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96/R/CS/10 and 96/W/CS/10 Long Term Liming - W. Wheat

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96/R/CS/10 and 96/W/CS/10

LONG TERM LIMING

Object: To study the effects of different amounts of lime, phosphate and sulphur on the yields and compositions of a sequence of crops - Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsor: S.P. McGrath.

The 35th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-95/R&W/CS/10.

Design: 2 randomised blocks of 16 plots split into 2 sub-plots.

Whole plot dimensions: 6.0 x 16.1.

Treatments: All combinations of:-

Whole plots

1. **CHALK** Residual effects of ground chalk (tonnes CaCO₃) (total applied 1962-87):

		Rothamsted total		Woburn total	
R	W	1962-78	1982-87	1962-78	1982-87
0	0	0	0	0	0
15	9	7	8	6	3
24.5	25.5	15	9.5	14	11.5
52.5	45.5	30	22.5	23	22.5

2. **P** Residual effects of P fertilizer applied:

		Until 1978	1981	1982	1983		1988	
		R & W	R & W	R & W	R	W	R	W
0		0	0	0	0	0	0	0
P1		0	P1	P1	0	P2	P1	P1
P2		P	P1	0	P2	P2	P1	P1
P3		P	P3	P1	P2	P4	P3	P3

Rates 1981-83 and 1988 P1, P2, P3, P4 = 25, 50, 75, 100 kg P as superphosphate

Sub-plots

3. **SULPHUR** Sulphur (kg S, as calcium sulphate), applied cumulatively since 1991:

0
30

96/R/CS/10 and 96/W/CS/10

- NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with crop, none in 1979 and 1980. K was also applied cumulatively, to P1 and P3 plots. Since 1981 K has been applied basally (none in 1986, 1987, 1989, 1990 and 1993 to 1996).
 (2) Test manganese was applied cumulatively, 1987-90.

Experimental diary:

Sawyers I (R):

- 10-Aug-95 : B : Straw baled.
 22-Aug-95 : B : Sub-soiled.
 25-Sep-95 : B : Ploughed.
 28-Sep-95 : B : Rotary harrowed, Hereward, dressed Panocrine, drilled at 380 seeds per m².
 11-Mar-96 : B : 34.5% N at 116 kg.
 09-Apr-96 : T : **SULPHUR** 30: Gypsum (17.5% S) at 171 kg.
 15-Apr-96 : B : 34.5% N at 463 kg.
 26-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l and Barclay Holdup at 2.3 l in 200 l.
 13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
 09-Aug-96 : B : Combine harvested.

Stackyard C (W):

- 25-Aug-95 : B : Sub-soiled.
 19-Sep-95 : B : Ploughed.
 23-Sep-95 : B : Rolled.
 03-Oct-95 : B : Rotary harrowed, Hereward, dressed Sibutol, drilled at 375 seeds per m².
 13-Nov-95 : B : Panther at 2.0 l in 200 l.
 13-Mar-96 : B : 34.5% N at 116 kg.
 19-Mar-96 : T : **SULPHUR** 30: Gypsum (17.5% S) at 171 kg.
 16-Apr-96 : B : 34.5% N at 348 kg.
 30-Apr-96 : B : Halo at 1.5 l in 200 l.
 06-Jun-96 : B : Silvacur at 1.0 l in 300 l.
 19-Aug-96 : B : Combine harvested.

NOTE: At Rothamsted, most CHALK 0 plots failed. They have been omitted from the analysis.

96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

***** Tables of means *****

	P	0	P1	P2	P3	Mean
CHALK						
15		7.47	8.38	8.91	8.44	8.30
24.5		8.38	8.83	8.74	9.20	8.79
52.5		8.03	8.94	8.69	8.86	8.63
Mean		7.96	8.72	8.78	8.83	8.57

96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

***** Tables of means *****

SULPHUR	0	30	Mean
CHALK			
15	8.44	8.16	8.30
24.5	8.73	8.85	8.79
52.5	8.74	8.52	8.63
Mean	8.63	8.51	8.57

SULPHUR	0	30	Mean
P			
0	8.21	7.71	7.96
P1	8.64	8.79	8.72
P2	8.84	8.71	8.78
P3	8.83	8.83	8.83
Mean	8.63	8.51	8.57

	SULPHUR	0	30
CHALK	P		
15	0	7.99	6.94
	P1	8.30	8.46
	P2	9.05	8.76
	P3	8.40	8.48
24.5	0	8.50	8.26
	P1	8.75	8.92
	P2	8.51	8.97
	P3	9.16	9.25
52.5	0	8.15	7.91
	P1	8.88	9.00
	P2	8.97	8.40
	P3	8.95	8.77

*** Standard errors of differences of means ***

	P	CHALK	SULPHUR	P
	0.263	0.227	0.108	CHALK 0.455
	P	CHALK	P	
	SULPHUR	SULPHUR	CHALK	
	0.304	0.263	SULPHUR 0.526	
Except when comparing means with the same level(s) of	0.217			
P		0.188		
CHALK				
P.CHALK			0.375	

96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.455	5.3
BLOCK.WP.SP	12	0.375	4.4

GRAIN MEAN DM% 87.8

SUB-PLOT AREA HARVESTED 0.00150

96/W/CS/10 STACKYARD C (W)

GRAIN TONNES/HECTARE

***** Tables of means *****

P	0	P1	P2	P3	Mean
CHALK					
0	3.58	3.63	4.12	4.45	3.95
9	7.81	8.19	8.12	8.30	8.10
25.5	7.58	7.04	7.76	7.54	7.48
45.5	6.74	8.14	7.46	7.92	7.56
Mean	6.43	6.75	6.86	7.05	6.77
SULPHUR					
	0	30	Mean		
CHALK					
0	4.03	3.86	3.95		
9	8.09	8.12	8.10		
25.5	7.43	7.53	7.48		
45.5	7.51	7.61	7.56		
Mean	6.77	6.78	6.77		
SULPHUR					
	0	30	Mean		
P					
0	6.25	6.60	6.43		
P1	6.65	6.85	6.75		
P2	6.90	6.82	6.86		
P3	7.26	6.84	7.05		
Mean	6.77	6.78	6.77		

96/W/CS/10 STACKYARD C (W)

GRAIN TONNES/HECTARE

***** Tables of means *****

CHALK	SULPHUR		0	30
	P			
0	0		3.28	3.88
	P1		3.32	3.95
	P2		3.87	4.38
	P3		5.68	3.22
9	0		7.40	8.21
	P1		8.42	7.97
	P2		8.31	7.93
	P3		8.25	8.35
25.5	0		7.73	7.43
	P1		6.77	7.30
	P2		7.78	7.73
	P3		7.44	7.64
45.5	0		6.59	6.89
	P1		8.10	8.17
	P2		7.66	7.26
	P3		7.69	8.14

*** Standard errors of differences of means ***

CHALK	P	SULPHUR	CHALK P
0.548	0.548	0.133	1.097
CHALK SULPHUR	P SULPHUR	CHALK P SULPHUR	
0.580	0.580	1.159	

Except when comparing means with the same level(s) of

CHALK	0.266		
P		0.266	
CHALK.P			0.531

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	1.097	16.2
BLOCK.WP.SP	15	0.531	7.8

GRAIN MEAN DM% 90.8

SUB-PLOT AREA HARVESTED 0.00143