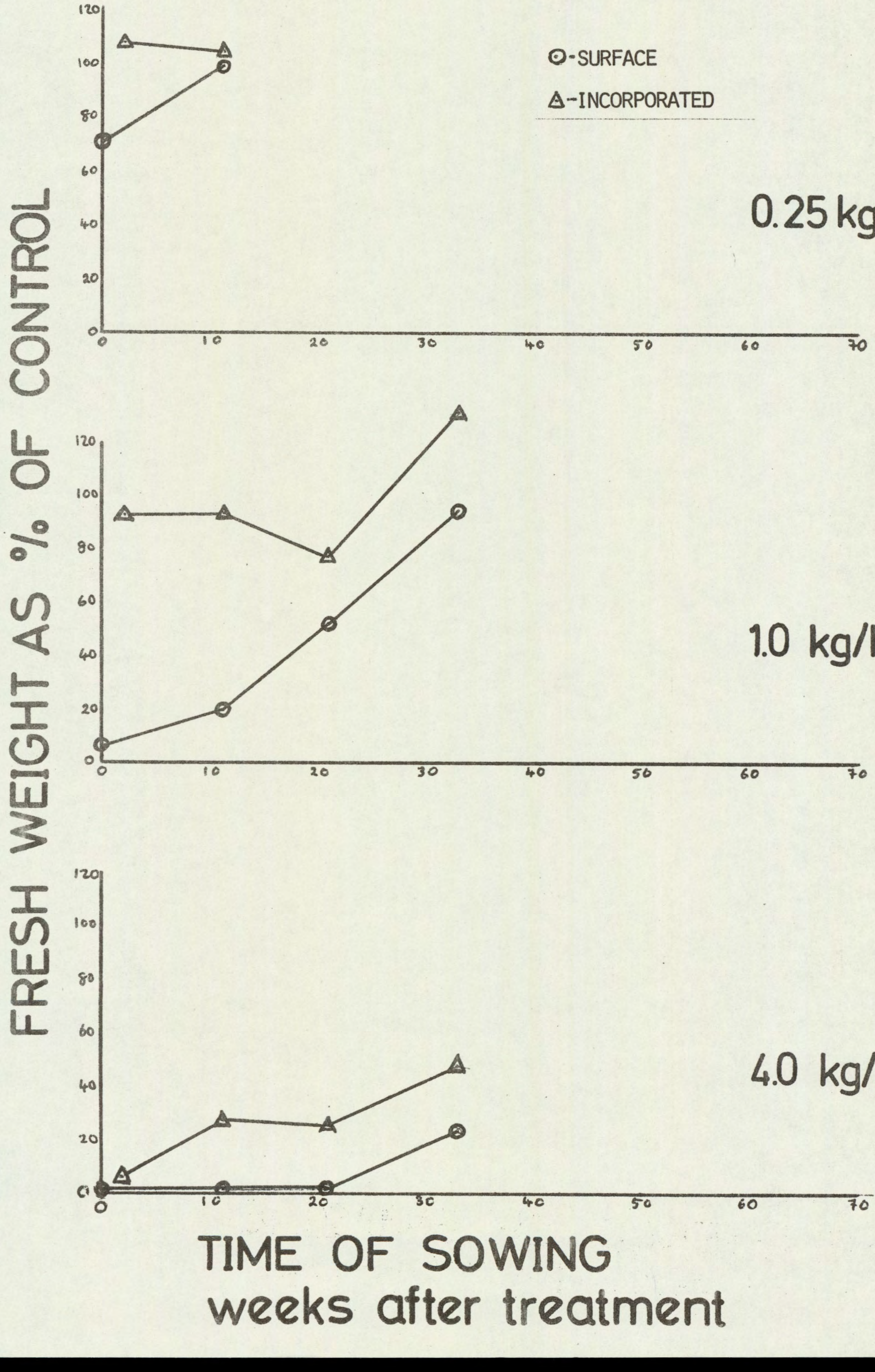
Click here for previous

PRE-EMERGENCE SELECTIVITY TEST

SPECIES		NC 20484 0.25 kg/ha		NC 20484 1.0 kg/ha		NC 20484 4.0 kg/ha	
TOMATO	83	xxxxxxxxxxxxxxxxx	0		0		
(71)	43	xxxxxxxxx	0		0		
OR BART	61	xxxxxxxxxxx	0		0		
(73)	57	xxxxxxxxxxx	0		0		
ECH CRUS	0		0		0		
(75)	0		0		0		
ROTT EXA	5	x	0		30	xxxxxx	
(76)	36	xxxxxxx	0		36	xxxxxxx	
DIG SANG	0		0		0		
(77)	0		0		0		
AMAR RET	0		0		0		
(78)	0		0		0		
BROM PEC	0		0		0		
(82)	0		0		0		
SNO POL	0		0		0		
(83)	0		0		0		
PHAL MIN	0		0		0		
(84)	0		0		0		
CYP ESCU	0		0		0		
(85)	0		0		0		
CYP ROTU	5	x	0		0		
(86)	29	xxxxxx	0		0		

