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Yields of the Field Experiments 1976

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76/W/RN/15 Rotation and Fumigation - Potatoes, Barley, Sugar Beet

Rothamsted Research

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76/W/RN/15

ROTATION AND FUMIGATION

Object: To study different ways of using nematicides in a three-course rotation and to determine the effects on crop yield and incidence of pathogenic nematodes - Woburn Butt Close.

Sponsors: F.G.W. Jones, A.G. Whitehead, T.D. Williams.

The eighth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-75/W/RN/15.

Design: 3 series each of 2 blocks of 3 plots split into 7.

Whole plot dimensions: 5.33 x 31.1.

Treatments:

All phases of the rotation potatoes, barley, sugar beet are present.
Each crop tests all combinations of:-

Whole plots

1. N Nitrogen fertiliser (kg N), applied cumulatively:

| POTATOES & S.BEET | BARLEY | To potatoes and sugar beet | To barley |
|----------------------|--------|-------------------------------|-----------|
| 75 | 38 | 75 | 38 |
| 150 | 75 | 150 | 75 |
| 225 | 113 | 225 | 113 |

Sub plots

2. CHEMICAL Chemicals:

| | |
|----------|--|
| 0 | None |
| A (P) | Aldicarb at 6 kg before potatoes |
| A (SB) | Aldicarb at 6 kg before sugar beet |
| A (B) | Aldicarb at 6 kg before barley |
| A (ALL) | Aldicarb at 6 kg before all crops |
| DAZ(ALL) | Dazomet at 224 kg before all crops since 1970 only |
| BEN(ALL) | Benomyl at 22 kg before all crops since 1974 only |

NOTE: Aldicarb first used in 1976. From 1969-75 dichloropropane/dichloropropene ('D-D') was applied at 448 kg to these treatments (before appropriate crops as above).

Standard applications:

Potatoes: Matures: (0:14:28) at 1080 kg. Weedkiller: Linuron at 1.2 kg plus 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.

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Barley: Manures: (0:20:20) at 310 kg combine drilled. Weedkiller:
Ioxynil at 0.52 kg with mecoprop at 1.6 kg in 280 l.
Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28) at
1080 kg. Boron at 7.4 kg B₂O₃ (as 'Solubor') applied with insecticide.
Insecticide: Demeton-s-methyl at 0.25 kg in 390 l.

Seed: Potatoes: Pentland Crown.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Sugar beet: Klein E, sown at 6 kg.

Cultivations, etc.:-

All Series: Dazomet applied and these plots only rotary cultivated and all
plots spring-tine cultivated: 11 Nov, 1975.

Potatoes: Ploughed: 4 Nov, 1975. Spring-tine cultivated with crumbler:
5 Nov. Ploughed: 15 Jan, 1976. Spring-tine cultivated: 3 Mar.
PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated:
24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated,
potatoes planted: 1 Apr. Weedkiller applied: 5 May. Grubbed: 2 June.
Rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide with
insecticide applied: 30 June. Fungicide applied: 30 July. Haulm
mechanically destroyed: 15 Sept. Lifted: 28 Sept.

Barley: Ploughed, spring-tine cultivated with crumbler: 5 Nov, 1975.
Ploughed: 15 Jan, 1976. Aldicarb and benomyl applied, all plots
rotary cultivated: 2 Mar. N applied, spring-tine cultivated, seed
sown: 3 Mar. Weedkiller applied: 29 Apr. Combine harvested: 28 July.

Sugar beet: Subsoiled: Tines 140 cm apart and 56 cm deep: 1 Sept, 1975.
Magnesian limestone applied: 5 Sept. Spring-tine cultivated: 18 Sept.
Ploughed twice: 16 Oct and 15 Jan, 1976. Spring-tine cultivated:
3 Mar. PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated:
24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated:
1 Apr. Spring-tine cultivated with crumbler, seed sown: 5 Apr.
Tractor hoed: 13 May. Singled: 20 May. Boron and insecticide applied:
28 May. Hoed by hand: 18 June, Lifted: 18 Nov.

NOTES: (1) Soil samples were taken after harvest for eelworm counts.
(2) Sugar beet: Because of rabbit damage the yields on three plots
with the following treatment combinations were not taken

| | |
|-----|----------|
| N | CHEMICAL |
| 75 | A(B) |
| 225 | O |
| 225 | BEN(ALL) |

Estimated values were used in the analysis.

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POTATOES

TOTAL TUBERS TONNES/HECTARE

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

| | N | 75 | 150 | 225 | MEAN |
|----------|---|------|------|------|------|
| CHEMICAL | | | | | |
| 0 | | 11.4 | 11.7 | 10.5 | 11.2 |
| A(P) | | 28.6 | 27.2 | 20.4 | 25.4 |
| A(SB) | | 23.9 | 23.8 | 20.8 | 22.8 |
| A(B) | | 18.1 | 19.1 | 12.0 | 16.4 |
| A(ALL) | | 31.3 | 30.5 | 27.5 | 29.8 |
| DAZ(ALL) | | 28.4 | 26.3 | 26.3 | 27.0 |
| BEN(ALL) | | 23.3 | 12.9 | 11.7 | 15.9 |
| MEAN | | 23.6 | 21.6 | 18.4 | 21.2 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|-------|----------|----------------|
| ----- | | |
| SED | 2.81 | 4.87 |

