WEED RESEARCH ORGANIZATION

TECHNICAL REPORT No.61

THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: R 40244, DPX 4189, ACIFLUORFEN, ARD 34/02 (NP 55) AND PP 009

W G RICHARDSON, T M WEST and C PARKER

NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

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THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: R 40244, DPX 4189, ACIFLUORFEN, ARD 34/02 (NP 55) AND PP 009

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SUMMARY

Five herbicides were examined for their post-emergence selectivity on 36 temperate and 26 tropical crop and weed species. The route of action of three of these herbicides was determined on six selected species in a separate test.

R 40244 caused a striking albinism of susceptible species, controlling a number of mainly annual broad-leaved weeds, but some Compositae were resistant. Carrot and cereal crops were relatively tolerant.

DPX 4189 exhibited a very high level of soil and foliar activity with as little as 10 g/ha being sufficient to control many annual broad-leaved weeds. At higher doses, other important weeds such as Galium aparine and Veronica persica as well as grasses and perennial broad-leaved weeds were controlled. The temperate cereals, wheat, barley and oat were highly tolerant but nearly all other crops were very sensitive.

Acifluorfen controlled an interesting spectrum of annual broad-leaved weeds but not Stellaria media, while temperate cereals, leguminous crops, onion and perennial ryegrass were tolerant. Among the tropical species, groundnut proved tolerant as well as soyabean, and useful activity was observed on Cyperus esculentus.

ARD 34/02 (NP 55) and PP 009 were almost identical in their level and type of activity on annual and perennial grass weeds, while onion and nearly all broad-leaved crops and weeds were highly tolerant. Interestingly, both failed to control Poa annua.

INTRODUCTION

The pre- and post-emergence selectivities of new herbicides are investigated on a large number of pot-grown crop and weed species at WRO. The objectives are to discover selectivities, crop and weed susceptibilities and to obtain experience of the type of effects produced by each compound. Attention is drawn to the limitations of these investigations; e.g. use of only one crop variety or source of weed species and growth in one particular soil type at only one depth of sowing without intraspecific competition. Consequently the results should only be used as a guide for further work; plant responses in pot experiments can be very different to those in the field.

The present report gives indications of the post-emergence selectivity of five new herbicides. Results of activity experiments are also included for DPX 4189, ARD 34/02 (NP 55) and PP 009 to provide information on levels of

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NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

phytotoxicity, type and route of action. Those for R 40244 and acifluorfen have been reported earlier (Richardson et al., 1979).

METHODS AND MATERIALS

(a) Activity experiments (AE 1, AE2)

These were carried out on six selected species as described previously (Richardson and Dean, 1974). Four annual species were raised from seeds and two perennials from rhizome fragments. Herbicides were applied by four different methods:

(i) post-emergence to the foliage only, avoiding contact with the soil,
(ii) post-emergence to the soil only, as a drench avoiding foliage contact,
(iii) pre-emergence to the soil surface,
(iv) pre-emergence with thorough incorporation, before planting.

Species data are summarised in Table 1 and soil and environmental conditions for all experiments in Table 2.

Table 1. Plant data for activity experiments (AE)

Species	Cultivar/ source	No. per pot at spraying		Depth of planting (cm)	Post-emergence stage of growth at spraying	Stage of growth at assessment	
		pre-	post			pre-	post-
Dwarf bean (Phaseolus vulgaris)	The Prince	3 or 4	2	2.0	2 uni-foliate leaves	2 tri-foliate leaves	2-2½ tri-foliate leaves
Kale (Brassica oleracea acephala)	Marrowstem: Maris Kestrel	10 or 12	5	0.5	1½-2 leaves	3-4 leaves	3½-4½ leaves
Polygonum amphibium	WRO Clone 1	6	4-5	1.0	4-6 leaves	6-10 leaves	8-10 leaves
Perennial ryegrass (Lolium perenne)	S 23	15	10	0.5	2½-3 leaves	10 leaves, tillering	8-15 leaves, tillering
Avena fatua	Bourton-on-the-Water 1973. B&S Supplies 1976	10	5	1.0	2½-3 leaves	4½-9 leaves, tillering	7-10 leaves, tillering
Agropyron repens	WRO Clone 31	6	5	1.0	2-3	4½-8 leaves, tillering	7-10 leaves, tillering

(b) Post-emergence selectivity experiment

The technique for this experiment was as before (Richardson and Parker, 1977).

NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

Plants were raised in 9 or 10 cm diameter plastic pots in soil taken from a field (Begbroke North) at Begbroke Hill. Planting dates were staggered so that the majority of species had reached the 2-4 leaf stage by the time of spraying. However, it can be seen in the Appendix that several species were at a more advanced stage of growth. Temperate species were raised in the open and tropical species in the glasshouse. Herbicides were applied using a laboratory sprayer operating at a pressure of 207 kPa (30 lb/in^2) and moving at constant speed 45 cm above the plants.

