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74/W/RN/13 Intensive Cereals - Ley, Potatoes, Wheat, Barley

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74/W/RN/13

INTENSIVE CEREALS

Object: To study the effects of intensive cereal cropping on yield, incidence of soil-borne diseases and organic matter in the soil-Woburn Stackyard I.

Sponsors: G.W. Cooke, D.B. Slope.

The ninth year, ley, potatoes, winter wheat, barley.

For previous years see 66/B/9(t), 67/B/9, 68/B/7(t), 69/W/RN/13(t), 70/W/RN/13(t), 71/W/RN/13(t) and 72-73/W/RN/13.

Design: For each experiment: 2 randomised blocks of 6 plots, split into 4.

Whole plot dimensions: 8.53 x 20.4. Sub plot area harvested:

Ley - 0.00089. Potatoes - 0.00139. Wheat - 0.00277. Barley - 0.00273.

Treatments:-

One experiment on winter wheat on part of the site of the classical wheat experiment 1877-1954

One experiment on barley on part of the site of the classical barley experiment 1877-1954

Factors tested on both experiments are the same but crop and nitrogen rates differ. All combinations of:-

Whole plots: 1. Previous crops:

PREVCROP

1967	1968	1969	1970	1971	1972	1973	
L	P	C	C	C	L	P	C/C/L/P
P	C	C	C	L	P	C	C/L/P/C
C	C	C	L	P	C	C	L/P/C/C
C	C	L	P	C	C	C	P/C/C/C
C	L	P	C	C	C	L	C/C/C/L
C	C	C	C	C	C	C	C/C/C/C

Ley = 1 year ley P = Potatoes C = Cereal: wheat or barley.

Sub plots: 2. Nitrogen fertiliser (kg N):

N

To wheat	To barley	Wheat	Barley
63	50	63	50
126	100	126	100
189	150	189	150
252	200	252	200

NOTE: Ley and potatoes receive basal N only, residues of dressings to cereals are tested (NRESID).

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Basal applications: All crops: Manures: Magnesian limestone applied at 3.5 tonnes. P205 at 130 kg, K2O at 260 kg as (0:14:28), half ploughed in, half applied to the plough-farrow. Weedkillers: Paraquat at 0.56 kg ion in 370 l.

Standard applications:

Leys: N at 60 kg, as 'Nitro-Chalk', in seedbed and repeated after sowing and after each cut except the last.

Potatoes: N at 150 kg as 'Nitro-Chalk'. Weedkiller: 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.

Wheat: Weedkiller: Ioxynil at 0.63 kg with mecoprop at 1.9 kg in 280 l on the first occasion and ioxynil at 0.52 kg with mecoprop at 1.6 kg in 280 l on the second occasion.

Barley: Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.

Seed: Leys: Italian ryegrass sown at 40 kg.

Potatoes: Pentland Crown.

Wheat: Cappelle, sown at 190 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.: All plots: Paraquat applied: 12 Sept, 1973. Magnesian limestone applied: 5 Oct. Half PK applied: 10 Oct. Ploughed: 11 Oct. Remaining PK applied: 12 Oct. Spring-tine cultivated: 13 Oct.

Leys: Spring-tine cultivated: 30 Mar, 1974. Power harrowed, N applied, seeds sown: 5 Apr. N applied: 31 May, 2 July, 19 Aug. Cut three times: 1 July, 15 Aug, 24 Sept.

Potatoes: Spring-tine cultivated: 30 Mar, 1974. N applied, rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 12 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 30 Sept.

Wheat: Seed sown: 15 Oct, 1973. Weedkiller applied: 5 Apr, 1974.

N applied: 9 Apr. Weedkiller applied on second occasion: 14 May.

Combine harvested: 30 Aug.

Barley: Spring-tine cultivated: 27 Mar, 1974. Spring-tine cultivated with crumbler: 28 Mar. Seed sown: 29 Mar. N applied: 1 Apr.

Weedkiller applied: 14 May. Combine harvested: 22 Aug.

NOTE: Estimates of eyespot (*Cercospora herpotrichoides*) and take-all (*Gaeumannomyces graminis*) were made on both cereal crops in early July.

