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Table 10. Potential pre-emergence selectivities

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
3.0	cotton*	<u>Polygonum lapathifolium</u> <u>Agropyron repens</u> <u>Allium vineale</u> <u>Oryza punctata</u> <u>Rottboellia exaltata</u> + species below
1.0	species above + wheat radish chickpea	<u>Avena fatua</u> <u>Alopecurus myosuroides</u> <u>Poa annua</u> <u>Senecio vulgaris</u> <u>Polygonum aviculare</u> <u>Stellaria media</u> <u>Eleusine indica</u> <u>Echinochloa crus-galli</u> <u>Digitaria sanguinalis</u> <u>Amaranthus retroflexus</u> + species below
0.33	species above + barley oat dwarf bean field bean pea rape kale swede carrot lettuce maize rice groundnut soyabean sesamum	<u>Poa trivialis</u> <u>Sinapis arvensis</u> <u>Tripleurospermum maritimum</u> <u>Rumex crispus</u>

\* but note some reduction of plant numbers



Table 11. Potential post-emergence selectivities

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
3.0	None	None listed as no crops tolerant
1.0	broad bean	<u>Polygonum aviculare</u> <u>Oryza punctata</u> <u>Eleusine indica</u> <u>Echinochloa crus-galli</u> <u>Amaranthus retroflexus</u> + species below
0.33	species above + wheat barley oat pea rape carrot radish sorghum rice groundnut soybean cotton	<u>Alopecurus myosuroides</u> <u>Poa annua</u> <u>Poa trivialis</u> <u>Sinapis arvensis</u> <u>Chrysanthemum segetum</u> <u>Tripleurospermum maritimum</u> <u>Senecio vulgaris</u> <u>Rumex crispus</u> <u>Chenopodium album</u> <u>Stellaria media</u> <u>Spergula arvensis</u> <u>Solanum nigrum</u> <u>Portulaca oleracea</u>

Comments on results

Activity experiment (see page 26)

Isoproturon was particularly active following soil application. The foliar spray caused considerable damage to the broad-leaved species but had relatively little activity on the grasses. Soil drenches to established annual plants caused a greater effect than either of the pre-emergence treatments. Surface pre-emergence application was generally more damaging to small seeded and perennial species while the incorporated treatments had a greater effect on the larger seeded species. The perennials, however, showed more resistance to all soil applied treatments compared to the annual species.

These variations in response to surface and incorporated treatments should be borne in mind when considering the results of the pre-emergence



selectivity experiment where application was to the soil surface.

### Symptoms

Symptoms were typical of a photosynthetic inhibitor with chlorosis preceding die-back. The foliar spray caused scorch on broad-leaved species. Germination was unaffected following pre-emergence applications.

### Soil persistence

White clover was used as the sensitive test species for isoproturon. Rates of 0.33 and 1.0 kg/ha could not be detected 25 and 28 weeks after application respectively. The 3.0 kg/ha dose caused only a 34% reduction in shoot fresh weight after 32 weeks, indicating a considerable loss of activity. However, minor symptoms and shoot fresh weight reductions (38-50%) were observed after 45 and 56 weeks.

### Selectivity among temperate species

#### Pre-emergence

There was good control of annual weeds, particularly the grasses, including Alopecurus myosuroides and Avena fatua. Perennial weeds were generally more resistant than annuals. However neither Polygonum lapathifolium nor Galium aparine were controlled, the latter being particularly resistant even at 3.0 kg/ha. Convolvulus arvensis also showed high resistance. Wheat and radish were tolerant to 1 kg/ha, although the latter suffered a stand reduction of 32%.

#### Post-emergence

All annual grasses, except Avena fatua were controlled at 0.33 kg/ha. Perennial grasses and Raphanus raphanistrum and Veronica persica were susceptible at 3.0 kg/ha but Galium aparine was resistant. Broad bean showed outstanding tolerance, 3.0 kg/ha causing only a 29% reduction in vigour. Cereals were safe at 0.33 kg/ha, barley being the most tolerant of these at 1.0 kg/ha.

Crop safety was slightly greater following pre-emergence applications but better weed control was generally achieved post-emergence. Thus selectivity was similar pre- and post-emergence with the exception that Avena fatua was controlled selectively pre- but not post-emergence.

### Selectivity among tropical species

#### Pre-emergence

Although all annual weeds were killed at 3.0 kg/ha, Cyperus rotundus and C. esculentus both recovered eventually. Based on one replicate only, cotton appeared to be resistant at 3.0 kg/ha. Number of plants was lower but this was not due to herbicide. Good control of most annual weeds other than Kottboellia should be possible in cotton and in chickpea at 1 kg/ha.

#### Post-emergence

No crop tolerated 1 kg/ha and at the lower 0.33 kg/ha dose, only small-seeded broad-leaved species were controlled. The main potential would perhaps be as an early post-emergence inter-row directed spray, particularly in cotton and soyabean where a higher dose could be used, for broader spectrum control.



