AGRICULTURAL RESEARCH COUNCIL

WEED RESEARCH ORGANIZATION

Technical Report No. 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)
R 12001

Orga 3045 is flupropanate-sodium,
HZ 52.112 is credazine,
Pronamide is propyzamide,
R 12001 is S-isopropyl 5-ethyl-2-methylpiperidine-1-carbothiolate (Stauffer)

by

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(Herbicide Evaluation and Overseas Sections)

January, 1971

Price

U.K. and Overseas Surface Mail - £0.25

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BEGBROKE HILL, YARNTON, OXFORD

W.R.O. Technical Report No. 17

The pre-emergence selectivity of some newly developed herbicides

(dalapon-sodium, Orga 3045, haloxydine, HZ 52.112, pronamide, R 12001)

CONTENTS

Acknowledgements

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Introduction

For many years the Herbicide Evaluation Section of the Weed Research Organization has investigated the selectivity of new herbicides which are in the process of commercial development by industry. This has involved application, both pre-emergence and post-emergence, to a wide range of crop and weed species grown in pots, as a preliminary stage of this process. The objectives have been to discover selectivities additional to those pinpointed by the firm which originally discovered the herbicidal properties of the chemical; to obtain experience of the type of effects produced by the chemical; and to provide a source of information on the relative susceptibility of the species. The latter may subsequently prove useful in considering problems such as the cropping of land contaminated with the herbicide.

Essentially the main value of this experimentation is as a guide in the planning of further experiments both in pots and in the field. However many people have requested that the results be made accessible to them. Hence the results are presented here in a published and readily available form as one of a series of Weed Research Organization Technical Reports.

Attention is drawn particularly to the fact that the experiment described here is only a preliminary guide to the relative resistance or susceptibility of the species included. Pot experiments of this sort are not a reliable guide to the dose levels needed to produce the same effects in the field. Further, the experiments are conducted on only one widely grown variety of each crop plant or on weed material from one readily available source. Large variations in response can occur between different varieties of the same crop, or between different strains or clones of weed species. In a few instances a cultivar attributed to the same species as the weed has been used for ease of propagation and there are a number of cases where a species has been included which is a crop in some circumstances and a weed in others. The pre-emergence experiments are conducted only on one soil type and the post-emergence experiments at one growth stage. These important variables can have a profound effect on response.

For the above reasons it must be emphasised that the data reported should be regarded primarily as a source of ideas for further work. The results are presented in full to enable the reader to extract information on particular species in which he may be interested, and to facilitate rapid production of the report on completion of computer processing of the data.

The Weed Research Organization only accepts herbicides for inclusion in its research programme if the chemical nature is disclosed. However in some cases this disclosure is confidential for a limited period of time. Hence there may be occasional instances in these reports where the chemical composition of a herbicide is not stated but marked as confidential. In general, recipients of these reports will find that information on this point becomes available from other sources in a relatively short period of time.

This report is presented in such a way that it can be sub-divided into portions dealing with individual herbicides, which can then be filed separately if desired.

EXPERIMENTAL PROCEDURE

The techniques used resembled those in previous pre-emergence selectivity experiments. Six herbicides were evaluated, each being applied at three doses and incorporated into the soil before planting. Incorporation was not necessarily required to secure the maximum effect from the herbicide, the intention being to assess the inherent selectivity when the herbicide was distributed throughout the growing medium.

Plant growing and treatment

Tin plate containers 19.0 x 13.7 x 7.6 cm deep were filled to a depth of 6.5 cm with a sandy loam topsoil from a field at Begbroke, having an organic matter content of 3%, a clay content of 13% and a moisture content of 16%. John Innes base fertiliser (100 g/36 l.) and DDT insecticide (30g/36 l. of a 5% dust) were incorporated into this soil. The herbicides were used in the formulation supplied by the manufacturer for field experimentation. They were sprayed on to the soil surface using a laboratory sprayer embodying a 'Teejet' fan nozzle moving at constant speed along a track over a spray bench. Shortly after spraying, the soil in each container was passed six times through a large polythene funnel to incorporate the herbicide evenly through the soil. The treated soil was then used to fill a series of 8.9 cm diameter disposable plastic pots in which the plants were subsequently grown. The soil depth in the pots was also approximately 6.5 cm.