Standard errors per sub plot.

Wheat, grain: tonnes/hectare: 0.346 or 9.7% (12 d.f.)

Barley, grain: tonnes/hectare: 0.559 or 10.8% (12 d.f.)

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TABLES OF MEANS

LEY

WHEAT SITE

DRY MATTER: TONNES/HECTARE

NRESID

63	126	189	252	Mean
		1ST CUT		
2.82	2.82	3.16	3.05	2.96
		2ND CUT		
3.01	3.09	2.69	3.08	2.97
		3RD CUT		
2.54	2.64	2.45	2.34	2.50
		TOTAL OF 3 CUTS		
8.37	8.55	8.31	8.48	8.43
Mean D.M. %	1st cut:	17.3		
	2nd cut:	18.4		
	3rd cut:	16.7		
	Total of 3 cuts:	17.5		

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LEY

BARLEY SITE

DRY MATTER: TONNES/HECTARE

NRESID

50	100	150	200	Mean
1ST CUT				
2.49	2.88	2.75	2.76	2.72
2ND CUT				
3.09	3.22	3.27	3.12	3.17
3RD CUT				
2.47	2.42	2.69	2.70	2.57
TOTAL OF 3 CUTS				
8.05	8.52	8.71	8.58	8.46
Mean D.M. %	1st cut:	16.0		
	2nd cut:	16.4		
	3rd cut:	14.6		
	Total of 3 cuts:	15.7		

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POTATOES				
WHEAT SITE				
NRESID				
63	126	189	252	Mean
TOTAL TUBERS: TONNES/HECTARE				
48.8	58.4	53.7	54.3	53.8
PERCENTAGE WARE: 3.81cm (1.5 INCH) RIDDLE				
98.2	98.2	98.6	98.9	98.5
BARLEY SITE				
NRESID				
50	100	150	200	Mean
TOTAL TUBERS: TONNES/HECTARE				
54.6	55.1	59.0	58.9	56.9
PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE				
99.1	98.6	99.0	99.0	98.9

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WINTER WHEAT

N

	63	126	189	252	Mean
GRAIN: TONNES/HECTARE					
PREVCROP					
C/C/L/P	3.98	5.34	5.53	4.95	4.95
C/L/P/C	2.08	3.60	3.46	2.89	3.01
L/P/C/C	1.78	2.89	3.33	3.41	2.85
C/C/C/C	2.33	3.75	3.97	3.75	3.45
Mean	2.54	3.89	4.07	3.75	3.56

STANDARD ERRORS OF DIFFERENCES

N	PREVCROP*
0.173	0.393

* Within the same level of PREVCROP only

STRAW: TONNES/HECTARE

PREVCROP					
C/C/L/P	4.19	4.96	5.68	5.80	5.16
C/L/P/C	2.87	3.56	4.10	3.78	3.58
L/P/C/C	2.44	2.93	3.16	3.45	2.99
C/C/C/C	3.36	3.98	3.97	4.10	3.85
Mean	3.22	3.86	4.23	4.28	3.89

Mean D.M. % Grain: 82.2
 Straw: 83.7

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BARLEY

N

	50	100	150	200	Mean
GRAIN: TONNES/HECTARE					
PREVCROP					
C/C/L/P	4.36	5.85	6.10	5.38	5.42
C/L/P/C	3.70	5.70	5.83	5.74	5.24
L/P/C/C	3.66	5.32	5.73	5.25	4.99
C/C/C/C	3.63	5.36	5.39	5.68	5.01
Mean	3.83	5.56	5.76	5.51	5.17

STANDARD ERRORS OF DIFFERENCES

N	PREVCROP*
N	N
0.279	0.533

* Within the same level of PREVCROP only

STRAW: TONNES/HECTARE

PREVCROP					
C/C/L/P	2.72	4.13	4.73	4.57	4.04
C/L/P/C	2.13	3.56	4.07	4.40	3.54
L/P/C/C	2.18	3.69	3.72	4.38	3.49
C/C/C/C	1.98	3.08	3.31	3.74	3.03
Mean	2.25	3.62	3.96	4.27	3.52

Mean D.M. % Grain: 85.5
Straw: 87.8