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NB: BAS 373OH is 4-(4'-fluorophenyl)-2-methyltetrahydro-1,2,4-oxadiazin-3,5-dione (BASF) HER 52.112 is 2-amino-4-isopropylamino-6-chloro-pyrimidine (Sandoz), SAN 9789 is norflurazon, U 27.267 is N,N-dimethyl-2-(3,4,5-tribromopyrazol-1-yl)propionamide (Upjohn)

SPECIES	METFLURAZONE 0.33 kg/ha	METFLURAZONE 1.00 kg/ha	METFLURAZONE 3.00 kg/ha
WHEAT (1)	102 xxxxxxxxxxxxxxxxxxxx 29 xxxxxx	0 0	0 0
BARLEY (2)	102 xxxxxxxxxxxxxxxxxxxx 57 xxxxxxxxxxx	0 0	0 0
OAT (3)	87 xxxxxxxxxxxxxxxxx 71 xxxxxxxxxxxxxx	0 0	0 0
PER RYGR (4)	109 xxxxxxxxxxxxxxxxxxxx+ 43 xxxxxxxxx	11 xx 29 xxxxxx	0 0
ONION (8)	122 xxxxxxxxxxxxxxxxxxxx+ 64 xxxxxxxxxxxxx	89 xxxxxxxxxxxxxxxxx 43 xxxxxxxxx	0 0
DWF BEAN (9)	88 xxxxxxxxxxxxxxxxx 57 xxxxxxxxxxx	71 xxxxxxxxxxxxxx 14 xxx	0 0
FLD BEAN (10)	82 xxxxxxxxxxxxxxxx 36 xxxxxxx	55 xxxxxxxxxxx 29 xxxxxx	55 xxxxxxxxxxx 21 xxxx
W CLOVER (12)	25 xxxxx 43 xxxxxxxxx	5 x 14 xxx	0 0
KALE (15)	13 xxx 14 xxx	0 0	0 0
SWEDE (17)	13 xxx 14 xxx	0 0	0 0
CARROT (18)	102 xxxxxxxxxxxxxxxxxxxx 100 xxxxxxxxxxxxxxxxxxxx	73 xxxxxxxxxxxxxx 86 xxxxxxxxxxxxxxxxx	102 xxxxxxxxxxxxxxxxxxxx 71 xxxxxxxxxxxxx
LETTUCE (20)	112 xxxxxxxxxxxxxxxxxxxx+ 43 xxxxxxxxx	0 0	0 0
SUG BEET (21)	16 xxx 36 xxxxxxx	0 0	0 0

SPECIES	METFLURAZONE 0.33 kg/ha		METFLURAZONE 1.00 kg/ha		METFLURAZONE 3.00 kg/ha	
AVE FATU (26)	102	xxxxxxxxxxxxxxxxxxx	51	xxxxxxxxxx	0	
	71	xxxxxxxxxxxxxx	21	xxxx	0	
ALO MYOS (27)	145	xxxxxxxxxxxxxxxxxxx+	0		0	
	43	xxxxxxxxx	0		0	
POA ANN (28)	97	xxxxxxxxxxxxxxxxxx	13	xxx	0	
	29	xxxxxx	14	xxx	0	
SEN VULG (34)	48	xxxxxxxxxx	12	xx	0	
	57	xxxxxxxxxxx	21	xxxx	0	
POL AVIC (36)	69	xxxxxxxxxxxxxx	0		0	
	36	xxxxxxx	0		0	
GAL APAR (38)	229	xxxxxxxxxxxxxxxxxxx+	14	xxx	29	xxxxxx
	43	xxxxxxxxx	7	x	7	x
CHEN ALB (39)	150	xxxxxxxxxxxxxxxxxxx+	14	xxx	0	
	57	xxxxxxxxxxx	14	xxx	0	
STEL MED (40)	41	xxxxxxxx	0		0	
	36	xxxxxxx	0		0	
AG REPEN (47)	113	xxxxxxxxxxxxxxxxxx+	113	xxxxxxxxxxxxxxxxxx+	84	xxxxxxxxxxxxxxxxx
	57	xxxxxxxxxxx	29	xxxxxx	14	xxx
ALL VIN (49)	43	xxxxxxxxx	64	xxxxxxxxxxxxx	21	xxxx
	36	xxxxxxx	21	xxxx	7	x
CIRS ARV (50)	90	xxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxx+	75	xxxxxxxxxxxxxxx
	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	36	xxxxxxx
TUS FARF (51)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
CONV ARV (52)	104	xxxxxxxxxxxxxxxxxx+	104	xxxxxxxxxxxxxxxxxx+	78	xxxxxxxxxxxxxxx
	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx

SPECIES	METFLURAZONE 0.33 kg/ha		METFLURAZONE 1.00 kg/ha		METFLURAZONE 3.00 kg/ha	
RUM ACET	118	xxxxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxxxx+	0	
(53)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	0	
MAIZE	83	xxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	17	xxx
(58)	43	xxxxxxxxx	29	xxxxxx	14	xxx
SORGHUM	75	xxxxxxxxxxxxxxx	0		0	
(59)	50	xxxxxxxxxx	0		0	
RICE	98	xxxxxxxxxxxxxxxxxx	65	xxxxxxxxxxxxx	49	xxxxxxxxxx
(60)	71	xxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
GRNDNUT	120	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(64)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
COTTON	208	xxxxxxxxxxxxxxxxxxx+	92	xxxxxxxxxxxxxxxxx	138	xxxxxxxxxxxxxxxxxxx+
(66)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
KENAF	88	xxxxxxxxxxxxxxxxx	6	x	0	
(68)	100	xxxxxxxxxxxxxxxxxxx	29	xxxxxx	0	
ELEU IND	18	xxxx	0		0	
(74)	43	xxxxxxxxx	0		0	
ECH CRUS	94	xxxxxxxxxxxxxxxxxx	0		0	
(75)	43	xxxxxxxxx	0		0	
ROT EXAL	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx	16	xxx
(76)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	7	x
DIG SANG	14	xxx	0		0	
(77)	29	xxxxxx	0		0	
AMAR RET	0		0		0	
(78)	0		0		0	
CYP ROTU	106	xxxxxxxxxxxxxxxxxx+	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(86)	71	xxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx

