Click here for previous

Dowco 290 is clopyralid, HOE 22870, K1441 is methyldymron, WL29226 is benzglycereth

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.8	species above + cowpea soyabean	Sinapis arvensis Tripleurospermum maritimum Polygonum aviculare Chenopodium album Stellaria media Rumex obtusifolius Agropyron repens Cyperus esculentus + species below
0.2	species above + wheat barley oat dwarf bean field bean pea carrot sugar beet groundnut cotton maize	Alopecurus myosuroides Poa annua Poa trivialis Senecio vulgaris Veronica persica Holcus lanatus Oryza punctata Eleusine indica Echinochloa crus-galli Digitaria sanguinalis Amaranthus retroflexus Snowdenia polystachya

Comments on results

Activity experiment (see page 37)

The foliar spray caused minor symptoms at the higher doses, more so on the broad-leaved than on the grass species. Soil drenches to established plants were much more effective on the grasses but differences were small on the broad-leaved species. The most active type of application on most species was the pre-emergence surface spray but the incorporated treatment was equally effective on Agropyron. Dwarf bean was relatively tolerant regardless of application method.

Symptoms

Minor scorch and necrosis occurred on leaves as a result of the foliar spray. With all three soil treatments, main shoots and buds were inhibited, with some leaves trapped and consequently deformed. A darker green colour of foliage developed. At higher doses, there was often no emergence from the soil. These symptoms are typical of herbicides of the amide or carbamate groups.

Soil persistence

Using perennial ryegrass as the test species, surface and incorporated treatments of 0.2 and 0.8 kg a.i./ha were undetectable 10 weeks after application contrasting with the severe effects caused initially. The incorporated treatment of 3.2 kg/ha was also undetectable, 10 weeks after application. The surface treatment at this same dose persisted a little longer than the incorporated treatment, but even this was barely detectable after 19 weeks and undetectable after 35.

Pre-emergence selectivity among temperate species

The smaller seeded grass weeds, including A. myosuroides were either killed or controlled at the lowest dose of 0.2 kg/ha. Senecio vulgaris and Veronica persica were the only broad-leaved weeds controlled at this dose, although several more of these were susceptible at the higher doses.

No crop tolerated more than 0.2 kg/ha. At this dose, all three cereals and large seeded legumes were tolerant as were sugar beet and carrot. Wheat and field bean were only slightly affected by 0.8 kg/ha however, while dwarf bean was reduced in vigour by only 21% at 3.2 kg/ha. The control of A. myosuroides and other small seeded grass weeds by epronaz in cereals, notably wheat, is interesting and, as suggested for K 1441 and WL 29226, comparison with other black-grass herbicides, would be worthwhile. Poor control of broad-leaved weeds is a disadvantage of epronaz however. Although the potential control of the annual grass weeds in several broad-leaved crops is interesting, no advantages over herbicides currently used in these crops are apparent.

Pre-emergence selectivity among tropical species

Amaranthus and the small seeded annual grasses (but not Rottboellia) were well controlled at the lowest dose and good selectivity is indicated in several crops at 0.8 kg/ha. Chickpea was outstandingly tolerant and the manufacturer's claims for safety in groundnut and soyabean are well supported. Selectivity in cotton and maize on the other hand would appear to be marginal.

Cyperus esculentus could perhaps be selectively suppressed in several of the legume crops at about 0.8 kg/ha. The higher dose of 3.2 kg/ha controlled both Cyperus species for 1-2 months but healthy recovery was occurring at 10 weeks.

ACTIVITY EXPERIMENT

EPRONAZ

		0.1 kg/ha	0.6 kg/ha	3.6 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx
	P	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx
	I	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
KALE	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxx	xxxx xxxxxx	o o
	I	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxx xxxxxxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	o o
	I	xxxxxxxxxxxxxxx + xxxxxxxxxx	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxx	xxxxxxxxxxxx xxxx
	P	xxxxx xxxxxx	o o	o o
	I	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxx xxxxxx	o o
AVENA FATUA	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxxx xxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxx xxxxxxx	o o
	I	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxx xxxxxxx	o o
	I	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxx xxxxxxxx	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 EXPERIMENT

SPECIES		EPRONAZ 0.2 kg/ha		EPRONAZ 0.8 kg/ha		EPRONAZ 3.2 kg/ha
WHEAT	78	xxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx
(1)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	36	xxxxxxx
BARLEY	104	xxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	36	xxxxxxx
OAT	98	xxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx	7	x
(3)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	7	x
PER RYGR	11	xx	0		0	
(4)	21	xxxx	0		0	
ONION	90	xxxxxxxxxxxxxxxxx	0		0	
(8)	71	xxxxxxxxxxxxxx	0		0	
DWF BEAN	106	xxxxxxxxxxxxxxxxxxx +	106	xxxxxxxxxxxxxxxxxxx +	106	xxxxxxxxxxxxxxxxxxx +
(9)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
FLD BEAN	79	xxxxxxxxxxxxxxxx	126	xxxxxxxxxxxxxxxxxxx +	111	xxxxxxxxxxxxxxxxxxx +
(10)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
PEA	104	xxxxxxxxxxxxxxxxxxx +	78	xxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +
(11)	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxx
W CLOVER	90	xxxxxxxxxxxxxxxxx	17	xxx	0	
(12)	57	xxxxxxxxxx	43	xxxxxxxxx	0	
RAPE	85	xxxxxxxxxxxxxxxxx	0		0	
(14)	50	xxxxxxxxxx	0		0	
KALE	76	xxxxxxxxxxxxxxx	4	x	0	
(15)	64	xxxxxxxxxxxxx	14	xxx	0	