Pots were allocated to individual species and a specified number of seeds sown at the appropriate depth (see Table 1). For the perennial weed species small portions of underground system were planted as indicated in Table 1. All pots were replicated twice.

With three species, plant material was pre-treated to improve establishment. Chenopodium album seeds were soaked in 0.1M potassium nitrate solution and kept in the light for three days prior to planting. With Polygonum aviculare the seeds were kept moist at 2°C for a period of at least six weeks before planting. Tubers of Cyperus esculentus were stored moist at 4°C for 8 days prior to planting to break dormancy.

The spraying of the soil, its subsequent transfer to pots and planting of the latter with the various species commenced on 18th November 1969. The pots were then placed in aluminium foil dishes in the glasshouses at 15°C until completion of spraying, the whole procedure taking 1½ days. The temperatures were then raised to the desired values for the temperate and tropical species respectively. Initial watering until emergence was from overhead using a boom with fan nozzles to give uniform treatment to all pots. After emergence of the majority of the species, pots were watered individually from overhead, according to need using a small rose with trigger control and avoiding contact with the plants as far as possible.

Glasshouse conditions for the temperate species were 18°C (minimum 16°C, maximum 22°C) and a mean relative humidity of 60% (range 32-85%). Glasshouse conditions for the tropical and sub-tropical species were 24°C (minimum 20°C, maximum 28°C) and a mean relative humidity of 45% (range 24-78%). In addition to the normal lighting conditions the day length was increased to a constant 14 hours, with supplementary lighting provided by warm white fluorescent tubes.

Assessment and processing of results

When the control plants were getting too big to be maintained properly, 4-6 weeks after spraying, a final assessment was made directly on to punch cards. The number of survivors for each treatment and their vigour expressed on a 0-7 subjective scoring scale were recorded. Scale points were defined as follows:

0 = completely dead;
1 = moribund but not all tissue dead;
2 = alive, with some green tissue, but unlikely to make much further growth;
3 = very stunted, but apparently still making some growth;
4 = considerable inhibition of growth;
5 = readily distinguishable inhibition of growth;
6 = some detectable adverse effect as compared with control - colour difference, morphological abnormality, epinasty or very slight reduction in growth;
7 = indistinguishable from control.

The punched cards were processed by ORION computer at Rothamsted Experimental Station. The computer output was produced directly on to duplicating stencils used in the preparation of this report. These give rise to the main diagrammatic presentation of the data; given separately for each herbicide. On each histogram there is an indication of herbicide, dose applied and species, abbreviations for which can be found in Table 1. For each species at each dose of herbicide there is a pair of figures. The upper figure of the pair gives mean plant survival as a percentage of untreated controls. The lower figure shows mean vigour score as a percentage of untreated controls. Directly to the right of each figure is the same information presented as a horizontal histogram. Each 'x' in the histogram represents a 5% increment in the value being plotted. An 'R' indicates figure based on one replicate only. For Cyperus rotundus a third row of 'x's represents freshweight of shoots as a percentage of controls 14 weeks after planting.

With certain species it was not possible to record the final assessment on to punch cards for various reasons. In the case of jute, Polygonum aviculare and Galium aparine there was very little or no germination. With onion, rice, Cynodon dactylon, Eleusine indica and Rottboellia exaltata growth was very variable due to poor planting material or attack by disease or insects. With Rumex acetosella, Cirsium arvense and Convolvulus arvensis some plants died back from an early growth stage due to lack of formation of an adequate root system. However an assessment of vigour was possible and this has been appended to the histograms. With Tussilago farfara there was a shortage of suitable material which led to variable emergence. However a vigour assessment was possible which has also been appended to the histograms. Several species, notably the perennials, were kept for a period of several months to observe later effects or the degree of recovery from injury. These final observations are referred to in the text.