SPECIES		METFLURAZONE 0.33 kg/ha		METFLURAZONE 1.00 kg/ha		METFLURAZONE 3.00 kg/ha
OXAL LAT	108	xxxxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxxx	62	xxxxxxxxxxx
(87)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx

SAN 9789
(Experiment 1)

Code number: SAN 9789 (HER 52.143) — Trade name: -

Chemical name: 4-chloro-5-methylamino-2-(2'-trifluoromethylphenyl)pyridazin-3(2H)-one

Source: Sandoz Ltd, 3090 Agro Research, CH-4002 Basle, Switzerland

Information available and suggested uses

Information received from the manufacturer reported activity against a broad spectrum of weed species, especially annuals, after pre-emergence application. Field trials, particularly in cotton, but also in a range of plantation crops, soyabean and established alfalfa are suggested.

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

Doses: 0.33, 1.00, 3.00 kg a.i./ha (0.30, 0.89 and 2.68 lb a.i./ac)

Spray volume: 338 l/ha (30.1 gal/ac)

RESULTS

Table of selectivities

DOSE kg/ha	CROP: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
3.00 1.00	none	none listed as no crops tolerant
0.33	carrot kenaf	Avena fatua Alopecurus myosuroides Poa annua Polygonum aviculare Chenopodium album Stellaria media Eleusine indica Echinochloa crus-galli Digitaria sanguinalis

Comments on results

General The mode of action, symptoms exhibited and selectivities of this compound were very similar to metflurazone but the activity was rather greater. Little difference was observed between grass and broadleaf susceptibility.

Temperate weeds and crops

Six weed species were controlled at 0.33 kg/ha, notably Avena fatua and Polygonum aviculare which was completely killed. Galium aparine, Allium vineale and Agropyron repens were severely affected but not controlled at this rate. Metflurazone appeared marginally superior in controlling these latter species but like SAN 9789, 1.00 kg/ha was required for the criteria of control to be satisfied.

Carrot was the most tolerant crop species but was only resistant at 0.33 kg/ha compared with metflurazone at 1.00 kg/ha. Wheat was found to be the most susceptible crop species, being killed at 0.33 kg/ha.

Selective control of certain difficult weed species was achieved in carrot i.e. Avena fatua and Polygonum aviculare.

Tropical weeds and crops

The three annual grass species, Eleusine indica, Echinochloa crus-galli and Digitaria sanguinalis were all controlled at 0.33 kg/ha, the latter being completely killed. Rottboellia exaltata exhibited resistance at the lower rates. Amaranthus retroflexus showed greater resistance to this compound than to metflurazone. Cyperus esculentus showed a 57% reduction in vigour at 0.33 and 3.00 kg/ha (1.00 kg/ha missing) but was not kept for a later assessment. Symptoms and activity of SAN 9789 on Cyperus rotundus closely paralleled metflurazone with more severe effects developing with time. Six weeks after treatment slight to severe chlorosis was apparent but no death was observed. 1.00 kg/ha caused reduction of foliage greater than 70% five months after treatment but new rhizome development was beginning. Metflurazone had slightly greater activity than SAN 9789 at this dose. At the remaining two doses no difference was observed between the two compounds i.e. plants had completely recovered from 0.33 kg/ha and the foliage was killed with up to 50% soft or rotten tubers at 3.00 kg/ha. Oxalis latifolia was somewhat variable but essentially results two months after treatment were similar to those at the main assessment. Little or no difference was observed between SAN 9789 and metflurazone activity against this species.

Despite variations in response of kenaf leading to death of some plants, the surviving 69% were tolerant at 0.33 kg/ha. Cotton, surprisingly, did not show tolerance at this dose although there was certainly no adverse effect on plant number. Results obtained with groundnut were reduced to one replicate due to erratic germination but there was some indication of resistance at 0.33 kg/ha. Neither soyabean nor jute showed any tolerance to this compound.

Selective pre-emergence control of annual grass weeds specified above was achieved in kenaf at 0.33 kg/ha but Amaranthus retroflexus was only suppressed at this rate.

Soil persistence

Using turnip as the sensitive test species regular sampling showed that the compound persisted for at least one year after application. At this time recovery was 22% of control from the 0.33 kg/ha dose, but was less than 2% at 1.00 kg/ha and zero at 3.00 kg/ha, all results based on fresh weights. There was, however, evidence of plant development to the cotyledon stage at the higher rates before death. These results were similar to those for metflurazone but slightly more severe in effect.

Possible uses and further testing

The tolerance observed in carrot was not outstanding and the range of weeds controlled offered no particular advantages over present treatments. Kenaf and particularly cotton exhibited only marginal tolerance of this compound but further testing, especially against Cyperus spp., may be worthwhile. The outstanding length of soil persistence, even at lower doses, could prove to be unacceptable in these situations but could prove a distinct advantage if used as a pre-emergence total herbicide where, in view of the fact that 91% of species tested were controlled at 3.00 kg/ha, further work may be justified.