ACTIVITY EXPERIMENT

ISOPROTURON

		0.25 kg/ha	1.00 kg/ha	4.00 kg/ha
DWARF BEAN	F	XXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXX XXXXXX XX XXXXX XXXX	XXXXXXXX XXXXXX XXXXXXXX
	S	O O	O O	O O
	P	XXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXX XXXXX	O O
	I	XXXXXXXXXXXXXX XXXXX XXXXXXXX	O O	XX XX
KALE	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXX XXXXXXXXXXXXX
	S	XXXXX XXXXXXXXXX	O O	O O
	P	XXXXXXXXXXXXX XXXXXXXXXXXXX	O O	O O
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XX XXXXX	O O
<u>POLYGONUM AMPHIBIUM</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXX	XXX XX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	P	XXXXXXXXXXXXXXXXXX XXXXXX XXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXX
PERENNIAL RYEGRASS	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXX XXXXXXXXXXXXX	O O	O O
	P	XXXXXXXXXXXXX XXXXXXXXXXXXX	X XXXXXX	O O
	I	XXXXXX XXXXXXXX XXXXXXXXXXXXXX	XXXXXX XXXXXX	O O
<u>AVENA FATUA</u>	F	XXXXXXXXXXXXXX XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX	O O	O O
	P	XXXXXXXXXXXXXX XXXXXXXXXXXXXX	X XX	O O
	I	XXXXXXXXXXXXXX XXXXXXXXXXXXX	O O	O O
<u>AGROPYRON REPENS</u>	F	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX
	S	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXX XX
	P	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXX XX
	I	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX	XXXXXXXXXX XXXXX

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



Table 12.

ISOPROTURON

SPECIES	SPECIES NO.	PRE-EMERGENCE			POST-EMERGENCE		
		0.33	1.00	3.00	0.33	1.00	3.00
		kg a.i./ha			kg a.i./ha		
WHEAT	1	100/100	93/86	100/57	100/86	100/50	25/14
BARLEY	2	109/100	89/79	55/36	100/100	100/71	25/14
OAT	3	104/93	78/29	7/7	100/100	50/29	0/0
PER RYGR	4	96/79	41/29	0/0	81/57	0/0	0/0
ONION	8	50/71	0/0	0/0	83/64	8/14	0/0
DWF BEAN	9	100/100	100/79	100/14	100/14	25/7	25/7
FLD BEAN	10	79/100	79/79	16/29	50/43	0/0	0/0
PEA	11	80/100	80/71	20/21	100/100	100/36	50/21
W CLOVER	12	0/0	0/0	0/0	0/0	0/0	0/0
BRD BEAN	13	-	-	-	100/100	100/86	100/71
RAPE	14	98/100	73/64	0/0	100/86	83/43	0/0
KALE	15	81/86	14/21	3/14	60/50	30/21	0/0
CABBAGE	16	-	-	-	75/79	37/43	0/0
SWEDE	17	100/93	4/21	0/0	-	-	-
CARROT	18	119/100	28/43	0/0	100/93	67/64	8/14
LETTUCE	20	100/100	48/43	0/0	0/0	0/0	0/0
SUG. BEET	21	40/36	0/0	0/0	0/0	0/0	0/0
AVE FATU	26	104/86	40/29	6/7	100/79	100/57	0/0
ALO MYOS	27	70/79	13/29	38/14	75/29	0/0	0/0
POA ANN	28	80/36	32/14	16/14	12/14	0/0	0/0
POA TRIV	29	29/14	6/7	6/7	0/0	0/0	0/0
SIN ARV	30	29/71	0/0	0/0	0/0	0/0	0/0
RAPH RAP	31	79/100	68/86	37/50	100/86	70/71	30/43
CHRY SEG	32	-	-	-	0/0	0/0	0/0
TRIP MAR	33	0/0	0/0	0/0	0/0	0/0	0/0
SEN VULG	34	124/86	0/0	0/0	0/0	0/0	0/0
POL LAPA	35	88/86	88/64	7/21	100/86	94/43	0/0
POL AVIL	36	62/79	3/21	0/0	100/86	31/29	0/0
RUM CRIS	37	15/7	7/7	0/0	0/0	0/0	0/0
GAL APAR	38	93/93	114/100	96/86	100/100	100/93	87/64
CHEN ALB	29	-	-	-	10/14	0/0	0/0
STEL MED	40	55/64	2/29	0/0	0/0	0/0	0/0
SPER ARV	41	-	-	-	0/0	0/0	0/0
VER PERS	42	-	-	-	100/100	100/86	50/29
SOL NIG	43	-	-	-	0/0	0/0	0/0
AG REPEN	47	100/100	97/64	62/29	100/100	100/100	87/21

KEY = No/Vigour (survivors, as % of control)

Untreated = 100/100



Table 12 (cont...)