PERSISTENCE OF NC 20484
species: perennial ryegrass

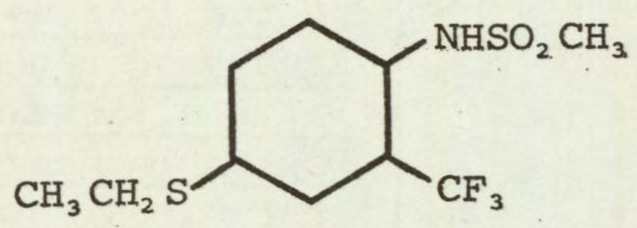


MBR 18337

Code number: MBR 18337

Chemical name: N-[4-(ethylthio)-2-(trifluoromethyl)phenyl]methane sulphonamide

Structure



Source

FBC Limited
Agrochemical Division
Chesterford Park Research Station
Saffron Walden
Essex CB10 1XL
UK

Information available and suggested uses

Grass growth retardation and seedhead suppression in all warm and cool season turf grasses at 0.14 and 2.24 kg a.i./ha depending on species; sucrose enhancement in sugar cane at 0.28 to 1.12 kg a.i./ha; weed control in cotton pre-emergence, pre-plant incorporated or post-emergence at 0.56 to 2.24 kg a.i./ha.

Formulation used: 24% w/v a.i. emulsifiable concentrate

Spray volume: for activity experiment 386 l/ha
for selectivity experiment 367 l/ha

RESULTS

Full results are given in the histograms on pages 30-36 and potential selectivities are summarised in the following table.

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
4.0	None	None listed as no crops tolerant
1.0	pea rape kale radish cowpea groundnut*	Veronica persica Oryza barthii Echinochloa crus-galli Snowdenia polystachya + species below

(Continued overleaf)

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.25	species above + wheat + safener (NA) barley + safener (NA) dwarf bean field bean swede lettuce* fenugreek pigeon pea chickpea cotton kenaf sesamum*	Bromus sterilis Festuca rubra Avena fatua Alopecurus myosuroides Poa annua Poa trivialis Stellaria media Holcus lanatus Agropyron repens Rottboellia exaltata Digitaria sanguinalis Amaranthus retroflexus Bromus pectinatus Phalaris minor

* Note some reductions in number of plants

Comments on results

Activity experiment

The foliar spray was active on all six species causing inhibition of growth even at the lower doses. It tended to be more effective than the soil drenches on the broad-leaved species, but with the grasses effects of the two application methods were similar in degree. However, pre-emergence treatments were the most toxic of all four application methods on the grasses and Polygonum amphibium. The surface and incorporated treatments were similar in degree of effect on dwarf bean, kale and Avena fatua. Perennial ryegrass and P. amphibium were more susceptible to the surface rather than the incorporated treatment but the reverse was true for Agropyron repens. This should be considered when interpreting the results of the selectivity experiment where the herbicide was applied as a surface, pre-emergence spray.

Symptoms

A powerful inhibition of growth developed as a result of all four methods of application, particularly of the apical meristems, these often being swollen as a consequence of the inhibition. Darker green leaves usually developed which were often shiny in appearance. New leaves were sometimes fused together causing deformities such as twisting, cupping and crinkling. Necrosis usually developed at a later stage. With pre-emergence treatments at the higher doses, plants often failed to emerge either from the soil, or the coleoptile or died soon after. The degree of effect on the root system usually corresponded to those on the shoots. Thus, the symptoms are generally very similar to those of NC 20484 and are typical of many of the amide group of herbicides.

Persistence in the soil

Perennial ryegrass was used as the test species. Incorporated treatments at the two lower doses were undetectable after 11 weeks and 4.0 kg/ha after 33 weeks. Surface treatments at the lowest dose were undetectable after 11 weeks, but the two higher doses caused shoot fresh weight reductions of about 37 and 27%, 33 weeks after spraying.

Pre-emergence selectivity among temperate species

All grass weeds tested were killed or controlled at the lowest dose of 0.25 kg/ha. Only two broad-leaved weeds were controlled, however, Stellaria media at 0.25 kg/ha and Veronica persica at 1.0 kg/ha.

Pea and three of the brassicas (kale, rape and radish) were the only crops to tolerate 1.0 kg/ha. At 0.25 kg/ha all other legumes (dwarf bean, field bean and fenugreek) except white clover were tolerant, as were swede and lettuce. Perennial ryegrass and cereals, especially wheat and barley were highly sensitive. However, the NA seed dressing gave complete protection of wheat and barley from 0.25 kg/ha.

Grass weed control was very impressive in a small range of broad-leaved crops but the weakness on broad-leaved weeds would have to be corrected by mixing with another herbicide or herbicides. The safening effect on wheat and barley has been confirmed in a later pot experiment where control of Bromus sterilis was again impressive. Provided that the two treatments (seed dressing and herbicide) are economical, it should offer potential for control of several important grass weeds including Avena fatua, Alopecurus myosuroides and others, such as volunteer cereals, as well as the more recent and more difficult problem of B. sterilis.

