BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

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Table 7 Crop tolerance and weed sensitivity to pre-emergence treatments of DPX-A7881

Dose (kg a.i./ha)	Tolerant crops[a]	Sensitive weeds[b]
0.160	No crops tolerant	Bromus sterilis Fallopia convolvulus Galium aparine Geranium dissectum Cirsium arvense Veronica persica (plus species listed below)
0.040	(species listed above plus) Wheat + safener Oat + safener	Festuca rubra Elymus repens Sinapis arvensis Chrysanthemum segetum Polygonum lapathifolium Lamium purpureum Viola arvensis Convolvulus arvensis (plus species listed below)
0.010	(species listed above plus) Wheat Barley +/- safener Maize +/- safener Dwarf bean Field bean Pea Oilseed rape Swede Carrot	Alopecurus myosuroides Festuca rubra Solanum nigrum Poa annua Poa trivialis Matricaria perforata Rumex obtusifolius Senecio vulgaris Stellaria media

[a] Vigour reduced by less than 15%

[b] Number or vigour reduced by 70% or more.

Comments on results

Activity test data, symptoms on susceptible species and post-emergence selectivities of DPX-A7881 were reported previously (West, 1988). This herbicide showed pre- and post-emergence activity against a range of grass and broad-leaved weeds. Symptoms of growth inhibition and chlorosis were similar to other sulphonyl urea herbicides.

Soil persistence

DPX-A7881 showed a long period of soil persistence. Fifty-two weeks after spraying, the lowest dose, 0.01 kg a.i./ha, caused appreciable phytotoxicity to perennial ryegrass sown into treated soil, while the 0.04 and 0.16 kg a.i./ha doses completely inhibited growth soon after coleoptile emergence.

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

Pre-emergence selectivities

Five broad-leaved and four grass weed species were sensitive to 0.01 kg a.i./ha, including some problem species, e.g. Matricaria perforata, Solanum nigrum, Stellaria media, Alopecurus myosuroides and Poa annua. At 0.04 kg a.i./ha a further six broad-leaved and two grass weeds were sensitive, including Lamium purpureum, Viola arvensis and Elymus repens. The highest dose, 0.16 kg a.i./ha, controlled several intractable weed species, e.g. Galium aparine, Fallopia convolvulus and Bromus sterilis.

No crops were tolerant to 0.16 kg a.i./ha and the only crops unaffected by 0.04 kg a.i./ha were wheat and oat, when seed dressed with the safener. Wheat, barley, maize, oilseed rape, swede, large seeded legumes and carrot were unaffected by 0.01 kg a.i./ha. The most sensitive crops were perennial rye-grass, sugar beet and onion, all considerably damaged by 0.01 kg a.i./ha.

Discussion

Pre-emergence treatments of DPX-A7881 were active against a wide range of grass and broad-leaved weed species. Unfortunately, crop tolerance to pre-emergence applications was limited, especially on the brassica crops which showed appreciable tolerance to post-emergence treatments. For instance, oilseed rape only tolerated 0.01 kg a.i./ha pre-emergence but was unaffected by 0.16 kg a.i./ha applied post-emergence (West, 1988). However, some problem weeds of brassica, legume and cereal crops were controlled at 0.01 kg a.i./ha.

The safening of wheat and oat to DPX-A7881 by NA is interesting, as DPX-A7881 differs in its spectrum of activity from other sulphonyl-ureas e.g. chlorsulfuron, for which safening of maize by NA has been observed. Whereas cereals are tolerant to chlorsulfuron, which has poor activity against grass weeds, DPX-A7881 is intended for use in oilseed rape and is active on grass species, including cereals, and broad-leaved weeds. Therefore, the possibility may exist to control a wider range of weeds in some cereals, by using safeners. Further investigation into the practical potential of safeners may be warranted.

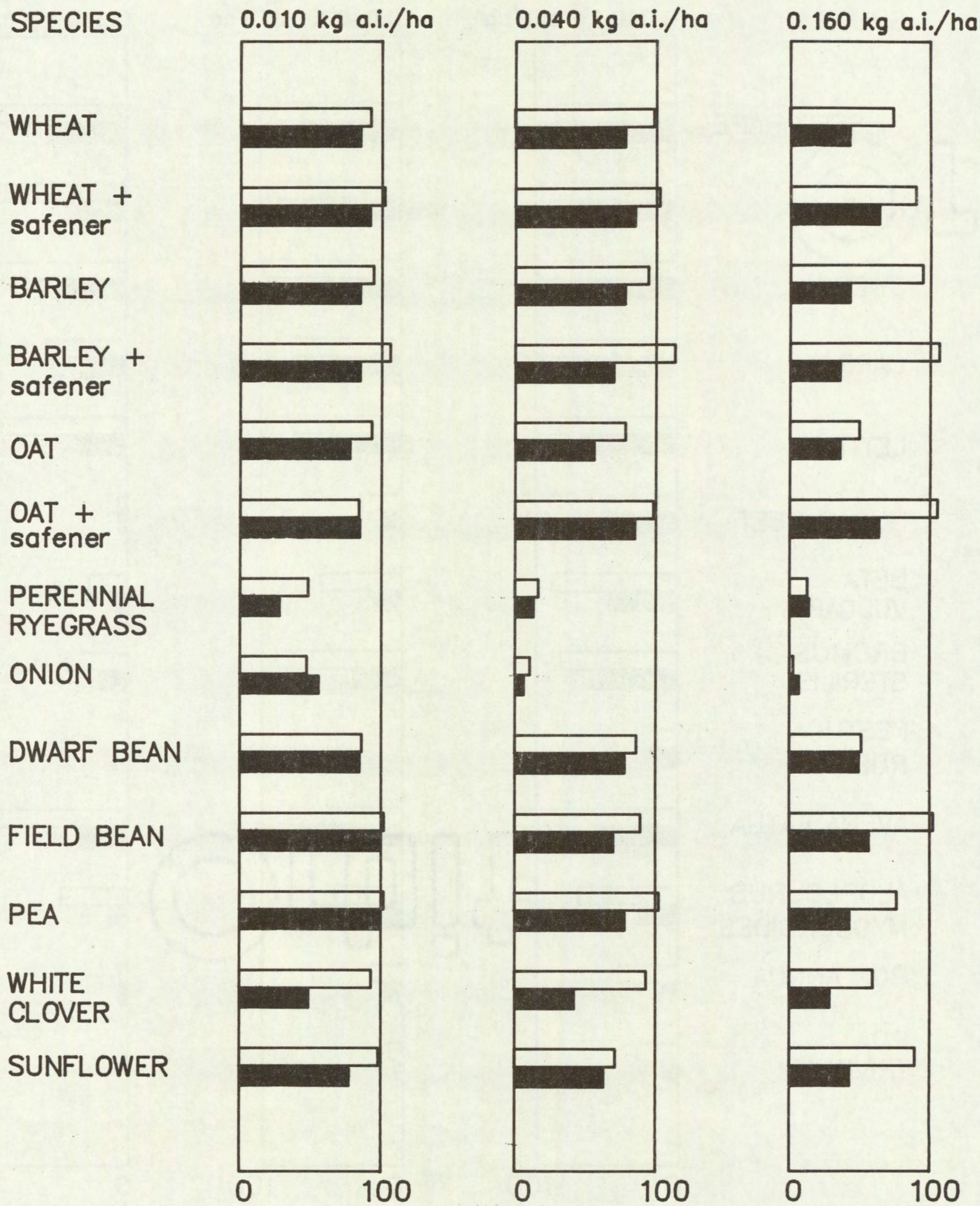
Also, studies on the interactions of NA and sulphonyl urea herbicides and on the mode and site of action within plants may be useful to more fully understand why safening occurs, and how it can be enhanced to increase crop tolerance.

