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75/ W/CS/34 - Nematicides in Crop Sequence - Potatoes, Sugar Beet, Barley

Rothamsted Research

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75/W/CS/34

NEMATOCIDES IN CROP SEQUENCE

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

Sponsor: A.G. Whitehead.

The seventh year, potatoes, sugar beet, barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-74/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
Series I	P	P	P*	SB	B	P	P*
Series II	P	P	P	P*	SB	B	P
Series III	P	B	P	P	P*	SB	B
Series IV	P	B	P	P	P	P*	SB

P = potatoes, SB = sugar beet, B = barley.

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

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

1. Nematicides	NEMACIDE(75)
'Dursban'	DURSBAN
Phoxim	PHDXIM
'Dacamox'	DACAMOX
2. Rates of nematicide (kg a.i.):	RATE
Single (2.8 kg for 'Dursban', 'Dacamox': 5.6 kg for phoxim)	SINGLE
Double (5.6 kg for 'Dursban' and 'Dacamox': 11.2 kg for phoxim)	DOUBLE
Quadruple (11.2 kg for 'Dursban' and 'Dacamox': 22.4 kg for phoxim)	QUAD
plus one untreated plot per block	0.0

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Treatments to potatoes (Series II):

All combinations of:-

1. Residues of nematicides applied 1972:	NEMACIDE(72)
Aldicarb	ALDICARB
'Du Pont 1410'	DUPONT
CGA 10576	CGA
2. Rates of nematicide (kg a.i.):	RATE
2.8	2.8
5.6	5.6
11.2	11.2
plus one untreated plot per block	0.0

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

1. Residues of nematicides applied 1973:	NEMACIDE(73)
Benomyl	BENOMYL
'Du Pont 1410'	DUPONT
'Dowco 275'	DOWCO
2. Rates of nematicide (kg a.i.):	RATE
Single rate (2.8 'Du Pont 1410', 'Dowco 275': 5.6 benomyl)	SINGLE
Double rate (5.6 'Du Pont 1410', 'Dowco 275': 11.2 benomyl)	DOUBLE
Quadruple rate (11.2 'Du Pont 1410', 'Dowco 275': 22.4 benomyl)	QUAD
plus one untreated plot per block	0.0

Treatments to sugar beet (Series IV): All combinations of:-

1. Residues of nematicides applied 1974:	NEMACIDE(74)
Benomyl	BENOMYL
Carbofuran	CARBOFUR
Thiabendazole	THIABEND
2. Rates of nematicide (kg a.i.):	RATE
5.6	5.6
11.2	11.2
22.4	22.4
plus one untreated plot per block	0.0

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Standard applications:

Potatoes (Series I and II): Manures: (13:13:20) at 1940 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Insecticide: Demeton-s-methyl at 0.25 kg in 280 l. Fungicide: Mancozeb at 1.3 kg in 390 l.

Sugar beet (Series IV): Manures: Magnesian limestone at 5 tonnes. (0:14:28) at 750 kg. N at 160 kg as 'Nitro-Chalk'. Boron at 7.4 kg B2O3 (as 'Solubor') applied with insecticide. Insecticide: Demeton-s-methyl at 0.25 kg applied on two occasions, once in 280 l and with boron in 390 l.

Barley: Manures: (20:14:14) at 490 kg. Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.

Seed: Potatoes: Pentland Crown.

Sugar beet: Klein E, sown at 5.6 kg.

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

Cultivations, etc.:-

Potatoes (Series I): Ploughed: 19 Dec, 1974. Spring-tine cultivated with crumbler: 25 Feb, 1975. NPK applied: 21 Apr, 1975. Treatments applied, all plots harrowed: 23-24 Apr. Rotary cultivated, potatoes planted: 2 May. Weedkiller applied: 22 May. Grubbed: 23 June. Rotary ridged: 24 June. Insecticide applied: 26 June. Fungicide applied: 15 July. Haulm mechanically destroyed: 2 Oct. Lifted: 15 Oct.

Potatoes (Series II): Subsoiled, tines 140 cm apart and 60 cm deep: 3 Sept, 1974. Ploughed: 19 Dec. Spring-tine cultivated with crumbler: 25 Feb, 1975. NPK applied: 21 Apr. Rotary cultivated, potatoes planted: 2 May. Weedkiller applied: 22 May. Grubbed: 23 June. Rotary ridged: 24 June. Insecticide applied: 26 June. Fungicide applied: 15 July. Haulm mechanically destroyed: 2 Oct. Lifted: 15 Oct.

Sugar beet (Series IV): Magnesian limestone applied: 7 Nov, 1974. Ploughed: 19 Dec. Spring-tine cultivated with crumbler: 25 Feb, 1975. PK applied: 22 Apr. N applied: 25 Apr. Spring-tine cultivated with crumbler: 28 Apr. Seed sown: 29 Apr. Tractor hoed twice: 29 May, 27 June. Singled: 4-5 June. Insecticide applied: 9 June. Boron and insecticide applied: 1 July. Side hoed: 2-3 July. Lifted: 4-5 Nov.

Barley (Series III): Ploughed: 19 Dec, 1974. Spring-tine cultivated with crumbler: 25 Feb, 1975. Seed sown: 28 Feb. Weedkiller applied: 20 May. Combine harvested: 12 Aug.

NOTE: Soil samples were taken before applying treatments and after harvest for counts of cysts, eggs and larvae of *Heterodera rostochiensis*.