Selectivity among tropical species

All the tropical weeds were controlled by 1 kg/ha and several of the more important, including Bromus pectinatus at 0.25 kg/ha. Cowpea, groundnut, chickpea and cotton showed greatest tolerance and a good range of weeds could be selectively controlled in these crops. Maize and sorghum were only slightly protected by their respective safeners, a little surprising in view of the substantial protection of wheat by NA, noted above. The use of NA on wheat could perhaps enable this compound to be used selectively against Bromus pectinatus as well as B. sterilis.

Cyperus species were temporarily suppressed by 1 kg/ha. Suppression by 4 kg/ha lasted about six weeks after which there was strong recovery.

ACTIVITY EXPERIMENT

MBR 18337

		0.1 kg/ha	0.5 kg/ha	2.5 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxxx xxxxx
KALE	F	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx
	I	xxxxxxxxx xxxxxxxxxxxx	xxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxx xxxxxxx	xxxxx xxxxx
	I	xxxxxxxxxxxx xxxxxxxxxxxxx +	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxx xxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxx +	xxxx xxxx	o o
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxx xxxxxxx	o o
AVENA FATUA	F	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxx xxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx +	xxxx xxx	o o
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xx xxx	o o
AGROPYRON REPENS	F	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxx xxxxx
	P	xxxxxxxxxxxxx xxxxxxxx	x xxx	o o
	I	xxxxxxxxxxxxx xxxxx	o o	o o

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

PRE-EMERGENCE SELECTIVITY TEST

SPECIES		MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
WHEAT	97	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	0	
(1)	21	xxxx	14	xxx	0	
WHEAT + S	102	xxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	51	xxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	29	xxxxxx	14	xxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx	0	
(3)	43	xxxxxxxxx	14	xxx	0	
BARLEY + S	89	xxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxxx
(4)	93	xxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
OAT	91	xxxxxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx	0	
(5)	71	xxxxxxxxxxxxxx	14	xxx	0	
PER RYGR	43	xxxxxxxxx	23	xxxxx	0	
(6)	21	xxxx	14	xxx	0	
ONION	73	xxxxxxxxxxxxxx	13	xxx	0	
(8)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	
DWF BEAN	91	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxx
(9)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
FLD BEAN	82	xxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxx +
(10)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
PEA	68	xxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	68	xxxxxxxxxxxxxx
(11)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx
W CLOVER	90	xxxxxxxxxxxxxxxxxx	29	xxxxxx	0	
(12)	57	xxxxxxxxxxx	43	xxxxxxxxx	0	

PRE-EMERGENCE SELECTIVITY TEST

SPECIES		MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
RAPE	87	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxxx	69	xxxxxxxxxxxxxx
(14)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
KALE	114	xxxxxxxxxxxxxxxxxxx +	95	xxxxxxxxxxxxxxxxxxx	118	xxxxxxxxxxxxxxxxxxx +
(15)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
SWEDE	106	xxxxxxxxxxxxxxxxxxx +	78	xxxxxxxxxxxxxxxxx	18	xxxx
(17)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	14	xxx
CARROT	82	xxxxxxxxxxxxxxxx	45	xxxxxxxxx	7	x
(18)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
LETTUCE	60	xxxxxxxxxxxx	7	x	0	
(20)	86	xxxxxxxxxxxxxxxxx	29	xxxxxx	0	
FENUGREK	100	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx
(21)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
SUG BEET	90	xxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxx +	56	xxxxxxxxxxx
(22)	71	xxxxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
BETA VUL	99	xxxxxxxxxxxxxxxxxxx	99	xxxxxxxxxxxxxxxxxxx	53	xxxxxxxxxxx
(23)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
BROM STE	5	x	0		0	
(24)	7	x	0		0	
FEST RUB	35	xxxxxxx	0		0	
(25)	29	xxxxxx	0		0	
AVE FATU	103	xxxxxxxxxxxxxxxxxx +	51	R xxxxxxxxxx	0	
(26)	21	xxxx	14	xxx	0	

PRE-EMERGENCE SELECTIVITY TEST

SPECIES		MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
ALO MYOS	73	xxxxxxxxxxxxxxx	0		0	
(27)	14	xxx	0		0	
POA ANN	0		0		0	
(28)	0		0		0	
POA TRIV	4	x	0		0	
(29)	7	x	0		0	
SIN ARV	112	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx
(30)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	50	xxxxxxxxxx
RAPH RAP	93	xxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxx +	84	xxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
CHRY SEG	125	xxxxxxxxxxxxxxxxxxx +	175	xxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxxx
(32)	57	xxxxxxxxxxx	50	xxxxxxxxxx	36	xxxxxxx
TRIP MAR	82	xxxxxxxxxxxxxxxx	55	xxxxxxxxxxx	10	xx
(33)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
SEN VULG	49	xxxxxxxxxx	59	xxxxxxxxxxxx	17	xxx
(34)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	21	xxxx
GAL APAR	50	xxxxxxxxxx	69	xxxxxxxxxxxxxx	19	xxxx
(38)	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx	14	xxx
CHEN ALB	86	xxxxxxxxxxxxxxxx	65	xxxxxxxxxxxxx	24	xxxxx
(39)	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
STEL MED	4	x	2	x	0	
(40)	43	xxxxxxxxx	36	xxxxxxx	0	