Results from the persistence experiment showed that length of phytotoxicity from DPX-A7881 residues in the soil could cause problems on susceptible following crops.

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

PRE-EMERGENCE SELECTIVITY EXPERIMENT

DPX-A7881



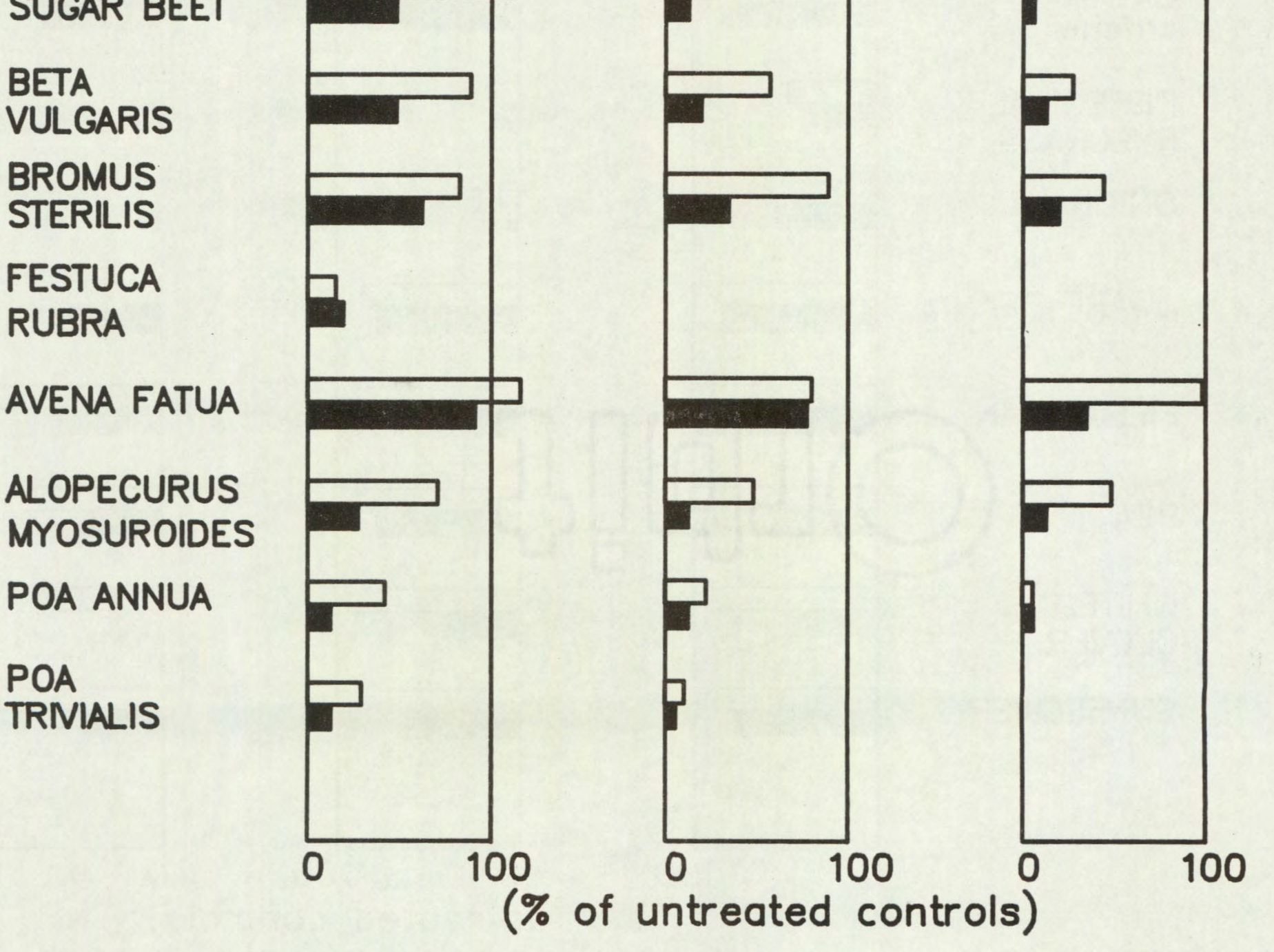
□ = number of plants

■ = vigour

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

PRE-EMERGENCE SELECTIVITY EXPERIMENT

DPX-A7881



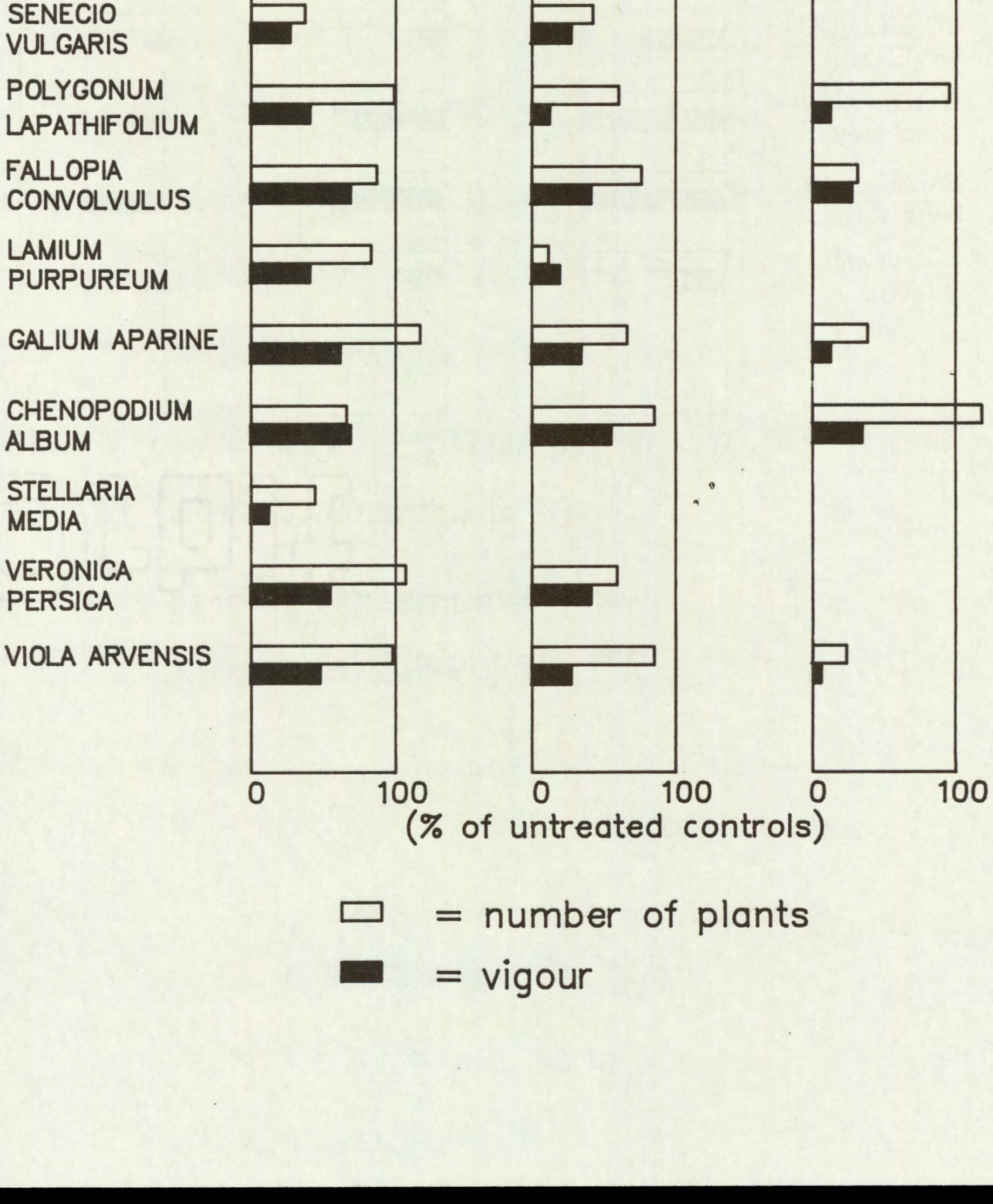
□ = number of plants

■ = vigour

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

PRE-EMERGENCE SELECTIVITY EXPERIMENT

DPX-A7881



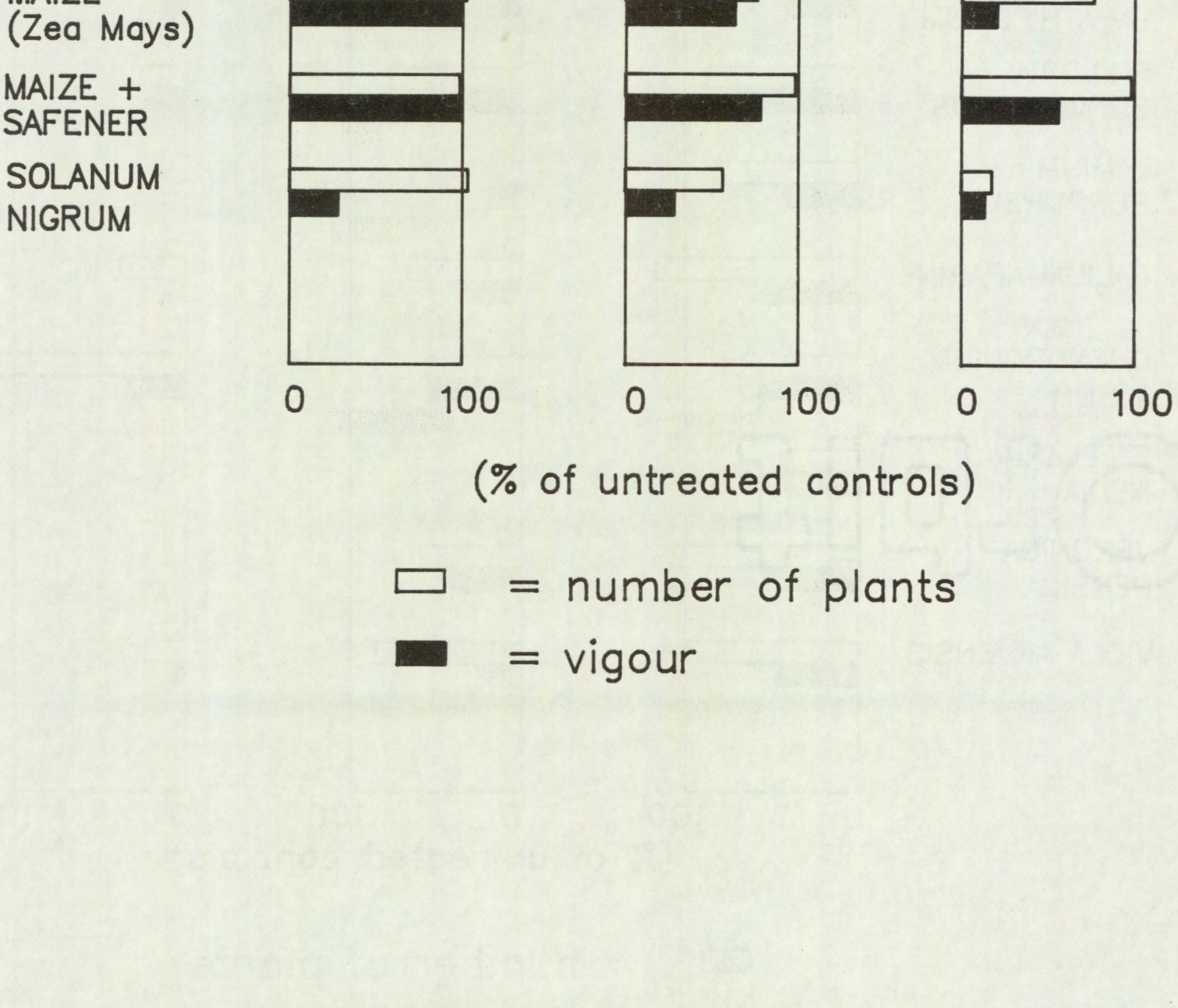
= number of plants

= vigour

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

PRE-EMERGENCE SELECTIVITY EXPERIMENT

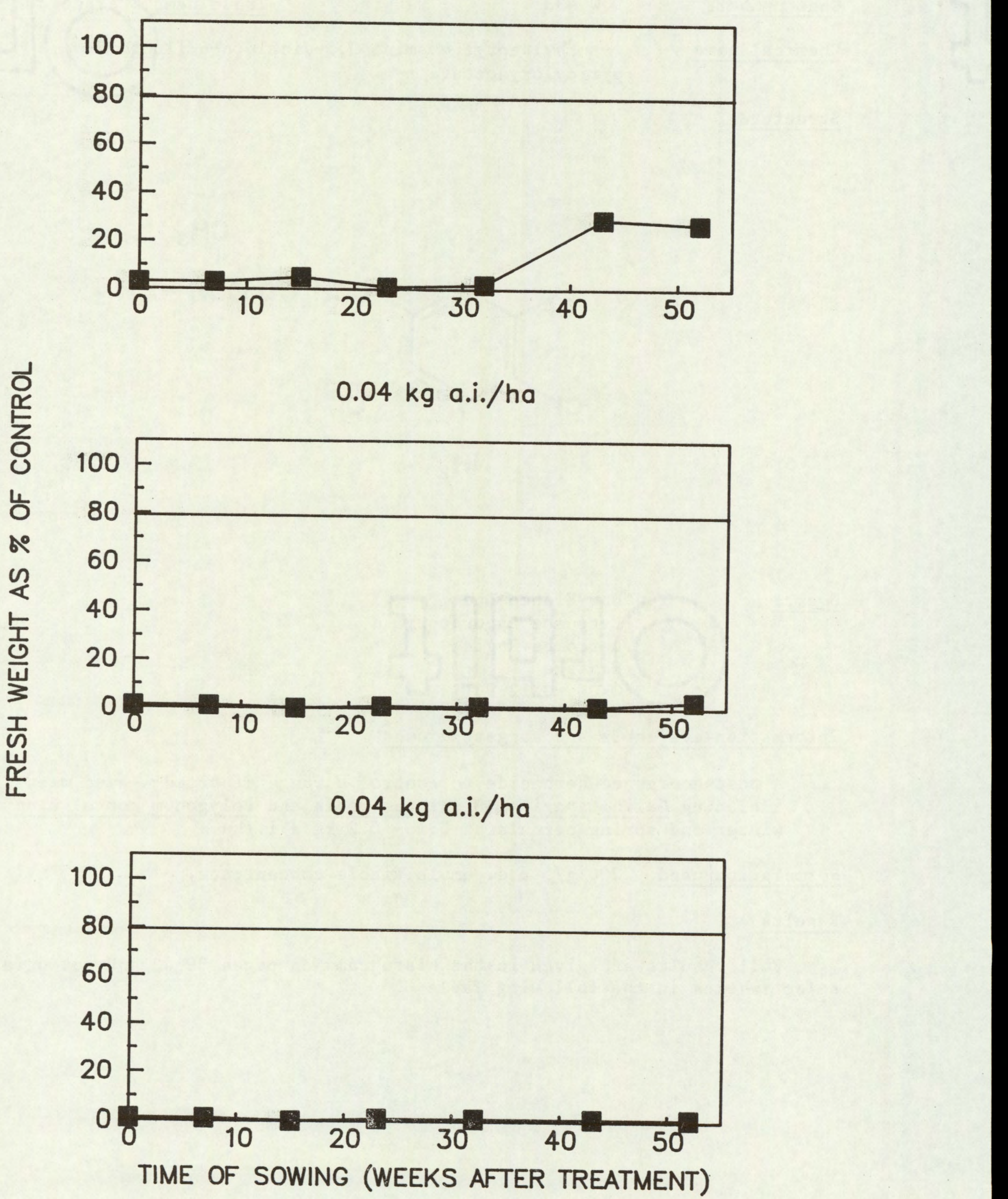
DPX-A7881



BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

PERSISTENCE OF DPX–A 7881

SPECIES : PERENNIAL RYEGRASS

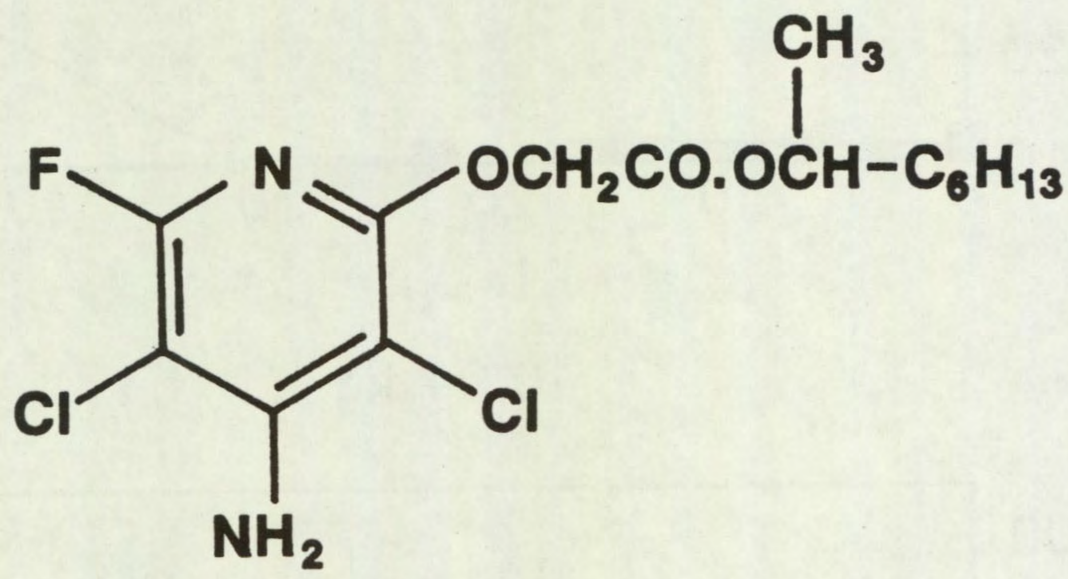


Fluroxypyr-(methylheptyl)

Code number DOW 433 **Trade name** Starane 2

Chemical name 1-methylheptyl 4-amino-3,5-dichloro-6-fluoro-2-pyridyloxyacetate

Structure



Source

Dow Elanco Ltd
Letcombe Laboratory
Letcombe Regis
Wantage
OXON, OX12 9JT

Information available and suggested uses

A post-emergence herbicide to control a range of broad-leaved weeds including Galium aparine, Stellaria media and Polygonum convolvulus in winter and spring cereals at 0.1 - 0.2 kg a.i./ha.

Formulation used 200 g/l a.e. emulsifiable concentrate.

