis Avena fatua Matricaria perforata Senecio vulgaris Lamium purpureum Galium aparine Chenopodium album Viola arvensis Elymus repens + species below
0.5	species above + wheat ± safener (NA) barley ± safener (NA) maize ± safener (NA) pea	Beta vulgaris Alopecurus myosuroides Poa annua Poa trivialis Sinapis arvensis Raphanus raphanistrum Chrysanthemum segetum Polygonum lapathifolium Stellaria media Spergula arvensis Veronica persica Rumex obtusifolius Solanum nigrum
0.125	None listed as no weeds controlled	None

Comments on results

Activity experiment

Although all species were affected by the foliar spray, activity was much greater with the soil treatments. The post-emergence soil drenches were as effective or even more so than pre-emergence treatments especially with grasses. There was little difference in activity between surface and incorporated pre-emergence treatments, although one exception was dwarf bean at the highest dose, which was damaged much more by incorporated treatments.

Symptoms on susceptible species

These were typical of other herbicides which inhibit photosynthesis eg ureas, triazines, triazinones. Chlorosis usually preceded necrosis of plant tissues with all four methods of application. Germination was not affected pre-emergence, plants usually dying back from an early growth stage.

Post-emergence selectivity

Thirteen annual weeds were controlled at 0.5 kg/ha. These included grasses (Alopecurus myosuroides and Poa species), crucifers (Sinapis arvensis, Raphanus raphanistrum) caryophyllaceae (Stellaria media, Spergula arvensis) polygonaceae (Polygonum lapathifolium, Rumex obtusifolius) as well as Solanum nigrum, Chrysantherum segetum and Veronica persica. At 2.0 kg/ha all remaining nine weeds were controlled including grasses (Bromus sterilis, Avena fatua, Elymus repens) and interestingly Galium aparine and Viola arvensis.

Carrot was outstandingly tolerant being unaffected at 2.0 kg/ha. At 0.5 kg/ha wheat, barley, maize and pea were tolerant. A moderate safening effect was found with barley at 2.0 kg/ha. Onion, cabbage and swede were very sensitive.

The potential control of such a wide spectrum of weeds in carrot is impressive. Further testing with pea may also be worthwhile. The tolerance of cereals, notably wheat and barley and the possible control of weeds such as A.myosuroides and Veronica persica also deserves more investigation and corresponds to other work (Hack et al., 1985; Bolton et al., 1985). Although Bromus sterilis was not quite adequately controlled selectively in wheat and barley, it was reduced in vigour by more than 60% at 0.5 kg/ha while other work has demonstrated potential control of this and other Bromus species both pre-and post-emergence in these crops (Bolton et al., 1985).

ACTIVITY EXPERIMENT

SMY 1500

		0.125 kg a.i./ha	0.5 kg a.i./ha	2.0 kg a.i./ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxx xxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xx xxx
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xx	xxxx x
	P	xxxxxxxxxxxxxx+ xxxxxxxxx	ô o	ô o
	I	xxxxxxxxxx xxxxxxxxxxxxx	x xx	o o
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxx xxx
	P	xxxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxx	xxxxxxxxxxxx xxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxxx	xxxxxxxxxxx xxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxx xxxx	xxx x
	P	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxx xxxxx	x xx
	I	xxxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx	x x
AVENA FATUA	F	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxx xx	o o
	P	xxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx	o o
	I	xxxxxxxxxxxxxx+ xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	o o
ELYMUS REPENS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxx	xxxxxxxxx xx
	P	xxxxxxxxxxxxxx+ xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx	xxxxxxx xx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx+ xxxxxxxx	xxxxxxxxxxxxx xxxx