Table 2. Soil and environmental conditions

Experiment number, type and herbicide(s) included	AE 1 DPX 4189 ARD 34/02	AE 2 PP 009	Post-emergence selectivity test R 40244, DPX 4189 acifluorfen, ARD 34/02 & PP 009	
Date of spraying	8.6.79	15.11.79	6 and 14. 9.79 9 and 16.10.79	
Main assessment completed	10.7.79	4. 1.80	14.11.79	
Organic matter (%)	4.1	4.1	4.1	
Clay content (%)	15.0	15.0	15.0	
pH	7.0	7.0	7.0	
Vitax Q4 (g/kg) fertilizer	5.0	5.0	-	
Vitax QS 3 (g/kg) fertilizer	-	-	3.0	
DDT (5% dust) (g/kg)	0.4	0.4	0.4	
Hydrated Mg SO_4 (g/kg)	1.0	1.0	1.0	
Temperature (^oC)			Temperate	Tropical
Mean	21	16	12	22
Maximum	34	24	23	31
Minimum	12	9	5	13
Relative humidity (%)				
Mean	65	63	70	70
Maximum	88	88	90	90
Minimum	30	32	30	28

Before spraying, each species was thinned to constant number per pot. Certain plant material was pre-treated to improve establishment:- Chenopodium album seeds were soaked in 0.1 M potassium nitrate solution and then kept in the light for two days prior to planting; Veronica persica, Agrostis stolonifera and tobacco seeds were sown in a tray of peat compost and seedlings (1-2 true leaves) transplanted into the potting medium; seeds of Polygonum aviculare were kept moist at 2^{o}C for at least six weeks before sowing; seeds of Sinapis arvensis were immersed in concentrated sulphuric acid for 20 minutes and then thoroughly washed before being soaked in an aqueous solution of gibberellic acid (250 ppm w/v) for 48 hours; tubers of Cyperus esculentus and Oxalis latifolia were stored moist for four and five weeks at 2^{o}C respectively prior to planting, to break dormancy. Perennial species were propagated vegetatively as indicated in Appendix 1.

To protect from soil-borne pathogens all seeds except Chenopodium album, Polygonum aviculare and the temperate cereals were pretreated with one of the following: thiram, Harvesan organomercury (for Avena fatua) or ethylmercuric phosphate + dieldrin (for sugar beet). Temperate cereal seeds were purchased already treated with a mercurial seed dressing.

Stages of growth (exclusive of cotyledons) at spraying are summarised in Appendix 1. After spraying, the plants were protected from rainfall for 24 hours and then given an overhead watering, by means of a rose at the end of a trigger hose attached to the mains water supply, to wash any residues off the foliage. The pots were then returned to their original position in the glass-house or the open. Watering throughout the experiment was done from overhead. Additional fertilizer in solution was applied to all species at one week intervals after spraying (0.5% v/v Vitafeed 301). Insecticide and fungicide solutions were applied to individual species as required.

Radish (Raphanus raphanistrum) was included for ease of propagation and may be regarded as a crop or weed. Polygonum aviculare failed to germinate. Rice grew normally and some observations were noted, but it was discarded in error before formal assessment.

(c) Assessment and processing of results

Results were assessed and processed as before (Richardson & Dean, 1974). Stages of growth at the time of assessment are given in Appendix 1. Survivors were counted and scored on a 0-7 scale as previously, where 0 = dead and 7 = untreated control.

Histograms are presented for each treatment, the upper of each pair represents mean plant survival and the lower, mean vigour score, both calculated as percentages of untreated controls. Actual percentage figures are displayed to the left of each row of x's (in selectivity test only). The same information is displayed in the histograms, each 'x' representing a 5% increment, but in the activity experiment each 'x' represents a 7% increment. A '+' indicates a value in excess of 100%. A value of 100 = as untreated control and 0 = a complete kill.

A table of observed selectivities, using the criteria specified, is presented for each compound along with comments to highlight salient points.

Several species, notably the perennials, were kept for an extra period of several weeks to observe later effects or the degree of recovery from injury and these final observations are referred to in the text.