In interpretation of the results arbitrary levels of vigour reduction of 15% or less compared with control in respect of crops, and vigour reduction of 70% or more as compared with control in respect of weeds have been taken as the criteria of selectivity. A series of individual comments are made on the results for each herbicide but these are not intended to be an exhaustive survey. They are provided merely to highlight a number of points of interest, but are not intended to replace careful consideration of the histograms with reference to the readers' own interests.

Persistence of herbicides

An extra identical batch of soil was sprayed and mixed simultaneously for each treatment of the main experiment. This soil was used to obtain preliminary information on the rate of disappearance, or persistence of the herbicides. The soil was stored in screw-top glass jars in the dark at a constant temperature of 23°C, together with jars containing samples of the same untreated control soil as used in the main experiment. At six week intervals the soil was remixed, a subsample drawn and a sensitive test species sown into it in pots which were kept in the glasshouse. When control plants had reached a certain well defined growth stage the number of plants per pot and their freshweight was recorded. The initial bioassay was run in the same week as the setting up of the main experiment. Sufficient soil was treated and stored to allow bioassay of residues at 6-weekly intervals for a year if necessary.

Table 1

Species abbreviations, varieties and stage of growth at assessment

Species	Designation and computer serial number	Cultivar or source	No. of seed or plant material per pot	Depth of planting (cm)	Stage of growth at assessment
Wheat (*Triticum aestivum*)	WHEAT (1)	Kolibri	8	1.2	4 leaves
Barley (*Hordeum vulgare*)	BARLEY (2)	Proctor	8	1.2	4½-5 leaves starting to tiller
Oat (*Avena sativa*)	OAT (3)	Condor	8	1.2	3½ leaves
Perennial ryegrass (*Lolium perenne*)	PER RYGR (4)	S 23	15	0.6	3½-4 leaves
Onion (*Allium cepa*)	ONION (8)	Rijnsburger	15	0.6	2 leaves
Dwarf French bean (*Phaseolus vulgaris*	DWF BEAN (9)	The Prince	3	1.8	1½ trifoliate leaves
Field bean (*Vicia faba*)	FLD BEAN (10)	Maris Bead	4	1.8	3-4 leaves
Pea (*Pisum sativum*)	PEA (11)	Dark skinned perfection	4	1.8	4-4½ leaves
White clover (*Trifolium repens*)	W CLOVER (12)	S 100	20	0.6	2 trifoliate leaves
Kale (*Brassica oleracea acephala*)	KALE (15)	Marrowstem	10	0.6	2½-3 leaves
Swede (*Brassica napus*)	SWEDE (17)	Lord Derby	10	0.6	2½-3 leaves
Carrot (*Daucus carota*)	CARROT (18)	Chantenay Red Core	10	0.6	2-2½ leaves
Lettuce (*Lactuca sativa*)	LETTUCE (20)	Borough Wonder	14	0.6	3½-4½ leaves
Sugar beet (*Beta vulgaris*)	SUG BEET (21)	'Klein E' monogerm	15	1.2	3½ leaves
Avena fatua	AVE FATU (26)	Harwell 1963	8	1.2	4 leaves