ISOPROTURON

SPECIES	SPECIES NO.	PRE-EMERGENCE			POST-EMERGENCE		
		0.33	1.00 kg a.i./ha	3.00	0.33	1.00 kg a.i./ha	3.00
AG STOL	48	-	-	-	100/64	100/36	75/21
ALL VIN	49	121/100	74/57	26/14	-	-	-
CIRS ARV	50	67/93	67/57	67/36	-	-	-
TUS FARF	51	100/100	87/64	100/36	-	-	-
CONV ARV	52	107/86	53/57	100/93	-	-	-
MAIZE	58	106/100	106/79	106/64	100/64	100/57	75/43
SORGHUM	59	-	-	-	100/86	83/50	0/0
RICE	60	117/86	132/79	80/57	100/100	100/57	75/29
CHICKPEA	63	129/100	100/86	43/21	-	-	-
GRNDNUT	64	60/100	60/64	75/71	100/86	100/50	100/36
SOYABEAN	65	131/93	131/71	112/21	100/93	100/79	100/29
COTTON	66	104/100	92/93	46/100	100/86	100/64	100/29
JUTE	67	0/0	0/0	0/0	8/14	0/0	0/0
KENAF	68	82/64	7/29	0/0	100/14	75/14	50/14
TOBACCO	69	-	-	-	0/0	0/0	0/0
SESAMUM	70	122/93	37/43	9/7	100/50	0/0	8/21
TOMATO	71	83/64	6/7	0/0	60/14	40/14	60/14
OR PUNCT	73	62/57	100/43	37/21	80/50	20/7	0/0
ELEU IND	74	48/36	0/0	0/0	81/64	0/0	0/0
ECH VRUS	75	91/86	30/43	0/0	100/71	33/21	0/0
ROT EXALT	76	174/93	111/57	0/0	100/100	100/64	80/29
DIG SANG	77	69/64	0/0	0/0	100/86	42/50	0/0
AMAR RET	78	70/57	0/0	0/0	90/71	10/29	0/0
PORT OLE	79	-	-	-	0/0	0/0	0/0
CYN DACT	82	-	-	-	114/100	114/93	114/71
CYP ESCU	85	94/93	94/64	84/50	114/86	57/57	71/36
CYP ROTU	86	120/100	120/100	97/93	97/100	109/100	74/93

KEY = No/Vigour (survivors, as % of control)

Untreated = 100/100



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Appendix I. Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments.

Species	Designation and computer serial number	Expt No.	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls)
<u>TEMPERATES</u>						
Wheat ( <u>Triticum aestivum</u> )	WHEAT (1)	1)	Kolibri	8	1.2	4-5 leaves
		2)				3½-4 leaves
		3)				4 leaves
Barley ( <u>Hordeum vulgare</u> )	BARLEY (2)	1	Proctor )	8	1.2	4½ leaves, tillering
		2	Sultan )			4½ leaves
		3	Sultan )			4 leaves
Oat ( <u>Avena sativa</u> )	OAT (3)	1)	Condor	8	1.2	4 leaves
		2)				4½ leaves
		3)				3½ leaves
Perennial ryegrass ( <u>Lolium perenne</u> )	PER RYGR (4)	1)	S23	15	0.6	4-5 leaves, tillering
		2)				4-5 leaves, tillering
		3)				5 leaves, tillering
Onion ( <u>Allium cepa</u> )	ONION (8)	1	Rijnsburger	20	0.6	2 leaves
		2	Robusta	15	0.6	2 leaves
		3	Robusta	15	0.6	2 leaves
Dwarf bean ( <u>Phaseolus vulgaris</u> )	DWF BEAN (9)	1)	The Prince	3	1.8	1½ trifoliolate leaves
		2)				1 trifoliolate leaf
		3)				1-1½ trifoliolate leaves
Field bean ( <u>Vicia faba</u> )	FLD BEAN (10)	1)	Maris Bead	4	1.8	3½-4½ leaves
		2)				5½ leaves
		3)				6½ leaves
Pea ( <u>Pisum sativum</u> )	PEA (11)	1)	Dark Skinned	4	1.8	5-6 leaves
		2)	Perfection	4	1.2	7-9 leaves
		3)	Perfection	4	1.2	6½ leaves
White clover ( <u>Trifolium repens</u> )	W CLOVER (12)	1)	S100	20	0.6	2 trifoliolate leaves
		2)		20	0.6	2 trifoliolate leaves
		3)		15	0.6	1 trifoliolate leaf
Rape ( <u>Brassica napus oleifera</u> )	RAPE (14)	1)	Not included	15	0.6	2½ leaves
		2)				
		3)				
Kale ( <u>Brassica oleracea acephala</u> )	KALE (15)	1)	Marrowstem	10	0.6	3½-4 leaves
		2)		15	0.6	3½ leaves
		3)		15	0.6	2½ leaves



Appendix I. (cont.) Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments.