SPECIES		EPRONAZ 0.2 kg/ha		0.8 kg/ha		3.2 kg/ha
CARROT	103	xxxxxxxxxxxxxxxxxxx +	59	xxxxxxxxxxxx	0	
(18)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	0	
LETTUCE	68	xxxxxxxxxxxxxx	0		0	
(20)	36	xxxxxxx	0		0	
SUG BEET	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	0	
(21)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	0	
AVE FATU	94	xxxxxxxxxxxxxxxxxxx	84	xxxxxxxxxxxxxxxxx	45	xxxxxxxxx
(26)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
ALO MYOS	21	xxxx	0		0	
(27)	21	xxxx	0		0	
POA ANN	0		0		0	
(28)	0		0		0	
POA TRIV	0		0		0	
(29)	0		0		0	
SIN ARV	85	xxxxxxxxxxxxxxxxx	0		0	
(30)	64	xxxxxxxxxxxxx	0		0	
RAPH RAP	102	xxxxxxxxxxxxxxxxxxx +	51	xxxxxxxxxx	0	
(31)	71	xxxxxxxxxxxxxx	36	xxxxxxx	0	
TRIP MAR	69	xxxxxxxxxxxxxx	66	xxxxxxxxxxxxx	0	
(33)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
SEN VULG	30	xxxxxx	0		0	
(34)	29	xxxxxx	0		0	

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	EPRONAZ 0.2 kg/ha		EPRONAZ 0.8 kg/ha		EPRONAZ 3.2 kg/ha	
POL LAPA	107	xxxxxxxxxxxxxxxxxxx +	77	xxxxxxxxxxxxxx	0	
(35)	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
POL AVIC	104	xxxxxxxxxxxxxxxxxxx +	24	xxxxx	0	
(36)	86	xxxxxxxxxxxxxxxx	14	xxx	0	
GAL APAR	79	xxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxx	40	xxxxxxxx
(38)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	29	xxxxxx
CHEN ALB	85	xxxxxxxxxxxxxxxx	23	xxxxx	0	
(39)	57	xxxxxxxxxx	29	xxxxxx	0	
STEL MED	60	xxxxxxxxxxx	0		0	
(40)	50	xxxxxxxxxx	0		0	
VER PERS	23	xxxxx	8	xx	0	
(42)	29	xxxxxx	14	xxx	0	
RUM OBTU	56	xxxxxxxxxx	0		0	
(44)	71	xxxxxxxxxxxxx	0		0	
HOLC LAN	0		0		0	
(45)	0		0		0	
AG REPEN	116	xxxxxxxxxxxxxxxxxxx +	19	xxxx	10	xx
(47)	100	xxxxxxxxxxxxxxxxxxx	29	xxxxxx	14	xxx
ALL VIN	82	xxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxx +	30	xxxxxx
(49)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx
CIRS ARV	124	xxxxxxxxxxxxxxxxxxx +	71	xxxxxxxxxxxxx	53	xxxxxxxxxx
(50)	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx

EPRONAZ

SPECIES		0.2 kg/ha		0.8 kg/ha		3.2 kg/ha
TUS FARF	114	xxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxx	0	
(51)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	0	
MAIZE	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(58)	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
SORGHUM	71	xxxxxxxxxxxxxx	11	xx	0	
(59)	64	xxxxxxxxxxxxx	21	xxxx	0	
RICE	62	xxxxxxxxxxx	0		0	
(60)	43	xxxxxxxxx	0		0	
PIGEON P	102	xxxxxxxxxxxxxxxxxxx +	88	xxxxxxxxxxxxxxxxx	29	xxxxxx
(61)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	21	xxxx
COWPEA	83	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	17	xxx
(62)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	29	xxxxxx
CHICKPEA	116	xxxxxxxxxxxxxxxxxxx +	87	xxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
GRNDNUT	75	xxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SOYABEAN	136	xxxxxxxxxxxxxxxxxxx +	150	xxxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxx +
(65)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
COTTON	112	xxxxxxxxxxxxxxxxxxx +	66	xxxxxxxxxxxxx	37	xxxxxxx
(66)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	29	xxxxxx
JUTE	35	xxxxxxx	0		0	
(67)	50	xxxxxxxxxx	0		0	

EPRONAZ

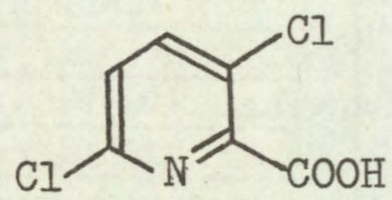
SPECIES		0.2 kg/ha		0.8 kg/ha		3.2 kg/ha
KENAF	70	xxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	0	
(68)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
SESAMUM	8	xx	8	xx	0	
(70)	21	xxxx	21	xxxx	0	
TOMATO	112	xxxxxxxxxxxxxxxxxxxx +	14	xxx	0	
(71)	50	xxxxxxxxxx	14	xxx	0	
OR PUNCT	24	xxxxx	0		0	
(73)	50	xxxxxxxxxx	0		0	
ELEU IND	3	x	0		0	
(74)	14	xxx	0		0	
ECH CRUS	22	xxxx	0		0	
(75)	14	xxx	0		0	
ROTT EXA	85	xxxxxxxxxxxxxxxx	69	xxxxxxxxxxxxx	35	xxxxxxx
(76)	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
DIG SANG	32	xxxxxx	0		0	
(77)	29	xxxxxx	0		0	
AMAR RET	0		0		0	
(78)	0		0		0	
SNOW POL	0		0		0	
(83)	0		0		0	
CYP ESCU	75	xxxxxxxxxxxxxx	60	xxxxxxxxxxx	0	
(85)	50	xxxxxxxxxx	21	xxxx	0	
CYP ROTU	75	xxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx	0	
(86)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	

DOWCO 290

Code number DOWCO 290 Trade name Lontrel

Chemical name 3,6-dichloropicolinic acid

Structure



Source

Dow Chemical Co (UK) Ltd
Heathrow House
Bath Road
Hounslow
London, TW5 9QY

Information available and suggested uses

Post-emergence control of broad-leaved weeds, with a spectrum confined mainly to members of the Compositae, Polygonaceae, Umbelliferae and Papilionaceae. Tolerant crops are:- cereals, maize, sorghum, flax, grasses and brassicae such as oil seed rape. In most situations, it will form part of a herbicide mixture with products such as dalapon and benazolin. Mixtures with mecoprop and dichlorprop are also available.

