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76/W/CS/34 Nematicide in Crop Sequence - Potatoes, Wheat, Barley

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76/W/CS/34

NEMATICIDES IN CROP SEQUENCE

Object: To study the effects of a range of nematicides on incidence of *Globodera* (formerly *Heterodera*) *rostochiensis* and yield of potatoes. Residual effects of previous treatments are studied in wheat and barley - Woburn Great Hill II and III.

Sponsor: A.G. Whitehead.

The seventh year, potatoes, wheat, barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-75/W/CS/34.

Design: 4 series of 3 blocks of 10 plots.

Whole plot dimensions: 4.27 x 9.14.

Treatments: The experiment has four series with the following cropping:-

	1969	1970	1971	1972	1973	1974	1975	1976
Series I	P	P	P*	SB	B	P	P*	W
Series II	P	P	P	P*	SB	B	P	P*
Series III	P	B	P	P	P*	SB	B	P
Series IV	P	B	P	P	P	P*	SB	B

P = potatoes, SB = sugar beet, B = barley, W = wheat

* Treatments applied to potatoes, later crops test residual effects.

Treatments to wheat (Series I): All combinations of:-

1. NEMACIDE(75) Residues of nematicides applied 1975:

DURSBAN	'Dursban'
PHOXIM	Phoxim
DACAMOX	'Dacamox'

2. RATE Rates of nematicide (kg a.i.):

SINGLE	Single (2.8 kg for 'Dursban', 'Dacamox': 5.6 kg for phoxim)
DOUBLE	Double (5.6 kg for 'Dursban' and 'Dacamox': 11.2 kg for phoxim)
QUAD	Quadruple (11.2 kg for 'Dursban' and 'Dacamox': 22.4 kg for phoxim)
NONE	plus one untreated plot per block

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Treatments to potatoes (Series II):
All combinations of:-

1. NEMACIDE(76) Nematicides applied 1976:

AC 64475	'AC 64475'
CARBOFUR	Carbofuran
PHOXIM	Phoxim

2. RATE Rates of nematicide (kg a.i.):

		'AC 64475'	Carbofuran	Phoxim
SINGLE	Single	2.2	2.8	5.6
DOUBLE	Double	4.4	5.6	11.2
QUAD	Quadruple	8.8	11.2	22.4

NONE plus one untreated plot per block

Treatments to potatoes (Series III): All combinations of:-

1. NEMACIDE(73) Residues of nematicides applied 1973:

BENOMYL	Benomyl
OXAMYL	Oxamyl
DOWCO	'Dowco 275'

2. RATE Rates of nematicide (kg a.i.):

SINGLE	Single rate (2.8 Oxamyl, 'Dowco 275': 5.6 benomyl)
DOUBLE	Double rate (5.6 Oxamyl, 'Dowco 275': 11.2 benomyl)
QUAD	Quadruple rate (11.2 Oxamyl, 'Dowco 275': 22.4-benomyl)

NONE plus one untreated plot per block

Treatments to barley (Series IV): All combinations of:-

1. NEMACIDE(74) Residues of nematicides applied 1974:

BENOMYL	Benomyl
CARBOFUR	Carbofuran
THIABEND	Thiabendazole

2. RATE Rates of nematicide (kg a.i.):

5.6	5.6
11.2	11.2
22.4	22.4

0.0 plus one untreated plot per block

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Standard applications:

Potatoes (Series II & III): Manures: (13:13:20) at 1950 kg. Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Wheat (Series I): Manures: Magnesian limestone at 5 tonnes. (10:24:24) at 250 kg. N at 80 kg as "Nitro-Chalk". Weedkiller: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

Barley (Series IV): Manures: (20:14:14) at 450 kg. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Seed: Potatoes: Pentland Crown.

Wheat: Cappelle, sown at 190 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Potatoes, test crop (Series II): Deep-tine cultivated twice: 27 Oct, 28 Oct, 1975. NPK applied: 19 Mar. Spring-tine cultivated: 22 Mar. Treatments applied, all plots rotary cultivated, potatoes planted: 7 Apr, 1976. Weedkiller applied: 7 May. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 5 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 25 Oct.

Potatoes (Series III): Subsoiled, tines 140 cm apart and 60 cm deep: 1 Sept, 1975. Ploughed: 16 Oct. NPK applied: 19 Mar, 1976. Spring-tine cultivated: 22 Mar. Rotary cultivated, potatoes planted: 2 Apr. Weedkiller applied: 7 May. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 5 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 20 Oct.

Wheat (Series I): Magnesian limestone applied: 24 Oct, 1975. Deep-tine cultivated twice: 27 Oct, 28 Oct. Spring-tine cultivated, seed sown: 8 Dec. N applied: 29 Mar, 1976. Weedkiller applied: 21 Apr. Combine harvested: 30 July.

Barley (Series IV): Ploughed: 25 Nov, 1976. Spring-tine cultivated: 3 Mar, 1976. Seed sown: 9 Mar. Weedkiller applied: 29 Apr. Combine harvested: 27 July.

