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## Yields of the Field Experiments 1975

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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':<br>5.6 benomyl)      | SINGLE       |
| Double rate (5.6 'Du Pont 1410', 'Dowco 275':<br>11.2 benomyl)     | DOUBLE       |
| Quadruple rate (11.2 'Du Pont 1410', 'Dowco 275':<br>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)<br>RATE<br>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 \*\*\*

|                   | 2.8  | 5.6  | 11.2 | MEAN |
|-------------------|------|------|------|------|
| RATE 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 \*\*\*

|                   | 2.8  | 5.6  | 11.2 | MEAN |
|-------------------|------|------|------|------|
| RATE NEMACIDE(72) |      |      |      |      |
| ALDICARB          | 75.5 | 76.0 | 87.4 | 79.6 |
| DUPONT            | 79.8 | 75.3 | 81.4 | 78.8 |
| CGA               | 76.4 | 73.4 | 79.2 | 76.0 |
| 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)<br>RATE<br>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 |      |      |

75/W/CS/34

TOTAL SUGAR TONNES/HECTARE

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

|              | RATE | 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)<br>RATE<br>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)<br>RATE<br>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)<br>RATE<br>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