Formulation used 30% w/v a.i. aqueous concentrate (alkanolamine salt)

Spray volume for activity experiment 305 l/ha
for selectivity experiment 417 l/ha

RESULTS

Full results are given in the histograms on pages 46-51 and potential selectivities are summarised in the following table.

RATE (kg a.i./ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
2.5	oat	Poa trivialis Polygonum lapathifolium Polygonum aviculare Galium aparine Veronica persica Agropyron repens Digitaria sanguinalis + species below
0.5	species above + kale wheat radish maize sorghum	Chenopodium album Allium vineale + species below

(Table continued overleaf)

RATE (kg a.i./ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
0.1	species above + barley perennial ryegrass rape rice	Tripleurospermum maritimum Senecio vulgaris Rumex obtusifolius Cirsium arvense Tussilago farfara Amaranthus retroflexus

Comments on results

Activity experiment (see page 46)

Dwarf bean and Polygonum were very sensitive to all four methods of application. Grasses were resistant to post-emergence treatments and the higher doses pre-emergence had only minor effects. With dwarf bean all four application methods showed a similar degree of activity. Polygonum was most affected by pre-emergence suface treatments, all plants being killed eventually; even remaining rhizome fragments failed to develop when replanted in untreated soil. Kale showed considerable resistance to all treatments.

Symptoms

Symptoms were identical to those caused by picloram. Dwarf bean and Polygonum developed a pronounced epinasty of leaves, petioles and stems within a few hours of spraying. These symptoms developed within a few days in soil drench treatments. Thickening and subsequent splitting of stems occurred, and on dwarf bean, root primordia developed. Newly developing leaves were often strap shaped with prominent and abnormal veination. Some chlorosis and necrosis developed later. At higher doses, pre-emergence, many broad-leaved species failed to emerge, while at lower doses, although emergence occurred, there was a severe inhibition of growth and development of stems and leaves, large seeded legumes in particular showing severely swollen stems.

Grasses treated pre-emergence at the higher doses, were generally lacking in vigour. Narrow leaf blades which tended to curl over were often seen.

Soil persistence

White clover was selected to monitor persistence because of its sensitivity to Dowco 290. Both surface and incorporated treatments caused complete kill even at the lowest dose. After 10 weeks, incorporated treatments of 0.1 and 0.5 kg/ha were undectable, but 2.5 kg/ha still killed plants after 35 weeks. At the lower doses, surface treatments also showed some signs of dissipation, although not quite as rapid as with the incorporated treatments. Thus, while 0.1 kg/ha had disappeared in 19 weeks, 0.5 and 2.5 kg/ha were still causing 50 and 80% shoot fresh weight reductions respectively, 35 weeks after spraying. These results lend support to the manufacturer's claim that persistence of Dowco 290 is much less than with the chemically related picloram.

Pre-emergence selectivity among temperate species

Composite weeds showed outstanding sensitivity, the annuals S. vulgaris and T. maritimum being controlled at 0.1 kg/ha while the perennials C. arvense and T. farfara were killed at this dose. Polygonaceous weeds were also sensitive especially Rumex obtusifolius. Although the high dose was required for adequate control of P. lapathifolium and P. aviculare, their vigour was reduced by 50% or more at the lower doses. (The perennial, P. amphibium was highly sensitive in the activity experiment). Galium aparine and Veronica persica were susceptible at 2.5 kg/ha and reduced in vigour by 50% or more at 0.5 kg/ha. Grass weeds were relatively resistant, but Poa trivialis and Agropyron repens were controlled at the high dose. The control of Allium vineale at only 0.5 kg/ha is of interest. A certain weakness exists with the resistance of Stellaria media.

Crop tolerance was found in the cereals, brassicas and perennial ryegrass. Oat was the most tolerant of the cereals, being unaffected at 2.5 kg/ha. Wheat was reduced in vigour by only 29% at this dose. Among the brassicas, kale and radish tolerated 0.5 kg/ha and were only marginally reduced at 2.5 kg/ha. Rape tolerated 0.1 kg/ha and suffered only 20% to 30% vigour reductions at higher doses. Carrot, lettuce and the leguminous crops were very susceptible.

The possible control of composite and polygonaceous weeds (perennials as well as annuals) in cereals, perennial ryegrass and brassicae crops is of considerable interest in view of their importance in these crops and the lack of adequate control measures. Although Dowco 290 is more likely to be used post-emergence, pre-emergence application could also be of interest and because of the reputed, more rapid breakdown in the soil, the problem of residues in the crop plant may then be less acute. The control of Allium vineale in cereals is interesting as only a few herbicides such as 2,4-D are used, not always successfully, against this weed which is still a problem in certain areas.

Pre-emergence selectivity among tropical species

All grass species and Cyperus spp were relatively unharmed while all broad-leaved species, especially the leguminous crops, were severely damaged or killed at 0.5 kg/ha.

The safety in maize and sorghum might be exploited for control of problem broad-leaved weeds but such problems are not wide spread. Safety in rice was not quite so great. Further work will be of interest in a wider range of tropical crops including perennials such as sugar cane, but post-emergence applications may be of greater relevance where there are broad-leaved perennial weeds.