- NOTES (1) For Barley (Series IV). The analysis presented assumes a Fourier curve with 2 terms, a sine and a cosine to represent positional variation.
- (2) Soil samples were taken before applying treatments and after harvest for counts of cysts, eggs and larvae of *Globodera* (formerly *Heterodera*) *rostochiensis*.

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POTATOES SERIES II

TOTAL TUBERS TONNES/HECTARE

***** TABLES OF MEANS *****

RATE NEMACIDE(76)	SINGLE	DOUBLE	QUAD	MEAN
AC 64475	15.2	21.8	21.0	19.3
CARBOFUR	13.1	15.9	21.2	16.7
PHOXIM	13.4	15.7	19.1	16.1
MEAN	13.9	17.8	20.4	17.4

RATE NONE 9.7

GRAND MEAN 16.6

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(76)	RATE NEMACIDE(76) RATE & RATE NONE
SED	1.43	2.47

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	3.03	18.2

PERCENTAGE 3.81CM (1.5 INCH) RIDDLE

***** TABLES OF MEANS *****

RATE NEMACIDE(76)	SINGLE	DOUBLE	QUAD	MEAN
AC 64475	78.9	83.7	80.3	81.0
CARBOFUR	78.9	80.8	83.4	81.1
PHOXIM	79.9	79.3	78.4	79.2
MEAN	79.3	81.3	80.7	80.4

RATE NONE 79.7

GRAND MEAN 80.4

PLOT AREA HARVESTED 0.00130

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POTATOES SERIES III

TOTAL TUBERS TONNES/HECTARE

***** TABLES OF MEANS *****

RATE NEMACIDE(73)	SINGLE	DOUBLE	QUAD	MEAN
BENOMYL	16.2	16.5	15.8	16.2
OXAMYL	19.5	3.0	21.4	21.3
DOWCO	18.3	17.0	18.8	18.1
MEAN	13.0	18.9	18.7	18.5

RATE NONE 17.0

GRAND MEAN 18.4

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(73)	RATE NEMACIDE(73)	RATE & RATE NONE
SED	1.28	1.28	2.21

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	2.71	14.7

PERCENTAGE 3.81CM (1.5 INCH) RIDDLE

***** TABLES OF MEANS *****

RATE NEMACIDE(73)	SINGLE	DOUBLE	QUAD	MEAN
BENOMYL	80.4	82.2	80.9	81.1
OXAMYL	2.1	83.8	84.4	83.4
DOWCO	81.2	80.2	81.2	80.9
MEAN	81.2	82.1	82.2	81.8

RATE NONE 81.4

GRAND MEAN 81.8

PLOT AREA HARVESTED 0.00130

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WINTER WHEAT

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

RATE NEMACIDE(75)	SINGLE	DOUBLE	QUAD	MEAN
DURSBAN	1.09	1.70	1.96	1.58
PHOXIM	1.60	1.84	1.39	1.61
DACAMOX	1.24	1.60	1.95	1.59
MEAN	1.31	1.71	1.77	1.59

RATE NONE 1.75

GRAND MEAN 1.61

GRAIN MEAN DM% 88.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(75)	RATE NEMACIDE(75) RATE & RATE NONE
SED	0.294	0.508

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.623	38.7

GRAIN MEAN DM% 88.2

STRAW TONNES/HECTARE

***** TABLES OF MEANS *****

RATE NEMACIDE(75)	SINGLE	DOUBLE	QUAD	MEAN
DURSBAN	1.14	1.42	1.09	1.22
PHOXIM	1.48	1.48	1.14	1.37
DACAMOX	1.01	1.31	1.15	1.16
MEAN	1.21	1.41	1.13	1.25

RATE NONE 1.23

GRAND MEAN 1.25

STRAW MEAN DM% 93.5

PLOT AREA HARVESTED 0.00260

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BARLEY

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

	RATE	5.6	11.2	22.4	MEAN
NEMACIDE(74)					
BENOMYL	1.89	2.50	2.03	2.14	
CARBOFUR	2.58	1.77	2.73	2.36	
THIABEND	2.17	1.66	2.48	2.10	
MEAN	2.21	1.98	2.41	2.20	

RATE 0.0 2.57

GRAND MEAN 2.24

GRAIN MEAN DM% 89.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(74)	RATE NEMACIDE(74)	RATE & RATE 0.0
SED	0.141	0.153	0.261

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.294	13.1

STRAW TONNES/HECTARE

***** TABLES OF MEANS *****

	RATE	5.6	11.2	22.4	MEAN
NEMACIDE(74)					
BENOMYL	1.08	1.28	1.25	1.20	
CARBOFUR	1.16	1.11	1.27	1.18	
THIABEND	1.37	1.14	1.31	1.28	
MEAN	1.20	1.18	1.28	1.22	

RATE 0.0 1.36

GRAND MEAN 1.23

STRAW MEAN DM% 93.2

PLOT AREA HARVESTED 0.00260