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

TRIAL NUMBER 34

SMY 1500

SPECIES	0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
WHEAT (1)	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 57	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxx
WHEAT+S (2)	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 57	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxx
BARLEY (3)	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	90 50	xxxxxxxxxxxxxxxxxx xxxxxxxxxx
BARLEY+S (4)	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	100 79	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
OAT (5)	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	70 29	xxxxxxxxxxxxxx xxxxxx	0 0	
PER RYGR (6)	100 57	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxx	20 7	xxxx x	0 0	
ONION (8)	24 21	xxxxx xxxx	0 0		0 0	
DWF BEAN (9)	100 64	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxx	50 7	xxxxxxxxxx x
FLD BEAN (10)	100 71	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxx	100 14	xxxxxxxxxxxxxxxxxxxx xxx
W CLOVER (12)	90 43	xxxxxxxxxxxxxxxxxxx xxxxxxxxx	0 0		0 0	
RAPE (14)	100 79	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	30 21	xxxxxx xxxx	0 0	
KALE (15)	100 64	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	10 7	xx x	0 0	

TRIAL NUMBER 34

SMY 1500

SPECIES		0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
CABBAGE	12	xx	0		0		
(16)	14	xxx	0		0		
SWEDE	20	xxxx	0		0		
(17)	7	x	0		0		
CARROT	90	xxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	0		
(19)	57	xxxxxxxxxxx	29	xxxxxx	0		
LETTUCE	70	xxxxxxxxxxxxxx	0		0		
(20)	36	xxxxxxx	0		0		
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(22)	71	xxxxxxxxxxxxxx	0		0		
BETA VUL	90	xxxxxxxxxxxxxxxxxx	0		0		
(23)	71	xxxxxxxxxxxxxx	0		0		
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	0		
(24)	79	xxxxxxxxxxxxxxx	36	xxxxxxx	0		
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	0		
(26)	100	xxxxxxxxxxxxxxxxxxxx	36	xxxxxxx	0		
ALO MYOS	75	xxxxxxxxxxxxxx	0		0		
(27)	50	xxxxxxxxxx	0		0		
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(28)	43	xxxxxxxxx	0		0		
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	30	xxxxxx	0		
(29)	43	xxxxxxxxx	7	x	0		

TRIAL NUMBER 34

SMY 1500

SPECIES		0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
SIN ARV	90	xxxxxxxxxxxxxxxxxx	0		0		
(30)	50	xxxxxxxxxx	0		0		
RAPH RAP	80	xxxxxxxxxxxxxxx	50	xxxxxxxxxx	20	xxxx	
(31)	36	xxxxxxx	14	xxx	7	x	
CHRY SEG	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(32)	79	xxxxxxxxxxxxxxx	0		0		
MAT PERF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	25	xxxxx	
(33)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	14	xxx	
SEN VULG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	12	xx	
(34)	64	xxxxxxxxxxxxx	57	xxxxxxxxxx	14	xxx	
POL LAPA	60	xxxxxxxxxxxx	0		0		
(35)	57	xxxxxxxxxxx	0		0		
LAM PUR	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	0		
(37)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	0		
GAL APAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0		
(38)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	0		
CHEN ALB	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	0		
(39)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0		
STEL MED	70	xxxxxxxxxxxxxx	0		0		
(40)	50	xxxxxxxxxx	0		0		
SPER ARV	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(41)	71	xxxxxxxxxxxxxx	0		0		
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(42)	64	xxxxxxxxxxxxx	0		0		

TRIAL NUMBER 34

SMY 1500

SPECIES	0.125 kg/ha		0.500 kg/ha		2.000 kg/ha	
VI ARVE	100	xxxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	11	xx
(43)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	14	xxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxxx	29	xxxxxx	0	
(44)	57	xxxxxxxxxxx	7	x	0	
EL REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx
(47)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
MAIZE+S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(56)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
SOL NIG	100	xxxxxxxxxxxxxxxxxxxx	56	xxxxxxxxxx	0	
(81)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	