ACTIVITY EXPERIMENT

DOWCO 290

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

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

DOWCO 290

SPECIES	0.1 kg/ha		0.5 kg/ha		2.5 kg/ha	
WHEAT	85	xxxxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx
(1)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
BARLEY	91	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxx +
(2)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxx
OAT	91	xxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
PER RYGR	109	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
ONION	60	xxxxxxxxxxx	0		0	
(8)	36	xxxxxxx	0		0	
DWF BEAN	0		0		0	
(9)	0		0		0	
FLD BEAN	47	xxxxxxxxx	0		0	
(10)	29	xxxxxx	0		0	
PEA	26	xxxxx	0		0	
(11)	7	x	0		0	
W CLOVER	0		0		0	
(12)	0		0		0	
RAPE	96	xxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxx	113	xxxxxxxxxxxxxxxxxxx +
(14)	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
KALE	97	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

DOWCO 290

SPECIES	0.1 kg/ha		0.5 kg/ha		2.5 kg/ha	
CARROT	0		0		0	
(18)	0		0		0	
LETTUCE	0		0		0	
(20)	0		0		0	
SUG BEET	103	xxxxxxxxxxxxxxxxxxx +	115	xxxxxxxxxxxxxxxxxxx +	58	xxxxxxxxxxx
(21)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
AVE FATU	105	xxxxxxxxxxxxxxxxxxx +	101	xxxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxx +
(26)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
ALO MYOS	77	xxxxxxxxxxxxxx	101	xxxxxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxx
(27)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
POA ANN	115	xxxxxxxxxxxxxxxxxxx +	108	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx
(28)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	36	xxxxxxx
POA TRIV	92	xxxxxxxxxxxxxxxxx	58	xxxxxxxxxxx	8	xx
(29)	71	xxxxxxxxxxxxxx	50	xxxxxxxxx	14	xxx
SIN ARV	97	xxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx	65	xxxxxxxxxxxx
(30)	93	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
RAPH RAP	102	xxxxxxxxxxxxxxxxxxx+	97	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx
(31)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
TRIP MAR	100	xxxxxxxxxxxxxxxxxxx	31	xxxxxx	6	x
(33)	14	xxx	14	xxx	7	x
SEN VULG	22	xxxx	0		7	x
(34)	7	x	0		7	x

DOWCO 290

SPECIES	0.1 kg/ha		0.5 kg/ha		2.5 kg/ha	
POL LAPA	127	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
(35)	43	xxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
POL AVIC	141	xxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxx
(36)	50	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
GAL APAR	99	xxxxxxxxxxxxxxxxxxx	59	xxxxxxxxxxx	8	xx
(38)	79	xxxxxxxxxxxxxxx	36	xxxxxxx	7	x
CHEN ALB	88	xxxxxxxxxxxxxxxxx	62	xxxxxxxxxxx	27	xxxxx
(39)	57	xxxxxxxxxx	29	xxxxxx	14	xxx
STEL MED	130	xxxxxxxxxxxxxxxxxxx +	110	xxxxxxxxxxxxxxxxxx +	65	xxxxxxxxxxx
(40)	86	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx
VER PERS	92	xxxxxxxxxxxxxxxxx	108	xxxxxxxxxxxxxxxxxx +	0	
(42)	64	xxxxxxxxxxxx	50	xxxxxxxxx	0	
RUM OBTU	9	xx	0		0	
(44)	14	xxx	0		0	
HOLC LAN	110	xxxxxxxxxxxxxxxxxx +	94	xxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxx
(45)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx
AG REPEN	116	xxxxxxxxxxxxxxxxxx +	116	xxxxxxxxxxxxxxxxxx +	10	xx
(47)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	14	xxx
ALL VIN	112	xxxxxxxxxxxxxxxxxx +	60	xxxxxxxxxxx	15	xxx
(49)	79	xxxxxxxxxxxxxxx	29	xxxxxx	29	xxxxxx
CIRS ARV	0		0		0	
(50)	0		0		0	

DOWCO 290

SPECIES	0.1 kg/ha		0.5 kg/ha		2.5 kg/ha	
TUS FARF	0		0		0	
(51)	0		0		0	
MAIZE	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(56)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SORGHUM	104	xxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(59)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
RICE	97	xxxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxxx +	79	xxxxxxxxxxxxxxx
(60)	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
PIGEON P	44	xxxxxxxxx	0		0	
(61)	29	xxxxxx	0		0	
COWPEA	17	xxx	0		0	
(62)	7	x	0		0	
CHICKPEA	0		0		0	
(63)	0		0		0	
GRNDNUT	75	xxxxxxxxxxxxxxx	0		0	
(64)	43	xxxxxxxxx	0		0	
SOYABEAN	0		0		0	
(65)	0		0		0	
COTTON	112	xxxxxxxxxxxxxxxxxxx +	28	xxxxxx	0	
(66)	43	xxxxxxxxx	14	xxx	0	
JUTE	76	xxxxxxxxxxxxxxx	24	xxxxx	0	
(67)	50	xxxxxxxxxx	29	xxxxxx	0	