Species	Designation and computer serial number	Cultivar or source	No. of seed or plant material per pot	Depth of planting (cm)	Stage of growth at assessment
Alopecurus myosuroides	ALO MYOS (27)	WRO 1967	30	0.6	3-3½ leaves
Poa annua	POA ANN (28)	WRO 1968	25	0.6	4-5 leaves
Senecio vulgaris	SEN VULG (34)	WRO 1967	20	0.6	4-4½ leaves
Polygonum lapathifolium	POL LAPA (35)	WRO 1968	15	0.6	4½ leaves
Polygonum aviculare	POL AVIC (36)	Rothamsted 1968	15	1.2	4 leaves
Galium aparine	GAL APAR (38)	Wytham 1965	15	0.6	-
Chenopodium album	CHEN ALB (39)	Kidlington 1967	25	0.6	2½-3 pairs leaves
Stellaria media	STEL MED (40)	WRO 1968	20	0.6	4-5 pairs leaves
Agropyron repens	AG REPEN (47)	WRO Clone 31	6x1-node rhizome fragments	1.2	4½ leaves
Allium vineale	ALL VIN (49)	WRO 1968	6 aerial bulbils	1.2	2½-3 leaves
Cirsium arvense	CIRS ARV (50)	WRO Clone 1	4x4cm root fragments	1.2	4½ leaves
Tussilago farfara	TUS FARF (51)	WRO Clone 1	4x1-node rhizome fragments	1.8	4½ leaves
Convolvulus arvensis	CONV ARV (52)	WRO Clone 1	4x4cm root fragments	1.2	7-16 leaves
Rumex acetosella	RUM ACET (53)	WRO Clone 1	4x4cm root fragments	1.2	3-5 leaves
*Maize (Zea mays)	MAIZE (58)	Inra 200	6	1.2	4 leaves
*Sorghum (Sorghum vulgare)	SORGHUM (59)	Serna (SB 68)	6	1.2	5-6 leaves
*Rice (Oryza sativa)	RICE (60)	Kogbandi	10	1.2	2 leaves

Species	Designation and computer aerial number	Cultivar or source	No. of seed or plant material per pot	Depth of planting (cm)	Stage of growth at assessment
*Groundnut (Arachis hypogea)	GRNDNUT (64)	Natal Common	4	1.8	4½ trifoliates
*Soyabean (Glycine max)	SOYABEAN (65)	Merit	4	1.8	2-3 trifoliates
*Cotton (Gossypium hirsutum)	COTTON (66)	Samaru 26J	6	1.8	2 leaves
*Jute (Corchorus olitorius)	JUTE (67)	Trinidad	12	0.6	2-3 leaves
*Kenaf (Hibiscus cannabinus)	KENAF (68)	Thai Native	8	1.2	2-3 leaves
*Eleusine indica	ELEU IND (74)	Zambia	15	0.6	5-6 leaves
*Echinochloa crus-galli	ECH CRUS (75)	UFS Wytham 1961	15	0.6	5 leaves
*Rottboellia exaltata	ROTT EXA (76)	Rhodesia	10	1.2	5-6 leaves
*Amaranthus retroflexus	AMAR RET (78)	ex Shell Res. Ltd.	15	0.6	6 leaves
*Cynodon dactylon	CYN DACT (82)	Clone 2 Sudan	5x1 node rhizome fragments	1.2	-
*Cyperus esculentus	CYP ESCU (85)	Clone 2 S. Africa	5 tubers	1.2	8 leaves
*Cyperus rotundus	CYP ROTU (86)	Clone 1 Rhodesia	5 tubers	1.2	6-7 leaves

* These species were kept in the greenhouse under the higher of the two temperature regimes.

RESULTS AND COMMENTS: Pre-emergence selectivity experiment G.69.37 (511)

DALAPON-SODIUM

Chemical name: Sodium 2,2-dichloropropionate Common name: dalapon-sodium

Formulation used: water soluble powder 74% w/w a.e. without wetter, from Boots Pure Drug Co.

Doses: lb/ac - 2.0 4.0 8.0

kg/ha - 2.24 4.48 8.97

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

Summary of results

Full results are given in the histograms and are summarised in the selectivity table below.

RATE lb/ac (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: vigour reduced by more than 70%
8.0 (8.97)	field bean carrot lettuce sugar beet cotton *kenaf	Avena fatua Poa annua Rumex acetosella + species below
4.0 (4.48)	As above + pea kale swede groundnut	Agropyron repens Tussilago farfara
2.0 (2.24)	none listed as no weeds controlled	none

* But note some stand reduction occurred

Comments on results

1. Dalapon was included in this experiment as a standard of comparison for the chemically related Orga 3045. Both compounds are referred to in greater detail in the section on Orga 3045.

