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

Rothamsted Research

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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, D.C.M. Corbett, A.G. Whitehead, T.D. Williams.

The fifth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-72/W/RN/15.

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

Whole plot dimensions: 5.33 x 31.1. Sub plot area harvested:

Barley: 0.00052 - potatoes: 0.00104 - sugar beet: 0.00156.

Treatments:

All phases of the rotation potatoes, barley, sugar beet are present.

Each crop tests all combinations of:-

Whole plots: 1. Nitrogen fertiliser (kg N):

N

To potatoes and
sugar beet

To
barley

To potatoes and
sugar beet

Barley

75

38

75

38

150

75

150

75

225

113

225

113

Sub plots: 2. Fumigants:

FUMIGANT

None (two sub plots per plot)

O

Dichloropropane/dichloropropene ('D-D') at 448 kg
before potatoes

DD(P)

Dichloropropane/dichloropropene ('D-D') at 448 kg
before sugar beet

DD(SE)

Dichloropropane/dichloropropene ('D-D') at 448 kg
before barley

DD(B)

Dichloropropane/dichloropropene ('D-D') at 448 kg
before all crops

DD(ALL)

Dazomet at 224 kg before all crops

DAZ(ALL)

Basal applications:

Barley: Manures: (0:20:20) at 300 kg combine drilled.

Potatoes: Manures: (0:14:28) at 1050 kg. Weedkiller: Linuron at 1.2 kg in 280 l. Fungicide with insecticide: Mancozeb at 1.3 kg plus demeton-s-methyl at 0.25 kg in 390 l. Fungicide: Mancozeb at 1.3 kg in 390 l on the first occasion and in 370 l on the second occasion.

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Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28)
at 1050 kg. Boron at 7.4 kg B2O3 (as 'Solubor') applied with
insecticide. Insecticide: Demeton-s-methyl at 0.25 kg in 450 l.
Weedkiller: Phenmedipham at 1.6 kg in 280 l.

Seed: Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.
Sugar beet: Klein E, sown at 8.0 kg.

Cultivations, etc.:-

All plots: Ploughed: 29 Nov, 1972. Dazomet applied and these plots only
rotary cultivated, 'D-D' injected: 12 Jan, 1973. Ploughed: 7 Feb.

Barley: N applied, seed sown: 13 Mar, 1973. Combine harvested:
20 Aug.

Potatoes: PK applied: 20 Mar, 1973. N applied: 23 Mar. Rotary cultivated:
3 Apr. Potatoes planted: 5 Apr. Weedkiller applied: 14 May. Grubbed:
1 June. Rotary ridged: 5 June. Fungicide and insecticide applied:
5 July. Fungicide applied: 25 July, 13 Aug. Haulm mechanically
destroyed: 18 Sept. Sprayed with undiluted BOV at 220 l: 24 Sept.
Lifted: 2 Oct.

Sugar beet: Magnesian limestone applied: 7 Oct, 1972. PK applied:
20 Mar, 1973. N applied, seed sown: 21 Mar. Weedkiller applied:
15 May. Singled: 25-29 May. Boron and insecticide applied:
25 June. Lifted: 9 Nov.

NOTE: Soil samples were taken after harvest for eelworm counts.

Standard errors per sub plot.

Barley, grain, tonnes/hectare: 0.332 or 7.2% (21 d.f.)
Potatoes, total tubers, tonnes/hectare: 3.76 or 8.9% (21 d.f.)
Sugar beet, roots, tonnes/hectare: 2.12 or 7.1% (21 d.f.)
total sugar, tonnes/hectare: 0.376 or 7.4% (21 d.f.)

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TABLES OF MEANS

BARLEY

	FUMIGANT						Mean
	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	
	GRAIN: TONNES/HECTARE						
N							
38	3.69	4.65	4.39	3.66	3.34	4.63	4.01
75	4.23	5.29	5.35	4.44	4.38	4.98	4.70
113	5.00	5.09	5.61	4.92	4.99	5.21	5.12
Mean	4.31	5.01	5.12	4.34	4.23	4.94	4.61

STANDARD ERRORS OF DIFFERENCES

	FUMIGANT	N*
		FUMIGANT
O v any of remainder	0.166	0.288
Between any of remainder	0.192	0.332

* Within the same level of N only

Mean D.M. % 83.9

	STRAW: TONNES/HECTARE						
N							
38	2.38	3.38	3.11	2.45	2.39	3.13	2.75
75	3.12	3.96	3.89	3.35	3.26	3.69	3.48
113	3.84	4.24	4.73	3.72	3.80	4.10	4.04
Mean	3.11	3.86	3.91	3.17	3.15	3.64	3.42

Mean D.M. % 90.3

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POTATOES

	FUMIGANT						
	0	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	Mean
	TOTAL TUBERS: TONNES/HECTARE						
N							
75	29.5	40.8	36.2	38.9	39.3	41.7	36.6
150	37.5	46.7	47.2	39.7	52.6	52.4	44.8
225	28.3	51.5	52.7	45.9	56.8	54.5	45.4
Mean	31.8	46.3	45.4	41.5	49.6	49.5	42.3

STANDARD ERRORS OF DIFFERENCES

	FUMIGANT	N*
0 v any of remainder	1.88	3.25
Between any of remainder	2.17	3.76

* Within the same level of N only

PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE

N							
75	95.3	96.0	97.0	96.5	96.5	96.1	96.1
150	96.5	96.4	97.8	97.5	96.8	97.0	96.9
225	95.0	97.5	97.9	97.3	96.7	97.5	96.7
Mean	95.6	96.6	97.6	97.1	96.7	96.9	96.6

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SUGAR BEET

N	FUMIGANT						Mean
	0	DD(P)	DD(SE)	DD(B)	DD(ALL)	DAZ(ALL)	
	ROOTS (WASHED): TONNES/HECTARE						
75	20.5	26.0	24.3	21.2	22.3	26.7	23.1
150	33.6	36.6	34.3	33.1	34.4	31.6	33.9
225	30.6	30.7	34.8	35.9	33.4	31.4	32.5
Mean	28.2	31.1	31.1	30.1	30.0	29.9	29.8

STANDARD ERRORS OF DIFFERENCES

	FUMIGANT	N*
0 v any of remainder	2.47	1.84
Between any of remainder	2.69	2.12

* Within the same level of N only

SUGAR PERCENTAGE							
N							
75	17.4	17.5	17.2	17.5	17.4	17.6	17.5
150	17.3	17.5	17.2	17.3	16.8	17.3	17.3
225	16.7	17.0	16.3	16.7	16.4	16.5	16.6
Mean	17.2	17.3	16.9	17.2	16.9	17.2	17.1

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SUGAR BEET

TOTAL SUGAR: TONNES/HECTARE

N	FUMIGANT						Mean
	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	
75	3.57	4.57	4.19	3.71	3.90	4.72	4.03
150	5.81	6.42	5.92	5.72	5.79	5.47	5.85
225	5.13	5.21	5.68	5.97	5.47	5.18	5.39
Mean	4.84	5.40	5.26	5.14	5.05	5.12	5.09

STANDARD ERRORS OF DIFFERENCES

	FUMIGANT	N*
O v any of remainder	0.188	0.325
Between any of remainder	0.217	0.376

* Within the same level of N only