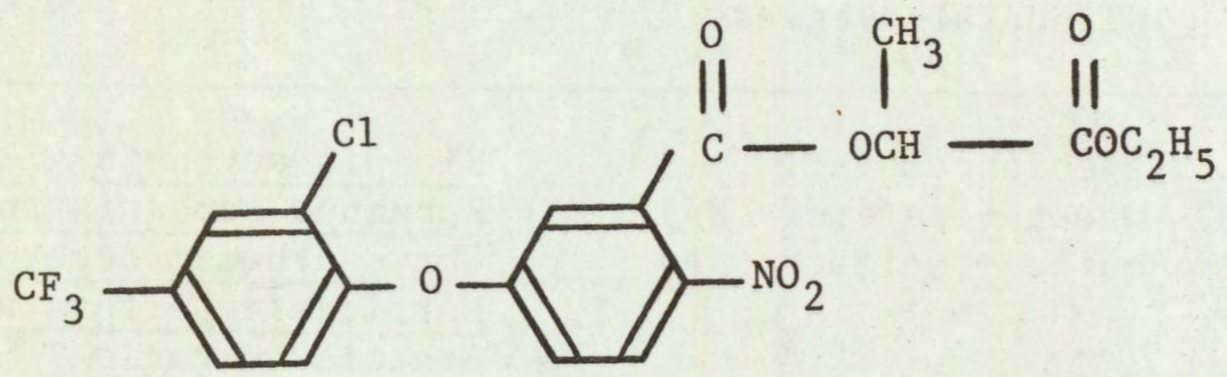
PPG 884

Code number PPG 884 **Trade name/s** 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
USA

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 372 l/ha (activity experiment)
300 l/ha (post-emergence selectivity)

RESULTS

Full results are given in the histograms on pages 18-22 and potential selectivities are summarised in the following table.

RATE (kg a.i./ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
0.8	None	None listed as no crops tolerant
0.2	oat perennial ryegrass	Beta vulgaris
0.05	species above + wheat + safener (NA) maize + safener (NA)	Sinapis arvensis Raphanus raphanistrum Chrysanthemum segetum Matricaria perforata Senecio vulgaris Polygonum lapathifolium Lamium purpureum Galium aparine Spergula arvensis Veronica persica Rumex obtusifolius Solanum nigrum

Comments on results

Activity experiment

The foliar spray was very active on most species particularly broad-leaved species, notably kale. Pre-emergence activity was also high on the smaller-seeded annuals, kale and perennial ryegrass, the surface spray being much more effective than when incorporated. Thus, the type of activity resembles other diphenyl ether herbicides.

Symptoms on susceptible species

These were also typical of diphenyl-ether herbicides such as oxyfluorfen. The foliar spray caused a rapid, contact scorch especially on broad-leaved species. Growth subsequent to treatment was often deformed, trapping and looping of leaves being common to all four application methods. Higher doses pre-emergence often resulted in failure of species to emerge from the soil or die-back soon after emergence.

Post-emergence selectivity

Most annual broad-leaved weeds were susceptible. Of sixteen of these tested, twelve were controlled at the lowest dose of 0.05 kg/ha and the remaining four were controlled at 0.2 kg/ha. No grass weeds were controlled.

Tolerance was limited to graminaceous crops, oat and perennial ryegrass at 0.2 kg/ha and wheat and maize at 0.05 kg/ha. Most broad-leaved crops were sensitive notably brassicas, lettuce and leguminous species.

The potential control of species such as Galium aparine, Veronica persica and Viola arvensis in wheat is impressive. Although corresponding to other diphenyl-ether herbicides in weed control and crop tolerance, PPG 884 would appear to be superior regarding control of crucifer weeds (Sinapis arvensis, Raphanus raphanistrum) and more notably Stellaria media.

ACTIVITY EXPERIMENT

PPG 884

		0.125 kg a.i./ha	0.5 kg a.i./ha	2.0 kg a.i./ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxx xxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
KALE	F	xxxxxxxxxx xx	o o	o o
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxx
	P	xxx xxxxxx	x xxxx	o o
	I	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxx	x xx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxx xxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxx xxxxxx
	I	xxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxx	xxxxxxxxxxxx xxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxx	o o
	I	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx
AVENA FATUA	F	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxx	xxxxxxxxxxxx xxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxx
ELYMUS REPENS	F	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxx+ xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx+ xxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx

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

TRIAL NUMBER 34

PPG 884

SPECIES	0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
WHEAT (1)	100 93	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxx xxxxxxxxxx
WHEAT+S (2)	100 86	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 79	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxx xxxxxxxxxx
BARLEY (3)	100 79	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	50 43	xxxxxxxxxx xxxxxxxxx
BARLEY+S (4)	100 79	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	90 64	xxxxxxxxxxxxxxxxxx xxxxxxxxxxxx	90 43	xxxxxxxxxxxxxxxxxx xxxxxxxxx
OAT (5)	100 86	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 86	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxx xxxxxxxxxx
PER RYGR (6)	100 93	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxx	100 86	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxx xxxxxxxxxx
ONION (8)	71 50	xxxxxxxxxxxxx xxxxxxxxxx	35 36	xxxxxxx xxxxxxx	0 0	
DWF BEAN (9)	100 21	xxxxxxxxxxxxxxxxxxx xxxx	0 0		0 0	
FLD BEAN (10)	50 14	xxxxxxxxxx xxx	17 7	xxx x	0 0	
W CLOVER (12)	90 36	xxxxxxxxxxxxxxxxxx xxxxxxx	10 7	xx x	0 0	
RAPE (14)	60 43	xxxxxxxxxxxx xxxxxxxxx	0 0		0 0	
KALE (15)	100 57	xxxxxxxxxxxxxxxxxxx xxxxxxxxxxx	0 0		0 0	

TRIAL NUMBER 34

PPG 884

SPECIES	0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
CABBAGE	12	xx	0		0	
(16)	14	xxx	0		0	
SWEDE	0		0		0	
(17)	0		0		0	
CARROT	80	xxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	10	xx
(18)	57	xxxxxxxxxxx	43	xxxxxxxxx	7	x
PARSNIP	67	xxxxxxxxxxxxx	0		0	
(19)	29	xxxxxx	0		0	
LETTUCE	0		0		0	
(20)	0		0		0	
SUG BEET	90	xxxxxxxxxxxxxxxxxx	40	xxxxxxxx	0	
(22)	43	xxxxxxxxx	21	xxxx	0	
BETA VUL	70	xxxxxxxxxxxxxx	0		0	
(23)	43	xxxxxxxxx	0		0	
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(24)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	50	xxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(26)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(27)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(28)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(29)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxxx

TRIAL NUMBER 34

PPG 884

SPECIES	0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
SIN ARV	0		0		0	
(30)	0		0		0	
RAPH RAP	0		0		0	
(31)	0		0		0	
CHRY SEG	0		0		0	
(32)	0		0		0	
MAT PERF	0		0		0	
(33)	0		0		0	
SEN VULG	12	xx	0		0	
(34)	14	xxx	0		0	
POL LAPA	0		0		0	
(35)	0		0		0	
LAM PUR	0		0		0	
(37)	0		0		0	
GAL APAR	50	xxxxxxxxxx	0		0	
(38)	14	xxx	0		0	
CHEN ALB	100	xxxxxxxxxxxxxxxxxxxx	20	xxxx	0	
(39)	64	xxxxxxxxxxxxx	36	xxxxxxx	0	
STEL MED	90	xxxxxxxxxxxxxxxxxx	30	xxxxxx	20	xxxx
(40)	50	xxxxxxxxxx	14	xxx	7	x
SPER ARV	0		0		0	
(41)	0		0		0	
VER PERS	0		0		0	
(42)	0		0		0	

TRIAL NUMBER 34

PPG 884

SPECIES		0.050 kg/ha		0.200 kg/ha		0.800 kg/ha	
VI ARVE	100	xxxxxxxxxxxxxxxxxxxx	0		0		
(43)	43	xxxxxxxxx	0		0		
RUM OBTU	43	xxxxxxxxx	14	xxx	0		
(44)	21	xxxx	7	x	0		
EL REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	
(47)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	
MAIZE+S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	
(56)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	
(57)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	
SOL NIG	22	xxxx	0		0		
(81)	14	xxx	0		0		