DOWCO 290

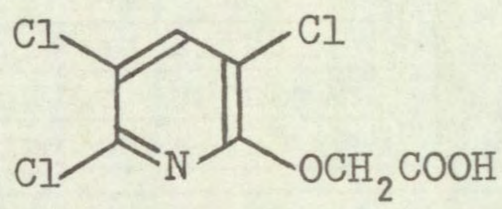
SPECIES	0.1 kg/ha		0.5 kg/ha		2.5 kg/ha	
KENAF	91	xxxxxxxxxxxxxxxxxx	33	xxxxxxx	3	x
(68)	36	xxxxxxx	21	xxxx	7	x
SESAMUM	114	xxxxxxxxxxxxxxxxxxxx +	0		0	
(70)	36	xxxxxxx	0		0	
TOMATO	49	xxxxxxxxxx	0		0	
(71)	21	xxxx	0		0	
OR PUNCT	101	xxxxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxxx +	81	xxxxxxxxxxxxxxx
(73)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	36	xxxxxxx
ELEU IND	94	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(74)	79	xxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
ECH CRUS	110	xxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxx	121	xxxxxxxxxxxxxxxxxxx +
(75)	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx
ROTT EXA	98	xxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx
(76)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxxx
DIG SANG	70	xxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxx	51	xxxxxxxxxx
(77)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	21	xxxx
AMAR RET	111	xxxxxxxxxxxxxxxxxxx +	34	xxxxxxx	13	xxx
(78)	29	xxxxxx	14	xxx	7	x
SNOW POL	84	xxxxxxxxxxxxxxxx	74	xxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
(83)	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxx
CYP ESCU	195	xxxxxxxxxxxxxxxxxxx +	150	xxxxxxxxxxxxxxxxxxx +	120	xxxxxxxxxxxxxxxxxxx +
(85)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CYP ROTU	82	xxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxx +	90	xxxxxxxxxxxxxxxxx
(86)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx	57	xxxxxxxxxx

TRICLOPYR

Code number DOWCO 233

Chemical name 3,5,6-trichloro-2-pyridyloxyacetic acid

Structure



Source

Dow Chemical Co (UK) Ltd
Heathrow House
Bath Road
Hounslow
London, TW5 9QY

Information available and suggested uses

A highly active herbicide on woody plants and brush species including ash (Fraxinus spp) which is relatively tolerant to picloram. It has utility for control of unwanted brush and perennial weeds in industrial areas, pastures, rangeland and forestry.

Formulation used 36% w/v a.e. aqueous concentrate (triethylamine salt)

Spray volume for activity experiment 305 l/ha
for selectivity experiment 417 l/ha

RESULTS

Full results are given in the histograms on pages 55-60 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
3.2	none	none listed as no crops tolerant
0.8	wheat	Sinapis arvensis Raphanus raphanistrum Tripleurospermum maritimum Chenopodium album Rumex obtusifolius Holcus lanatus Oryza punctata Eleusine indica Echinochloa crus-galli + 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
0.2	species above + barley oat field bean pea	Poa trivialis Stellaria media Cirsium arvense Digitaria snaguinalis Amaranthus retroflexus Snowdenia polystachya

Comments on results

Activity experiment (see page 55)

All broad-leaved species were susceptible to the foliar spray but grasses were resistant. Soil drenches had less activity than foliar sprays on dwarf bean and kale and virtually no effect on grasses or Polygonum. Most phytotoxicity was found with pre-emergence treatments (except in dwarf bean), broad-leaved species again being sensitive, as was Agropyron. Avena was more resistant however. Incorporation into the soil reduced activity slightly on kale, perennial ryegrass and Polygonum, but made little difference on the other species.

Symptoms

Symptoms were generally similar to those described for Dowco 290, with severe growth regulator type symptoms developing on all broad-leaved species. In contrast to Dowco 290, however, no epinasty was found with soil drench treatments to dwarf beans and kale. These treatments caused retardation of growth and a mild chlorosis or yellowing of the unifoliate leaves of dwarf bean while trifoliates, which were also retarded, were dark green in colour. In kale, retarded growth was accompanied by a slight swelling of stems above the cotyledons, the plants thus tending to collapse.

Pre-emergence treatments at high doses prevented many species emerging from the soil. At lower doses severe stunting of broad-leaved species was noted, many dying back from the cotyledon leaf stage. Elongation of the mesocotyl occurred with most of the grass species, this often being visible above soil level. Leaf blades were narrow and usually tended to curl over.

Soil persistence

White clover was highly sensitive, being killed by surface and incorporated treatments initially, even at the lowest dose. The incorporated treatments of 0.2 and 0.8 kg/ha were undetectable after 10 weeks and 3.2 kg/ha after 19 weeks. Surface treatments tended to be more persistent than when incorporated, but these also tended to dissipate steadily with time. Thus surface treatments of 0.2 and 0.8 kg/ha were undetectable when assayed 35 weeks later, while 3.2 kg/ha, although still detectable at this time, was causing only a 40% reduction in shoot fresh weight.

Pre-emergence selectivity among temperate species

Several weeds were controlled, including annual broad-leaved species such as S. media, T. maritimum, C. album, R. obtusifolius and the crucifers S. arvensis and R. raphanistrum as well as annual grasses, ie P. trivialis and H. lanatus. As with Dowco 290, Cirsium arvense was very sensitive. In contrast Tussilago farfara recovered from initially severe symptoms at the lower doses. Convolvulus arvensis failed to emerge and root fragments eventually rotted.

Crop tolerance was limited to only five species (cereals and legumes) and then only at the lower doses. Wheat was the most tolerant to 0.8 kg/ha and barley and oat to 0.2 kg/ha. The large seeded legumes, field bean and pea were tolerant to 0.2 kg/ha, while dwarf bean survival was only marginally reduced at this dose. White clover, onion, carrot and lettuce were very sensitive.

This herbicide shows some potential use for the selective control of certain broad-leaved perennial weeds, eg Cirsium and Convolvulus, in cereals and in view of the increasing importance of these species in arable situations, further experiments would seem worthwhile.