* WITHIN THE SAME LEVEL OF N ONLY

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

| STRATUM | DF | SE | CV% |
|-------------|----|------|------|
| BLOCK.WP.SP | 18 | 4.87 | 23.0 |

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

| | N | 75 | 150 | 225 | MEAN |
|----------|---|------|------|------|------|
| CHEMICAL | | | | | |
| 0 | | 74.6 | 78.3 | 77.5 | 76.8 |
| A(P) | | 91.7 | 87.1 | 84.0 | 87.6 |
| A(SB) | | 91.0 | 89.1 | 89.1 | 89.7 |
| A(B) | | 83.1 | 82.7 | 79.0 | 81.6 |
| A(ALL) | | 90.8 | 87.6 | 88.6 | 89.0 |
| DAZ(ALL) | | 90.5 | 89.1 | 89.7 | 89.8 |
| BEN(ALL) | | 85.1 | 83.0 | 74.8 | 81.0 |
| MEAN | | 86.7 | 85.3 | 83.2 | 85.1 |

PLOT AREA HARVESTED 0.00052

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BARLEY

GRAIN TONNES/HECTARE

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

| | N | 38 | 75 | 113 | MEAN |
|----------|---|------|------|------|------|
| CHEMICAL | | | | | |
| 0 | | 2.02 | 1.91 | 2.35 | 2.09 |
| A(P) | | 1.90 | 2.58 | 2.24 | 2.24 |
| A(SE) | | 2.12 | 2.70 | 3.03 | 2.62 |
| A(B) | | 2.24 | 2.69 | 3.25 | 2.72 |
| A(ALL) | | 1.68 | 2.24 | 3.36 | 2.43 |
| DAZ(ALL) | | 2.24 | 1.68 | 1.56 | 1.83 |
| BEN(ALL) | | 2.13 | 2.13 | 2.57 | 2.28 |
| MEAN | | 2.05 | 2.27 | 2.62 | 2.31 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|-------|----------|----------------|
| ----- | | |
| SED | 0.348 | 0.603 |

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

| STRATUM | DF | SE | CV% |
|----------------|------|-------|------|
| BLOCK.WP.SP | 18 | 0.603 | 26.1 |
| GRAIN MEAN DM% | 87.3 | | |

STRAW TONNES/HECTARE

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

| | N | 38 | 75 | 113 | MEAN |
|----------|---|------|------|------|------|
| CHEMICAL | | | | | |
| 0 | | 1.67 | 1.40 | 2.06 | 1.71 |
| A(P) | | 1.59 | 2.16 | 1.57 | 1.77 |
| A(SB) | | 1.87 | 2.05 | 2.25 | 2.06 |
| A(B) | | 1.78 | 2.06 | 2.43 | 2.09 |
| A(ALL) | | 1.58 | 1.89 | 2.27 | 1.91 |
| DAZ(ALL) | | 1.95 | 2.19 | 1.50 | 1.88 |
| BEN(ALL) | | 1.97 | 1.97 | 1.96 | 1.97 |
| MEAN | | 1.77 | 1.96 | 2.01 | 1.91 |

STRAW MEAN DM% 91.3

PLOT AREA HARVESTED 0.00052

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SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

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

| N | 75 | 150 | 225 | MEAN |
|----------|------|------|------|------|
| CHEMICAL | | | | |
| 0 | 29.8 | 32.4 | 29.7 | 30.6 |
| A(P) | 27.7 | 30.9 | 29.8 | 29.5 |
| A(SB) | 31.8 | 36.5 | 37.6 | 35.3 |
| A(B) | 29.3 | 29.8 | 32.4 | 30.5 |
| A(ALL) | 33.9 | 37.1 | 36.4 | 35.8 |
| DAZ(ALL) | 33.3 | 28.0 | 32.4 | 31.3 |
| BEN(ALL) | 26.6 | 25.6 | 32.7 | 28.3 |
| MEAN | 30.3 | 31.5 | 33.0 | 31.6 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|-------|----------|----------------|
| SED | 1.45 | 2.52 |

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

| STRATUM | DF | SE | CV% |
|-------------|----|------|-----|
| BLOCK.WP.SP | 15 | 2.52 | 8.0 |

SUGAR PERCENTAGE

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

| N | 75 | 150 | 225 | MEAN |
|----------|------|------|------|------|
| CHEMICAL | | | | |
| 0 | 15.2 | 14.7 | 14.0 | 14.7 |
| A(P) | 14.6 | 14.8 | 14.3 | 14.6 |
| A(SB) | 15.0 | 14.9 | 14.8 | 14.9 |
| A(B) | 15.0 | 14.3 | 14.5 | 14.6 |
| A(ALL) | 14.8 | 14.8 | 14.8 | 14.8 |
| DAZ(ALL) | 15.0 | 14.3 | 14.5 | 14.6 |
| BEN(ALL) | 15.0 | 14.7 | 14.4 | 14.7 |
| MEAN | 14.9 | 14.7 | 14.5 | 14.7 |

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SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

| | N | 75 | 150 | 225 | MEAN |
|----------|---|------|------|------|------|
| CHEMICAL | | | | | |
| 0 | | 4.54 | 4.78 | 4.15 | 4.49 |
| A(P) | | 4.04 | 4.58 | 4.26 | 4.29 |
| A(SB) | | 4.77 | 5.43 | 5.58 | 5.26 |
| A(B) | | 4.45 | 4.28 | 4.69 | 4.47 |
| A(ALL) | | 5.00 | 5.47 | 5.38 | 5.29 |
| DAZ(ALL) | | 5.00 | 4.00 | 4.70 | 4.57 |
| BEN(ALL) | | 3.98 | 3.78 | 4.82 | 4.19 |
| MEAN | | 4.54 | 4.62 | 4.80 | 4.65 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|-------|----------|----------------|
| ----- | | |
| SED | 0.231 | 0.400 |

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

| STRATUM | DF | SE | CV% |
|---------------------|---------|-------|-----|
| BLOCK.WP.SP | 15 | 0.400 | 8.6 |
| PLOT AREA HARVESTED | 0.00130 | | |