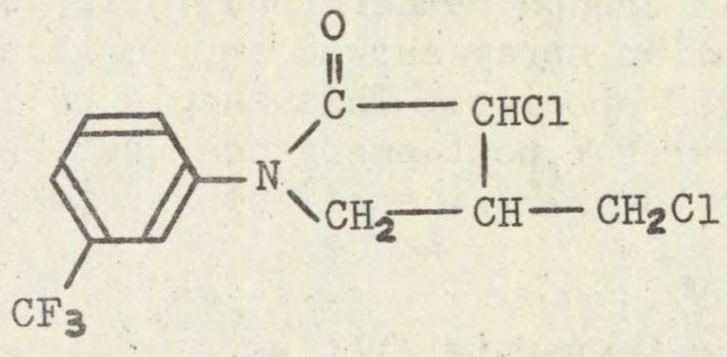
NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

R 40244

Code number R 40244

Chemical name 1-(m-trifluoromethylphenyl)-3-chloro-4-chloromethyl-2-pyrrolidone

Structure



Source

Stauffer Agrochemicals Ltd
200 Harpur Centre
Horne Lane
Bedford MK40 1PJ

Information available and suggested uses

Control of broad-leaved and grass weeds at 0.25 to 0.5 kg a.i./ha early pre-emergence in potatoes and pre-emergence in umbelliferous crops. Weeds are controlled with pre-emergence surface, pre-plant incorporated or early post-emergence sprays and preliminary observations indicate control of some perennial weeds post-emergence.

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

Spray volume for post-emergence selectivity experiment 345 l/ha

RESULTS

Full results are given in the histograms on pages 7-12 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
1.6	none	none listed as no crops tolerant
0.4	wheat barley oat carrot maize	Spergula arvensis Rumex obtusifolius Holcus lanatus Portulaca oleracea + species below
0.1	species above + perennial ryegrass onion pea fenugreek millet sorghum	Sinapis arvensis & Raphanus raphanistrum Chenopodium album Stellaria media

NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

Comments on results

Activity test data, symptoms caused on susceptible species, pre-emergence selectivity and persistence of R 40244 were reported previously (Richardson et al, 1979). The most striking characteristic was the pronounced chlorosis, or rather albinism, produced on susceptible species, which was also prominent in the current test. In the activity test, plants treated post-emergence were generally more susceptible to soil drench rather than foliar sprays, particularly with the grasses, although the foliar spray showed appreciable, though non-lethal, effects on the broad-leaved species. This should be considered when interpreting the results of the current post-emergence test, where there was the opportunity for the herbicide to exert its effect via the soil and the foliage.

Post-emergence selectivities among temperate species

Only a narrow range of mainly annual broad-leaved weeds were controlled selectively, the two crucifers, Sinapis arvensis and Raphanus raphanistrum being susceptible to 0.1 kg/ha together with Chenopodium album and Stellaria media. Holcus lanatus was the only grass weed controlled. Other annual grasses and perennial weeds tended to be resistant as were the composite weeds, notably Tripleurospermum maritimum.

No crop tolerated the highest dose, although carrot and the cereals wheat, barley and oat suffered only 20-30% reductions in vigour. While symptoms of albinism were seen even at the lowest dose, this did not result in a significant effect on shoot fresh weight even at the highest dose. Perennial ryegrass, onion and the legumes, pea and fenugreek, were the only other tolerant crops, but only to the lowest dose of 0.1 kg/ha.

The most interesting selectivity occurred with carrot, as in the earlier pre-emergence test. However, activity on weeds and the level of tolerance was greater pre- rather than post-emergence. It is perhaps significant that this species often shows tolerance to herbicides which cause albinism, for example aminotriazole, metflurazone and norflurazon. Mechanism of action studies have shown these to act by inhibiting carotenoid biosynthesis, the high capacity for this crop to produce carotenoids perhaps being the main reason for its high tolerance to this type of herbicide.

Post-emergence selectivity among tropical species

Only one tropical weed, Portulaca oleracea and the small-seeded crops jute and sesamum were effectively controlled at 0.4 kg/ha, while maize was the only crop to tolerate this dose. Selectivities were, therefore, much less apparent than when the compound was used as a pre-emergence treatment (Richardson et al, 1979). Although cotton and groundnut were not seriously affected at 0.4 kg/ha post-emergence, they showed symptoms at 0.1 kg/ha which did not occur with pre-emergence treatments. It does not appear, therefore, that the use of this compound post-emergence offers any useful advantage.