Pre-emergence selectivity among tropical species

Triclopyr showed much less distinct selectivity than Dowco 290, the grasses being almost as much damaged as the broad-leaved species. Maize was the most tolerant crop but only small seeded broad-leaved species (Amaranthus, jute and sesamum) were susceptible at the low dose of 0.2 kg/ha which might just be safe.

The Cyperus species were partially suppressed at the high dose of 3.2 kg/ha but were recovering within 10 weeks.

The usefulness of this compound as a soil applied herbicide in the tropics would seem very doubtful.

ACTIVITY EXPERIMENT

TRICLOPYR

		0.05 kg/ha	0.25 kg/ha	1.25 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxx
	I	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xx xxx
KALE	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxx x
	I	xxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	x xxx
	I	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxx xxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx
	I	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx + xxxxxxxxxxxxx
AVENA FATUA	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx + xxxxxxxxxx
	I	xxxxxxxxxxxxxxx + xxxxxxxxxxxxxxx	xxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxx	xxx xxx
	I	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxx xxxx

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

TRICLOPYR

SPECIES	0.2 kg/ha		0.8 kg/ha		3.2 kg/ha	
WHEAT	85	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
BARLEY	104	xxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxx
OAT	104	xxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxx +	85	xxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
PER RYGR	86	xxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
(4)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
ONION	34	xxxxxxx	26	xxxxx	9	xx
(8)	21	xxxx	29	xxxxxx	14	xxx
DWF BEAN	88	xxxxxxxxxxxxxxxxx	18	xxxx	0	
(9)	79	xxxxxxxxxxxxxxxx	36	xxxxxxx	0	
FLD BEAN	95	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx
(10)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx
PEA	91	xxxxxxxxxxxxxxxxx	52	xxxxxxxxxx	13	xxx
(11)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	14	xxx
W CLOVER	7	x	0		0	
(12)	14	xxx	0		0	
RAPE	74	xxxxxxxxxxxxxx	28	xxxxxx	0	
(14)	50	xxxxxxxxxx	14	xxx	0	
KALE	51	xxxxxxxxxx	46	xxxxxxxxx	13	xxx
(15)	43	xxxxxxxxx	29	xxxxxx	7	x

TRICLOPYR

SPECIES	0.2 kg/ha		0.8 kg/ha		3.2 kg/ha	
CARROT	15	xxx	0		0	
(18)	21	xxxx	0		0	
LETTUCE	32	xxxxxx	0		0	
(20)	21	xxxx	0		0	
SUG BEET	78	xxxxxxxxxxxxxxxx	0		0	
(21)	57	xxxxxxxxxxx	0		0	
AVE FATU	98	xxxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
ALO MYOS	98	xxxxxxxxxxxxxxxxxxxx	66	xxxxxxxxxxxxx	70	xxxxxxxxxxxxxx
(27)	64	xxxxxxxxxxxxx	36	xxxxxxx	14	xxx
POA ANN	112	xxxxxxxxxxxxxxxxxxxx +	33	xxxxxxx	9	xx
(28)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	7	x
POA TRIV	17	xxx	8	xx	0	
(29)	50	xxxxxxxxxx	14	xxx	0	
SIN ARV	41	xxxxxxxx	0		0	
(30)	36	xxxxxxx	0		0	
RAPH RAP	92	xxxxxxxxxxxxxxxxxx	5	x	0	
(31)	50	xxxxxxxxxx	14	xxx	0	
TRIP MAR	60	xxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	11	xx
(33)	43	xxxxxxxxx	29	xxxxxx	7	x
SEN VULG	82	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	0	
(34)	71	xxxxxxxxxxxxxx	36	xxxxxxx	0	

TRICLOPYR

SPECIES	0.2 kg/ha		0.8 kg/ha		3.2 kg/ha	
POL LAPA	110	xxxxxxxxxxxxxxxxxxxx +	113	xxxxxxxxxxxxxxxxxxxx +	53	xxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	29	xxxxxx
POL AVIC	104	xxxxxxxxxxxxxxxxxxxx +	67	xxxxxxxxxxxxx	0	
(36)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	0	
GAL APAR	91	xxxxxxxxxxxxxxxxxx	99	xxxxxxxxxxxxxxxxxxx	3	x
(38)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	7	x
CHEN ALB	100	xxxxxxxxxxxxxxxxxxx	23	xxxxx	0	
(39)	64	xxxxxxxxxxxxx	21	xxxx	0	
STEL MED	25	xxxxx	0		0	
(40)	29	xxxxxx	0		0	
VER PERS	108	xxxxxxxxxxxxxxxxxxx +	31	xxxxxx	0	
(42)	95	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	0	
RUM OBTU	52	xxxxxxxxxx	0		0	
(44)	50	xxxxxxxxxx	0		0	
HOLC LAN	92	xxxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxx	17	xxx
(45)	64	xxxxxxxxxxxxx	29	xxxxxx	21	xxxx
AG REPEN	106	xxxxxxxxxxxxxxxxxxx +	68	xxxxxxxxxxxxx	0	
(47)	93	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
ALL VIN	105	xxxxxxxxxxxxxxxxxxx +	64	xxxxxxxxxxxx	49	xxxxxxxxx
(49)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	36	xxxxxxx
CIRS ARV	18	xxxx	0		0	
(50)	29	xxxxxx	0		0	