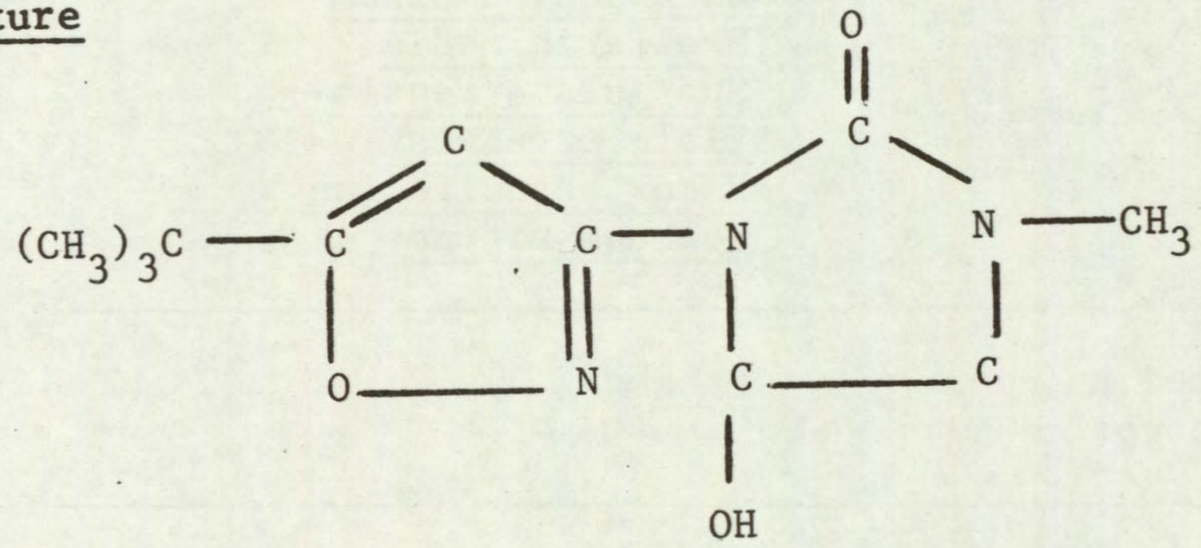
PPG 1259

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
USA

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 372 l/ha (activity experiment)
300 l/ha (post-emergence selectivity)

RESULTS

Full results are given in the histograms on pages 26-30 and potential selectivities are summarised in the following table.

RATE (kg a.i./ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
0.4	wheat ± safener (NA) barley ± safener (NA) maize ± safener (NA) oat perennial ryegrass onion pea	Beta vulgaris Sinapis arvensis Raphanus raphanistrum Senecio vulgaris Polygonum lapathifolium Lamium purpureum Galium aparine Chenopodium album Stellaria media Spergula arvensis Viola arvensis Rumex obtusifolius Solanum nigrum
0.025 and 0.1	None listed as no weeds controlled	None

Comments on results

Activity experiment

Although broad-leaved species were not killed by the foliar spray even at the high dose, symptoms were observed on all three of these at a very low dose of 0.025 kg/ha. The soil drench, post-emergence was the most effective means of application on the two small-seeded annuals, kale and perennial ryegrass. Where effects were found pre-emergence e.g. on kale, perennial ryegrass and Avena fatua, they tended to be greater with the surface spray rather than with incorporation.

Symptoms on susceptible species

Inhibition of growth, chlorosis and necrosis were the most prominent symptoms, thus being reminiscent of herbicides which inhibit photosynthesis such as ureas and triazines. Unlike the latter however, poor emergence was observed with kale and Avena fatua in pre-emergence treatments.

Post-emergence selectivity

Although no weeds were controlled at the two lower doses, thirteen annual broad-leaved weeds were controlled at the highest dose of 0.4 kg/ha. The three exceptions were Chrysanthemum segetum, Matricaria perforata and Veronica persica, but all of these were reduced in vigour by 50%. Grass weeds were resistant.

Crop tolerance was found with all monocotyledonous species, wheat, barley, oat, maize, perennial ryegrass and onion all of which withstood the highest dose of 0.4 kg/ha. Surprisingly peas also tolerated the highest dose.

The potential control of problem weeds such as Galium aparine and Viola arvensis in cereals in perhaps the most interesting feature of PPG 1259.

However many more annual broad-leaved weeds can apparently be controlled in these crops, onion and peas and further investigations are warranted.

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