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		0.1 kg/ha		0.4 kg/ha		1.6 kg/ha
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(4)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	29	xxxxxx
ONION	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(8)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	50	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
W CLOVER	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	10	xx
(12)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	7	x
RAPE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(14)	57	xxxxxxxxxxx	36	xxxxxxx	21	xxxx
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	29	xxxxxx	14	xxx	14	xxx

POST -EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		0.1 kg/ha		0.4 kg/ha		1.6 kg/ha
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(19)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	50	xxxxxxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(20)	57	xxxxxxxxxxx	43	xxxxxxxxx	0	
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx	20	xxxx
(21)	50	xxxxxxxxxx	29	xxxxxx	14	xxx
FENUGREEK	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(22)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxx
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(27)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
(28)	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(29)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	36	xxxxxxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(30)	29	xxxxxx	29	xxxxxx	29	xxxxxx
RAPH RAP	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	0	
(31)	29	xxxxxx	14	xxx	0	
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(27)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
(28)	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(29)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	36	xxxxxxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(30)	29	xxxxxx	29	xxxxxx	29	xxxxxx
RAPH RAP	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	0	
(31)	29	xxxxxx	14	xxx	0	

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	0.1 kg/ha		0.4 kg/ha		1.6 kg/ha	
TRIP MAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
SEN VULG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(34)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	50	xxxxxxxxxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(35)	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	0	
GAL APAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(38)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
CHEN ALB	90	xxxxxxxxxxxxxxxxx	40	xxxxxxxx	30	xxxxxx
(39)	29	xxxxxx	7	x	7	x
STEL MED	50	xxxxxxxxxx	0		0	
(40)	29	xxxxxx	0		0	
SPER ARV	100	xxxxxxxxxxxxxxxxxxxx	10	xx	0	
(41)	43	xxxxxxxxx	14	xxx	0	
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(42)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(44)	36	xxxxxxx	29	xxxxxx	14	xxx
HOLC LAN	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	20	xxxx
(45)	71	xxxxxxxxxxxxxx	14	xxx	7	x
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(48)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx

POST-EMERGENCE SELECTIVITY TEST

R 40244

SPECIES		0.1 kg/ha		0.4 kg/ha		1.6 kg/ha
CIRS ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(50)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
MILLET	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	50	xxxxxxxxxx
(55)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	43	xxxxxxxxx
PIGEON P	83	xxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx
(61)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(63)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	79	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	50	xxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
JUTE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(67)	29	xxxxxx	21	xxxx	14	xxx
KENAF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(68)	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx

POST-EMERGENCE SELECTIVITY TEST

SPECIES	0.1 kg/ha		0.4 kg/ha		1.6 kg/ha	
TOBACCO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(69)	57	xxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SESAMUM	8	xx	0		0	
(70)	7	x	0		0	
TOMATO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(71)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
OR PUNCT	100	xxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx
(73)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
ELEU IND	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(74)	71	xxxxxxxxxxxxxx	36	xxxxxxx	21	xxxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxx
(75)	64	xxxxxxxxxxxxx	36	xxxxxxx	14	xxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(76)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	29	xxxxxx
DIG SAND	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(77)	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
AMAR RET	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(78)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
PORT OLE	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(79)	43	xxxxxxxxx	29	xxxxxx	21	xxxx
SOL NIG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(81)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
SNOW POL	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(83)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx

POST-EMERGENCE SELECTIVITY TEST

R 40244

SPECIES		0.1 kg/ha		0.4 kg/ha		1.6 kg/ha
PHAL MIN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(84)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(85)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	36	xxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(87)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
BROM PEC	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(88)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	36	xxxxxxx

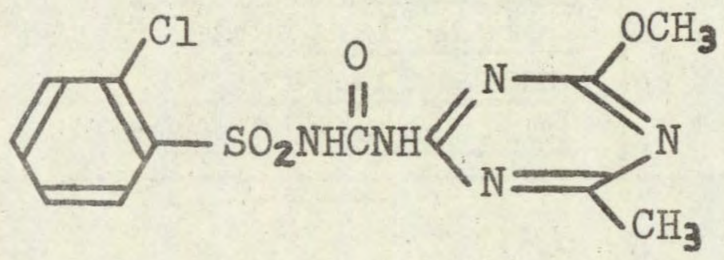
NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

DPX 4189

Code number DPX 4189

Chemical name 2-chloro-N-[(4-methoxy-6-methyl-1,3,5-triazin-2-yl) aminocarbonyl]benzenesulphonamide

Structure



Source

Du Pont (UK) Ltd
Biochemicals Department
Maylands Avenue
Hemel Hempstead
Herts HP2 7DP
UK

Information available and suggested uses

Pre- or post-emergence control of broad-leaved and certain grass weeds in spring and winter cereals (wheat, barley, rye and oats) and possibly flax post-emergence at doses ranging from 5-60 g a.i./ha. Also promising for use in non-cropland situations, pastures, grass seed crops and in reduced tillage fallow systems.