Results

Full results are given in the histograms on pages 39-42 and potential selectivities in the following Table 8.

Table 8 Crop tolerance and weed sensitivity to pre-emergence treatments of fluroxpyr

Dose (kg a.i./ha)	Tolerant crops[a]	Sensitive weeds[b]
1.0	Oat +/- safener	Alopecurus myosuroides Poa trivialis Sinapis arvensis Beta vulgaris Chrysanthemum segetum Polygonum lapathifolium Fallopia convolvulus Lamium purpureum Veronica persica Viola arvensis Geranium dissectum Rumex obtusifolius Cirsium arvense
0.2	(species listed above plus) Wheat +/- safener Barley +/- safener Maize +/- safener Sunflower	Matricaria perforata Senecio vulgaris Galium aparine Stellaria media Solanum nigrum
0.04	(species listed above plus) Perennial ryegrass Dwarf bean Field bean Pea Oilseed rape Kale Swede	No weed species controlled

[a] Vigour reduced by less than 15%

[b] Number or vigour reduced by 70% or more.

Comments on results

Activity test data, symptoms on susceptible species and post-emergence selectivities of fluroxypyr were reported previously (Richardson, West & Parker, 1981b). From this data this herbicide showed both pre- and post-emergence activity against broad-leaved species. The distinctive symptoms being epinasty of stems, petioles and leaves.

In this pre-emergence test fluroxypyr was seen to reduce germination of sensitive species and cause darkening, bending of leaves and growth reduction of some grass species at high doses.

Soil persistence

