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## Yields of the Field Experiments 1993

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### 93/R/CS/10 and 93/W/CS/10 Long-term Liming - W. Lupins

#### Rothamsted Research

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93/R/CS/10 and 93/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.

**Sponsors:** S.P. McGrath, P.B. Barraclough, G.F.J. Milford, J.M. Day.

The 32nd year, w. lupins.

For previous years see 'Details' 1967, 1973 and 74-92/R&W/CS/10.

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

**Whole plot dimensions:** 5.8 x 16.1 (R), 5.6 x 16.1 (W).

**Treatments:** All combinations of:-

Whole plots

1. **CHALK** Residual effects of ground chalk (tonnes CaCO<sub>3</sub>) (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
P1			P1	P1	0	P2	P1	P1
P2			P	P1	0	P2	P1	P1
P3			P	P3	P1	P2	P4	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):

0  
30

**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).  
(2) Test manganese was applied cumulatively, 1987-90.

93/R/CS/10 and 93/W/CS/10

**Experimental diary:**

Sawyers I (R):

- 29-Sep-92 : B : Ploughed.
- 07-Oct-92 : B : Rotary harrowed, CH 304/70, inoculated with rhizobium, drilled at 100 kg.
- 13-Oct-92 : B : Opogard 500 FW at 2.8 l in 200 l.
- 16-Apr-93 : T : **SULPHUR** 30: 30 kg S as gypsum.
- 22-Jun-93 : B : Power Dimethoate 40 at 1.7 l in 200 l.
- 02-Jul-93 : B : Mistral at 1.0 l in 200 l.
- : B : Sportak 45 at 1.1 l in 200 l.
- 06-Sep-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.30 l in 260 l.
- 10-Oct-93 : B : Combine harvested.

Stackyard C (W):

- 02-Oct-92 : B : Rotary harrowed, CH 304/70, inoculated with rhizobium, drilled at 100 kg.
- 12-Oct-92 : B : Opogard 500 FW at 1.8 l and Scythe at 3.0 l in 200 l.
- 22-Mar-93 : B : Ploughed (crop failed).
- 08-Jul-93 : B : Rotary cultivated.

- NOTES:** (1) At Rothamsted plant samples were taken in early June from transects across plots for a detailed study of the relation between soil pH gradient and plant growth. Harvested grain samples were taken for sulphur analysis.
- (2) At Woburn the crop failed and no yields were taken.
- (3) At Rothamsted, most **CHALK** 0 plots failed. They have been omitted from the analysis.

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

**GRAIN TONNES/HECTARE**

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

P	0	P1	P2	P3	Mean
<b>CHALK</b>					
15	2.34	2.24	1.95	1.75	2.07
24.5	1.82	1.13	1.67	1.46	1.52
52.5	1.25	1.49	1.26	1.32	1.33
Mean	1.80	1.62	1.63	1.51	1.64
<b>SULPHUR</b>	0	30	Mean		
<b>CHALK</b>					
15	1.90	2.23	2.07		
24.5	1.44	1.60	1.52		
52.5	1.19	1.47	1.33		
Mean	1.51	1.77	1.64		

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

GRAIN TONNES/HECTARE

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

SULPHUR		0	30	Mean
<b>P</b>				
	O	1.63	1.97	1.80
	P1	1.58	1.65	1.62
	P2	1.40	1.86	1.63
	P3	1.44	1.58	1.51
Mean		1.51	1.77	1.64

  

CHALK	P	SULPHUR	0	30
15	O		2.12	2.55
	P1		2.17	2.30
	P2		1.67	2.23
	P3		1.64	1.85
24.5	O		1.62	2.03
	P1		1.16	1.09
	P2		1.56	1.78
	P3		1.42	1.50
52.5	O		1.15	1.34
	P1		1.40	1.57
	P2		0.96	1.57
	P3		1.25	1.39

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

	CHALK	P	SULPHUR	CHALK
				P
	0.161	0.186	0.091	0.323
	CHALK	P	CHALK	
	SULPHUR	SULPHUR	P	
	0.196	0.226	0.392	
Except when comparing means with the same level(s) of				
CHALK	0.157			
P		0.181		
CHALK.P			0.314	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.323	19.7
BLOCK.WP.SP	12	0.314	19.2

GRAIN MEAN DM% 70.3

SUB PLOT AREA HARVESTED 0.00149