Formulation used 80% w/w a.i. wettable powder

Spray volume for activity experiment 370 l/ha
for post-emergence selectivity experiment 345 l/ha

RESULTS

Full results are given in the histograms on pages 16-22 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
0.16	wheat barley oat	Poa annua Tripleurospermum maritimum Galium aparine Veronica persica Cirsium arvense Oryza punctata Echinochloa crus-galli + species below
0.04	species above	Poa trivialis Sinapis arvensis Chenopodium album Spergula arvensis Oxalis latifolia + species below

continued on page 14

NB: ARD 34/02 (NP55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.01	species above + pigeon pea	Raphanus raphanistrum Senecio vulgaris Polygonum lapathifolium Stellaria media Rumex obtusifolius Holcus lanatus Amaranthus retroflexus Portulaca oleracea

Comments on results

Activity experiment

This herbicide exhibited remarkably high activity. Polygonum amphibium which is generally difficult to control, was killed at the lowest dose of 0.025 kg/ha by all four methods of application. It can be seen from the histograms that a rather flat dose response is apparent for most of the species tested, activity at all doses being of a similar degree for a particular application method. With the broad-leaved species, foliar, soil drench and pre-emergence treatments were almost equally effective. Grasses, particularly Agropyron repens, were more susceptible to the soil drench rather than to the foliar spray while the pre-emergence treatments were slightly the more effective. Within the latter, surface and incorporated treatments were equally effective. However, differences may exist at still lower doses but this requires further investigation. Avena fatua was the most resistant of the six species tested.

Symptoms

The major symptom observed was a powerful inhibition of the apical meristems of both broad-leaved and grass species. This was accompanied by a variety of pigmentation effects, mainly a severe chlorosis or yellowing but also on certain species a red, orange or purple colour developing. Necrosis usually developed slowly with post- and pre-emergence treatments. High doses pre-emergence often resulted in a failure of plants to emerge, or die-back soon after. A powerful inhibition of root systems was observed on grass species; in the case of Avena fatua primary, secondary and even lateral roots on these being stopped very early. With the perennials A. repens and P. amphibium, rhizomes either failed to develop or stopped growing when only 1 or 2 cm in length. Apart from the pigmentation effects (reddening etc) other than yellowing and chlorosis, and root inhibition, the symptoms described are similar to those caused by asulam.

Post-emergence selectivity among temperate species

Even at the lowest dose of 0.01 kg/ha, six annual, mainly broad-leaved weeds were controlled, while many others were severely affected.

Members of the Cruciferae, Compositae and Polygonaceae families were included in the susceptible weed spectrum, although the two higher doses were often necessary for adequate control. Galium aparine and Veronica persica were controlled at 0.16 kg/ha and reduced in vigour by 50% or more at 0.04 kg/ha. The perennial, Cirsium arvense was also controlled at the high dose and suffered vigour reductions greater than 50% at the two lowest doses. Certain of the annual grasses were susceptible; Holcus lanatus at 0.01 kg/ha, Poa trivialis at 0.04 kg/ha and Poa annua at 0.16 kg/ha. Alopecurus myosuroides was moderately

affected, though not controlled at the two higher doses, while Avena fatua, Bromus sterilis and the perennials (Agropyron and Agrostis) were resistant.

The temperate cereals, wheat, barley and oat were the only tolerant crops, withstanding the highest dose of 0.16 kg/ha. When shoot systems were harvested, nearly eight weeks after spraying, shoot fresh weights were the same as for the untreated controls. Some inhibition of the secondary roots of oat treated at the high dose were noted at this time and dry weight of roots was reduced as compared with control. Although no visible effects were seen on the roots of wheat or barley, their dry weight was reduced by about 35% at 0.16 kg/ha. All other crops tested were very sensitive, their vigour reduced by 40% or more at the lowest dose.

DPX 4189 has considerable potential for selective control of a wide range of weeds in cereals. Its control of Compositae and certain grass weeds (including volunteer ryegrass) gives it a big advantage over phenoxy herbicides, eg 2,4-D. Also the possible control of Cirsium arvense is of great interest in view of the shortage of existing herbicides to control this weed in cereals. Other pot tests at WRO have revealed that selective control of Cirsium is possible even at a very advanced stage of growth (West and Richardson, 1980, in preparation). The control of Galium and Veronica in cereals is promising in view of the failure of many other herbicides to control them. The high resistance of Avena fatua will necessitate use of DPX 4189 in mixture with other herbicides which can control this weed.

Post-emergence selectivity among tropical species

Only a few small-seeded dicots were adequately controlled at the lowest dose and no crops showed tolerance. Prospects for selective use in most tropical annual crops are, therefore, slim but the susceptibility of Oxalis latifolia at 0.04 kg/ha may be of interest in perennial crop situations.

Although Bromus pectinatus was not apparently well controlled, the root systems were severely reduced, even at 0.01 kg/ha (dry weight only 28% of untreated) and some useful selectivity in wheat might be expected under field conditions.