Species	Designation and computer serial number	Expt No.	Cultivar or source	No. plant- per pot	Depth of (cm)	Stage of growth at assessment (untreated controls)
<u>Swede</u> ( <u>Brassica napus</u> )	SWEDE (17)	1)		10	0.6	3-4 leaves
		2)	Lord Derby	15	0.6	3½ leaves
		3)		10	0.6	3-3½ leaves
<u>Carrot</u> ( <u>Daucus carota</u> )	CARROT (18)	1)	Chantenay			3-4 leaves
		2)	Red Core	10	0.6	2-2½ leaves
		3)				2 leaves
<u>Lettuce</u> ( <u>Lactuca sativa</u> )	LETTUCE (20)	1)	Borough	14	0.6	5½ leaves
		2)	Wonder	15	0.6	5½ leaves
		3)		10	0.6	3½ leaves
<u>Sugar beet</u> ( <u>Beta vulgaris</u> )	SUG BEET (21)	1)	Klein E	15	1.2	3-4 leaves
		2)	monogerm	15	1.2	Not recorded
		3)		20	0.6	2½ leaves
<u>Avena fatua</u>	AVE FATU (26)	1	Harwell 1963	8	1.2	4-5 leaves
		2	Chipping Norton 1968	8	1.2	3½-4 leaves
		3	Hensington 1969	10	1.2	3 leaves
<u>Alopecurus myosuroides</u>	ALO MYOS (27)	1	WRO 1967 )			5 leaves, tillering
		2)	Rothamsted)	30	0.6	6 leaves, tillering
		3)	1968 )			5 leaves, tillering
<u>Poa annua</u>	POA ANN (28)	1	WRO 1968	25	0.6	5 leaves
		2	WRO 1966	25	0.6	5 leaves
		3	WRO 1966	30	0.6	3 leaves
<u>Poa trivialis</u>	POA TRIV (29)	1)	Not included			
		2)				
		3	Watts Ltd. 1972	30	0.6	3 leaves
<u>Sinapis arvensis</u>	SIN ARV (30)	1	Not included			
		2	WRO 1965	15	0.6	Erratic germination
		3	WRO 1966	50	0.6	3½ leaves
<u>Raphanus raphanistrum</u>	RAPH RAP (31)	1	Not included			
		2	Long Black Spanish	12	0.6	3 leaves
		3	French Break- fast	12	0.6	3-3½ leaves
<u>Chrysanthemum segetum</u>	CHRY SEG (32)	1	Not included			
		2	WRO 1972	50	Surface	Erratic germination
		3	Not included			



Appendix I. (cont.) Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments.

Species	Designation and computer serial number	Expt. No.	Cultivar or source	No. plant- pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls)
<u>Tripleurospermum maritimum</u>	TRIP MAR (33)	1	Not included			
		2	WRO 1971	25	Surface	8 leaves
		3	WRO 1968	30	Surface	8½ leaves
<u>Senecio vulgaris</u>	SEN VULG (34)	1	WRO 1967	20	0.6	4-6 leaves
		2	WRO 1970	35	0.3	5 leaves
		3	WRO 1970	30	0.6	3½ leaves
<u>Polygonum lapathifolium</u>	POL LAPA (35)	1	WRO 1968 )			3 leaves
		2	WRO 1971 )	15	0.6	2½ leaves
		3	WRO 1970 )			2½ leaves
<u>Polygonum aviculare</u>	POL AVIC (36)	1	Not included			
		2	Rothamsted 1968 and WRO 1972	100	0.6	No germination
		3	WRO 1972	25	0.6	3½ leaves
<u>Galium aparine</u>	GAL APAR (38)	1	Bletchington 1967	15	0.6	3 whorls
		2	WRO 1970	12	0.6	2½-4 whorls
		3	WRO 1970	25	0.6	4½ whorls
<u>Chenopodium album</u>	CHEN ALB (39)	1	Gosford Road 1967	25	0.6	4-6 leaves
		2	WRO 1967	40	0.6	4-8 leaves
		3	WRO 1972	25	0.6	2½ leaves
<u>Stellaria media</u>	STEL MED (40)	1	WRO 1968	20	0.6	10 leaves
		2	WRO 1970	20	0.6	8-10 leaves
		3	B & S Supp- lies 1972	30	0.6	11 leaves
<u>Veronica persica</u>	VER PERS (42)	1	Not included			
		2	WRO 1972	25	0.6	Diseased
		3	Not included			
<u>Solanum nigrum</u>	SOL NIG (43)	1	Not included			
		2	Asmer Seeds Ltd, 1972	12	0.6	Erratic germination
		3	B & S Supplies 1973	20	0.3	Nil germination
<u>Rumex obtusifolius</u>	RUM OBTU (44)	1)	Not included			
		2)	Not included			
		3)	Shipton 1968	15	0.3	2 leaves



