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RP 20810 is confidential (Rhone Poulenc)

SPECIES		CHLORNITROFEN 0.67 KG/HA		CHLORNITROFEN 2.00 KG/HA		CHLORNITROFEN 6.00 KG/HA
GRNDNUT	75	xxxxxxxxxxxxxxx	M		105	xxxxxxxxxxxxxxxxxxxx +
(64)	86	xxxxxxxxxxxxxxxxx	M		64	xxxxxxxxxxxxx
SOYABEAN	150	xxxxxxxxxxxxxxxxxxxx +	131	xxxxxxxxxxxxxxxxxxxx +	112	xxxxxxxxxxxxxxxxxxx +
(65)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
COTTON	104	xxxxxxxxxxxxxxxxxxx +	58	xxxxxxxxxxxx	115	xxxxxxxxxxxxxxxxxxx +
(66)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
JUTE	0		0		0	
(67)	0		0		0	
KENAF	75	xxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(68)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
SESAMUM	47	xxxxxxxxx	37	xxxxxxx	28	xxxxxx
(70)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
TOMATO	72	xxxxxxxxxxxxxx	44	xxxxxxxxx	22	xxxx
(71)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	36	xxxxxxx
OR PUNCT	119	xxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(73)	50	xxxxxxxxxx	29	xxxxxx	21	xxxx
ELEU IND	3	x	0		0	
(74)	14	xxx	0		0	
ECH CRUS	68	xxxxxxxxxxxxxx	0		0	
(75)	50	xxxxxxxxxx	0		0	
ROTT EXA	63	xxxxxxxxxxxxx	0		32	xxxxxx
(76)	50	xxxxxxxxxx	0		21	xxxx
DIG SANG	0		0		0	
(77)	0		0		0	

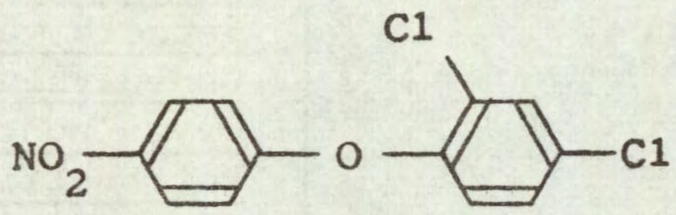
SPECIES		CHLORNITROFEN 0.67 KG/HA		CHLORNITROFEN 2.00 KG/HA		CHLORNITROFEN 6.00 KG/HA
AMAR RET	0		0		0	
(78)	0		0		0	
CYP ESCU	94	xxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +	112	xxxxxxxxxxxxxxxxxxx +
(85)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
CYP ROTU	90	xxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx

NITROFEN

Code number FW 925 **Trade name** TokE 25
NIP

Chemical name 2,4-dichlorophenyl-4-nitrophenyl ether

Structure



Source Rohm and Haas (UK) Ltd
Lennig House
2 Masons Avenue
Croydon
Surrey

Information available and suggested uses

Nitrofen was introduced around 1964 and is recommended for pre-emergence control of certain annual grass and broad-leaved weeds. As uptake is primarily through the emerging shoot it requires application as a layer to the soil surface. Incorporation greatly reduces activity. In the UK it is approved for use pre-emergence in many brassica crops. Temperate cereals are tolerant and it has been approved for control of blackgrass (*A. myosuroides*) in winter sown wheat. Nitrofen has also been used in transplanted rice.

Formulation used 24.0 w/v a.i. emulsifiable concentrate

Spray volume for selectivity experiment 413 l/ha (36.8 gal/ac)

RESULTS

Full histogram results are given on pages 34-38 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
6.00	dwarf bean pea kale swede carrot radish chickpea soyabean	*Galium aparine* *Allium vineale* + species below

(Table continued overleaf)

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
2.00	species above + field bean rape kenaf	Avena fatua Senecio vulgaris Convolvulus arvensis Oryza punctata Rottboellia exaltata + species below
0.67	species above + wheat lettuce sugar beet maize cotton	Alopecurus myosuroides Poa annua Poa trivialis Polygonum lapathifolium Polygonum aviculare Rumex obtusifolius Eleusine indica Echinochloa crus-galli Digitaria sanguinalis Amaranthus retroflexus

Comments on results

Nitrofen was included in this experiment for comparison with the closely related chlornitrofen. No activity experiment data are available on the type and route of action of nitrofen.

Symptoms

These were typical for nitrophenyl ether herbicides. The foliar spray caused contact scorch of treated leaves while pre-emergence applications caused severe inhibition of both grasses and broad-leaved species.