SPECIES	SAN 9789 0.33 kg/ha		SAN 9789 1.00 kg/ha		SAN 9789 3.00 kg/ha	
WHEAT	0		0		0	
(1)	0		0		0	
BARLEY	32	xxxxxx	0		0	
(2)	29	xxxxxx	0		0	
OAT	32	xxxxxx	0		0	
(3)	29	xxxxxx	0		0	
PER RYGR	56	xxxxxxxxxxx	0		0	
(4)	29	xxxxxx	0		0	
ONION	56	xxxxxxxxxxx	0		0	
(8)	43	xxxxxxxxx	0		0	
DWF BEAN	106	xxxxxxxxxxxxxxxxxxxx+	53	xxxxxxxxxxx	35	xxxxxxx
(9)	57	xxxxxxxxxxx	7	x	7	x
FLD BEAN	109	xxxxxxxxxxxxxxxxxxxx+	41	xxxxxxxx	41	xxxxxxxx
(10)	57	xxxxxxxxxxx	29	xxxxxx	14	xxx
W CLOVER	10	xx	0		0	
(12)	14	xxx	0		0	
KALE	19	xxxx	0		0	
(15)	21	xxxx	0		0	
SWEDE	13	xxx	0		0	
(17)	14	xxx	0		0	
CARROT	102	xxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	66	xxxxxxxxxxxx
(18)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	50	xxxxxxxxxx
LETTUCE	59	xxxxxxxxxxx	12	xx	6	x
(20)	36	xxxxxxx	14	xxx	14	xxx
SUG BEET	16	xxx	8	xx	0	
(21)	21	xxxx	7	x	0	

SPECIES	SAN 9789 0.33 kg/ha	SAN 9789 1.00 kg/ha	SAN 9789 3.00 kg/ha
AVE FATU	95 xxxxxxxxxxxxxxxxxx	0	0
(26)	29 xxxxxx	0	0
ALO MYOS	53 xxxxxxxxxx	0	0
(27)	21 xxxx	0	0
POA ANN	27 xxxxx	0	0
(28)	21 xxxx	0	0
SEN VULG	48 xxxxxxxxx	12 xx	0
(34)	50 xxxxxxxxx	21 xxxx	0
POL AVIC	0	0	0
(36)	0	0	0
GAL APAR	143 xxxxxxxxxxxxxxxxx+	29 xxxxxx	14 xxx
(38)	43 xxxxxxxxx	21 xxxx	7 x
CHEN ALB	109 xxxxxxxxxxxxxxxxx+	14 xxx	0
(39)	29 xxxxxx	21 xxxx	0
STEL MED	15 xxx	0	0
(40)	29 xxxxxx	0	0
AG REPEN	113 xxxxxxxxxxxxxxxxx+	94 xxxxxxxxxxxxxxxxx	75 xxxxxxxxxxxxxxx
(47)	36 xxxxxxx	21 xxxx	14 xxx
ALL VIN	150 xxxxxxxxxxxxxxxxx+	86 xxxxxxxxxxxxxxxx	0
(49)	50 xxxxxxxxxx	14 xxx	0
CIRS ARV	120 xxxxxxxxxxxxxxxxx+	90 xxxxxxxxxxxxxxxx	30 xxxxxx
(50)	71 xxxxxxxxxxxxx	43 xxxxxxxxx	21 xxxx
TUS FARF	100 xxxxxxxxxxxxxxxxx	114 xxxxxxxxxxxxxxxxx+	43 xxxxxxxxx
(51)	50 xxxxxxxxxx	36 xxxxxxx	14 xxx
CONV ARV	104 xxxxxxxxxxxxxxxxx+	104 xxxxxxxxxxxxxxxxx+	91 xxxxxxxxxxxxxxxxx
(52)	64 xxxxxxxxxxxxx	57 xxxxxxxxxxx	50 xxxxxxxxxx

SPECIES	SAN 9789 0.33 kg/ha		SAN 9789 1.00 kg/ha		SAN 9789 3.00 kg/ha	
RUM ACET	107	xxxxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxx	0	
(53)	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx	0	
MAIZE	92	xxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	42	xxxxxxxx
(58)	43	xxxxxxxxx	36	xxxxxxx	29	xxxxxx
SORGHUM	11	xx	0		0	
(59)	14	xxx	0		0	
RICE	60	xxxxxxxxxxx	38	xxxxxxxx	60	xxxxxxxxxxx
(60)	36	xxxxxxx	14	xxx	14	xxx
GRNDNUT	39r	xxxxxxxx	79r	xxxxxxxxxxxxxxx	M	
(64)	85r	xxxxxxxxxxxxxxxx	42r	xxxxxxxx	M	
COTTON	231	xxxxxxxxxxxxxxxxxxxx+	138	xxxxxxxxxxxxxxxxxxx+	23	xxxxx
(66)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
KENAF	69	xxxxxxxxxxxxx	6	x	0	
(68)	86	xxxxxxxxxxxxxxxx	21	xxxx	0	
ELEU IND	4	x	0		0	
(74)	21	xxxx	0		0	
ECH CRUS	54	xxxxxxxxxx	0		0	
(75)	29	xxxxxx	0		0	
ROT EXAL	97	xxxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxx+	81	xxxxxxxxxxxxxxx
(76)	57	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
DIG SANG	0		0		0	
(77)	0		0		0	
AMAR RET	33	xxxxxxx	0		0	
(78)	57	xxxxxxxxxx	0		0	
CYP ROTU	97	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	115	xxxxxxxxxxxxxxxxxx+
(86)	71	xxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx

SPECIES		SAN 9789 0.33 kg/ha		SAN 9789 1.00 kg/ha		SAN 9789 3.00 kg/ha
OKAL IAT	123	xxxxxxxxxxxxxxxxxxxx+	123	xxxxxxxxxxxxxxxxxxxx+	69	xxxxxxxxxxxx
(87)	93	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	29	xxxxxx

HER 52.123
(Experiment 2)

Code number HER 52.123 Trade name -

Chemical name 2-amino-4-isopropylamino-6-chloro-pyrimidine

Source Sandoz Ltd, 3090 Agro Research, CH-4002 Basle, Switzerland

Information available and suggested uses

Preliminary data sheet coupled with field trials project sheets received during 1970 suggest pre- and post-emergence activity against a range of mono- and dicotyledonous weed species with promising selectivity in potato.

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

Doses 0.73, 2.22 and 6.66 kg a.i./ha
(0.65, 1.98 and 5.95 lb a.i./ac)

Spray volume 384 l/ha (34.2 gal/ac)

RESULTS

Table of selectivities

DOSE kg/ha	CROP: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
6.66	none	none listed as no crops tolerant
2.22	dwarf bean field bean maize	Avena fatua Raphanus raphanistrum Tripleurospermum maritimum Galium aparine Agropyron repens Tussilago farfara + species below
0.73	species above + pea sorghum groundnut kenaf	Alopecurus myosuroides Poa annua Sinapis arvensis Senecio vulgaris Polygonum lapathifolium Polygonum aviculare Chenopodium album Stellaria media Veronica persica Amaranthus retroflexus

Comments on results

General This compound showed a high level of activity combined with a broad spectrum of weed control. Tolerances were few, however, being restricted to the larger-seeded crops such as the legumes and some cereals.

Symptoms Symptoms were typical of a photosynthetic inhibitor with die back from a fairly advanced growth stage (3-4 leaves) following severe chlorosis.

Temperate weeds and crops

Nine weed species were controlled at 0.73 kg/ha and a further six species at 2.22 kg/ha. The wide spectrum of control against both mono- and dicotyledonous weed species was impressive with both annual and perennial species being susceptible. Several of the more important weed families were susceptible e.g. Polygonaceae (notably Polygonum aviculare), Cruciferae and Compositae. Galium aparine and the perennials Agropyron repens and Tussilago farfara were controlled at 2.22 kg/ha. The two latter species were completely killed eventually at this dose.

Temperate crops tolerant to this compound were the large-seeded legumes. Dwarf bean and field bean exhibited no symptoms at 2.22 kg/ha while pea was tolerant to 0.73 kg/ha. White clover was killed at this lower rate and no other crops (cereals or broadleaved) showed any degree of tolerance.

Notable pre-emergence selectivity was achieved against Polygonum aviculare (and P. lapathifolium) in the large-seeded legumes, dwarf bean, field bean and more particularly pea. The perennials Agropyron repens and Tussilago farfara were also selectively controlled in dwarf beans and field bean as was Galium aparine and a range of other grass and broadleaved species.

Tropical weeds and crops

Amaranthus retroflexus was the only tropical weed controlled at 0.73 kg/ha. The annual grasses, Eleusine indica, Digitaria sanguinalis and Echinochloa crus-galli were all severely suppressed at this rate and killed at 6.66 kg/ha but no results are available for the 2.22 kg/ha dose. However, comparison with similar temperate species suggests that these grasses may well have been controlled at this rate. Of the perennial species Cyperus esculentus was the most susceptible initially but no effect was observed on this species, C. rotundus or Oxalis latifolia three months after treatment at any dose.

Four crops exhibited tolerance, most notably maize at 2.22 kg/ha. This was only moderately reduced in vigour at 6.66 kg/ha while the smaller seeded sorghum was only tolerant at 0.73 kg/ha and rice showed no tolerance. Kenaf tolerated 0.73 kg/ha and was only marginally affected at 2.22 kg/ha. Of the legumes groundnut was the more tolerant (0.73 kg/ha) while soyabean was marginally affected at this dose (vigour reduced 21%).

Amaranthus retroflexus was the only weed selectively controlled in the above crop species. However, there would appear to be some useful suppression of other species at marginal levels of selectivity.

Soil persistence

Using turnip as a sensitive test species, residues were undetected 6, 20 and 40 weeks after treatment for the 0.73, 2.22 and 6.66 kg/ha doses

respectively. These results would appear to show a reasonable length of persistence for satisfactory weed control in the most resistant crops without the risk of residue damage to following crops.

Possible uses and further testing

This compound would appear to show some promise as a pre-emergence treatment in both temperate and tropical legumes. Large-seeded tropical cereals also appear to exhibit some degree of tolerance and it may be that control of tropical annual grass weeds may be achieved in these crops.