Fluroxypyr showed a short to moderate period of soil persistence. Initially, sugar beet sown into treated soil was unaffected by fluroxypr, at 0.04 kg a.i./ha, but was sensitive to 0.2 and 1.0 kg a.i./ha. After 16 weeks only slight effects were observed on sugar beet sown into treated soil at 0.2 kg a.i./ha, while after 26 weeks phytotoxicity had virtually disappeared. The highest dose, 1 kg a.i./ha, still caused slight epinasty on sugar beet sown after 40 weeks, but after 50 weeks it was unaffected.

Pre-emergence selectivities

No weed species were sensitive to 0.04 kg a.i./ha. Galium aparine, Stellaria media, Matricaria perforata, Senecio vulgaris and Solanum nigrum were sensitive to 0.20 kg a.i./ha. A further eleven broad-leaved species and two grasses, Alopecurus myosuroides and Poa trivialis were sensitive to 1 kg a.i./ha. The larger seeded grasses, Avena fatua and Bromus sterilis, And the broad-leaved species Raphanus raphanistrum were relatively unaffected by 1 kg a.i./ha.

Oat was the only crop tolerant at 1 kg a.i./ha, leaf bending was apparent on the other cereals at this dose. Wheat, barley, maize and sunflower were unaffected at 0.2 kg a.i./ha, and perennial rye-grass, large seeded legumes and brassicas tolerant at 0.04 kg a.i./ha. The most sensitive crop was white clover which failed to emerge from 0.2 kg a.i./ha.

Discussion

Fluroxypyr was included in this test to complete the data set on its activity and selectivity, the post-emergence selectivity having been investigated several years previously (Richardson, West and Parker, 1981).

