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77/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, A.G. Whitehead, T.D. Williams.

The ninth year, potatoes, barley, sugar beet.

For previous years see 'Details' 1973 and 74-76/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 and S.Beet	Barley
75	38
150	75
225	113

Sub plots

2. CHEMICAL

Chemicals:

O	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
A D(ALL)	Aldicarb at 6 kg before all crops in 1977. Dazomet at 224 kg before all crops 1970-76
BEN(ALL)	Benomyl at 22 kg before all crops since 1974 only

NOTE: Aldicarb was first used in 1976. From 1969-75 dichloropropane/dichloropropene ('D-D') was applied at 448 kg to CHEMICAL A (P), A (SB), A (B) and A (ALL).

Standard applications:

Potatoes: Manures: (0:14:28) at 1080 kg. Fungicide: Mancozeb at 1.3 kg on four occasions, the last three with insecticide, in 420 l, 390 l and twice in 370 l successively. Insecticide: Pirimicarb at 0.14 kg on three occasions with fungicide.

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Barley: Manures: (0:20:20) at 310 kg. Weedkillers: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 420 l.

Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28) at 1080 kg. Boron at 7.4 kg B_2O_3 (as 'Solubor') applied with insecticide.

Insecticide: Pirimicarb at 0.14 kg in 280 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: Ploughed: 26 Nov, 1976. Aldicarb and benomyl applied, and all plots rotary cultivated: 15 Mar, 1977 (Barley), 15 Apr (Potatoes, sugar beet).

Potatoes: PK applied: 6 Apr, 1977. N applied: 7 Apr. Potatoes planted: 15 Apr. Grubbed: 2 May. Fine tooth cultivated and grubbed twice: 25-26 May. Grubbed and earthed up: 20 June. Fungicide applied four times: 24 June, 8 July, 21 July, 12 Aug. Insecticide applied three times: 8 July, 21 July, 12 Aug. Haulm mechanically destroyed: 20 Sept. Lifted: 4 Oct.

Barley: Spring-tine cultivated: 15 Mar, 1977. N applied, spring-tine cultivated with crumbler attached: 30 Mar. Spring-tine cultivated with crumbler attached, seed sown: 4 Apr. Weedkillers applied: 30 May. Combine harvested: 4 Sept.

Sugar beet: Magnesian limestone applied: 6 Sept, 1976. PK applied: 6 Apr, 1977. N applied: 7 Apr. Spring-tine cultivated with crumbler attached, seed sown: 15 Apr. Tractor hoed: 27 May. Singled: 8-9 June. Steerage hoed: 27 June. Hand hoed: 11 July. Insecticide and boron applied: 18 July. Lifted: 11 Nov.

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

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POTATOES

TOTAL TUBERS TONNES/HECTARE

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

N	75	150	225	MEAN
CHEMICAL				
0	7.1	27.7	26.2	20.3
A (P)	18.4	34.0	35.7	29.4
A (SB)	13.0	20.1	36.3	23.1
A (B)	11.0	28.2	30.7	23.3
A (ALL)	20.6	30.5	41.0	30.7
A D(ALL)	21.0	37.3	44.2	34.2
BEN(ALL)	19.1	23.0	30.8	24.3
MEAN	15.7	28.7	35.0	26.5

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

TABLE	CHEMICAL	N* CHEMICAL

SED	2.98	5.16

* WITHIN SAME LEVEL OF N ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	5.16	19.5

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

N	75	150	225	MEAN
CHEMICAL				
0	56.9	85.4	85.5	75.9
A (P)	82.2	90.7	93.0	88.6
A (SB)	77.2	88.1	91.4	85.6
A (B)	73.3	91.1	92.7	85.7
A (ALL)	82.3	91.4	92.3	88.7
A D(ALL)	88.1	90.5	93.6	90.7
BEN(ALL)	81.1	88.8	91.9	87.3
MEAN	77.3	89.4	91.5	86.1

SUB PLOT AREA HARVESTED 0.00052

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BARLEY

GRAIN TONNES/HECTARE

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

	N	38	75	113	MEAN
CHEMICAL					
0		2.13	3.17	2.85	2.72
A (P)		2.35	3.08	3.44	2.96
A (SB)		2.03	3.49	3.47	2.99
A (B)		2.03	2.68	3.35	2.68
A (ALL)		1.51	3.56	2.82	2.63
A D(ALL)		1.94	3.06	3.45	2.82
BEN(ALL)		2.04	3.19	2.74	2.66
MEAN		2.00	3.18	3.16	2.78

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

TABLE	CHEMICAL	N*
		CHEMICAL
SED	0.201	0.349

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.349	12.6
GRAIN MEAN DM%	79.4		

STRAW TONNES/HECTARE

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

	N	38	75	113	MEAN
CHEMICAL					
0		1.23	1.91	1.65	1.60
A (P)		1.12	1.43	2.09	1.55
A (SB)		1.08	1.98	1.94	1.67
A (B)		1.29	1.57	1.70	1.52
A (ALL)		0.99	2.07	1.87	1.64
A D(ALL)		1.27	1.85	2.01	1.71
BEN(ALL)		1.22	1.70	1.50	1.47
MEAN		1.17	1.79	1.82	1.59

STRAW MEAN DM% 79.4

SUB 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		22.0	32.9	34.7	29.8
A (P)		24.6	38.8	36.7	33.4
A (SB)		30.4	40.6	41.0	37.3
A (B)		27.1	35.2	38.6	33.6
A (ALL)		28.6	36.4	40.5	35.2
A D(ALL)		32.3	35.1	36.4	34.6
BEN(ALL)		25.9	31.8	34.0	30.6
MEAN		27.3	35.8	37.4	33.5

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

TABLE	CHEMICAL	N*
		CHEMICAL
SED	2.04	3.54

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	3.54	10.6

SUGAR PERCENTAGE

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

	N	75	150	225	MEAN
CHEMICAL					
0		18.8	18.2	17.6	18.2
A (P)		18.7	18.4	17.6	18.3
A (SB)		18.8	18.4	17.6	18.2
A (B)		18.8	18.4	17.7	18.3
A (ALL)		18.7	18.1	17.7	18.2
A D(ALL)		18.7	18.0	17.3	18.0
BEN(ALL)		18.8	18.1	17.7	18.2
MEAN		18.7	18.2	17.6	18.2

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SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

	N	75	150	225	MEAN
CHEMICAL					
O		4.13	5.98	6.10	5.40
A (P)		4.61	7.15	6.47	6.08
A (SB)		5.70	7.47	7.22	6.79
A (B)		5.08	6.46	6.82	6.12
A (ALL)		5.35	6.58	7.17	6.37
A D(ALL)		6.05	6.32	6.30	6.22
BEN(ALL)		4.87	5.76	6.01	5.55
MEAN		5.11	6.53	6.58	6.08

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

TABLE	CHEMICAL	N* CHEMICAL

SED	0.392	0.680

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.680	11.2
SUB PLOT AREA HARVESTED	0.00130		