SPECIES	HER 52.123 0.73 kg/ha		HER 52.123 2.22 kg/ha		HER 52.123 6.66 kg/ha	
WHEAT	104	xxxxxxxxxxxxxxxxxxxx+	104	xxxxxxxxxxxxxxxxxxxx+	91	xxxxxxxxxxxxxxxxx
(1)	71	xxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
BARLEY	81	xxxxxxxxxxxxxxxx	0		0	
(2)	50	xxxxxxxxxx	0		0	
OAT	65	xxxxxxxxxxxxx	0		0	
(3)	29	xxxxxx	0		0	
PER RYGR	90	xxxxxxxxxxxxxxxxx	10	xx	0	
(4)	43	xxxxxxxxx	29	xxxxxx	0	
ONION	54	xxxxxxxxxxx	8	xx	0	
(8)	43	xxxxxxxxx	21	xxxx	0	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	17	xxx
(9)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	14	xxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(10)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxxx
(11)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	29	xxxxxx
W CLOVER	0		0		0	
(12)	0		0		0	
KALE	27	xxxxx	0		0	
(15)	21	xxxx	0		0	
SWEDE	0		0		0	
(17)	0		0		0	
CARROT	94	xxxxxxxxxxxxxxxxx	0		0	
(18)	43	xxxxxxxxx	0		0	
LETTUCE	0		0		0	
(20)	0		0		0	

NB: BAS 373OH is 4-(4'-fluorophenyl)-2-methyltetrahydro-1,2,4-oxadiazin-3,5-dione (BASF)
HER 52.112 is 2-amino-4-isopropylamino-6-chloro-pyrimidine (Sandoz), SAN 9789 is norflurazon,
U 27.267 is N,N-dimethyl-2-(3,4,5-tribromopyrazol-1-yl)propionamide (Upjohn)

SPECIES	HER 52.123 0.74 kg/ha		HER 52.123 2.22 kg/ha		HER 52.123 6.66 kg/ha	
SUG BEET	0		0		0	
(21)	0		0		0	
AVE FATU	120	xxxxxxxxxxxxxxxxxxxx+	0		0	
(26)	43	xxxxxxxxx	0		0	
ALO MYOS	38	xxxxxxxx	6	x	6	x
(27)	29	xxxxxx	14	xxx	7	x
POA ANN	45	xxxxxxxxx	0		0	
(28)	29	xxxxxx	0		0	
SIN ARV	0		0		0	
(30)	0		0		0	
RAPH RAP	81	xxxxxxxxxxxxxxxx	12	xx	0	
(31)	36	xxxxxxx	14	xxx	0	
TRIP MAR	88	xxxxxxxxxxxxxxxxxx	0		0	
(33)	64	xxxxxxxxxxxxx	0		0	
SEN VULG	0		0		0	
(34)	0		0		0	
POL LAPA	21	xxxx	0		0	
(35)	14	xxx	0		0	
POL AVIC	7	x	0		0	
(36)	7	x	0		0	
GAL APAR	111	xxxxxxxxxxxxxxxxxxx+	39	xxxxxxxx	24	xxxxx
(38)	86	xxxxxxxxxxxxxxxx	29	xxxxxx	7	x
CHEN ALB	53	xxxxxxxxxx	0		0	
(39)	29	xxxxxx	0		0	
STEL MED	0		0		0	
(40)	0		0		0	

SERIES	HER 52.123 0.73 kg/ha		HER 52.123 2.22 kg/ha		HER 52.123 6.66 kg/ha	
VER PERS	0		0		0	
(42)	0		0		0	
AG REPEN	103	xxxxxxxxxxxxxxxxxxxx+	34	xxxxxxx	0	
(47)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
ALL VIN	103	xxxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxxx+	77	xxxxxxxxxxxxx
(49)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
CIRS ARV	97	xxxxxxxxxxxxxxxxxxx	39r	xxxxxxxx	19	xxxx
(50)	79	xxxxxxxxxxxxxxxx	70r	xxxxxxxxxxxxx	14	xxx
TUS FARF	100	xxxxxxxxxxxxxxxxxxxx	33	xxxxxxx	0	
(51)	57	xxxxxxxxxxx	14	xxx	0	
CONV ARV	100	xxxxxxxxxxxxxxxxxxxx	38	xxxxxxxx	25	xxxxx
(52)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	64	xxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	25	xxxxx
(59)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	7	x
RICE	91	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxx
(60)	71	xxxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	38	xxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	14	xxx
SOYABEAN	122	xxxxxxxxxxxxxxxxxxxx+	44	xxxxxxxxx	11	xx
(65)	79	xxxxxxxxxxxxxxxx	7	x	7	x
COTTON	94	xxxxxxxxxxxxxxxxxxx	9	xx	0	
(66)	64	xxxxxxxxxxxxx	7	x	0	
JUTE	6	x	6	x	0	
(67)	21	xxxx	21	xxxx	0	

SPECIES	HER 52.123 0.73 kg/ha		HER 52.123 2.22 kg/ha		HER 52.123 6.66 kg/ha	
KENAF	102	xxxxxxxxxxxxxxxxxx:	96	xxxxxxxxxxxxxxxxxx	0	
(68)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	0	
SESAMUM	0		0		0	
(70)	0		0		0	
ELEU IND	94	xxxxxxxxxxxxxxxxx	M		0	
(74)	57	xxxxxxxxxx	M		0	
ECH CRUS	99	xxxxxxxxxxxxxxxxx	M		0	
(75)	57	xxxxxxxxxx	M		0	
ROT EXAL	129	xxxxxxxxxxxxxxxxxx+	71	xxxxxxxxxxxxx	7	x
(76)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	21	xxxx
DI SANG	59	xxxxxxxxxx	M		0	
(77)	50	xxxxxxxxxx	M		0	
AMAR RET	0		0		0	
(78)	0		0		0	
CYP ESCU	110	xxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxx	113	xxxxxxxxxxxxxxxxxx+	93	xxxxxxxxxxxxxxxxx
(86)	93	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxx xx
OXAL LAT	94	xxxxxxxxxxxxxxxxx	63	xxxxxxxxxxx	106	xxxxxxxxxxxxxxxxx+
(87)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxx

U 27,267
(Experiment 1)

Code number U 27,267 Trade name -

Chemical name 2,N,N-trimethyl-2-(3,4,5-tribromopyrazol-1-yl) acetamide

Source The Upjohn Co., Agricultural Division, Kalamazoo, Michigan 49001

Information available and suggested uses

Technical data sheets from the manufacturer suggested tolerance in groundnut, cotton, sugar beet, tobacco and a range of cereal, vegetable and orchard crops.