Appendix I. (cont.) Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments

Species	Designation and computer serial number	Expt No.	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls)
<u>Agropyron repens</u>	AG REPEN (47)	1)				4-5 leaves
		2)	WRO Clone 31	6 <sup>+</sup>	1.2	4 $\frac{1}{2}$ -5 leaves, tillering
		3)				3 $\frac{1}{2}$ leaves
<u>Allium vineale</u>	ALL VIN (49)	1	WRO 1968	6*	1.2	3-4 leaves
		2	WRO 1971	6*	1.2	2 $\frac{1}{2}$ -3 leaves
		3	WRO 1972	10*	0.6	3 leaves
<u>Cirsium arvense</u>	CIRS ARV (50)	1)				6 $\frac{1}{2}$ leaves
		2)	WRO Clone 1	4 <sup>++</sup>	1.2	Premature die back
		3)				4 $\frac{1}{2}$ leaves
<u>Tussilago farfara</u>	TUS FARF (51)	1)		4 <sup>+</sup>	1.8	4 $\frac{1}{2}$ leaves
		2)	WRO Clone 1	4 <sup>+</sup>	1.8	3 $\frac{1}{2}$ leaves
		3)		4 <sup>+</sup>	1.2	4 $\frac{1}{2}$ leaves
<u>Convolvulus arvensis</u>	CONV ARV (52)	1)		4 <sup>++</sup>	1.2	6-12 leaves
		2)	WRO Clone 1	4 <sup>++</sup>	1.2	Premature die back
		3)		5 <sup>++</sup>	1.2	Nil germination
<u>Rumex acetosella</u>	RUM ACET (53)	1	WRO Clone 1	4 <sup>++</sup>	1.2	5-10 leaves
		2)	Not included			
		3)				
<u>TROPICALS</u>						
<u>Maize (Zea mays)</u>	MAIZE (58)	1)	Inra 200	6	1.2	5 $\frac{1}{2}$ leaves
		2)		6	1.8	4 $\frac{1}{2}$ -5 leaves
		3	Caldera	6	1.8	3 $\frac{1}{2}$ -4 leaves
<u>Sorghum (Sorghum bicolor)</u>	SORGHUM (59)	1	SB 68	6	1.2	5 leaves
		2	Eli Lilly USA 1972	8	1.2	5 leaves
		3	Fetereita	8	1.2	3 $\frac{1}{2}$ -4 $\frac{1}{2}$ leaves
<u>Rice (Oryza sativa)</u>	RICE (60)	1	Kogbandi	10	1.2	3 leaves
		2)		10	1.2	3-3 $\frac{1}{2}$ leaves
		3)	IR 5	10	0.6	1-4 leaves
<u>Cowpea (Vigna unguiculata)</u>	COWPEA (62)	1)	Not included			
		2)				
		3	Nigeria 1972	5	1.2	Nil germination
<u>Chickpea (Cicer arietinum)</u>	CHICKPEA (63)	1)	Not included			
		2)				
		3	Ethiopia 1970	6	1.2	7 $\frac{1}{2}$ -10 leaves



Appendix I. (cont.) Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments

Species	Designation and Computer serial number	Expt. No.	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls)
<u>Groundnut</u> ( <u>Arachis hypogea</u> )	GRNDNUT (64)	1	Natal Common)	4	1.8	4-5 trifoliolate leaves
		2	Argentine )			4½-5 trifoliolate leaves
		3	Natal Common)			4 trifoliolate leaves
<u>Soyabean</u> ( <u>Glycine max</u> )	SOYABEAN (65)	1	Altona	4	1.8	2 trifoliolate leaves
		2)	Wayne	6	1.2	2-2½ trifoliolate leaves
		3)				1½-2 trifoliolate leaves
<u>Cotton</u> ( <u>Gossypium hirsutum</u> )	COTTON (66)	1)	26J	6	1.8	2 leaves
		2)		6	1.8	1½-2 leaves
		3)		5	1.8	1½-2 leaves
<u>Jute</u> ( <u>Corchorus olitorius</u> )	JUTE (67)	1	Trinidad 1968	12	0.6	Nil germination
		2)	Egypt 1971	20	0.6	3-3½ leaves
		3)		15	0.6	2½-3 leaves
<u>Kenaf</u> ( <u>Hibiscus cannabinus</u> )	KENAF (68)	1)	Thai Native 1968	8	1.2	1½ leaves
		2)		10	0.6	2-2½ leaves
		3)		10	0.6	½-1½ leaves
<u>Sesamum</u> ( <u>Sesamum indicum</u> )	SESAMUM (70)	1	Not included	10	0.6	2-4 leaves
		2	Addis Ababa ) 1970 )			
		3	Addis Ababa ) 1971 )			
<u>Tomato</u> ( <u>Lycopersicum esculentum</u> )	TOMATO (71)	1	Not included	10	0.6	3½-4 leaves
		2)	Ailsa Craig			
		3)				
<u>Oryza punctata</u>	OR PUNCT (73)	1)	Not included	30	0.6	1-2 leaves
		2)				
		3)				
<u>Eleusine indica</u>	ELEU IND (74)	1	WRO 1967 )	15	0.6	3½ leaves
		2	WRO 1964 )			4-5 leaves
		3	WRO 1968 )			3-4 leaves
<u>Echinochloa crus-galli</u>	ECH CRUS (75)	1	Wytham 1961)	15	0.6	5 leaves
		2	WRO 1968			5 leaves
		3	WRO 1969			3-5 leaves
<u>Rottboellia exaltata</u>	ROT EXAL (76)	1	Rhodesia 1969	10	1.2	5 leaves
		2	Rhodesia 1971	30	0.6	3½-4 leaves
		3	Rhodesia 1971	15	1.2	3½-5 leaves