Soil persistence

This test confirmed that nitrofen can exist for a considerable period of time in the soil after application as a surface spray. Using Poa trivialis as the sensitive test species, 2.0 kg/ha was causing a 93% reduction of plant fresh weight, 32 weeks after treatment, but was undetectable at 45 weeks. Plants were still being killed 45 weeks after application of 6.0 kg/ha.

Selectivity among temperate species

All annual grass weeds were controlled or severely reduced by 0.67 kg/ha. Certain annual broad-leaved weeds were controlled, with the Polygonaceae being particularly sensitive. Stellaria media and the Cruciferae were resistant. The perennials Agropyron repens, Cirsium arvense and Tussilago farfara were resistant. Convolvulus arvensis was eventually completely killed at 6.0 kg/ha while at 2.0 kg/ha, emergence of most plants was very late. There was a high mortality of Allium vineale (68 and 95% with 2.0 and 6.0 kg/ha respectively).

Carrot and the brassicas all showed good tolerance of nitrofen, although rape suffered a moderate reduction in plant number and vigour

at the highest dose. Pea germination and development was variable at 2.0 kg/ha but some degree of tolerance was apparent. Dwarf bean germination was somewhat reduced by 6.0 kg/ha of nitrofen but survivors were healthy. Wheat was the only cereal to show any tolerance, its vigour being reduced by only 21% at 2.0 kg/ha.

This test confirms the potential of nitrofen for controlling mainly annual grass and certain broad-leaved weeds in a variety of broad-leaved crops and wheat, including the control of A. mysoruoides in the latter. No clear advantages over herbicides currently used in these crops are apparent. The sensitivity of the perennial, Allium vineale, has perhaps not been appreciated hitherto and some further investigation of this may be worthwhile.

Selectivity among tropical species

Good control of all annual weeds was achieved at 2.0 kg/ha or below. The perennial Cyperus spp. recovered from minor symptoms at 6.0 kg/ha.

The legumes, chickpea and soyabean were particularly tolerant; groundnut showed only marginal resistance at 0.67 kg/ha but was not reduced much more at 6.0 kg/ha. Cotton, although only completely tolerant at 0.67 kg/ha, was not severely affected at higher doses. The tolerance of kenaf parallels that found previously with this species (Dean and Parker, 1971) when Oxalis latifolia was also well controlled.

SPECIES	NITROFEN 0.67 KG/HA		NITROFEN 2.00 KG/HA		NITROFEN 6.00 KG/HA	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxxx +	87	xxxxxxxxxxxxxxxxx
(1)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
BARLEY	95	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	14	xxx
(2)	71	xxxxxxxxxxxxxx	36	xxxxxxx	7	x
OAT	104	xxxxxxxxxxxxxxxxxxxx +	85	xxxxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx
(3)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
PER RYGR	30	xxxxxx	7	x	0	
(4)	36	xxxxxxx	7	x	0	
ONION	95	xxxxxxxxxxxxxxxxxxx	15	xxx	0	
(8)	64	xxxxxxxxxxxxx	7	x	0	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
FLD BEAN	126	xxxxxxxxxxxxxxxxxxx +	95	xxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx
(10)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
PEA	120	xxxxxxxxxxxxxxxxxxx +	60	xxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxxx +
(11)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
W CLOVER	53	xxxxxxxxxxx	5	x	5	x
(12)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
RAPE	101	xxxxxxxxxxxxxxxxxxx +	92	xxxxxxxxxxxxxxxxx	66	xxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
KALE	100	xxxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
SWEDE	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		NITROFEN 0.67 KG/HA		NITROFEN 2.00 KG/HA		NITROFEN 6.00 KG/HA
CARROT	79	xxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
LETTUCE	104	xxxxxxxxxxxxxxxxxxx +	78	xxxxxxxxxxxxxxxx	74	xxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
SUG BEET	89	xxxxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	50	xxxxxxxxxx
AVE FATU	87	xxxxxxxxxxxxxxxx	23	xxxxx	0	
(26)	43	xxxxxxxxx	21	xxxx	0	
ALO MYOS	64	xxxxxxxxxxxxx	0		0	
(27)	29	xxxxxx	0		0	
POA ANN	3	x	0		0	
(28)	7	x	0		0	
POA TRIV	0		0		0	
(29)	0		0		0	
SIN ARV	78	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	46	xxxxxxxxx
(30)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
RAPH RAP	100	xxxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxx +	105	xxxxxxxxxxxxxxxxxxx +
(31)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
TRIP MAR	76	xxxxxxxxxxxxxxx	43	xxxxxxxxx	33	xxxxxxx
(33)	57	xxxxxxxxxxx	43	xxxxxxxxx	50	xxxxxxxxxx
SEN VULG	103	xxxxxxxxxxxxxxxxxxx +	21	xxxx	0	
(34)	93	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	0	
POL LAPA	29	xxxxxx	0		0	
(35)	71	xxxxxxxxxxxxxx	0		0	