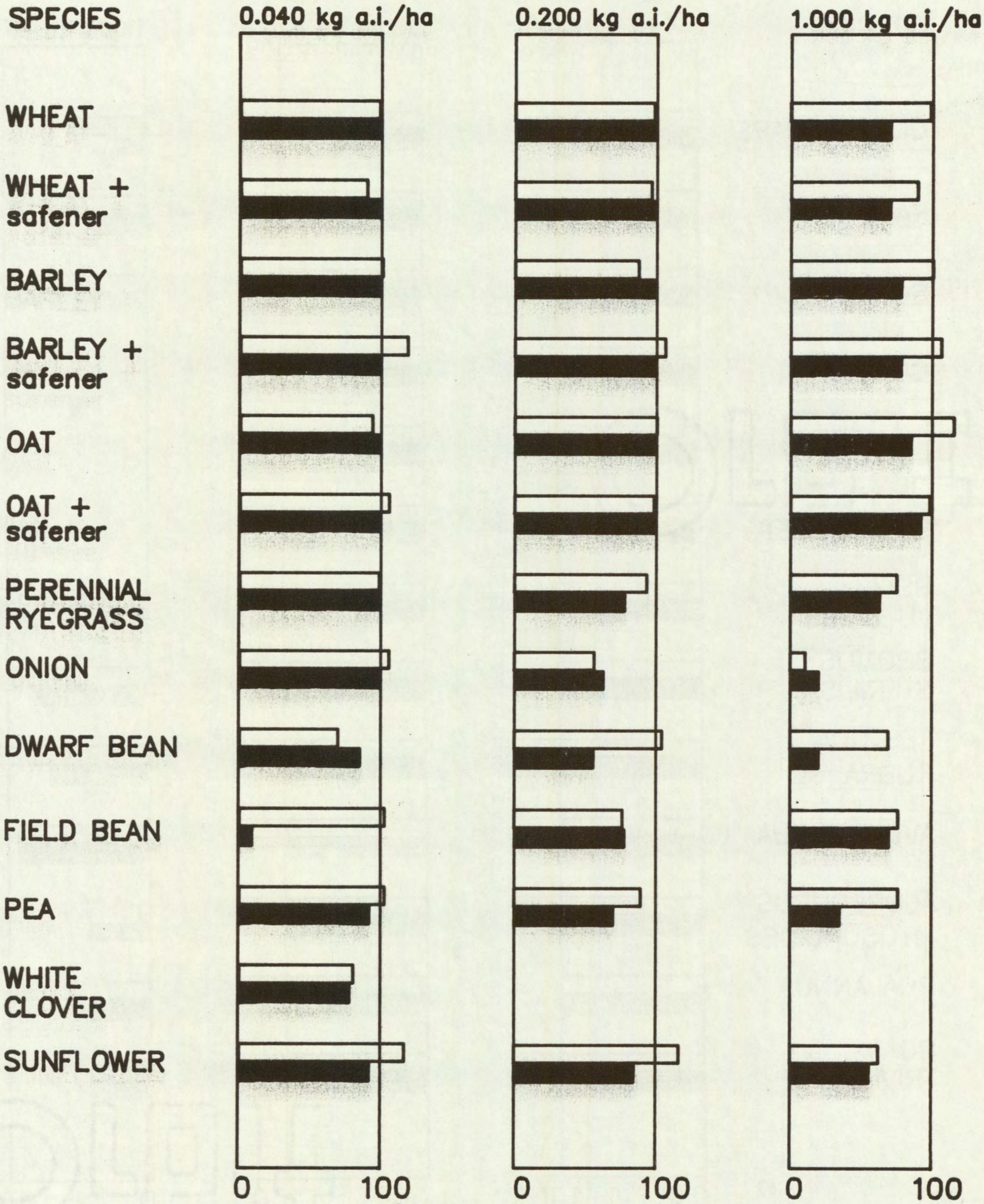
Fluroxypyr exhibited pre-emergence activity, although it is used primarily as a post-emergence herbicide. At 0.2 kg a.i./ha the recommended post-emergence field dose, a limited range of broad-leaved weeds were controlled pre-emergence, similar to those found previously post-emergence (Richardson et al., 1981b). These included the problem cereal weeds, Galium aparine and Stellaria media. There was good crop tolerance of the cereals to pre-emergence treatments, but perennial rye-grass was appreciably more susceptible. Oat showed exceptional tolerance, being unaffected by 1 kg a.i./ha, at which dose sixteen of the broad-leaved weeds tested were sensitive.

The tolerance of sunflower, to 0.2 kg a.i./ha pre-emergence, was perhaps unexpected in view of the activity of fluroxypyr against other broad-leaved species, especially composites. Further investigation to determine post-emergence selectivity may be warranted, if the sensitive weeds are species are likely to cause problems early in the life of the sunflower crop.

Results of the persistence test for fluroxypyr indicate there should not be problems with carry over to subsequent crops and that the moderate persistence, coupled with its pre-emergence activity, should be advantageous in controlling sensitive weed species emerging after spraying.