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	TRICLOPYR 0.2 kg/ha		TRICLOPYR 0.8 kg/ha		TRICLOPYR 3.2 kg/ha	
TUS FARF	57	xxxxxxxxxxx	43	xxxxxxxxx	0	
(51)	57	xxxxxxxxxxx	50	xxxxxxxxxx	0	
MAIZE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(58)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
SORGHUM	87	xxxxxxxxxxxxxxxxx	76	xxxxxxxxxxxxxxx	5	x
(59)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
RICE	115	xxxxxxxxxxxxxxxxxxx +	18	xxxx	0	
(60)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	
PIGEON P	59	xxxxxxxxxxxx	0		0	
(61)	64	xxxxxxxxxxxxx	0		0	
COWPEA	100	xxxxxxxxxxxxxxxxxxx	0		0	
(62)	71	xxxxxxxxxxxxxx	0		0	
CHICKPEA	29	xxxxxx	0		0	
(63)	36	xxxxxxx	0		0	
GRNDNUT	112	xxxxxxxxxxxxxxxxxxx +	75	xxxxxxxxxxxxxx	0	
(64)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	0	
SOYABEAN	55	xxxxxxxxxxx	0		0	
(65)	57	xxxxxxxxxxx	0		0	
COTTON	84	xxxxxxxxxxxxxxxx	37	xxxxxxx	0	
(66)	79	xxxxxxxxxxxxxxxx	21	xxxx	0	
JUTE	0		0		0	
(67)	0		0		0	

PRE-EMERGENCE SELECTIVITY EXPERIMENT

TRICLOPYR

SPECIES	0.2 kg/ha		0.8 kg/ha		3.2 kg/ha	
KENAF	103	xxxxxxxxxxxxxxxxxxxx +	12	xx	0	
(68)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
SESAMUM	0		0		0	
(70)	0		0		0	
TOMATO	112	xxxxxxxxxxxxxxxxxxxx +	0		0	
(71)	71	xxxxxxxxxxxxxx	0		0	
OR PUNCT	53	xxxxxxxxxxx	28	xxxxxx	0	
(73)	50	xxxxxxxxxx	29	xxxxxx	0	
ELEU IND	103	xxxxxxxxxxxxxxxxxxxx +	44	xxxxxxxxx	0	
(74)	57	xxxxxxxxxxx	29	xxxxxx	0	
ECH CRUS	99	xxxxxxxxxxxxxxxxxxxx	18	xxxx	7	x
(75)	50	xxxxxxxxxx	7	x	7	x
ROTT EXA	95	xxxxxxxxxxxxxxxxxxx	41	xxxxxxxx	9	xx
(76)	71	xxxxxxxxxxxxxx	36	xxxxxxx	7	x
DIG SANG	86	xxxxxxxxxxxxxxxxx	10	xx	0	
(77)	29	xxxxxx	14	xxx	0	
AMAR RET	4	x	0		0	
(78)	21	xxxx	0		0	
SNOW POL	30	xxxxxx	0		0	
(83)	43	xxxxxxxxx	0		0	
CYP ESCU	180	xxxxxxxxxxxxxxxxxxxx +	120	xxxxxxxxxxxxxxxxxxx +	45	xxxxxxxxx
(85)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
CYP ROTU	82	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	22	xxxx
(86)	93	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx

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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)	Maris Huntsman	8	1.2	3-4½ leaves
Barley (Hordeum vulgare)	BARLEY (2)	Maris Mink	8	1.2	3½ leaves
Oat (Avena sativa)	OAT (3)	Peniarth	8	1.2	3½ leaves
Perennial ryegrass (Lolium perenne)	PER RYGR (4)	S 23	15	0.6	5-6 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	2-3 trifoliate leaves
Field bean (Vicia faba)	FLD BEAN (10)	Maris Bead	4	1.8	4 leaves
Pea (Pisum sativum)	PEA (11)	Dark Skinned Perfection	4	1.2	6 leaves
White clover (Trifolium repens)	W CLOVER (12)	S 100	20	0.6	1½-2½ trifoliate leaves
Rape (Brassica napus oleifera)	RAPE (14)	Victor	12	0.6	3½ leaves
Kale (Brassica oleracea acephala)	KALE (15)	Marrowstem	12	0.6	2½-3½ leaves
Carrot (Daucus carota)	CARROT (18)	Chantenay Red Core	12	0.6	2½ leaves
Lettuce (Lactuca sativa)	LETTUCE (20)	Borough Wonder	12	0.6	3½-4½ leaves