SPECIES	NITROFEN 0.67 KG/HA		NITROFEN 2.00 KG/HA		NITROFEN 6.00 KG/HA	
POL AVIC	3	x	0		0	
(36)	21	xxxx	0		0	
GAL APAR	102	xxxxxxxxxxxxxxxxxxxx +	70	xxxxxxxxxxxxxx	9	xx
(38)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	21	xxxx
STEL MED	90	xxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
RUM OBTU	29	xxxxxx	0		0	
(44)	29	xxxxxx	0		0	
AG REPEN	97	xxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxxx +
(47)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ALL VIN	63	xxxxxxxxxxxx	32	xxxxxx	5	x
(49)	71	xxxxxxxxxxxxx	43	xxxxxxxxx	21	xxxx
CIRS ARV	100	xxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
(50)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
TUS FARF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(51)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
CONV ARV	53	xxxxxxxxxxx	20	xxxx	0	
(52)	64	xxxxxxxxxxxx	36	xxxxxxx	0	
MAIZE	106	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(58)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	57	xxxxxxxxxx
RICE	88	xxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxx +
(60)	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	43	xxxxxxxxx
CHICKPEA	143	xxxxxxxxxxxxxxxxxxx +	129	xxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		NITROFEN 0.67 KG/HA		NITROFEN 2.00 KG/HA		NITROFEN 6.00 KG/HA
GRNDNUT	105	xxxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxxxx +
(64)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	71	xxxxxxxxxxxxxx
SOYABEAN	112	xxxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxxx	169	xxxxxxxxxxxxxxxxxxxx +
(65)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
COTTON	81	xxxxxxxxxxxxxxxx	58	xxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx
(66)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
JUTE	0		0		0	
(67)	0		0		0	
KENAF	95	xxxxxxxxxxxxxxxxxx	123	xxxxxxxxxxxxxxxxxxx +	34	xxxxxxx
(68)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
SESAMUM	28	xxxxxx	0		0	
(70)	21	xxxx	0		0	
TOMATO	67	xxxxxxxxxxxxx	6	x	17	xxx
(71)	71	xxxxxxxxxxxxxx	21	xxxx	21	xxxx
OR PUNCT	144	xxxxxxxxxxxxxxxxxxxx +	87	xxxxxxxxxxxxxxxxx	125	xxxxxxxxxxxxxxxxxxxx +
(73)	36	xxxxxxx	21	xxxx	14	xxx
ELEU IND	0		0		0	
(74)	0		0		0	
ECH CRUS	11	xx	0		0	
(75)	14	xxx	0		0	
ROTT EXA	79	xxxxxxxxxxxxxxxx	32	xxxxxx	0	
(76)	57	xxxxxxxxxxx	29	xxxxxx	0	
DIG SANG	0		0		0	
(77)	0		0		0	

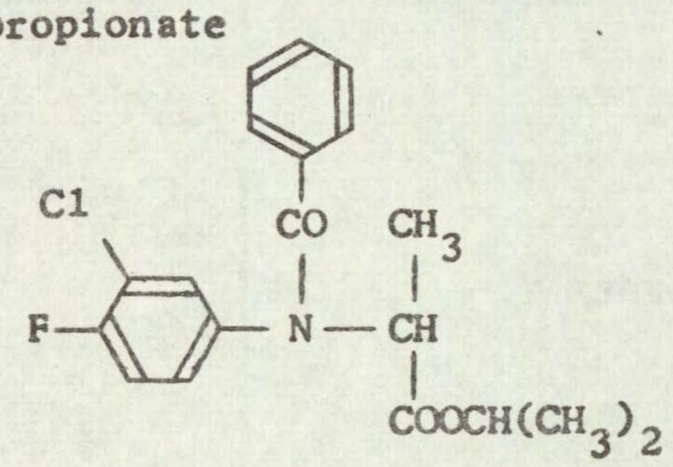
SPECIES		NITROFEN 0.67 KG/HA		NITROFEN 2.00 KG/HA		NITROFEN 6.00 KG/HA
AMAR RET	0		0		0	
(78)	0		0		0	
CYP ESCU	94	xxxxxxxxxxxxxxxxxx	112	xxxxxxxxxxxxxxxxxxx +	103	xxxxxxxxxxxxxxxxxxx +
(85)	71	xxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
CYP ROTU	90	xxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	142	xxxxxxxxxxxxxxxxxxx +
(86)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx

FLAMPROP-ISOPROPYL

Code number WL 29762 **Trade name** Barnon

Chemical name Isopropyl (±)-2-(N-benzoyl-3-chloro-4-fluoroanilino) propionate

Structure



Source Woodstock Agricultural Research Centre
Shell Research Organization
Sittingbourne
Kent

Information available and suggested uses

Flamprop-isopropyl is recommended for the post-emergence control of wild oats (Avena spp.) in spring sown barley at 1.0 kg a.i./ha. The timing of spraying is important and should be between the end of tillering and appearance of the first node of the crop. Application is best in a volume of 250 to 600 l/ha but aerial applications in 25 to 50 l/ha have been successful. It can not be "tank mixed" with the commonly used broad-leaved weed killers, and these should not be applied within several days of spraying flamprop-isopropyl.

Formulation used 20% w/v a.i. emulsifiable concentrate

Spray volume for activity experiment 305 l/ha (27.1 gal/ac)
for pre-emergence selectivity experiment 413 l/ha (36.8 gal/ac)

RESULTS

Full histogram results are given on pages 42-47 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
8.00	barley perennial ryegrass dwarf bean field bean pea carrot lettuce maize chickpea groundnut soyabean cotton	Avena fatua Oryza punctata Amaranthus retroflexus + species below

(Table continued overleaf)

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
2.00	species above + wheat white clover rape kale swede sugar beet radish rice kenaf tomato	Alopecurus myosuroides + species below
0.5	species above + oat onion	Poa trivialis

Comments on result

Activity experiment (see page 42)

In the activity experiment the only appreciable phytotoxicity occurred with pre-emergence surface sprays to Avena fatua, which was very surprising in view of the expected foliar activity on this species. Although scorch symptoms were seen initially with foliar sprays of 1.0 and 3.0 kg/ha, A. fatua made excellent recovery. This contrasted with foliar sprays of the related benzoylprop-ethyl which was included for comparison. Doses of 1.0 and 3.0 kg/ha of the latter caused severe inhibition. It is possible that the stage of growth at spraying (2-2½ leaves) was too early, but this was also the case for benzoylprop-ethyl. However the susceptibility of A. fatua to pre-emergence surface sprays of flamprop-isopropyl warranted further investigation.

Symptoms

The foliar spray at 3 kg/ha caused contact scorch on A. fatua and to a lesser extent on Agropyron repens, kale and dwarf bean. This was only temporary however, no inhibition of growth resulting and all affected plants recovered. Pre-emergence surface sprays caused a severe inhibition of the main shoot of A. fatua, the first leaf usually emerging from the coleoptile but eventually turning necrotic and dying. Leaves were usually darker green. No symptoms were seen on wheat or barley within the first 4 or 5 weeks after treatment but subsequently a slight inhibition occurred which was accompanied by a yellowing of the 4th and 5th leaves in wheat. This coincided with the production of the secondary roots, which were inhibited for a time, resulting in plants becoming weakly anchored in the soil and tending to fall over. All plants succeeded in producing panicles however. Some perennial ryegrass plants also had a weak root system but shoots were healthy. An inhibition of growth of certain broad-leaved species also occurred, sometimes accompanied by yellowing of leaves, notably in the brassica family.

Soil persistence

Residues were detectable in the soil for a considerable period of time, using Poa trivialis as the sensitive test species. 0.5 kg/ha had almost disappeared when the soil was assayed after 18 weeks. A dose of 2.0 kg/ha was undetectable after 28 weeks, but 8.0 kg/ha was still causing a fresh weight reduction of 92% after 45 weeks.

Selectivity among temperate species

In the pre-emergence selectivity experiment, all annual grasses were controlled except Poa annua which was much more resistant than Poa trivialis. Avena fatua was controlled at 8.0 kg/ha and reduced in vigour by 64% at 2.0 kg/ha. The perennials and annual broad-leaved species were resistant, although Agropyron repens exhibited severe inhibition for several weeks before recovering.

Barley was the most tolerant cereal, fresh weights of shoots being in excess of controls when harvested. At the same time wheat showed a slight reduction in fresh weight at the two higher doses. Oat showed a similar sensitivity to Avena fatua. Perennial ryegrass, large seeded legumes, carrot and lettuce were tolerant at the highest dose. Onion was only slightly reduced in vigour at 2.0 kg/ha.