ACTIVITY EXPERIMENT

DPX 4189

		0.025 kg/ha	0.1 kg/ha	0.4 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	o o	o o	o o
	I	o o	o o	o o
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxx xxxx	o o	o o
	I	xxxxxxxxxx xxxx	x x	x x
AVENA FATUA	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxx
	I	xxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx	xxxxxxxxxx xxxx	o o
	I	xxxxxxxxxxxxx xxxxxx	xxxxxxxx xxxx	o o

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

POST-EMERGENCE SELECTIVITY EXPERIMENT

DPX 4189

SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx
(4)	36	xxxxxxx	14	xxx	14	xxx
ONION	70	xxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	50	xxxxxxxxxx
(8)	36	xxxxxxx	29	xxxxxx	29	xxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	43	xxxxxxxxx	29	xxxxxx	29	xxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	43	xxxxxxxxx	29	xxxxxx	29	xxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
W CLOVER	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(12)	36	xxxxxxx	21	xxxx	14	xxx
RAPE	83	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(14)	21	xxxx	14	xxx	0	
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	57	xxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	29	xxxxxx	29	xxxxxx	14	xxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx
(18)	57	xxxxxxxxxxx	29	xxxxxx	21	xxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(19)	29	xxxxxx	29	xxxxxx	29	xxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	57	xxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(21)	36	xxxxxxx	29	xxxxxx	29	xxxxxx
FENUGREEK	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(22)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(27)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
POA ANN	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(28)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(29)	50	xxxxxxxxxx	29	xxxxxx	21	xxxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(30)	36	xxxxxxx	29	xxxxxx	29	xxxxxx
RAPH RAP	70	xxxxxxxxxxxxxx	50	xxxxxxxxxx	70	xxxxxxxxxxxxxx
(31)	29	xxxxxx	29	xxxxxx	14	xxx

DPX 4189

SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
TRIF MAR	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(33)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
SEN VULG	100	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(34)	21	xxxx	14	xxx	14	xxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(35)	14	xxx	14	xxx	14	xxx
GAL APAR	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(38)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
CHEN ALB	80	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(39)	43	xxxxxxxxx	21	xxxx	14	xxx
STEL MED	69	xxxxxxxxxxxxxx	75	xxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(40)	21	xxxx	14	xxx	14	xxx
SPER ARV	50	xxxxxxxxxx	60	xxxxxxxxxxx	20	xxxx
(41)	36	xxxxxxx	29	xxxxxx	14	xxx
VER PERS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(42)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	21	xxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(44)	29	xxxxxx	29	xxxxxx	29	xxxxxx
HOLC LAN	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx
(45)	29	xxxxxx	21	xxxx	14	xxx
AG REPEN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(48)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

DPX 4189

SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
CIRS ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(50)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
MILLET	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx	50	xxxxxxxxxx
(55)	50	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	50	xxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	57	xxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
PIGEON P	83	xxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(61)	86	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	36	xxxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	36	xxxxxxx	29	xxxxxx	29	xxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(63)	57	xxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	57	xxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	50	xxxxxxxxxx
JUTE	75	xxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	17	xxx
(67)	21	xxxx	21	xxxx	7	x
KENAF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(68)	43	xxxxxxxxx	29	xxxxxx	21	xxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

DPX 4189

SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
TOBACCO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(69)	50	xxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
SESAMUM	0		0		0	
(70)	0		0		0	
TOMATO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(71)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	36	xxxxxxx
OR PUNCT	90	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(73)	50	xxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
ELEU IND	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(74)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(75)	57	xxxxxxxxxxx	36	xxxxxxx	14	xxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(76)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(77)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
AMAR RET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(78)	29	xxxxxx	29	xxxxxx	29	xxxxxx
PORT OLE	75	xxxxxxxxxxxxxxx	0		0	
(79)	29	xxxxxx	0		0	
SOL NIG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(81)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx
SNOW POL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
(83)	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx

DPX 4189

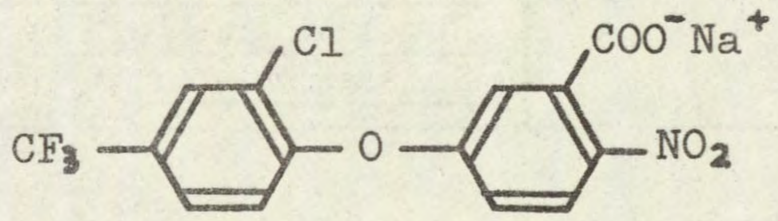
SPECIES		0.01 kg/ha		0.04 kg/ha		0.16 kg/ha
PHAL MIN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(84)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx	60	xxxxxxxxxxxx
(87)	71	xxxxxxxxxxxxxx	29	xxxxxx	29	xxxxxx
BROM PEC	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(88)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx

Acifluorfen

Code number RH 6201 Trade name Blazer

Chemical name Sodium 5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-nitrobenzoate

Structure



Source

Rohm & Haas (UK) Ltd
Lennig House
2 Masons Avenue
Croydon
Surrey CR9 3NB
UK

Information available and suggested uses

A contact and residual herbicide, pre- and post-emergence in all large-seeded legumes (peas, beans, peanuts, soyabeans) at 0.14-1.12 kg/ha and possibly in rice, wheat, lucerne, clover, onions. It is already marketed for post-emergence use in soyabean in some countries. Its chemical, physical and biological properties have been reported by Johnson et al, 1978.

Formulation used 48% w/v a.i. aqueous concentrate, sodium salt

Spray volume for post-emergence selectivity experiment 345 l/ha

RESULTS

Full histogram results are presented on pages 26-31 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
1.8	perennial ryegrass	Galium aparine Chenopodium album Cirsium arvense Echinochloa crus-galli Digitaria sanguinalis Cyperus esculentus + species below
0.6	species above + wheat barley oat onion pea groundnut soyabean	Senecio vulgaris Spergula arvensis Veronica persica Amaranthus retroflexus Portulaca oleracea + species below

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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 + dwarf bean kale maize	Sinapis arvensis Raphanus raphanistrum Tripleurospermum maritimum Polygonum lapathifolium Rumex obtusifolius Solanum nigrum

Comments on results

Activity test data, symptoms caused on susceptible species, pre-emergence selectivity and persistence data were reported previously (Richardson et al 1979). It had many features in common with the related nitrofen and other nitrophenylethers. The foliar spray was more active than the soil drench on broad-leaved species but the reverse was true for the grass species.

NB: ARD 34/02 (NF 55) is sethoxydim, DPX 4189 is chlorsulfuron, PP 009 is fluazifop-butyl, R 40244 is flurochloridone

Post-emergence selectivity among temperate species

Only annual broad-leaved weeds were controlled. These included members of the Cruciferae (Sinapis arvensis and Raphanus raphanistrum) and Polygonaceae (Polygonum lapathifolium and Rumex obtusifolius), which were very sensitive, but also Compositae. Solanum nigrum was also highly sensitive, while Veronica persica was controlled at 0.6 kg/ha. In addition, Galium aparine and Cirsium arvense were controlled at the highest dose, the latter being reduced in vigour by more than 50% at 0.6 kg/ha. Stellaria media was not controlled even at the high dose, nor were annual and perennial grass weeds.

Perennial ryegrass was the most tolerant crop, withstanding 1.8 kg/ha. The cereals, wheat, barley and oat tolerated 0.6 kg/ha as did onion and pea. Dwarf bean and kale were the only tolerant crops at 0.2 kg/ha while cabbage and rape were reduced in vigour by only 20-30%. White clover, lettuce, parsnip and radish were very sensitive.

The weed and crop selectivity spectrum for acifluorfen was generally similar to that found pre-emergence (Richardson et al, 1979). However, pea showed a greater degree of tolerance pre-emergence at a dose where certain grass weeds were also controlled. In contrast, cereals showed marginally better tolerance post-emergence but the weed spectrum was essentially the same. Some interesting selectivities in these crops are apparent which are not necessarily shared by all herbicides in current use in these crops, the control of Veronica persica and Solanum nigrum for example. The potential selective control of the two cruciferous weeds Sinapis arvensis and Raphanus raphanistrum in kale is worth further examination. The lack of control of Stellaria media is a serious disadvantage as with other nitrophenyl ether herbicides, necessitating mixture studies with other herbicides.

Post-emergence selectivity among tropical species

Small-seeded annual broad-leaved species were well controlled at 0.6 kg/ha and some by 0.2 kg/ha, while soyabean and groundnut showed good tolerance of the 0.6 kg dose. Other legumes were much less tolerant. Grass weeds were generally tolerant but Cyperus species were scorched and distorted and there was prolonged suppression of Cyperus esculentus at 0.6 kg and some kill at 1.8 kg/ha. Some useful selectivity can, therefore, be expected against this species in groundnut and soyabean in addition to the control of small broad-leaved annuals.

Maize was relatively tolerant and a directed spray for suppression of Cyperus esculentus would probably prove safe. Rice also showed some tolerance at least at the lowest dose but detailed assessment was unfortunately not carried out.