Activity has been reported against a range of annual broadleaved and grass species and against perennial species such as Cyperus spp. and Agropyron repens. Members of the Convolvulaceae and some Solanaceae with a few other species have been found to be tolerant.

Formulation used 75% w/w a.i. wettable powder

Doses 0.33, 1.00 and 3.00 kg a.i./ha (0.30, 0.89 and 2.68 lb a.i./ac)

Spray volume 338 l/ha (30.1 gal/ac)

RESULTS

Table of selectivities

DOSE kg/ha	CROP: vigour reduced by less than 15%	WEEDS: number or vigour reduced by more than 70%
3.00	none	none listed as no crops tolerant
1.00	groundnut	Eleusine indica Echinochloa crus-galli Rottboellia exaltata Digitaria sanguinalis Avena fatua Alopecurus myosuroides Poa annua Senecio vulgaris Polygonum aviculare + species below
0.33	species above + dwarf bean sugar beet maize sorghum kenaf	Rumex acetosella Chenopodium album Stellaria media

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HER 52.112 is 2-amino-4-isopropylamino-6-chloro-pyrimidine (Sandoz), SAN 9789 is norflurazon,
U 27.267 is N,N-dimethyl-2-(3,4,5-tribromopyrazol-1-yl)propionamide (Upjohn)

Comments on results

General This compound was found to be moderately active, controlling a range of broadleaf and grass weed species, the latter exhibiting slightly greater susceptibility. The majority of species controlled were of the small seeded annual types.

Symptoms At higher rates of application several species failed to emerge while at lower rates, growing points and buds of plants which had emerged were severely inhibited or deformed. Later observation usually showed a marked inhibition of the root systems and symptoms were generally similar to other root inhibitors e.g. chlorfenac and credazine.

Temperate weeds and crops

Stellaria media, Chenopodium album and the perennial Rumex acetosella were the only weeds controlled at 0.33 kg/ha. However, there was useful suppression of several annual weed species including Galium aparine and Polygonum aviculare. Perennial weeds such as Allium vineale and Cirsium arvense were only suppressed at this rate and 3.00 kg/ha was required for control. Tussilago farfara and more notably Convolvulus arvensis were resistant at this rate. Agropyron repens was completely killed at 3.00 kg/ha and initially controlled at 1.00 kg/ha but at the lower rates complete recovery was eventually achieved.

Dwarf bean was tolerant at 0.33 kg/ha and reduced in vigour by only 21% at 1.00 kg/ha. Other temperate legumes and crops were susceptible with the exception of sugar beet where the stand reduction of 21% at 0.33 kg/ha was almost certainly not due to the treatment.

Selectivities observed in dwarf bean and sugar beet were not outstanding although it is interesting to note the selective control of Chenopodium album in the latter.

Tropical weeds and crops

Tropical annual grass species were all controlled at 1.00 kg/ha. Rottboellia exaltata was more resistant and control was only just achieved at this rate. The three remaining species, Digitaria sanguinalis, Echinochloa crus-galli and Eleusine indica were only moderately suppressed at 0.33 kg/ha but useful suppression of Amaranthus retroflexus was observed at this rate. Fresh weight of Cyperus rotundus was still reduced by 50% at 3.00 kg/ha five months after treatment while lower rates had completely recovered. C. esculentus was controlled at 1.00 and 3.00 kg/ha at the initial assessment but further observations were not made and these results are based on one replicate only. Oxalis latifolia had completely recovered from 3.00 kg/ha five months after treatment.

Among the tropical legumes tested results from soyabean were erratic due to bad germination. At 1.00 and 3.00 kg/ha vigour was reduced by over 50% but no results were obtained at the lower rate. Groundnut was tolerant at 1.00 kg/ha showing only marginal retardation but more severe symptoms were observed at 3.00 kg/ha. Both maize and sorghum were tolerant at 0.33 kg/ha with maize being also marginally tolerant at 1.00 kg/ha where some reduction in root development was apparent. Kenaf showed marginal tolerance at 1.00 kg/ha with more complete tolerance at 0.33 kg/ha but jute exhibited no tolerance at any dose.

Although many weed species were suppressed at 0.33 kg/ha no conclusive selectivities were observed in maize, sorghum or kenaf. Selective control of the annual grass species and C. esculentus in groundnut was achieved.

Soil persistence

Using perennial ryegrass as a sensitive test plant a relatively long persistence period was observed at the highest rate of application. Plant fresh weight was only 20% of control 52 weeks after application at 3.00 kg/ha. At 0.33 and 1.00 kg/ha, however, the herbicide was undetected 6 and 13 weeks after treatment respectively.

Possible uses and further testing

Useful suppression of many weed species was achieved at rates where a range of crops were tolerant. However, levels of selectivity were generally marginal and those observed in dwarf bean and sugar beet did not show any marked advantage over herbicides already used in these crops. Further testing of the compound as a surface application may increase levels of selectivity compared with these incorporated treatments.