PRE-EMERGENCE SELECTIVITY TEST

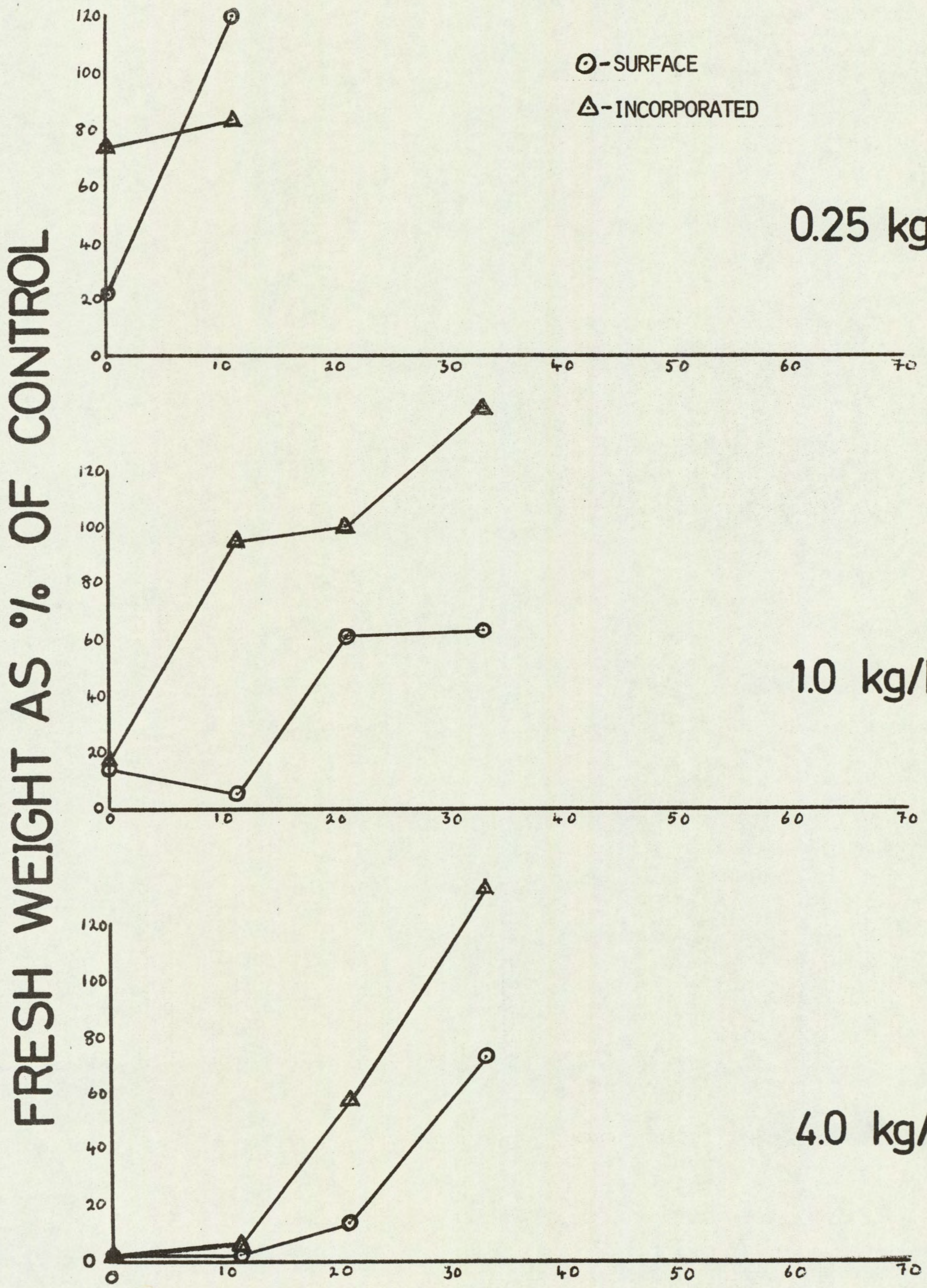
SPECIES		MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
VER PERS	89	xxxxxxxxxxxxxxxxxx	14	xxx	0	
(42)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	0	
RUM OBTU	100	xxxxxxxxxxxxxxxxxxx	54	xxxxxxxxxxx	38	xxxxxxxx
(44)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	21	xxxx
HOLC LAN	0		0		0	
(45)	0		0		0	
AG REPEN	0		0		0	
(47)	0		0		0	
ALL VIN	78	xxxxxxxxxxxxxxxx	37	xxxxxxx	18	xxxx
(49)	71	xxxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
CIRS ARV	112	xxxxxxxxxxxxxxxxxxx +	94	xxxxxxxxxxxxxxxxxx	112	xxxxxxxxxxxxxxxxxxx +
(50)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	57	xxxxxxxxxxx
TUS FARF	95	xxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxx +
(51)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx
MILLET	34	xxxxxxx	0		0	
(55)	64	xxxxxxxxxxxxx	0		0	
MAIZE + S	91	xxxxxxxxxxxxxxxxxx	26	xxxxx	0	
(56)	57	xxxxxxxxxxx	29	xxxxxx	0	
MAIZE	75	xxxxxxxxxxxxxxx	12	xx	0	
(57)	36	xxxxxxx	14	xxx	0	
SORG + S	85	xxxxxxxxxxxxxxxxx	0		0	
(58)	29	xxxxxx	0		0	