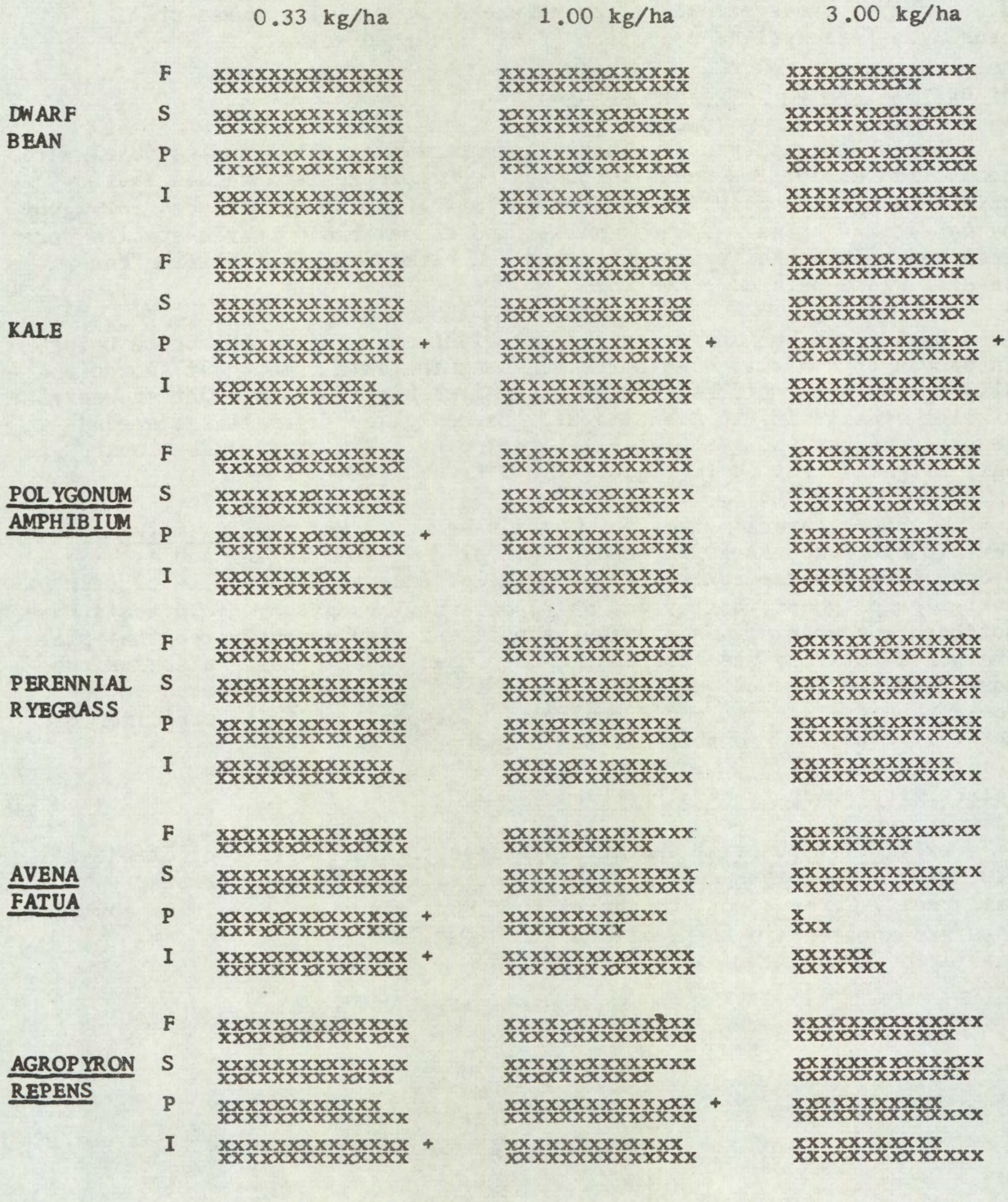
Although several other pot tests have confirmed that A. fatua and certain other annual grass weeds, including A. ludoviciana and A. myosuroides, can be controlled by pre-emergence application in certain varieties of wheat, barley and S. 23 perennial ryegrass, field tests have not been encouraging. A subsequent pot test also demonstrated that pre-emergence activity was less in the open than under glass. Also, as the dose required for post-emergence control of A. fatua is reputed to be lower than for pre-emergence control, development of this herbicide for the latter use is probably not economical.

Selectivity among tropical species

Only Oryza punctata and Amaranthus retroflexus were controlled at 8.0 kg/ha. The other annual tropical grass weeds were particularly resistant. Cyperus spp. recovered from very minor symptoms. No obvious uses are apparent in tropical crops.