SPECIES	U 27,267 0.33 kg/ha		U 27,267 1.00 kg/ha		U 27,267 3.00 kg/ha	
WHEAT	89	xxxxxxxxxxxxxxxxxx	61	xxxxxxxxxxxx	0	
(1)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
BARLEY	102	xxxxxxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxxx	0	
(2)	50	xxxxxxxxxx	29	xxxxxx	0	
OAT	47	xxxxxxxxx	71	xxxxxxxxxxxxxx	24	xxxxx
(3)	57	xxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
PER RYGR	109	xxxxxxxxxxxxxxxxxxx+	15	xxx	0	
(4)	64	xxxxxxxxxxxxx	14	xxx	0	
ONION	133	xxxxxxxxxxxxxxxxxxx+	167	xxxxxxxxxxxxxxxxxxx+	56	xxxxxxxxxx
(8)	64	xxxxxxxxxxxxx	57	xxxxxxxxxx	29	xxxxxx
DWF BEAN	106	xxxxxxxxxxxxxxxxxx+	106	xxxxxxxxxxxxxxxxxx+	88	xxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
FLD BEAN	82	xxxxxxxxxxxxxxxx	55	xxxxxxxxxx	0	
(10)	50	xxxxxxxxxx	21	xxxx	0	
W CLOVER	86	xxxxxxxxxxxxxxxx	127	xxxxxxxxxxxxxxxxxx+	97	xxxxxxxxxxxxxxxxx
(12)	29	xxxxxx	29	xxxxxx	29	xxxxxx
KALE	100	xxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxx
(15)	57	xxxxxxxxxx	43	xxxxxxxx	29	xxxxxx
SWEDE	80	xxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxx+
(17)	57	xxxxxxxxxx	50	xxxxxxxxx	29	xxxxxx
CARROT	73	xxxxxxxxxxxxxx	59	xxxxxxxxxxx	59	xxxxxxxxxxx
(18)	36	xxxxxxx	36	xxxxxxx	21	xxxx
LETTUCE	88	xxxxxxxxxxxxxxxx	124	xxxxxxxxxxxxxxxxx+	53	xxxxxxxxxx
(20)	43	xxxxxxxx	29	xxxxxx	21	xxxx
SUG BEET	79	xxxxxxxxxxxxxx	79	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
(21)	86	xxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx

SPECIES	U 27,267 0.33 kg/ha		U 27,267 1.00 kg/ha		U 27,267 3.00 kg/ha	
AVE FATU	117	xxxxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxxxx	29	xxxxxx
(26)	57	xxxxxxxxxxx	29	xxxxxx	29	xxxxxx
ALO MYOS	44	xxxxxxxxx	10	xx	0	
(27)	43	xxxxxxxxx	14	xxx	0	
POA ANN	37	xxxxxxx	0		0	
(28)	57	xxxxxxxxxxx	0		0	
SEN VULG	132	xxxxxxxxxxxxxxxxxx+	60	xxxxxxxxxxx	24	xxxxx
(34)	50	xxxxxxxxx	21	xxxx	14	xxx
POL AVIC	138	xxxxxxxxxxxxxxxxxx+	69	xxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(36)	43	xxxxxxxxx	29	xxxxxx	29	xxxxxx
GAL APAR	114	xxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxx	157	xxxxxxxxxxxxxxxxxx+
(38)	43	xxxxxxxxx	36	xxxxxx	29	xxxxxx
CHEN ALB	218	xxxxxxxxxxxxxxxxxx+	136	xxxxxxxxxxxxxxxxx+	191	xxxxxxxxxxxxxxxxxx+
(39)	29	xxxxxx	29	xxxxxx	29	xxxxxx
STEL MED	85	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	47	xxxxxxxxx
(40)	29	xxxxxx	29	xxxxxx	29	xxxxxx
AG REPEN	113	xxxxxxxxxxxxxxxxx+	47	xxxxxxxxx	0	
(47)	71	xxxxxxxxxxxxx	43	xxxxxxxxx	0	
ALL VIN	129	xxxxxxxxxxxxxxxxx+	150	xxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxx
(49)	57	xxxxxxxxxx	43	xxxxxxxx	29	xxxxxx
CIRS ARV	90	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxx	45	xxxxxxxxx
(50)	57	xxxxxxxxxx	50	xxxxxxxxx	29	xxxxxx
TUS FARF	114	xxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxx
(51)	71	xxxxxxxxxxxxx	64	xxxxxxxxxxxx	50	xxxxxxxxx
CONV ARV	91	xxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxx+
(52)	93	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx

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HER 52.112 is 2-amino-4-isopropylamino-6-chloro-pyrimidine (Sandoz), SAN 9789 is norflurazon,
U 27.267 is N,N-dimethyl-2-(3,4,5-tribromopyrazol-1-yl)propionamide (Upjohn)