Appendix I. (cont.) Species, abbreviations, cultivars and stages of growth at assessment for pre-emergence selectivity experiments.

Species	Designation and computer serial number	Expt. No.	Cultivar or source	No. per pot	Depth of planting (cm)	Stage of growth at assessment (untreated controls)
<u>Digitaria sanguinalis</u>	DIG SANG (77)	1	WRO 1965	15	0.6	6 leaves
		2	WRO 1968	20	0.2	4½-5 leaves
		3	WRO 1965	15	0.2	3-4 leaves
<u>Amaranthus retroflexus</u>	AMAR RET (78)	1	WRO 1968	20	0.6	5-7 leaves
		2	WRO 1966	15	0.3	4-7 leaves
		3	WRO 1969	20	0.3	1½-5 leaves
<u>Cyperus esculentus</u>	CYP ESCU (85)	1)	WRO Clone 2	5**	1.2	Not recorded
		2)	(ex South Africa)	5**	1.8	5-7 leaves/shoot
		3)		6**	1.8	4½-7 leaves/shoot
<u>Cyperus rotundus</u>	CYP ROTU (86)	1)	WRO Clone 1	5**	1.2	Not recorded
		2)	(ex Rhodesia)	5**	1.8	7½-8½ leaves/shoot
		3)		5**	1.8	3-10½ leaves/shoot
<u>Oxalis latifolia</u>	OXAL LAT (87)	1	Not included			
		2)	WRO Clone 2	15 <sup>+</sup>	1.2	1-3 leaves
		3)	(ex Cornwall)	25 <sup>+</sup>	1.2	Nil germination



Appendix II. Species, abbreviations, cultivars and stages of growth at spraying and assessment for post-emergence selectivity experiment.

Species	Designation and computer serial number	Cultivar or source	No. plants at spraying	Stage of growth at spraying	Stage of growth at assessment (untreated controls)
<u>TEMPERATES</u>					
Wheat ( <u>Triticum aestivum</u> )	WHEAT (1)	Kolibri	4	2½ leaves	5½ leaves, tillering
Barley ( <u>Hordeum vulgare</u> )	BARLEY (2)	Sultan	4	2½ leaves	5½ leaves, tillering
Oat ( <u>Avena sativa</u> )	OAT (3)	Condor	4	2-2½ leaves	5 leaves
Perennial ryegrass ( <u>Lolium perenne</u> )	PER RYGR (4)	S23	8	2 leaves	4 leaves, tillering
Onion ( <u>Allium cepa</u> )	ONION (8)	Robusta	6	2½ leaves	3 leaves
Dwarf bean ( <u>Phaseolus vulgaris</u> )	DWF BEAN (9)	The Prince	2	2 unifoliate leaves	1½-2 trifoliate leaves
Field bean ( <u>Vicia faba</u> )	FLD BEAN (10)	Maris Bead	2	2-2½ leaves	6½ leaves
Pea ( <u>Pisum sativum</u> )	PEA (11)	Dark Skinned Perfection	2	2½ leaves	8½ leaves
White Clover ( <u>Trifolium repens</u> )	W CLOVER (12)	S100	8	1-2 trifoliate leaves	11 trifoliate leaves
Broad bean ( <u>Vicia faba</u> )	BRD BEAN (13)	Midget	2	1-1½ leaves	6½ leaves
Rape ( <u>Brassica napus oleifera</u> )	RAPE (14)	Victor	6	2½ leaves	4½ leaves
Kale ( <u>Brassica oleracea acephala</u> )	KALE (15)	Marrowstem	5	1½-2 leaves	4 leaves
Cabbage ( <u>Brassica oleracea capitata</u> )	CABBAGE (16)	Primo	4	1½-2 leaves	5 leaves



Appendix II (cont.) Speices, abbreviations, cultivars and stages of growth at spraying and assessment for post-emergence selectivity experiment