ACTIVITY EXPERIMENT

FLAMPROP-ISOPROPYL



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

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		FLAMPROP-ISOPROPYL 0.50 KG/HA		FLAMPROP-ISOPROPYL 2.00 KG/HA		FLAMPROP-ISOPROPYL 8.00 KG/HA
WHEAT	107	xxxxxxxxxxxxxxxxxxxx +	107	xxxxxxxxxxxxxxxxxxxx +	80	xxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
BARLEY	109	xxxxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxxx +
(2)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
OAT	98	xxxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
PER RYGR	107	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
ONION	120	xxxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(8)	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
FLD BEAN	126	xxxxxxxxxxxxxxxxxxxx +	111	xxxxxxxxxxxxxxxxxxx +	126	xxxxxxxxxxxxxxxxxxx +
(10)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxxx +	80	xxxxxxxxxxxxxxx
(11)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
W CLOVER	96	xxxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(12)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
RAPE	85	xxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
KALE	95	xxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxx +	84	xxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
SWEDE	111	xxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		FLAMPROP-ISOPROPYL 0.50 KG/HA		FLAMPROP-ISOPROPYL 2.00 KG/HA		FLAMPROP-ISOPROPYL 8.00 KG/HA
CARROT	85	xxxxxxxxxxxxxxxxx	113	xxxxxxxxxxxxxxxxxxxx +	125	xxxxxxxxxxxxxxxxxxxx +
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
LETTUCE	91	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SUG BEET	76	xxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx	76	xxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
AVE FATU	115	xxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxx
(26)	93	xxxxxxxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
ALO MYOS	77	xxxxxxxxxxxxxxx	51	xxxxxxxxxx	51	xxxxxxxxxx
(27)	71	xxxxxxxxxxxxxx	14	xxx	14	xxx
POA ANN	99	xxxxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxxx	51	xxxxxxxxx
(28)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx
POA TRIV	53	xxxxxxxxxx	12	xx	0	
(29)	21	xxxx	14	xxx	0	
SIN ARV	95	xxxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +	83	xxxxxxxxxxxxxxxx
(30)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
RAPH RAP	95	xxxxxxxxxxxxxxxxxx	111	xxxxxxxxxxxxxxxxxxx +	74	xxxxxxxxxxxxxx
(31)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
TRIP MAR	102	xxxxxxxxxxxxxxxxxxx +	59	xxxxxxxxxxxx	53	xxxxxxxxxx
(33)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	57	xxxxxxxxxx
SEN VULG	103	xxxxxxxxxxxxxxxxxxx +	52	xxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
(34)	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
POL LAPA	132	xxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxx +	88	xxxxxxxxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		FLAMPROP-ISOPROPYL 0.50 KG/HA		FLAMPROP-ISOPROPYL 2.00 KG/HA		FLAMPROP-ISOPROPYL 8.00 KG/HA
POL AVIC	104	xxxxxxxxxxxxxxxxxxxx +	110	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx
(36)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
GAL APAR	82	xxxxxxxxxxxxxxxx	111	xxxxxxxxxxxxxxxxxxx +	82	xxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
STEL MED	98	xxxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxxx +	96	xxxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
RUM OBTU	102	xxxxxxxxxxxxxxxxxxxx +	161	xxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxx +
(44)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
AG REPEN	106	xxxxxxxxxxxxxxxxxxxx +	106	xxxxxxxxxxxxxxxxxxx +	106	xxxxxxxxxxxxxxxxxxx +
(47)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx
ALL VIN	100	xxxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx
(49)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CIRS ARV	83	xxxxxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxxx +	117	xxxxxxxxxxxxxxxxxx +
(50)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
TUS FARF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(51)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CONV ARV	93	xxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx	40	xxxxxxxx
(52)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
MAIZE	106	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxxx +
(58)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx
RICE	88	xxxxxxxxxxxxxxxxx	110	xxxxxxxxxxxxxxxxxx +	117	xxxxxxxxxxxxxxxxxx +
(60)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxx
CHICKPEA	129	xxxxxxxxxxxxxxxxxxx +	114	xxxxxxxxxxxxxxxxxxx +	114	xxxxxxxxxxxxxxxxxxx +
(63)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx

SPECIES		FLAMPROP-ISOPROPYL 0.50 KG/HA		FLAMPROP-ISOPROPYL 2.00 KG/HA		FLAMPROP-ISOPROPYL 8.00 KG/HA
GRNDNUT	75	xxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxx +	90	xxxxxxxxxxxxxxxxx R
(64)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx R
SOYABEAN	112	xxxxxxxxxxxxxxxxxxx +	56	xxxxxxxxxxx	112	xxxxxxxxxxxxxxxxxxx +
(65)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
COTTON	46	xxxxxxxxx	69	xxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +
(66)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
JUTE	137	xxxxxxxxxxxxxxxxxxx +	50	xxxxxxxxxx	112	xxxxxxxxxxxxxxxxxxx +
(67)	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx
KENAF	82	xxxxxxxxxxxxxxxx R	102	xxxxxxxxxxxxxxxxxxx +	68	xxxxxxxxxxxxxx
(68)	100	xxxxxxxxxxxxxxxxxxx R	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
SESAMUM	37	xxxxxxx	94	xxxxxxxxxxxxxxxxxx	9	xx
(70)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
TOMATO	111	xxxxxxxxxxxxxxxxxxx +	94	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(71)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
OR PUNCT	125	xxxxxxxxxxxxxxxxxxx +	131	xxxxxxxxxxxxxxxxxxx +	112	xxxxxxxxxxxxxxxxxxx +
(73)	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	29	xxxxxx
ELEU IND	89	xxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxx +	72	xxxxxxxxxxxxx
(74)	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ECH CRUS	106	xxxxxxxxxxxxxxxxxxx +	95	xxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx
(75)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
ROTT EXA	95	xxxxxxxxxxxxxxxxxx	126	xxxxxxxxxxxxxxxxxxx +	32	xxxxxx
(76)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
DIG SANG	60	xxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	69	xxxxxxxxxxxx
(77)	57	xxxxxxxxxxx	79	xxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		FLAMPROP-ISOPROPYL 0.50 KG/HA		FLAMPROP-ISOPROPYL 2.00 KG/HA		FLAMPROP-ISOPROPYL 8.00 KG/HA
AMAR RET	60	xxxxxxxxxxxx	50	xxxxxxxxxx	10	xx
(78)	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx	21	xxxx
CYP ESCU	84	xxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +	84	xxxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CYP ROTU	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx

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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)	Kolibri	8	1.2	4 leaves
Barley (*Hordeum vulgare*)	BARLEY (2)	Sultan	8	1.2	4 leaves
Oat (*Avena sativa*)	OAT (3)	Condor	8	1.2	3½ leaves
Perennial ryegrass (*Lolium perenne*)	PER RYGR (4)	S 23	15	0.6	5 leaves, tillering
Onion (*Allium cepa*)	ONION (8)	Robusta	15	0.6	2 leaves
Dwarf bean+ (*Phaseolus vulgaris*)	DWF BEAN (9)	The Prince	3	1.8	1-1½ trifoliate leaves
Field bean (*Vicia faba*)	FLD BEAN (10)	Maris Bead	4	1.8	6½ leaves
Pea (*Pisum sativum*)	PEA (11)	Dark Skinned	4	1.2	6½ leaves
White clover (*Trifolium repens*)	W CLOVER (12)	S 100	15	0.6	1 trifoliate leaf
Rape (*Brassica napus oleifera*)	RAPE (14)	Victor	15	0.6	2½ leaves
Kale (*Brassica oleracea acephala*)	KALE (15)	Marrowstem	15	0.6	2½ leaves
Swede (*Brassica napus*)	SWEDE (17)	Lord Derby	10	0.6	3-3½ leaves
Carrot (*Daucus carota*)	CARROT (18)	Chantenay Red Core	8	0.6	2 leaves

Appendix 1 (cont.)

	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)
Lettuce (Lactuca sativa)	LETTUCE (20)	Borough Wonder	10	0.6	3½ leaves
Sugar beet (Beta vulgaris)	SUG BEET (21)	'Klein E'	20	0.6	2½ leaves
Avena fatua	AVE FATU (26)	Hensington 1969	10	1.2	3 leaves
Alopecurus myosuroides	ALO MYOS (27)	Rothamsted 1968	30	0.6	5 leaves, tillering
Poa annua	POA ANN (28)	WRO 1966	30	0.6	3 leaves
Poa trivialis	POA TRIV (29)	Watts 1972	30	0.6	3 leaves
Sinapis arvensis	SIN ARV (30)	WRO 1966	50	0.6	3½ leaves
Raphanus raphanistrum	RAPH RAP (31)	French Breakfast	12	0.6	3-3½ leaves
Tripleurospermum maritimum	TRIP MAR (33)	WRO 1968	30	Surface	8½ leaves
Senecio vulgaris	SEN VULG (34)	WRO 1970	30	0.6	3½ leaves
Polygonum lapathifolium	POL LAPA (35)	WRO 1970	15	0.6	2½ leaves
Polygonum aviculare	POL AVIC (36)	WRO 1972	25	0.6	3½ leaves
Galium aparine	GAL APAR (38)	WRO 1970	25	0.6	4½ whorls
Chenopodium album	CHEN ALB (39)	WRO 1972	25	0.6	2½ leaves
Stellaria media	STEL MED (40)	Band S supplies, 1972	30	0.6	11 leaves

Appendix 1 (cont.)