2. As was to be expected dalapon severely affected many grasses at 8.0 lb/ac. Rumex acetosella was also controlled at this rate. Tussilago farfara appears in the table as being controlled at the time of the main assessment. However shoots emerged subsequently although these showed leaf deformities and a lack of development, and associated poor root development.

3. A wide range of broadleaved crops was tolerant.

TRIAL NUMBER 511

SPECIES		TREATMENTS DALAPON 2.0000 LB/AC		DALAPON 4.0000 LB/AC		DALAPON 8.0000 LB/AC
WHEAT	95	xxxxxxxxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxxx+	117	xxxxxxxxxxxxxxxxxxx+
(1)	64	xxxxxxxxxxxxx	36	xxxxxxx	21	xxxx
BARLEY	105	xxxxxxxxxxxxxxxxxxx+	112	xxxxxxxxxxxxxxxxxxx+	56	xxxxxxxxxxx
(2)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	21	xxxx
OAT	94	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	31	xxxxxx
(3)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
PER RYGR	90	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	76	xxxxxxxxxxxxxx
(4)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
FLD BEAN	124	xxxxxxxxxxxxxxxxxx+	124	xxxxxxxxxxxxxxxxxx+	106	xxxxxxxxxxxxxxxxxx+
(10)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
PEA	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(11)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
W CLOVER	106	xxxxxxxxxxxxxxxxxx+	113	xxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxx
(12)	79	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx
KALE	87	xxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
SWEDE	91	xxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxx+	111	xxxxxxxxxxxxxxxxxx+
(17)	100	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx	57	xxxxxxxxxx
CARROT	126	xxxxxxxxxxxxxxxxxx+	87	xxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxx
(18)	93	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
LETTUCE	52	xxxxxxxxx	91	xxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SUG BEET	114	xxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxx+
(21)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx

TRIAL NUMBER 511

SPECIES		TREATMENTS DALAPON 2.0000 LB/AC		DALAPON 4.0000 LB/AC		DALAPON 8.0000 LB/AC
AVE FATU	68	xxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	15	xxx
(26)	50	xxxxxxxxxx	50	xxxxxxxxxx	14	xxx
ALO MYOS	80	xxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx	40	xxxxxxxx
(27)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
POA ANN	38	xxxxxxxx	21	xxxx	0	
(28)	71	xxxxxxxxxxxxx	57	xxxxxxxxxxx	0	
SEN VULG	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(34)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
CHEN ALB	103	xxxxxxxxxxxxxxxxxxx+	124	xxxxxxxxxxxxxxxxxxx+	67	xxxxxxxxxxxx
(39)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
STEL MED	87	xxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
AG REPEN	80	xxxxxxxxxxxxxxx	40	xxxxxxxx	0	
(47)	57	xxxxxxxxxxx	29	xxxxxx	0	
ALL VIN	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	94	xxxxxxxxxxxxxxxxx
(49)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	71	xxxxxxxxxxxxx
SORGHUM	50	xxxxxxxxxx	13	xxx	0	
(59)	64	xxxxxxxxxxxx	21	xxxx	0	
RICE	96	xxxxxxxxxxxxxxxxx	108	xxxxxxxxxxxxxxxxxxx+	79	xxxxxxxxxxxxxx
(60)	93	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
GRNDNUT	91	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx+	104	xxxxxxxxxxxxxxxxxx+
(64)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxx	140	xxxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxx
(65)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx

TRIAL NUMBER 511

SPECIES		TREATMENTS DALAPON 2.0000 LB/AC		DALAPON 4.0000 LB/AC		DALAPON 8.0000 LB/AC
COTTON	78	xxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx+
(66)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
KENAF	102	xxxxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxxx
(68)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
ECH CRUS	75	xxxxxxxxxxxxxx	66	xxxxxxxxxxxxx	38	xxxxxxxx
(75)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx
AMAR RET	57	xxxxxxxxxx	43	xxxxxxxxx	30	xxxxxx
(78)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(86)	64	xxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
	*125	xxxxxxxxxxxxxxxxxxx+	105	xxxxxxxxxxxxxxxxxxx+	83	xxxxxxxxxxxxxxxxx
POL LAPA	89	xxxxxxxxxxxxxxxxx	45	xxxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxx
(35)	95	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx

HISTOGRAMS BASED ON VIGOUR SCORES ONLY

CIRS ARV	64	xxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
(50)						
TUS FARF	71	xxxxxxxxxxxxx	21	xxxx	14	xxx
(51)						
CONV ARV	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
(52)						
RUM ACET	57	xxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	14	xxx
(53)						

* Based on fresh weight of foliage as a percentage of untreated control three months after treatment.

RESULTS AND COMMENTS: Pre-emergence selectivity experiment G.69-37 (511)

ORGA 3045

Code number: Orga 3045

Chemical name: Sodium 2,2,3,3-tetrafluoropropionate

Other designations: TFP-sodium

Source: Orgachemia Ltd., Boseind, Boxtel, Netherlands.

Technical information available:
Technical information bulletin (dated January 1969)
Proceedings 3rd E.W.R.C. Symposium on New Herbicides 1969, 17-33.

Manufacturers' suggestions for principal uses: Control of annual and perennial grass weeds; pre- and post-emergence in turnips, rape, cabbage, kale, sugar beet, apples, stone fruit, pines, strawberries and red currants at between 2 and 8 kg/ha.

Other W.R.O. Experiments:
Initial Activity Test G.69.15
Standard Post-emergence selectivity test G.69.19

Formulation used: aqueous concentrate 80.8% a.e.

Doses:

lb/ac	2.0	4.0	8.0
kg/ha	2.24	4.48	8.97

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

Summary of results:

Full results are given in the histograms and are summarised in the selectivity table below.

RATE lb/ac (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: vigour reduced by more than 70%
8.0 (8.97)	kale swede cotton	Amaranthus retroflexus Rumex acetosella + species below
4.0 (4.48)	As above + sugar beet carrot	Echinochloa crus-galli Cyperus rotundus + species below
2.0 (2.24)	As above + field bean lettuce maize groundnut	Avena fatua Alopecurus myosuroides Poa annua Agropyron repens

Comments on results

1. Both dalapon and Orga 3045 were much more active on grasses than on broad-leaved species. About four times the rate of dalapon was needed to secure the equivalent effect of Orga 3045. Symptoms on the grasses were almost identical with both compounds. Main shoots were inhibited in growth, partly through trapping and sticking together of leaves. The foliage became a much darker green colour.

2. With Orga 3045 only one plant of Agropyron repens succeeded in emerging when treated at 2 lb/ac. Examination of rhizome fragments in all other treatments seven weeks after spraying showed that buds had been inhibited soon after sprouting, the whole bud becoming a very dark brown colour. With the dalapon treatment at 4 and 8 lb/ac primary buds were inhibited in the same way; there was then a tendency to produce secondary and tertiary buds which were also inhibited subsequently. The apparent susceptibility to Orga 3045 at the lowest dose was probably the most important response warranting further investigation.

3. Control of Rumex acetosella was common to both Orga 3045 and dalapon at 8 lb/ac. As with dalapon there was a severe effect on Tussilago farfara. Some rhizome fragments rotted while others eventually produced shoots; in some instances root development was severely restricted. There was no major difference from dalapon in this instance. Other broad leaved weeds were resistant as with dalapon.

4. Sugar beet, carrot, field bean and lettuce showed tolerance to both herbicides but more so with dalapon, being resistant to two or four times the equivalent rate of Orga 3045. Thus for selective control of grass weeds in these crops the present results do not suggest any major advantage for Orga 3045 over dalapon.