SPECIES			MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
SORGHUM	38		xxxxxxxx	0		0	
(59)	14		xxx	0		0	
RICE	23		xxxxx	0		0	
(60)	43		xxxxxxxxx	0		0	
PIGEON P	257	R	xxxxxxxxxxxxxxxxxxxx +	0		0	
(61)	86		xxxxxxxxxxxxxxxxx	0		0	
COWPEA	96		xxxxxxxxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxxxx +	36	xxxxxxx
(62)	100		xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
CHICKPEA	93		xxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +	10	xx
(63)	93		xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	29	xxxxxx
GRNDNUT	75		xxxxxxxxxxxxxxx	56	xxxxxxxxxx	56	xxxxxxxxxx
(64)	86		xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxx
SOYABEAN	105		xxxxxxxxxxxxxxxxxx +	135	xxxxxxxxxxxxxxxxxxxx +	90	xxxxxxxxxxxxxxxxx
(65)	64		xxxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
COTTON	89		xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxx
(66)	86		xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx
JUTE	75		xxxxxxxxxxxxxx	8	xx	0	
(67)	71		xxxxxxxxxxxxx	21	xxxx	0	
KENAF	80		xxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(68)	100		xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	50	xxxxxxxxx
SESAMUM	48		xxxxxxxxx	27	xxxxx	7	x
(70)	86		xxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx

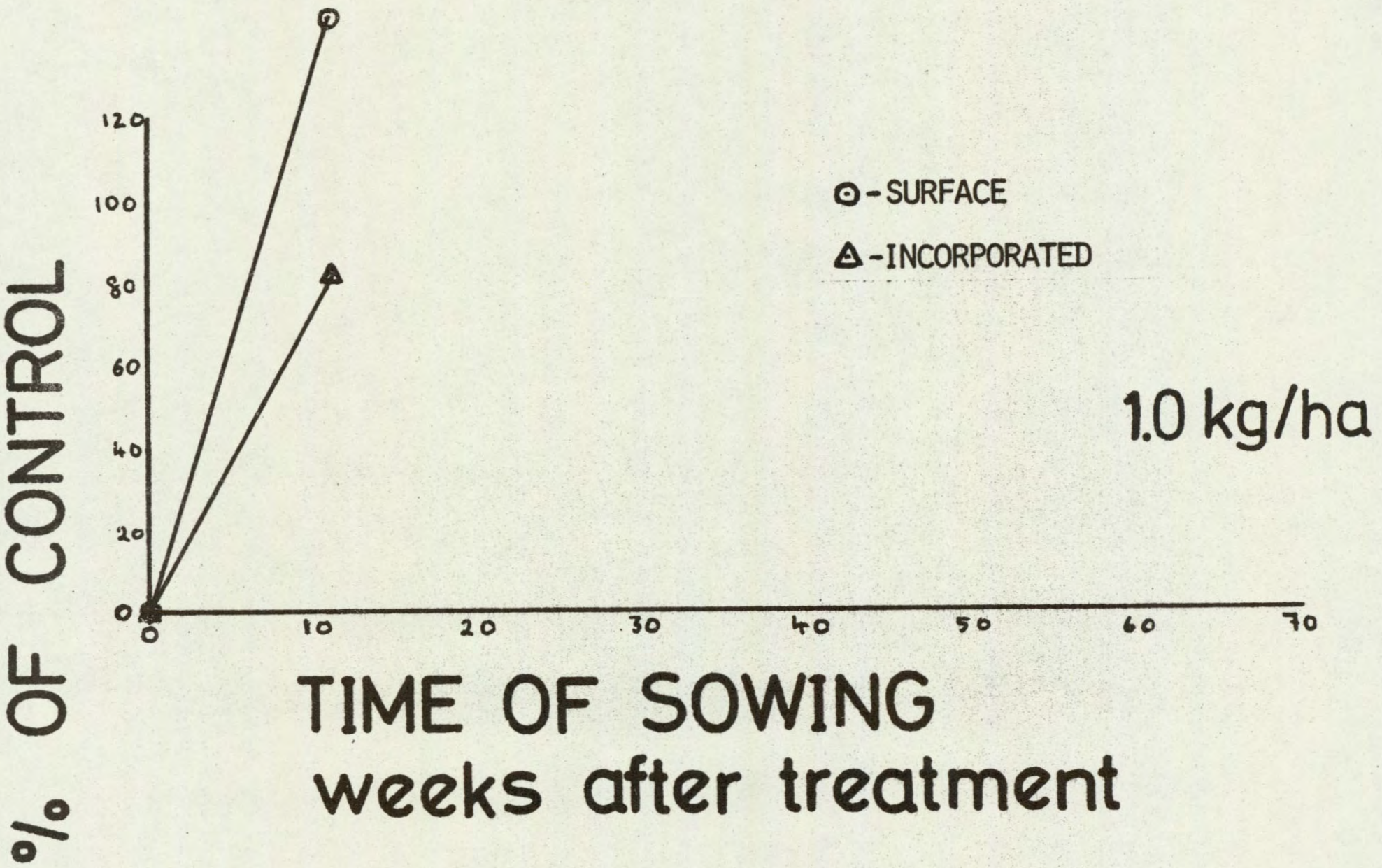
PRE-EMERGENCE SELECTIVITY TEST

SPECIES		MBR 18337 0.25 kg/ha		MBR 18337 1.0 kg/ha		MBR 18337 4.0 kg/ha
TOMATO	108	xxxxxxxxxxxxxxxxxxxx +	67	xxxxxxxxxxxxx	0	
(71)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	
OR BART	92	xxxxxxxxxxxxxxxxxx	0		0	
(73)	43	xxxxxxxxx	0		0	
ECH CRUS	55	xxxxxxxxxxx	0		0	
(75)	50	xxxxxxxxxx	0		0	
ROTT EXA	0		0		0	
(76)	0		0		0	
DIG SANG	0		0		0	
(77)	0		0		0	
AMAR RET	7	x	0		0	
(78)	71	xxxxxxxxxxxxx	0		0	
BROM PEC	16	xxx	0		0	
(82)	14	xxx	0		0	
SNO POL	38	xxxxxxxx	15	xxx	0	
(83)	43	xxxxxxxxx	43	xxxxxxxxx	0	
PHAL MIN	5	x	0		0	
(84)	14	xxx	0		0	
CYP ESCU	75	xxxxxxxxxxxxxxx	58	xxxxxxxxxxxx	0	
(85)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	
CYP ROTU	67	xxxxxxxxxxxxx	31	xxxxxx	0	
(86)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	

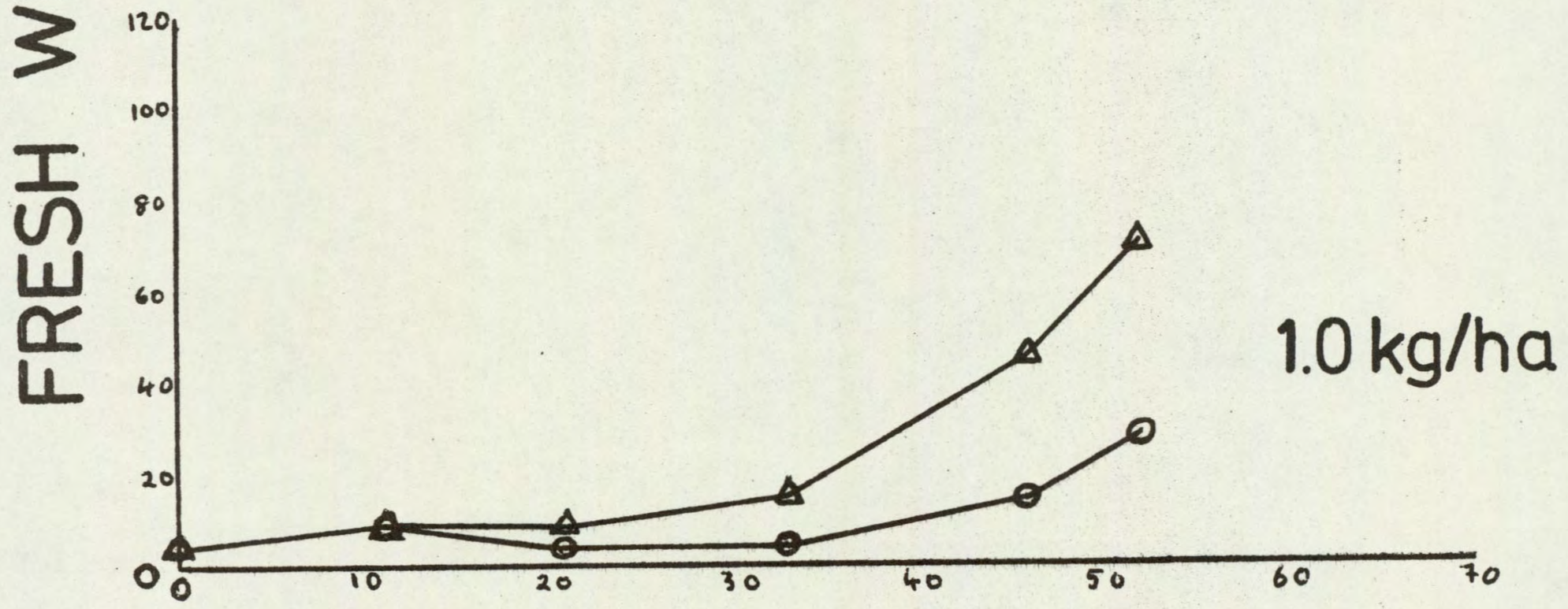
PERSISTENCE OF MBR 18337
species: perennial ryegrass



PERSISTENCE OF CYANAZINE
species: perennial ryegrass



PERSISTENCE OF SIMAZINE
species: perennial ryegrass



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RICHARDSON, W.G. and DEAN, M.L. (1973) The pre-emergence selectivity of some recently developed herbicides: lenacil, RU 12068, metribuzin, cyprazine, EMD-IT 5914 and benthiocarb. Technical Report Agricultural Research Council Weed Research Organization, 25, pp 57.