PRE-EMERGENCE SELECTIVITY EXPERIMENT

FLUROXYPYR

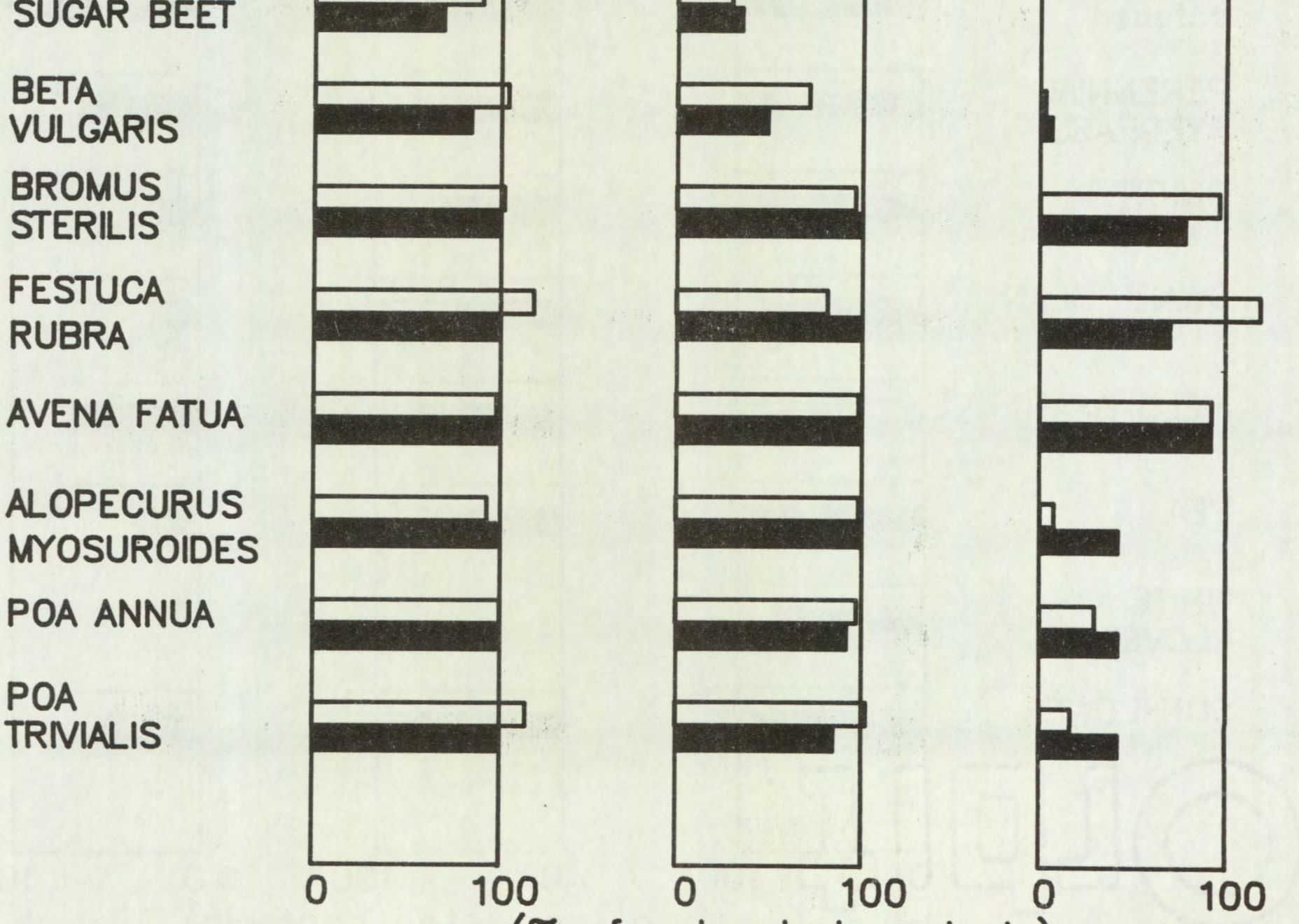


□ = number of plants

■ = vigour

PRE-EMERGENCE SELECTIVITY EXPERIMENT

FLUROXYPYR

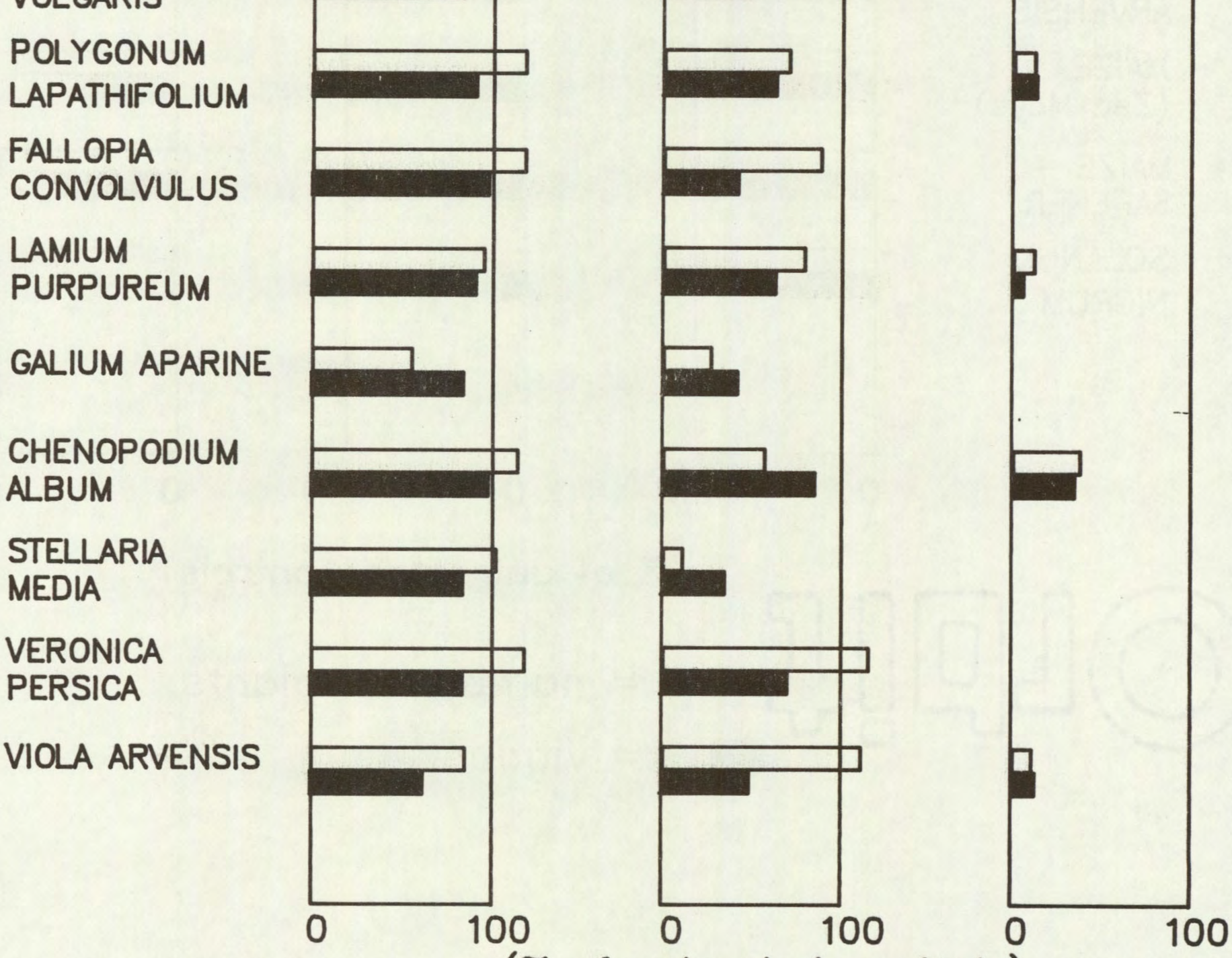


□ = number of plants

■ = vigour

PRE–EMERGENCE SELECTIVITY EXPERIMENT

FLUROXYPYR

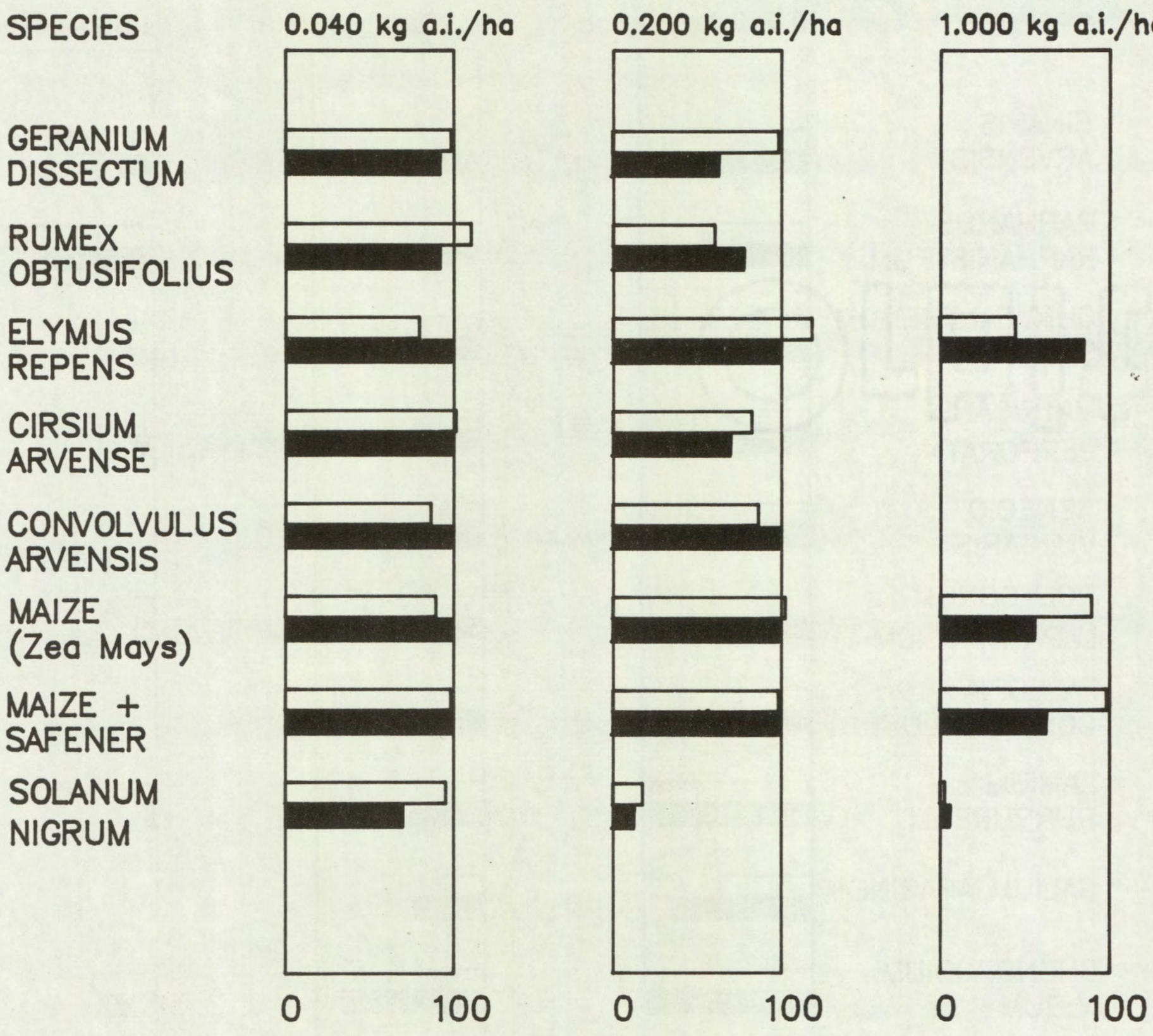


□ = number of plants

■ = vigour

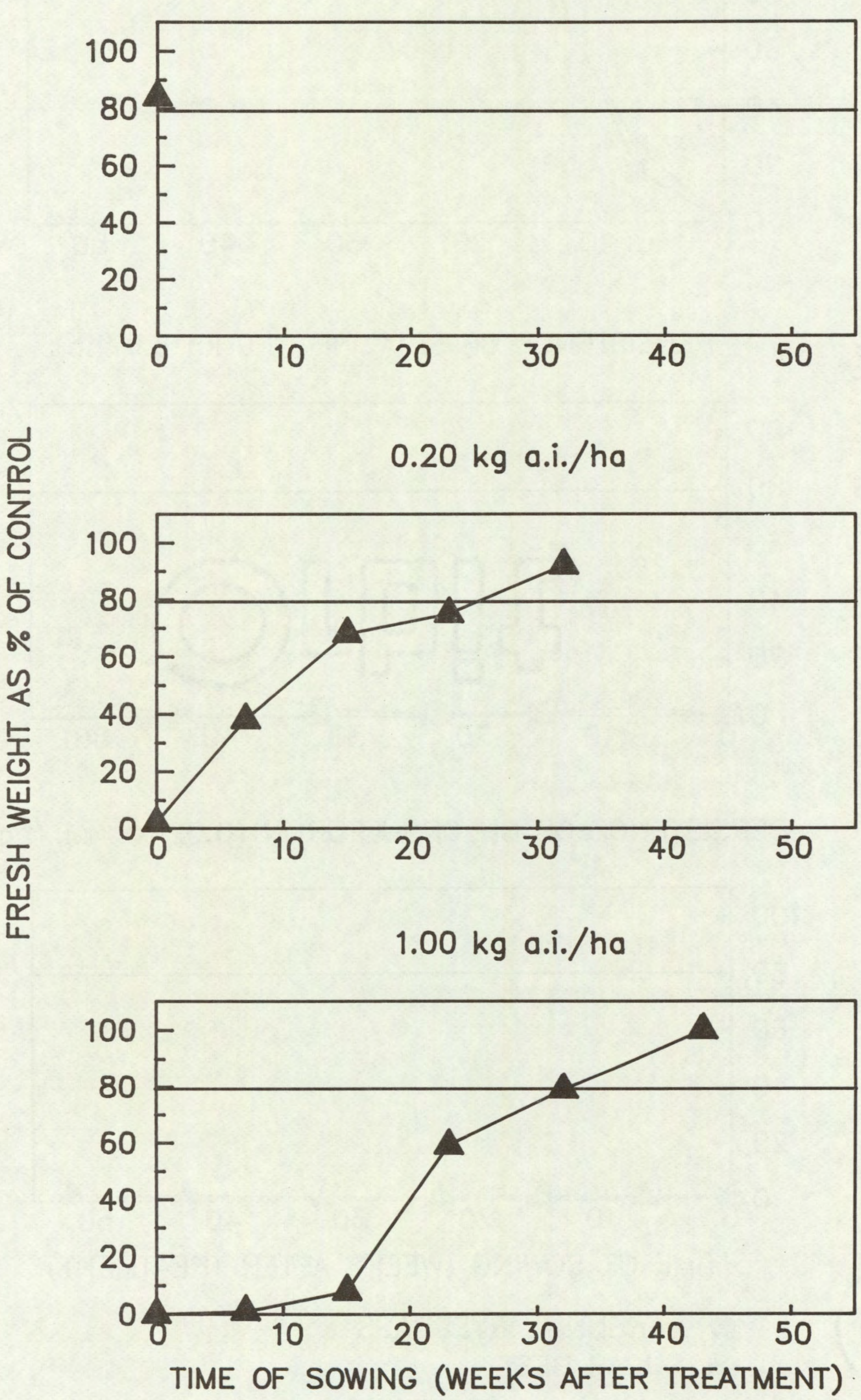
PRE–EMERGENCE SELECTIVITY EXPERIMENT

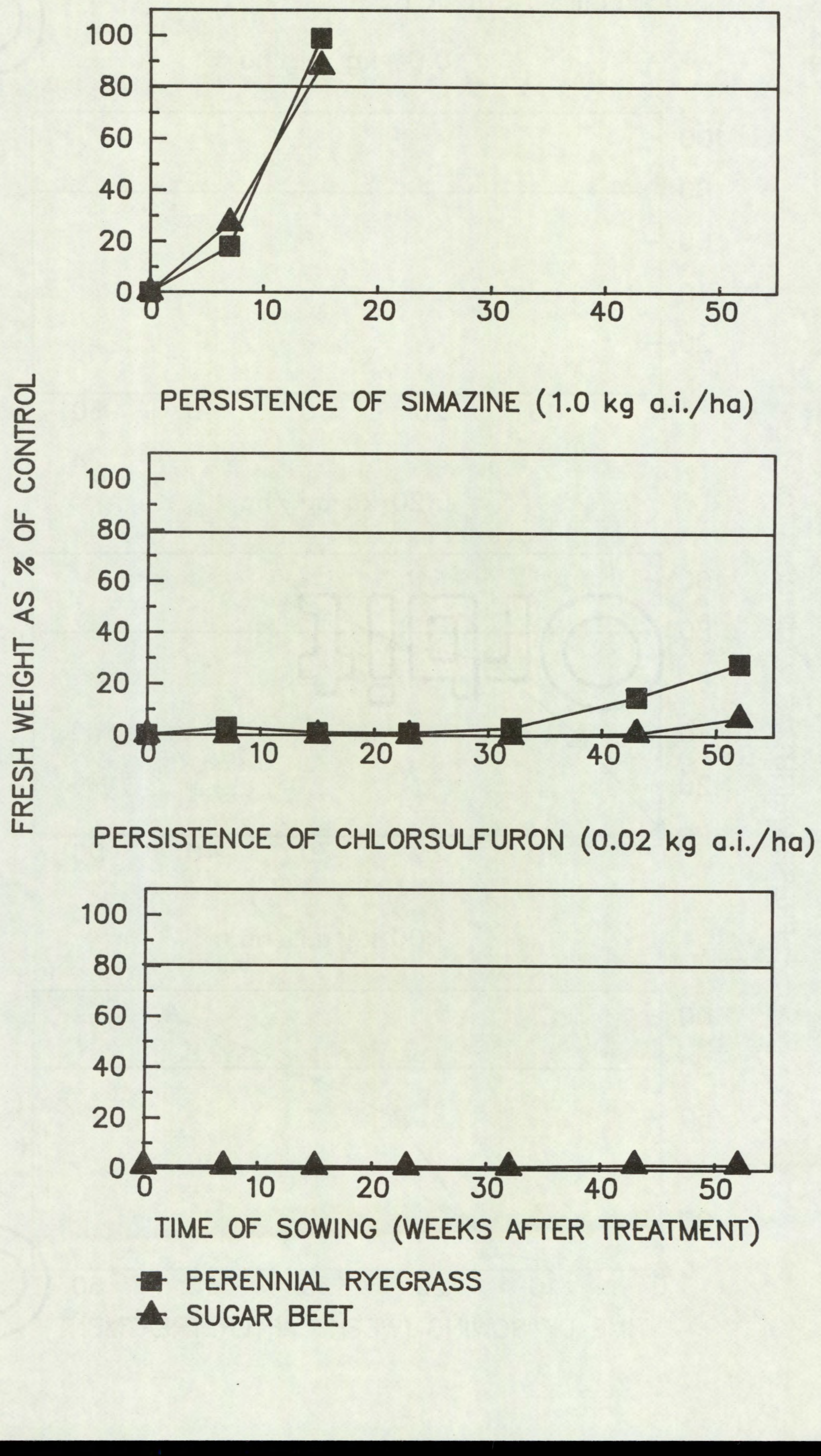
FLUROXYPYR



PERSISTENCE OF FLUROXYPYR

SPECIES : SUGAR BEET




PERSISTENCE OF CYANAZINE (1.0 kg a.i./ha)
PERSISTENCE OF SIMAZINE (1.0 kg a.i./ha)
PERSISTENCE OF CHLORSULFURON (0.02 kg a.i./ha)
FRESH WEIGHT AS % OF CONTROL
100
80
60
40
20
0
0
10
20
30
40
50
TIME OF SOWING (WEEKS AFTER TREATMENT)
PERENNIAL RYEGRASS
SUGAR BEET

BAS 518 00H is cycloxydim, DPX-L5300 is tribenuron-methyl, DPX-A7881 is ethametsulfuron-methyl

ACKNOWLEDGEMENTS

I am most grateful to Mr R.J. Tutcher, Mr R.F. Hughes and his staff for practical assistance; to Mr C.J. Marshall for processing the experimental data; Mrs S.M. Brooks for assistance with graphics; to Mrs C.P.P. Cooke for typing this report; Scientific Liaison for its reproduction and to the manufacturers who kindly provided the chemicals and relevant data.

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Appendix 2. Species, abbreviations, cultivars and stages of growth of assessment

Species	Cultivar or Source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons
Wheat (*Triticum aestivum*)	Avalon	8	1	5 leaves 1 tiller
Wheat + safener	Avalon	8	1	5 leaves 1 tiller
Barley (*Hordeum vulgare*)	Igri	8	1	5 leaves 1 tiller
Barley + safener	Igri	8	1	5 leaves 1 tiller
Oat (*Avena sativa*)	Peniarth	8	1	6 leaves
Oat + safener	Peniarth	8	1	6 leaves
Perennial ryegrass (*Lolium perenne*)	Melle	12	0.5	6 tillers
Onion (*Allium cepa*)	White Lisbon	15	0.5	3 leaves
Dwarf bean (*Phaseolus vulgaris*)	The Prince	3	2	2 trifoliate leaves
Field bean (*Vicia faba*)	Maris Bead	4	1.5	8 leaves
Pea (*Pisum sativum*)	Meteor	4	1.5	8 leaves flowering
White clover (*Trifolium repens*)	Huia	15	0.25	15 trifoliates
Sunflower (*Helianthus annuus*)	Frankasol 1986	7	1.5	3 pairs leaves
Oilseed rape *Brassica napus oleifera*)	Jet Neuf 1986	12	0.5	4 leaves
Kale (*Brassica oleracea acephala*)	Marrowstem 1986	12	0.5	4 leaves

Species	Cultivar or Source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons
Swede (Brassica napus)	Marian 1986	12	0.5	4 leaves
Carrot (Daucus carota)	Chantenay Red Cored 1986	12	0.5	5 leaves
Lettuce (Lactuca sativa)	Webbs Wonderful 1986	15	0.5	6 leaves
Sugar beet (Beta vulgaris)	Samson 1986	8	1	3 pairs leaves
Beta vulgaris (Wild beet)	Broom's Barn 1986	15	1	3 pairs leaves
Bromus sterilis	Herbiseed 1986	8	1	4 leaves 3 tillers
Festuca rubra	Herbiseed 1986	20	0.5	5 leaves, 4 tillers
Avena fatua	WRO 1980	10	1	5 leaves
Alopecurus myosuroides	Herbiseed 1986	20	0.25	5 tillers
Poa annua	Herbiseed 1986	20	0.25	8 tillers