SPECIES	U 27,267 0.33 kg/ha		U 27,267 1.00 kg/ha		U 27,267 3.00 kg/ha	
RUM ACET	11	xx	0		0	
(53)	14	xxx	0		0	
MAIZE	92	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
SORGHUM	96	xxxxxxxxxxxxxxxxxx	118	xxxxxxxxxxxxxxxxxxx+	54	xxxxxxxxxxx
(59)	93	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx	57	xxxxxxxxxx
RICE	93	xxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxx	11	xx
(60)	71	xxxxxxxxxxxxx	29	xxxxx	14	xxx
GRNDNUT	120	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxx
(64)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
COTTON	69	xxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx	138	xxxxxxxxxxxxxxxxxxx+
(66)	57	xxxxxxxxxx	43	xxxxxxxxx	43	xxxxxxxxx
KENAF	106	xxxxxxxxxxxxxxxxxxx+	113	xxxxxxxxxxxxxxxxxxx+	56	xxxxxxxxxx
(68)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
ELEU IND	35	xxxxxxx	0		0	
(74)	64	xxxxxxxxxxxx	0		0	
ECH CRUS	112	xxxxxxxxxxxxxxxxxxx+	4	x	0	
(75)	57	xxxxxxxxxx	14	xxx	0	
ROT EXAL	81	xxxxxxxxxxxxxxx	65	xxxxxxxxxxxx	32	xxxxxx
(76)	86	xxxxxxxxxxxxxxxx	29	xxxxxx	21	xxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxx	7	x	0	
(77)	71	xxxxxxxxxxxxx	7	x	0	
AMAR RET	50	xxxxxxxxxx	67	xxxxxxxxxxxx	33	xxxxxxx
(78)	57	xxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
CYP ROTU	97	xxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
(86)	64	xxxxxxxxxxxx	57	xxxxxxxxxx	50	xxxxxxxxxx

NB: BAS 373OH is 4-(4'-fluorophenyl)-2-methyltetrahydro-1,2,4-oxadiazin-3,5-dione (BASF)
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U 27.267 is N,N-dimethyl-2-(3,4,5-tribromopyrazol-1-yl)propionamide (Upjohn)

SPECIES	U 27,267 0.33 kg/ha	U 27,267 1.00 kg/ha	U 27,267 3.00 kg/ha
OXAL LAT	123 xxxxxxxxxxxxxxxxxxxx+	77 xxxxxxxxxxxxxxx	108 xxxxxxxxxxxxxxxxxxx+
(87)	100 xxxxxxxxxxxxxxxxxxx	86 xxxxxxxxxxxxxxxx	71 xxxxxxxxxxxxxx

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REFERENCES

FISCHER, A. (1968) New herbicides particularly for the control of mayweeds. Proc. 9th Br. Weed Control Conf., 2, 1042-45.

FISCHER, A. (1969) New herbicides for the control of broadleaved and grassy weeds. Proc. 3rd EWRC Symposium on New Herbicides, Versailles, 1, 67-75.

HILTON, J.L., SCHAREN, A.L., ST. JOHN, J.B., MORELAND, D.E. and NORRIS, K.H. (1969) Modes of action of pyridazinone herbicides. Weed Sci., 17, (4), 541-47.

RICHARDSON, W.G., PARKER, C. and HOLLY, K. (1971) The pre-emergence selectivity of some newly developed herbicides. Tech. Rep. agric. Res. Coun. Weed Res. Orgn, 17, pp.39.

Technical reports available

5. A survey of the problem of aquatic weed control in England and Wales. October, 1967. T.O. Robson. Price - £0.25.

6. The botany, ecology, agronomy and control of Poa trivialis L. rough-stalked meadow-grass. November 1966. G.P. Allen. Price - £0.25.

7. Flame cultivation experiments 1965. October, 1966. G.W. Ivens. Price - £0.25.

8. The development of selective herbicides for kale in the United Kingdom. 2. The methylthiotriazines. Price - £0.25.

9. The post-emergence selectivity of some newly developed herbicides (NC 6627, NC 4780, NC 4762, BH 584, BH 1455). December, 1967. K. Holly and Mrs. A.K. Wilson. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.

10. The liverwort, Marchantia polymorpha L. as a weed problem in horticulture; its extent and control. July, 1968. I.E. Henson. Price - £0.25.

11. Raising plants for herbicide evaluation; a comparison of compost types. July, 1968. I.E. Henson. Price - £0.25.

12. Studies on the regeneration of perennial weeds in the glasshouse; I. Temperate species. May, 1969. I.E. Henson. Price - £0.25.

13. Changes in the germination capacity of three Polygonum species following low temperature moist storage. June, 1969. I.E. Henson. Price - £0.25.

14. Studies on the regeneration of perennial weeds in the glasshouse. II. Tropical species. May, 1970. I.E. Henson. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.

15. Methods of analysis for herbicide residues in use at the Weed Research Organization. December, 1970. R.J. Hance and C.E. McKone. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.

16. Report on a joint survey of the presence of wild oat seeds in cereal seed drills in the United Kingdom during Spring 1970. November, 1970. J.G. Elliott and P.J. Attwood. Price - £0.25.

17. The pre-emergence selectivity of some newly developed herbicides, Orga 3045 (in comparison with dalapon), haloxydine (PP 493), HZ 52.112, pronamide (RH 315) and R 12001. January, 1971. W.G. Richardson, C. Parker and K. Holly. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.

18. A survey from the roadside of the state of post-harvest operations in Oxfordshire in 1971. November, 1971. A. Phillipson. Price - U.K. and overseas surface mail - £0.12; overseas airmail - £0.34.

19. The pre-emergence selectivity of some recently developed herbicides in jute, kenaf and sesamum, and their activity against Oxalis latifolia. December, 1971. M.L. Dean and C. Parker. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.45.

20. A survey of cereal husbandry and weed control in three regions of England. July, 1972. A. Phillipson, T.W. Cox and J.G. Elliott. Price - U.K. and overseas surface mail - £0.35; overseas airmail - £0.75.

21. An automatic punching counter. November, 1972. R.C. Simmons. Price - U.K. and overseas surface mail - £0.30; overseas airmail - £0.50.

22. The pre-emergence selectivity of some newly developed herbicides: bentazon, BAS 373OH, metflurazone, SAN 9789, HER 52.123, U 27,267. December 1972. W.G. Richardson and M.L. Dean. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.45.

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