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POTATOES SERIES I

TOTAL TUBERS TONNES/HECTARE

*** TABLES OF MEANS ***

	RATE	SINGLE	DOUBLE	QUAD	MEAN
NEMACIDE(75)					
DURSBAN		8.2	13.1	14.9	12.0
PHOXIM		14.4	12.7	15.4	14.2
DACAMCK		10.8	12.5	18.8	14.0
MEAN		11.1	12.8	16.3	13.4
RATE 0.0			7.8		
GRAND MEAN			12.8		

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

TABLE	NEMACIDE(75)	RATE	NEMACIDE(75) RATE AND RATE 0.0
SED	1.35	1.35	2.34

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	2.87	22.3

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

*** TABLES OF MEANS ***

	RATE	SINGLE	DOUBLE	QUAD	MEAN
NEMACIDE(75)					
DURSBAN		77.5	81.1	84.0	80.9
PHOXIM		81.3	76.7	80.7	79.6
DACAMCK		83.3	81.2	86.8	83.8
MEAN		80.7	79.7	83.8	81.4
RATE 0.0			77.7		
GRAND MEAN			81.0		

PLOT AREA HARVESTED 0.00130

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POTATOES SERIES II

TOTAL TUBERS TONNES/HECTARE

*** TABLES OF MEANS ***

RATE	2.8	5.6	11.2	MEAN
NEMACIDE(72)				
ALDICARB	14.9	15.6	24.9	18.5
DUPONT	17.1	16.7	19.0	17.6
CGA	15.4	14.6	17.0	15.7
MEAN	15.8	15.6	20.3	17.2
RATE 0.0		12.8		
GRAND MEAN		16.8		

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

TABLE	NEMACIDE(72)	RATE NEMACIDE(72)	RATE AND RATE 0.0
SED	1.10	1.10	1.91

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	2.34	13.9

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

*** TABLES OF MEANS ***

RATE	2.8	5.6	11.2	MEAN
NEMACIDE(72)				
ALDICARB	75.5	76.0	87.4	79.6
DUPONT	79.8	75.3	81.4	78.8
CGA	76.4	78.4	79.2	78.0
MEAN	77.2	76.6	82.7	78.8
RATE 0.0		76.3		
GRAND MEAN		78.5		

PLOT AREA HARVESTED 0.00130

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SUGAR BEET SERIES IV

ROOTS WASHED TONNES/HECTARE

*** TABLES OF MEANS ***

	5.6	11.2	22.4	MEAN
RATE				
NEMACIDE(74)				
BENOMYL	12.9	12.2	12.2	12.4
CARBOFUR	11.8	11.8	12.7	12.1
THIABEND	11.5	11.6	12.4	11.9
MEAN	12.1	11.9	12.4	12.1
RATE 0.0		12.2		
GRAND MEAN		12.1		

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

TABLE	NEMACIDE(74)	RATE	NEMACIDE(74) RATE AND RATE 0.0
SED	0.81	0.81	1.41

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	1.73	14.2

SUGAR PERCENTAGE

*** TABLES OF MEANS ***

	5.6	11.2	22.4	MEAN
RATE				
NEMACIDE(74)				
BENOMYL	14.4	14.6	14.5	14.5
CARBOFUR	14.5	14.4	14.7	14.5
THIABEND	14.7	14.4	14.6	14.6
MEAN	14.5	14.5	14.6	14.5
RATE 0.0		14.7		
GRAND MEAN		14.6		

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TOTAL SUGAR TONNES/HECTARE

*** TABLES OF MEANS ***

	5.6	11.2	22.4	MEAN
NEMACIDE(74)				
BENOMYL	1.86	1.78	1.77	1.80
CARBOFUR	1.72	1.70	1.86	1.76
THIABEND	1.69	1.68	1.82	1.73
MEAN	1.76	1.72	1.82	1.76
RATE 0.0		1.78		
GRAND MEAN		1.77		

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

TABLE	NEMACIDE(74)	RATE	NEMACIDE(74) RATE AND RATE 0.0
SED	0.118	0.118	0.205

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.251	14.2

PLOT AREA HARVESTED 0.00130

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BARLEY SERIES III

GRAIN TONNES/HECTARE

*** TABLES OF MEANS ***

	RATE	SINGLE	DOUBLE	QUAD	MEAN
NEMACIDE(73)					
BENOMYL		3.46	3.50	3.54	3.50
DUPONT		3.37	3.69	3.37	3.48
DOWCO		3.44	3.59	3.27	3.43
MEAN		3.42	3.59	3.39	3.47
RATE 0.0			3.04		
GRAND MEAN			3.43		

GRAIN MEAN DM% 87.2

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

TABLE	NEMACIDE(73)	RATE	NEMACIDE(73) RATE AND RATE 0.0
SED	0.271	0.271	0.470

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.576	16.8

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BARLEY SERIES III

STRAW TONNES/HECTARE

*** TABLES OF MEANS ***

	RATE	SINGLE	DOUBLE	QUAD	MEAN
NEMACIDE(73)					
BENOMYL		2.03	2.09	2.07	2.07
DUPONT		2.05	2.06	1.86	1.99
DQWCO		2.08	2.13	1.96	2.06
MEAN		2.06	2.09	1.97	2.04
RATE 0.0			1.86		
GRAND MEAN			2.02		

STRAW MEAN DM% 93.7

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

TABLE	NEMACIDE(73)	RATE	NEMACIDE(73) RATE AND RATE 0.0
SED	0.1332	0.1332	0.2307

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.2826	14.0

PLOT AREA HARVESTED 0.00260