	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)
Solanum nigrum[+]	SOL NIG (43)	Band S supplies, 1973	20	0.3	nil germination
Rumex obtusifolius	RUM OBTU (44)	Shipton 1968	15	0.3	2 leaves
Agropyron repens	AG REPEN (47)	WRO Clone 31	6[f]	1.2	3½ leaves
Allium vineale	ALL VIN (49)	WRO 1972	10*	0.6	3 leaves
Cirsium arvense	CIRS ARV (50)	WRO Clone 1	4[ff]	1.2	4½ leaves
Tussilago farfara	TUS FARF (51)	WRO Clone 1	4[f]	1.2	4½ leaves
Convolvulus arvensis	CONV ARV (52)	WRO Clone 1	5[ff]	1.2	-
Tropical species (grown under higher temperature regime)					
Maize (Zea mays)	MAIZE (58)	Caldera	6	1.8	3½-4 leaves
Sorghum (Sorghum vulgare)	SORGHUM (59)	Fetereita	8	1.2	3½-4½ leaves
Rice (Oryza sativa)	RICE (60)	I R 5	10	0.6	1-4 leaves
Cowpea (Vigna unguiculata)	COWPEA (62)	Nigeria 1972	5	1.2	nil germination
Chickpea (Cicer arietinum)	CHICKPEA (63)	Ethiopia 1970	6	1.2	7½-10 pinnate leaves
Groundnut (Arachis hypogaea)	GRNDNUT (64)	Natal Common	4	1.8	4 trifoliate leaves
Soyabean (Glycine max)	SOYABEAN (65)	Wayne	6	1.2	1½-2 trifoliate leaves
Cotton (Gossypium hirsutum)	COTTON (66)	Samaru 26J	5	1.8	1½-2 leaves

Appendix 1 (cont.)

	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)
Jute (Corchorus olitorius)	JUTE (67)	Egypt 1971	15	0.6	2½-3 leaves
Kenaf (Hibiscus cannabinus)	KENAF (68)	Thai Native	10	0.6	½-1½ leaves
Sesamum (Sesamum indicum)	SESAMUM (70)	Addis Ababa 1971	10	0.6	0-3 leaves
Tomato (Lycopersicum esculentum)	TOMATO (71)	Ailsa Craig	10	0.6	3-3½ leaves
Oryza punctata	OR PUNCT (73)	Swaziland 1967	30	0.6	1-2 leaves
Eleusine indica	ELEU IND (74)	WRO 1968	15	0.6	3-4 leaves
Echinochloa crus-galli	ECH CRUS (75)	WRO 1969	15	0.6	3-5 leaves
Rottboellia exaltata	ROTT EXA (76)	Rhodesia 1971	15	1.2	3½-5 leaves
Digitaria sanguinalis	DIG SANG (77)	WRO 1965	15	0.2	3-4 leaves
Amaranthus retroflexus	AMAR RET (78)	WRO 1969	20	0.3	1½-5 leaves
Cyperus esculentus	CYP ESCU (85)	WRO Clone 2 (ex South Africa)	6**	1.8	4½-7 leaves/ shoot
Cyperus rotundus	CYP ROTU (86)	WRO Clone 1 (Rhodesia)	5**	1.8	3-10½ leaves/ shoot
Oxalis latifolia	OXAL LAT (87)	WRO Clone 2 (Cornwall)	25 bulbs	1.2	nil germination

/ one node rhizome fragments
// 4 cm root fragments
\+ temperate species raised under higher temperature

* aerial bulbils
** tubers

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 × time product	ct	inch	in.
concentration required to kill 50% test animals	LC_{50}	infra red	i.r.
cubic centimetre*	cm^3	kilogramme	kg
cubic foot*	ft^3	kilo ($\times 10^3$)	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	LD_{50}
degree Celsius*	^oC	medium volume	MV
degree centigrade*	^oC	melting point	m.p.
degree Fahrenheit*	^oF	metre	m
diameter	diam.	micro ($\times 10^{-6}$)	µ
diameter at breast height	d.b.h.	microgramme*	µg
divided by*	÷ or /	micromicro (pico: $\times 10^{-12}$)*	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 ($\times 10^{-3}$)	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: $\times 10^{-9}$)	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: $\times 10^{-12}$)	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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