Appendix 1. Species, abbreviations, cultivars and stage of growth at assessment

	Designation and computer serial number	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Temperate species					
Wheat (Triticum aestivum)	WHEAT (1)	Maris Huntsman	8	1.0	$7\frac{1}{2}$-$9\frac{1}{2}$ leaves, tillering
Wheat + safener (Triticum aestivum)	WHEAT + S (2)	Maris Huntsman	8	1.0	$7\frac{1}{2}$-$9\frac{1}{2}$ leaves, tillering
Barley (Hordeum vulgare)	BARLEY (3)	Sonja	8	1.0	6-8 leaves, tillering
Barley + safener (Hordeum vulgare)	BARLEY + S (4)	Sonja	8	1.0	6-8 leaves, tillering
Oat (Avena sativa)	OAT (5)	Pennal	8	1.0	8-10 leaves, tillering
Perennial ryegrass (Lolium perenne)	PER RYGR (6)	S 23	15	0.5	7-$11\frac{1}{2}$ leaves, tillering
Onion (Allium cepa)	ONION (8)	Hygro	15	0.5	2-$2\frac{1}{2}$ leaves
Dwarf bean* (Phaseolus vulgaris)	DWF BEAN (9)	Masterpiece	4	2.0	2 trifoliate leaves
Field bean (Vicia faba)	FLD BEAN (10)	Maris Blaze	4	2.0	5-6 leaves
Pea (Pisum sativum)	PEA (11)	Dark Skinned Perfection	4	1.5	8-9 leaves
White Clover (Trifolium repens)	W CLOVER (12)	Milkanova	20	0.5	$2\frac{1}{2}$ trifoliate leaves
Rape (Brassica napus oleifera	RAPE (14)	Rapora	15	0.5	4 leaves
Kale (Brassica oleracea acephala)	KALE (15)	Marrowstem	15	0.5	4-5 leaves
Swede (Brassica napus)	SWEDE (17)	Acme	12	0.5	3-4 leaves

* raised with tropical species until emergence, then transferred to lower temperature regime.

	Designation and computer serial number	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Carrot (Daucus carota)	CARROT (18)	Chantenay Red Core	10	0.5	3-4½ leaves
Lettuce (Lactuca sativa)	LETTUCE (20)	Reskia	15	0.5	8 leaves
Fenugreek (Trigonella foenumgraecum)	FENUGREK (21)	Paul	10	0.5	5 trifoliate leaves
Sugar beet (Beta vulgaris)	SUG BEET (22)	Nomo	15	1.0	3½ leaves
Beta vulgaris	BETA VUL (23)	WRO 1979	20	0.5	3½ leaves
Bromus sterilis	BROM STE (24)	WRO 1979	12	0.5	7-8 leaves, tillering
Festuca rubra	FEST RUB (25)	Boreal CDN 86-0192	25	0.25	4½-7 leaves, tillering
Avena fatua	AVE FATU (26)	WRO 1978	10	1.0	6-9 leaves, tillering
Alopecurus myosuroides	ALO MYOS (27)	B and S Supplies 1979	25	0.25	3-6½ leaves, several tillering
Poa annua	POA ANN (28)	B and S Supplies 1978	25	0.5	4-6 leaves, some tillering
Poa trivialis	POA TRIV (29)	WRO 1978	25	0.25	5½-7½ leaves, tillering
Sinapis arvensis	SIN ARV (30)	WRO 1978	15	0.5	6 leaves
Raphanus raphanistrum	RAPH RAP (31)	Long Black Spanish	12	0.5	4 leaves
Chrysanthemum segetum	CHRY SEG (32)	WRO 1979	25	surface	6-8 leaves
Tripleurospermum maritium	TRIP MAR (33)	WRO 1978	35	surface	8 leaves