Species	Designation and computer serial number	Cultivar or source	No. Plants at spraying	Stage of growth at spraying	Stage of growth at assessment (untreated controls)
<u>Carrot</u> ( <u>Daucus carota</u> )	CARROT (18)	Chantenay Red Core	6	2 leaves	4½ leaves
<u>Lettuce</u> ( <u>Lactuca sativa</u> )	LETTUCE (20)	Borough Wonder	2-4	3½ leaves	9½ leaves
<u>Sugar beet</u> ( <u>Beta vulgaris</u> )	SUG BEET (21)	Klein E monogerm	6	2 leaves	4½ leaves
<u>Avena fatua</u>	AVE FATU (26)	Hensington 1969	5	3-4½ leaves	7 leaves, tillering
<u>Alopecurus</u> <u>myosuroides</u>	ALO MYOS (27)	Rothamsted (1968)	4	2½-3½ leaves	10 leaves, tillering
<u>Poa annua</u>	POA ANN (28)	B. & S. Supplies 1972	8	3½-4½ leaves	12 leaves, tillering
<u>Poa trivialis</u>	POA TRIV	Watts Ltd	6	4½-5 leaves, tillering	12 leaves, tillering
<u>Sinapis arvensis</u>	SIN ARV (30)	WRO 1964	2	2 leaves	4½ leaves
<u>Raphanus</u> <u>raphanistrum</u>	RAPH RAP (31)	Long Black Spanish	5	1½-2 leaves	4½ leaves
<u>Chrysanthemum</u> <u>segetum</u>	CHRY SEG (32)	WRO 1971	2	2 leaves	10½ leaves
<u>Tripleurospermum</u> <u>maritimum</u>	TRIP MAR (33)	WRO 1971	6	2-4 leaves	10½ leaves
<u>Senecio vulgaris</u>	SEN VULG (34)	WRO 1970	3	3½ leaves	7 leaves
<u>Polygonum</u> <u>lapathifolium</u>	POL LAPA (35)	WRO 1971	8	2½-3½ leaves	7½ leaves
<u>Polygonum</u> <u>aviculare</u>	POL AVIC (36)	WRO 1972	8	3½-4½ leaves	25 leaves
<u>Rumex crispus</u>	RUM CRIS (37)	Bletchington 1968	4	2½ leaves	6½ leaves



Appendix II (cont.) Species, abbreviations, cultivars and stages of growth at spraying and assessment for post-emergence selectivity experiment.

Species	Designation and computer serial number	Cultivar or source	No. plants at spraying	Stage of growth at spraying	Stage of growth at assessment (untreated controls)
<u>Galium aparine</u>	GAL APAR (38)	WRO 1970	4	1 whorl	7 whorls
<u>Chenopodium album</u>	CHEN ALB (39)	B. & S. Supplies 1972	5	2-4 leaves	9 leaves
<u>Stellaria media</u>	STEL MED (40)	B. & S. Supplies 1972	8	Not recorded	14 leaves
<u>Spergula arvensis</u>	SPER ARV (41)	WRO 1965	6	2 whorls	4 whorls
<u>Veronica persica</u>	VER PERS (42)	WRO 1973	4	6-8 leaves	12 leaves
<u>Solanum nigrum</u>	SOL NIG (43)	Asmer Seeds Ltd, 1972	6	1½ leaves	5½ leaves
<u>Agropyron repens</u>	AG REPEN (47)	WRO Clone 31	4 <sup>f</sup>	1½-3 leaves	12 leaves, tillering
<u>Agrostis stolonifera</u>	AG STOLO (48)	WRO Clone 1	2**	2½ leaves	12 leaves, tillering
<u>TROPICALS</u>					
Maize ( <u>Zea mays</u> )	MAIZE (58)	Caldera	2	3-3½ leaves	5½-6 leaves
Sorghum ( <u>Sorghum bicolor</u> )	SORGHUM (59)	YE 90-L	3	3-3½ leaves	5 leaves
Rice ( <u>Oryza sativa</u> )	RICE (60)	IR5	4	3-3½ leaves	6 leaves
Groundnut ( <u>Arachis hypogea</u> )	GRNDNUT (64)	Samaru 1972	2	3-4 leaves	6-6½ leaves
Soyabean ( <u>Glycine max</u> )	SOYABEAN (65)	Wayne	2	½-1 trifoliolate leaf	3 trifoliolate leaves
Cotton ( <u>Gossypium hirsutum</u> )	COTTON (66)	26J	5	½-2 leaves	2½-3 leaves



Appendix II (cont.) Species, abbreviations, cultivars and stages of growth at spraying and assessment for post-emergence selectivity experiment.