ACIFLUORFEN

SPECIES	0.2 kg/ha		0.6 kg/ha		1.8 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
ONION	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxx
(8)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	57	xxxxxxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	71	xxxxxxxxxxxxx	36	xxxxxxx	29	xxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
W CLOVER	90	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
(12)	43	xxxxxxxxx	21	xxxx	0	
RAPE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(14)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	40	xxxxxxxx
(15)	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	7	x
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	0	
(16)	71	xxxxxxxxxxxxxx	36	xxxxxxx	0	

POST-EMERGENCE SELECTIVITY EXPERIMENT

ACIFLUORFEN

SPECIES	0.2 kg/ha		0.6 kg/ha		1.8 kg/ha	
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxx	0	
(19)	43	xxxxxxxxx	29	xxxxxx	0	
LETTUCE	100	xxxxxxxxxxxxxxxxxxx	20	xxxx	0	
(20)	57	xxxxxxxxxxx	14	xxx	0	
SUG BEET	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(21)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx	36	xxxxxxx
FENUGREEK	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxx
(22)	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx	14	xxx
BROM STE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(27)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(28)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(29)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
(30)	21	xxxx	14	xxx	0	
RAPH RAP	60	xxxxxxxxxxxx	0		0	
(31)	21	xxxx	0		0	
TRIP MAR	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx	0	
(33)	29	xxxxxx	21	xxxx	0	

ACIFLUORFEN

SPECIES		0.2 kg/ha		0.6 kg/ha		1.8 kg/ha
SEN VULG	62	xxxxxxxxxxxx	0		0	
(34)	43	xxxxxxxxx	0		0	
POL LAPA	17	xxx	0		0	
(35)	7	x	0		0	
GAL APAR	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(38)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
CHEN ALB	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	30	xxxxxx
(39)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	7	x
STEL MED	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(40)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx
SPER ARV	80	xxxxxxxxxxxxxxxx	0		0	
(41)	43	xxxxxxxxx	0		0	
VER PERS	100	xxxxxxxxxxxxxxxxxxx	20	xxxx	0	
(42)	57	xxxxxxxxxxx	14	xxx	0	
RUM OBTU	87	xxxxxxxxxxxxxxxxx	0		0	
(44)	14	xxx	0		0	
HOLC LAN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
(45)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx
AG REPEN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(48)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx
CIRS ARV	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(50)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx

ACIFLUORFEN

SPECIES		0.2 kg/ha		0.6 kg/ha		1.8 kg/ha
MILLET	70	xxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	40	xxxxxxxx
(55)	57	xxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(57)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	0	
(59)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	0	
PIGEON P	83	xxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	58	xxxxxxxxxxxx
(61)	43	xxxxxxxxx	36	xxxxxxx	14	xxx
COWPEA	100	xxxxxxxxxxxxxxxxxxx	111	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(62)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(63)	50	xxxxxxxxxx	64	xxxxxxxxxxxx	57	xxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(65)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(66)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	21	xxxx
JUTE	0		0		0	
(67)	0		0		0	
KENAF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(68)	57	xxxxxxxxxx	29	xxxxx	21	xxxx
TOBACCO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	37	xxxxxx
(69)	57	xxxxxxxxxx	43	xxxxxxxxx	21	xxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

ACIFLUORFEN

SPECIES	0.2 kg/ha		0.6 kg/ha		1.8 kg/ha	
SESAMUM (70)	0 0		0 0		0 0	
TOMATO (71)	100 79	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 57	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxx	0 0	
OR PUNCT (73)	100 64	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	70 50	xxxxxxxxxxxxxx xxxxxxxxxx	60 43	xxxxxxxxxxxx xxxxxxxxx
ELEU IND (74)	100 79	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 64	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	100 43	xxxxxxxxxxxxxxxxxxxx xxxxxxxxx
ECH CRUS (75)	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxx	83 21	xxxxxxxxxxxxxxxxx xxxx
ROTT EXA (76)	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxx	87 57	xxxxxxxxxxxxxxxxx xxxxxxxxxxx
DIG SANG (77)	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 64	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxx	100 29	xxxxxxxxxxxxxxxxxxxx xxxxxx
AMAR RET (78)	81 36	xxxxxxxxxxxxxxxx xxxxxxx	0 0		0 0	
PORT OLE (79)	75 36	xxxxxxxxxxxxxxx xxxxxxx	0 0		0 0	
SOL NIG (81)	83 14	xxxxxxxxxxxxxxxx xxx	0 0		0 0	
SNOW POL (83)	100 100	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 86	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	100 50	xxxxxxxxxxxxxxxxxxx xxxxxxxxxx
PHAL MIN (84)	100 93	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxx	100 71	xxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxx	100 43	xxxxxxxxxxxxxxxxxxx xxxxxxxxx

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