	Designation and computer serial number	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Senecio vulgaris	SEN VULG (34)	WRO 1979	15	surface	5 leaves
Polygonum lapathifolium	POL LAPA (35)	WRO 1978	15	0.5	nil germination
Polygonum aviculare	POL AVIC (36)	B and S Supplies 1976	50	0.5	nil germination
Galium aparine	GAL APAR (38)	WRO 1978	12	1.0	Up to 16 whorls
Chenopodium album	CHEN ALB (39)	B and S Supplies 1977	30	0.5	6-7 leaves
Stellaria media	STEL MED (40)	B and S Supplies 1979	25	0.5	14 leaves
Veronica persica	VER PERS (42)	WRO 1977	15	0.5	8 leaves
Rumex obtusifolius	RUM OBTU (44)	B and S Supplies 1978	25	0.25	5 leaves
Holcus lanatus	HOLC LAN (45)	B and S Supplies 1977	20	0.5	5-13 leaves, tillering
Agropyron repens	AG REPEN (47)	WRO Clone 31	6/	1.5	8-9 leaves, tillering
Allium vineale	ALL VIN (49)	WRO 1979	12+	1.0	3 leaves
Cirsium arvense	CIRS ARV (50)	WRO Clone 1	4//	1.5	7 leaves
Tussilago farfara	TUS FARF (51)	WRO Clone 1	4/	2.0	4-5 leaves
Tropical species (grown under higher temperature regime)					
Millet (Pennisetum typhoideum)	MILLET (55)	ICRISAT 1977	15	0.5	$5\frac{1}{2}$-6 leaves

	Designation and computer serial number	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Maize + safener (Zea mays)	MAIZE + S (56)	Julia	4	2.0	$5\frac{1}{2}$-$6\frac{1}{2}$ leaves
Maize (Zea mays)	MAIZE (57)	Julia	4	2.0	$5\frac{1}{2}$-$6\frac{1}{2}$ leaves
Sorghum + safener (Sorghum vulgare)	SORG + S (58)	Funk G 268	8	1.0	$5\frac{1}{2}$-6 leaves
Sorghum (Sorghum vulgare)	SORGHUM (59)	Funk G 268	8	1.0	$5\frac{1}{2}$-6 leaves
Rice (Oryza sativa)	RICE (60)	IR 298	10	1.0	3-$3\frac{1}{2}$ leaves
Pigeon pea (Cajanus cajan)	PIGEON P (61)	ICRISAT 1 G 1977	6	1.0	2-4 trifoliate leaves
Cowpea (Vigna unguiculata)	COWPEA (62)	ICRISAT 88-63 1977	5	1.0	3-4 trifoliate leaves
Chickpea (Cicer arietinum)	CHICKPEA (63)	ICRISAT G 62404 1977	6	1.0	$\frac{1}{2}$-15 pinnate leaves
Groundnut (Arachis hypogaea)	GRNDNUT (64)	Valencia 1980	5	2.0	Up to 6 pinnate leaves
Soyabean (Glycine max)	SOYABEAN (65)	Fiskby V.	6	1.0	3-4 trifoliate leaves
Cotton (Gossypium hirsutum)	COTTON (66)	Nigeria 26 J	6	2.0	2-4 leaves
Jute (Corchorus olitorius)	JUTE (67)	UAR 1971	15	0.5	3-6 leaves
Kenaf (Hibiscus cannabinus)	KENAF (68)	Ghana A63-440, 1978	12	0.5	4-6 leaves
Sesamum (Sesamum indicum)	SESAMUM (70)	Uganda 1972	20	0.5	4-6 leaves
Tomato (Lycopersicum esculentum)	TOMATO (71)	Ailsa Craig	8	0.5	4-5 leaves
Oryza barthii	OR BART (73)	Upper Volta 1977	10	1.0	4 leaves
Eleusine indica	ELEU IND (74)	WRO 1977	12	0.5	Nil germination

	Designation and computer serial number	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls, leaf numbers exclusive of cotyledons)
Echinochloa crus-galli	ECH CRUS (75)	WRO 1976	15	0.5	4-6 leaves
Rottboellia exaltata	ROTT EXA (76)	Zambia 1978	15	0.5	$4\frac{1}{2}$-$5\frac{1}{2}$ leaves
Digitaria sanguinalis	DIG SANG (77)	WRO 1973	15	0.25	4-6 leaves
Amaranthus retroflexus	AMAR RET (78)	WRO 1970	100	0.25	4-6 leaves
Solanum nigrum	SOL NIG (81)	WRO 1977	50	0.25	Nil germination
Bromus pectinatus	BROM PEC (82)	Tanzania 1978	10	0.5	$3\frac{1}{2}$-4 leaves
Snowdenia polystachya	SNO POL (83)	Ethiopia 1978	20	0.5	5-7 leaves
Phalaris minor*	PHAL MIN (84)	India 1977	15	0.25	$3\frac{1}{2}$-4 leaves
Cyperus esculentus	CYP ESCU (85)	WRO Clone 2 (ex South Africa)	8**	2.0	Up to 6 leaves
Cyperus rotundus	CYP ROTU (86)	WRO Clone 1 (Zimbabwe)	6**	2.0	Up to 10 leaves
Oxalis latifolia	OXAL LAT (87)	WRO Clone 2 (Cornwall)	15 bulbs	2.0	Nil germination

* = raised with temperate species until emergence, then transferred to higher temperature regime
** = tubers
/ = one node rhizome fragments
// = 4 cm root fragments
+ = aerial bulbils

ABBREVIATIONS

ångstrøm	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.

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