Poa trivialis	Herbiseed 1986	16	0.25	8 tillers
Sinapis arvensis	B & S Weed Seed Suppliers 1985	15	0.5	6 leaves
Raphanus raphanistrum	Herbiseed 1986	10	0.5	7 leaves
Chrysanthemum segetum	B&S Weed Seed Sup. 1985	25	Surface	13 leaves
Matricaria perforata	Herbiseed 1986	25	Surface	12 leaves
Senecio vulgaris	Herbiseed 1986	15	Surface	7 leaves flowering

Species	Cultivar or Source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons
Polygonum lapathifolium	Herbiseed 1986	20	0.25	9 leaves
Fallogia convolvulus	Herbiseed 1986	20	0.5	12 leaves
Lamium purpureum	Herbiseed 1986	20	0.5	6 pairs leaves flowering
Galium aparine	Herbiseed 1986	16	0.5	8 whorls + axillaries
Chenopodium album	Herbiseed 1986	15	0.25	9 leaves flowering
Stellaria media	Herbiseed 1986	20	0.25	10 leaves + axillaries
Veronica persica	Herbiseed 1986	20	0.25	5 pairs leaves, + axillaries
Viola arvensis	Herbiseed 1986	25	0.25	6 leaves
Geranium dissectum	Herbiseed 1986	10	0.5	6 leaves
Rumex obtusifolius	Herbiseed 1986	15	0.25	6 leaves
Elymus repens	WRO Clone 31	6	1	7 leaves 1 tiller
Cirsium arvense	WRO Clone 1	6	1	10 leaves
Convolvulus arvensis	Herbiseed 1986	20	0.5	8 leaves
Maize (Zea mays)	L.G.11 1985	4	2	5 leaves
Maize + safener	L.G.11	4	2	5 leaves
Solanum nigrum	Herbiseed 1986	15	Surface	8 leaves

TM/CC/9.

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*	$\surd$
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.

Grant Aided

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