5. A notable exception to the above was with the Brassica crops, kale and swede, which showed outstanding tolerance to Orga 3045 at 8 lb/ac while phyto-toxic symptoms were seen with dalapon at this rate. Where grass weeds are the principal problem Orga 3045 would appear to have an extremely useful potential. It would be complementary to the chemically related sodium monochloroacetate which is used post-emergence in some Brassica crops for the control of seedling annual weeds, including some dicotyledonous species. An earlier post-emergence selectivity experiment showed that some Brassica crops are also resistant to foliar applications of Orga 3045.

The response of onion requires verification for there was a variable emergence and some pathogenic effects evident even in the control pots. However with Orga 3045 treatments at 8 lb/ac there was no kill of plants and vigour was 86% of control, while dalapon treatments had much more severe effects.

6. Orga 3045 was outstandingly safe in cotton and there are apparent possibilities of selectivity against perennial weeds such as Cyperus spp. as well as the annual grasses.

7. Maize and groundnut were also relatively tolerant of Orga 3045, suggesting possible selectivity against Echinochloa and Eleusine. Rottboellia, however, was also rather tolerant.

8. After the main assessment, effects of Orga 3045 on Cyperus rotundus became more severe and fresh weight of shoots after 3 months still showed 90% suppression by 2 lb/ac (compared with negligible effect from 8 lb dalapon

after this interval). C. esculentus and Cynodon dactylon, though uneven were also clearly very severely suppressed for a similar period of time. There appear to be very promising possibilities of selective control of Cyperus spp. in cotton, and more marginal possibilities in maize and groundnut at 2 lb/ac.

9. From the data so far available, Orga 3045 is much more persistent in the soil than dalapon. After three months, using perennial rye grass as a test species, dalapon had disappeared at the 2 and 4 lb/ac rates and was only just detectable at 8 lb/ac. With Orga 3045 plants were still reduced in fresh weight by 70% at 2 lb/ac and killed at 4 and 8 lb/ac. This persistence, coupled with the ability to leach readily reported elsewhere, must be borne in mind in considering potential uses for Orga 3045.

TRIAL NUMBER 511

SPECIES		TREATMENTS ORGA3045 2.0000 LB/AC		ORGA3045 4.0000 LB/AC		ORGA3045 8.0000 LB/AC
WHEAT	110	xxxxxxxxxxxxxxxxxxxx+	44	xxxxxxxxx	22	xxxx
(1)	43	xxxxxxxxx	14	xxx	14	xxx
BARLEY	98	xxxxxxxxxxxxxxxxxxx	14	xxx	0	
(2)	50	xxxxxxxxxx	14	xxx	0	
OAT	100	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	63	xxxxxxxxxxxx
(3)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
PER RYGR	83	xxxxxxxxxxxxxxxx	48	xxxxxxxxx	21	xxxx
(4)	50	xxxxxxxxxx	29	xxxxx	7	x
IWF BEAN	100	xxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(9)	71	xxxxxxxxxxxxx	43	xxxxxxxx	21	xxxx
FLD BEAN	106	xxxxxxxxxxxxxxxxxxx+	88	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxx+
(10)	93	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx
PEA	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(11)	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx
W CLOVER	91	xxxxxxxxxxxxxxxx	99	xxxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxx+
(12)	71	xxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
KALE	98	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxx+
(15)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
SWEDE	117	xxxxxxxxxxxxxxxxxx+	104	xxxxxxxxxxxxxxxxxx+	85	xxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
CARROT	145	xxxxxxxxxxxxxxxxxx+	116	xxxxxxxxxxxxxxxxxx+	68	xxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
LETTUCE	130	xxxxxxxxxxxxxxxxxx+	91	xxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx
SUG BEET	105	xxxxxxxxxxxxxxxxxx+	123	xxxxxxxxxxxxxxxxxx+	127	xxxxxxxxxxxxxxxxxx+
(21)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx

TRIAL NUMBER 511

SPECIES		TREATMENTS ORGA3045 2.0000 LB/AC		ORGA3045 4.0000 LB/AC		ORGA3045 8.0000 LB/AC
AVE FATU	60	xxxxxxxxxxxx	30	xxxxxx	0	
(26)	29	xxxxxx	14	xxx	0	
ALO MYOS	33	xxxxxxx	27	xxxxx	0	
(27)	29	xxxxxx	21	xxxx	0	
POA ANN	12	xx	0		0	
(28)	29	xxxx	0		0	
SEN VULG	53	xxxxxxxxxx	77	xxxxxxxxxxxxxx	63	xxxxxxxxxxxxx
(34)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
CHEN ALB	88	xxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx
(39)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
STEL MED	101	xxxxxxxxxxxxxxxxxxxx	74	xxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
AG REPEN	10	xx	0		0	
(47)	14	xxx	0		0	
ALL VIN	94	xxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxx+	69	xxxxxxxxxxxxx
(49)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(58)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	43	xxxxxxxxx
SORGHUM	13	xxx	0		0	
(59)	14	xxx	0		0	
RICE	0		0		0	
(60)	0		0		0	
GRNDNUT	91	xxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxx+	104	xxxxxxxxxxxxxxxxxx+
(64)	93	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxx	120	xxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxxx
(65)	36	xxxxxx	29	xxxxxx	29	xxxxxx

TRIAL NUMBER 511

SPECIES		TREATMENTS ORGA3045 2.0000 LB/AC		ORGA3045 4.0000 LB/AC		ORGA3045 8.0000 LB/AC
COTTON	52	xxxxxxxxxx	65	xxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx+
(66)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
KENAF	102	xxxxxxxxxx	96	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
(68)	43	xxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
ECH CRUS	38	xxxxxxxx	5	x	0	
(75)	36	xxxxxxx	14	xxx	0	
AMAR RET	74	xxxxxxxxxxxxx	48	xxxxxxxxxx	0	
(78)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	0	
CYP ROTU	80	xxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	30	xxxxxx
(86)	43	xxxxxxxxx	21	xxxx	14	xxx
	*12	xx	0		0	
POL LAPA	95	xxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(35)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxx

HISTOGRAMS BASED ON VIGOUR SCORES ONLY

CIRS ARV	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	36	xxxxxxx
(50)						
TUS FARF	79	xxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	36	xxxxxxx
(51)						
CONV ARV	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
(52)						
RUM ACET	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	21	xxxx
(53)						

* Based on fresh weight of foliage as a percentage of untreated control three months after treatment.

RESULTS AND COMMENTS: Pre-emergence selectivity experiment G.69.37 (511)

HALOXYDINE

Code number: PP 493 Common name: haloxydine

Chemical name: 3,5-dichloro-2,6-difluoro-4-hydroxypyridine

Other designations: JF 2408 for water soluble concentrate

Source: Plant Protection Ltd.,
Jealotts Hill Research Station,
Bracknell RG12 6EY,
England.

Technical information available:
Preliminary Data Sheet March 1968
Technical Data Sheet March 1969

Manufacturers suggestions for principal uses:
Pre- crop emergence in oil-seed rape, kale and other Brassica crops.

Other W.R.O. Experiments:
Standard Post-emergence Selectivity Test G.68.12
Initial Activity Test G.69.21

Formulation used: Aqueous concentrate containing 200 g/l a.i. as potassium salt.

Doses:

lb/ac	0.0625	0.25	1.0
kg/ha	0.070	0.28	1.12

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

Summary of results:

Full results are given in the histograms and are summarised in the selectivity table below.

RATE lb/ac (kg/ha)	CROPS: vigour reduced by less than 15%	WEEDS: vigour reduced by more than 70%
0.25 (0.28)	kale maize *groundnut cotton	Avena fatua Poa annua Agropyron repens + species below
0.0625 (0.07)	As above + *perennial ryegrass dwarf bean pea swede carrot lettuce sugar beet sorghum rice soyabean	Stellaria media Amaranthus retroflexus

* But note a small reduction in stand occurred.

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