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

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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 sixth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-73/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:
Potatoes - 0.00052, barley - 0.00052, sugar beet - 0.00130.

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	Potatoes & s.beet	Barley
75	38	75	38
150	75	150	75
225	113	225	113

Sub plots: 2. Chemicals:

	CHEMICAL
None	0
Dichloropropane/dichloropropene ('D-D') at 448 kg before potatoes	DD(P)
Dichloropropane/dichloropropene ('D-D') at 448 kg before sugar beet	DD(SB)
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 since 1970 only	DAZ(ALL)
Benomyl at 22 kg before all crops since 1974 only	BEN(ALL)

Standard applications:

Potatoes: Manures: (0:14:28) at 1080 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide with insecticide: Mancozeb at 1.3 kg plus 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 320 kg, combine drilled. Weedkiller: Ioxynil at 0.52 kg and 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 6.7 kg B2O3 (as 'Solubor') applied with the second application of insecticide. Insecticide: Demeton-s-methyl at 0.25 kg in 280 l followed by 0.21 kg in 390 l. Weedkiller: Phenmedipham at 1.1 kg in 340 l.

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

Cultivations, etc.:-

All series: Dazomet and benomyl applied, and these plots only, rotary cultivated: 27 Nov, 1973. DD injected, all plots spring-tine harrowed: 17 Dec.

Potatoes: Ploughed twice: 23 Nov, 1973, 6 Mar, 1974. Spring-tine cultivated: 28 Mar. PK and N applied, spring-tine cultivated: 2 Apr. Rotary cultivated, potatoes planted: 11 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 19 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 11 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 1 Oct.

Barley: Ploughed: 12 Oct, 1973. Spring-tine cultivated: 23 Nov. Ploughed: 6 Mar, 1974. Spring-tine cultivated: 28 Mar. N applied: 29 Mar. Spring-tine cultivated with crumbler, seed sown: 1 Apr. Weedkiller applied: 17 May. Combine harvested: 12 Sept.

Sugar beet: Subsoiled, tines 140 cm apart and 50 cm deep: 18 Sept, 1973. Magnesian limestone applied: 11 Oct. Ploughed twice: 12 Oct, 6 Mar, 1974. Spring-tine cultivated: 28 Mar. PK and N applied, spring-tine cultivated: 2 Apr. Power harrowed, rolled, seed sown: 3 Apr. Weedkiller applied: 26 May. Singled: 3-4 June. Insecticide applied: 5 June. Boron and insecticide applied: 24 June. Lifted: 30 Oct - 4 Nov.

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

Standard errors per sub plot.

Potatoes, total tubers: tonnes/hectare:	7.55 or 15.8% (18 d.f.)
Barley, grain: tonnes/hectare:	0.516 or 13.6% (18 d.f.)
Sugar beet, roots (washed): tonnes/hectare:	2.73 or 14.9% (18 d.f.)
total sugar: tonnes/hectare:	0.400 or 14.5% (18 d.f.)

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TABLES OF MEANS

POTATOES

CHEMICAL

	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
TOTAL TUBERS: TONNES/HECTARE								
N								
75	32.0	32.5	36.2	35.6	38.0	40.4	42.0	36.7
150	37.2	44.1	53.0	42.6	55.5	62.6	59.7	50.7
225	39.0	53.9	50.8	57.3	65.0	71.0	56.9	56.3
Mean	36.1	43.5	46.7	45.2	52.8	58.0	52.8	47.9

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N*
CHEMICAL	CHEMICAL
4.36	7.55

* Within the same level of N only

PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE

N								
75	98.3	97.9	98.2	97.3	98.3	98.4	97.7	98.0
150	98.1	99.5	98.5	99.5	97.7	99.0	97.9	98.6
225	98.9	98.1	98.5	98.5	98.3	97.9	99.0	98.4
Mean	98.4	98.5	98.4	98.4	98.1	98.4	98.2	98.4

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BARLEY

CHEMICAL

	0	DD(P)	DD(SE)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
GRAIN: TONNES/HECTARE								
N								
38	2.28	2.78	2.02	2.26	1.49	3.65	2.66	2.45
75	4.35	4.44	4.54	3.55	4.13	3.99	4.66	4.24
113	4.98	4.34	4.96	4.66	4.11	5.06	4.62	4.68
Mean	3.87	3.85	3.84	3.49	3.24	4.23	3.98	3.79

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N*
0.298	0.516

* Within the same level of N only

Mean D.M. % 84.1

STRAW: TONNES/HECTARE								
N								
38	1.49	1.78	1.84	1.72	1.48	2.61	2.05	1.85
75	2.22	2.60	2.47	2.13	2.13	2.46	2.76	2.40
113	2.64	2.26	2.77	2.52	2.06	2.79	2.53	2.51
Mean	2.12	2.21	2.36	2.13	1.89	2.62	2.44	2.25

Mean D.M. % 82.0

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SUGAR BEET

CHEMICAL

	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
ROOTS (WASHED): TONNES/HECTARE								
N								
75	13.0	14.4	15.1	16.0	14.2	19.0	14.0	15.1
150	17.5	21.0	18.0	20.6	20.5	20.7	18.7	19.6
225	21.6	21.0	20.2	22.6	16.2	20.8	20.6	20.4
Mean	17.4	18.8	17.8	19.7	17.0	20.2	17.7	18.4

STANDARD ERRORS OF DIFFERENCES

CHEMICAL N*
CHEMICAL

1.58 2.73

* Within the same level of N only

	SUGAR PERCENTAGE							
N								
75	15.8	15.4	15.3	15.0	14.8	15.6	15.5	15.4
150	15.4	15.4	15.1	15.1	14.7	14.8	15.3	15.1
225	14.8	14.7	14.3	14.3	13.9	15.1	15.0	14.6
Mean	15.3	15.2	14.9	14.8	14.5	15.2	15.3	15.0

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SUGAR BEET

TOTAL SUGAR: TONNES/HECTARE

CHEMICAL

	0	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
N								
75	2.06	2.22	2.31	2.39	2.11	2.97	2.17	2.32
150	2.70	3.24	2.71	3.11	3.01	3.08	2.86	2.96
225	3.20	3.09	2.89	3.23	2.26	3.14	3.09	2.98
Mean	2.65	2.85	2.64	2.91	2.46	3.06	2.71	2.75

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	CHEMICAL	N*
0.231	0.400	

* Within the same level of N only