Species	Designation and computer serial number	Cultivar or source	No. plants at spraying	Stage of growth at spraying	Stage of growth at assessment (untreated controls)
Jute ( <u>Corchorus olitorius</u> )	JUTE (67)	Egypt 1971	6	2-3 leaves	6½-7 leaves
Kenaf ( <u>Hibiscus cannabinus</u> )	KENAF (68)	Thai Native	4	½-1 leaf	3½ leaves
Tobacco ( <u>Nicotiana tabacum</u> )	TOBACCO (69)	Yellow Mammoth	5	2½-4 leaves	3½ leaves
Sesamum ( <u>Sesamum inidcum</u> )	SESAMUM (70)	Heavy Black	4-8	0-2 leaves	5-6 leaves
Tomato ( <u>Lycopersicum esculentum</u> )	TOMATO (71)	Ailsa Craig	5	2½-3½ leaves	4½-5½ leaves
<u>Oryza punctata</u>	OR PUNCT (73)	Swaziland 1967	5	2-3 leaves	4-5½ leaves, tillering
<u>Eleusine indica</u>	ELEU IND (74)	WRO 1964	8	3½-4 leaves	6-6½ leaves, tillering
<u>Echinochloa crus-galli</u>	ECH CRUS (75)	WRO 1969	6	3-3½ leaves	4-5 leaves
<u>Rottboellia exaltata</u>	ROT EXAL (76)	Rhodesia 1971	10	2½-3 leaves	4½-5 leaves
<u>Digitaria sanguinalis</u>	DIG SANG (77)	WRO 1971	6	3½-4 leaves	5 leaves, tillering
<u>Amaranthus retroflexus</u>	AMAR RET (78)	WRO 1968	10	3½-4½ leaves	6½-9½ leaves
<u>Portulaca oleracea</u>	PORT OLE (79)	WRO 1967	6	2-3 leaves	8-12 leaves
<u>Cynodon dactylon</u>	CYN DACT (82)	WRO Clone 2 (ex Sudan)	4 <sup>++</sup>	5½-9½ leaves/ shoot	11-16 leaves/ shoot
<u>Cyperus esculentus</u>	CYP ESCU (85)	WRO Clone 2 (ex South Africa)	5 <sup>**</sup>	1-5½ leaves/ shoot	7-10 leaves/ shoot
<u>Cyperus rotundus</u>	CYP ROTU (86)	WRO Clone 1 (ex Rhodesia)	5 <sup>**</sup>	1-6½ leaves/ shoot	7-8½ leaves/ shoot

/ one node rhizome pieces  
// 4 cm root sections

\* aerial bulbils  
\*\* tubers

+ bulbs  
++ shoot pieces



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 <sup>3</sup>	kilogramme	kg
cubic foot*	ft <sup>3</sup>	kilo (x10 <sup>3</sup> )	k
cubic inch*	in <sup>3</sup>	less than	<
cubic metre*	m <sup>3</sup>	litre	l.
cubic yard*	yd <sup>3</sup>	low volume	LV
cultivar(s)	cv.	maximum	max.
curie*	Ci	median lethal dose	LD50
degree Celsius*	°C	medium volume	MV
degree centigrade*	°C	melting point	m.p.
degree Fahrenheit*	°F	metre	m
diameter	diam.	micro (x10 <sup>-6</sup> )	μ
diameter at breast height	d.b.h.	microgramme*	μg
divided by*	÷ or /	micromicro (pico: x10 <sup>-12</sup> )*	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 <sup>-3</sup> )	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	pre-emergence	pre-em.
millimicro* (nano: $\times 10^{-9}$ )	n or $\mu$	quart	quart
minimum	min.	relative humidity	r.h.
minus	-	revolution per minute*	rev/min
minute	min	second	s
molar concentration*	M (small cap)	soluble concentrate	s.c.
molecule, molecular	mol.	soluble powder	s.p.
more than	>	solution	soln
multiplied by*	x	species (singular)	sp.
normal concentration*	N (small cap)	species (plural)	spp.
not dated	n.d.	specific gravity	sp. gr.
oil miscible concentrate	o.m.c. (tables only)	square foot*	ft <sup>2</sup>
organic matter	o.m.	square inch*	in <sup>2</sup>
ounce	oz	square metre*	m <sup>2</sup>
ounces per gallon	oz/gal	square root of*	$\sqrt{\quad}$
page	p.	sub-species*	ssp.
pages	pp.	summary	s.
parts per million*	ppm	temperature	temp.
parts per million by volume*	ppmv	ton	ton
parts per million by weight*	ppmw	tonne	t
percent(age)*	%	ultra-low volume	ULV
pico (micromicro: $\times 10^{-12}$ )	p or $\mu$	ultra violet	u.v.
pint	pint	vapour density	v.d.
pints per acre	pints/ac	vapour pressure	v.p.
plus or minus*	$\pm$	<u>varietas</u>	var.
post-emergence	post-em.	volt	V
pound	lb	volume	vol.
pound per acre*	lb/ac	volume per volume	v/v
pounds per minute	lb/min	water soluble powder	w.s.p. (tables only)
pound per square inch*	lb/in <sup>2</sup>	watt	W
powder for dry application	p. (tables only)	weight	wt
power take off	p.t.o.	weight per volume*	w/v
precipitate (noun)	ppt.	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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