+ temperate species raised under higher temperature regime

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)
Sugar beet (Beta vulgaris)	SUG BEET (21)	'Klein E'	15	1.2	$2\frac{1}{2}$-3 leaves
Avena fatua	AVE FATU (26)	B and S supplies 1972	15	1.2	$3\frac{1}{2}$ leaves
Alopecurus myosuroides	ALO MYOS (27)	B and S supplies 1972	25	0.6	4 leaves, tillering
Poa annua	POA ANN (28)	WRO 1974	30	0.6	4-6 leaves, tillering
Poa trivialis	POA TRIV (29)	Watts 1972	75	0.6	6 leaves, tillering
Sinapis arvensis	SIN ARV (30)	WRO 1965	30	0.6	$3\frac{1}{2}$-$4\frac{1}{2}$ leaves
Raphanus raphanistrum	RAPH RAP (31)	Long Black Spanish	12	0.6	$2\frac{1}{2}$-3 leaves
Tripleurospermum maritimum	TRIP MAR (33)	WRO 1975	30	Surface	6-8 leaves
Senecio vulgaris	SEN VULG (34)	WRO 1972	25	0.3	$2\frac{1}{2}$-$3\frac{1}{2}$ leaves
Polygonum lapathifolium	POL LAPA (35)	WRO 1974	25	0.6	$2\frac{1}{2}$-$3\frac{1}{2}$ leaves
Polygonum aviculare	POL AVIC (36)	WRO 1971	100	0.6	5-6 leaves
Galium aparine	GAL APAR (38)	WRO 1973	25	0.6	4-6 whorls
Chenopodium album	CHEN ALB (39)	WRO 1972	25	0.15	6-7 leaves
Stellaria media	STEL MED (40)	B and S supplies 1974	50	0.6	8 leaves
Veronica persica	VER PERS (42)	WRO 1972	20	0.6	5 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)
Rumex obtusifolius	RUM OBTU (44)	Tackley 1972	15	0.15	2½-4 leaves
Holcus lanatus	HOLC LAN (45)	WRO 1973	40	0.6	4-5 leaves, tillering
Agropyron repens	AG REPEN (47)	WRO Clone 31	6/	1.2	3½-4 leaves
Allium vineale	ALL VIN (49)	WRO 1974	15*	1.2	2-3 leaves
Cirsium arvense	CIRS ARV (50)	WRO Clone 1	4//	1.2	5-6 leaves
Tussilago farfara	TUS FARF (51)	WRO Clone 1	4/	1.2	3-4 leaves
Convolvulus arvensis	CONV ARV (52)	WRO Clone D	5//	1.2	8 leaves
Tropical species (grown under higher temperature regime)					
Maize (Zea mays)	MAIZE (58)	Caldera	5	1.8	4-4½ leaves
Sorghum (Sorghum bicolor)	SORGHUM (59)	YE-90-L	12	1.2	4-4½ leaves
Rice (Oryza sativa)	RICE (60)	Blue Bonnet	12	0.6	2-2½ leaves
Pigeon pea (Cajanus cajan)	PIGEON P (61)	Jamaica 1974	8	1.2	2-3 trifoliate, leaves
Cowpea (Vigna unguiculata)	COWPEA (62)	Nigeria 1974	8	1.2	2-3 trifoliate, leaves
Chickpea (Cicer arietinum)	CHICKPEA (63)	Ethiopia 1970	6	1.2	10-12 leaves
Groundnut (Arachis hypogea)	GRNDNUT (64)	S.38	5	1.8	5 leaves
Soyabean (Glycine max)	SOYABEAN (65)	Amsoy	6	1.2	2-3 trifoliate leaves

/ one node rhizome fragments // 4 cm root fragments * aerial bulbils

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)
Cotton (Gossypium hirsutum)	COTTON (66)	Samaru 26J	6	1.2	2-3 leaves
Jute (Corchorus olitorius)	JUTE (67)	Egypt 1971	12	0.6	4-5 leaves
Kenaf (Hibiscus cannabinus)	KENAF (68)	Thai Native 1968	20	0.6	2-3 leaves
Sesamum (Sesamum indicum)	SESAMUM (70)	Uganda 1972	10	0.6	2-4 leaves
Tomato (Lycopersicum esculentum)	TOMATO (71)	Ailsa Craig	8	0.6	4 leaves
Oryza punctata	OR PUNCT (73)	Swaziland 1974	20	0.6	$2\frac{1}{2}$-3 leaves
Eleusine indica	ELEU IND (74)	Rhodesia 1967	18	0.6	4-$4\frac{1}{2}$ leaves
Echinochloa crus-galli	ECH CRUS (75)	WRO 1973	15	0.6	4 leaves
Rottboellia exaltata	ROT EXAL (76)	Rhodesia 1971	20	0.6	4 leaves
Digitaria sanguinalis	DIG SANG (77)	WRO 1971	20	0.3	3-5 leaves
Amaranthus retroflexus	AMAR RET (78)	WRO 1972	20	0.15	5-6 leaves
Solanum nigrum+	SOL NIG (81)	B and S supplies 1973	20	0.15	7 leaves
Snowdenia polystachya	SNOW POL (83)	Ethiopia 1974	50	surface	$5\frac{1}{2}$ leaves
Cyperus esculentus	CYP ESCU (85)	WRO Clone 2 (ex South Africa)	6**	1.8	6 leaves/ shoot
Cyperus rotundus	CYP ROTU (86)	WRO Clone 1 (ex Rhodesia)	5**	1.8	7 leaves/ shoot

+ Temperate species raised under higher temperature regime
** Tubers

ABBREVIATIONS

ångstrŏm	Å
Abstract	Abs.
acid equivalent*	a.e.
acre	ac
active ingredient*	a.i.
approximately equal to*	≃
aqueous concentrate	a.c.
bibliography	bibl.
boiling point	b.p.
bushel	bu
centigrade	C
centimetre*	cm
concentrated	concd
concentration	concn
concentration × time product	ct
concentration required to kill 50% test animals	LC50
cubic centimetre*	cm^3
cubic foot*	ft^3
cubic inch*	in^3
cubic metre*	m^3
cubic yard*	yd^3
cultivar(s)	cv.
curie*	Ci
degree Celsius*	^oC
degree centigrade*	^oC
degree Fahrenheit*	^oF
diameter	diam.
diameter at breast height	d.b.h.
divided by*	÷ or /
dry matter	d.m.
emulsifiable concentrate	e.c.
equal to*	=
fluid	fl.
foot	ft
freezing point	f.p.
from summary	F.s.
gallon	gal
gallons per hour	gal/h
gallons per acre	gal/ac
gas liquid chromatography	GLC
gramme	g
hectare	ha
hectokilogram	hkg
high volume	HV
horse power	hp
hour	h
hundredweight*	cwt
hydrogen ion concentration*	pH
inch	in.
infra red	i.r.
kilogramme	kg
kilo ($\times 10^3$)	k
less than	<
litre	l.
low volume	LV
maximum	max.
median lethal dose	LD50
medium volume	MV
melting point	m.p.
metre	m
micro ($\times 10^{-6}$)	µ
microgramme*	µg
micromicro (pico: $\times 10^{-12}$)*	µµ
micrometre (micron)*	µm (or µ)
micron (micrometre)*×	µm (or µ)
miles per hour*	mile/h
milli ($\times 10^{-3}$)	m
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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