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90/R/CS/10 and 90/W/CS/10 Long-term Liming - S. Beans

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90/R/CS/10 and 90/W/CS/10

LONG TERM LIMING

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

Sponsors: S.P. McGrath, J. McEwen, D.P. Yeoman.

The 29th year, s. beans.

For previous years see 'Details' 1967, 1973 and 74-89/R&W/CS/10.

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

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

Whole plots

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

R	W	Rothamsted total		Woburn total	
		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

- 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 P1, P2, P3, P4 = 25, 50, 75, 100 kg P as superphosphate

Sub plots

- MANGNESE** Manganese in 1990, cumulative to earlier applications:

0	None
MN	Manganese sprays

- 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 and 1990).
- (2) Manganese was applied at 0.19 kg Mn, as 'Vytel', in 200 l on 30 Apr, 1990 (R), at 0.096 kg Mn in 220 l on 30 Apr (W) repeated at 0.096 kg Mn in 200 l on 5 June (R).

90/R/CS/10 and 90/W/CS/10

Basal applications:

Sawyers I (R): Weedkillers: Simazine at 0.17 kg and trietazine at 1.2 kg in 200 l. Insecticides: Phorate at 2.2 kg. Deltamethrin at 7.5 g in 200 l applied on two occasions. Pirimicarb at 0.14 kg in 200 l.

Stackyard C (W): Weedkillers: Glyphosate at 1.4 kg in 220 l. Simazine at 0.14 kg and trietazine at 0.97 kg in 220 l. Paraquat at 0.60 kg ion. Insecticide: Phorate at 1.8 kg.

Seed: Alfred, sown at 260 kg (R), 250 kg (W).

Cultivations, etc.:-

Sawyers I (R): Tine cultivated with vibrating tines 60 cm apart, 45 cm deep: 23 Aug, 1989. Ploughed: 24 Nov. Spring-time cultivated: 5 Mar, 1990. Rotary harrowed, phorate applied, rotary harrowed, seed sown, harrowed and rolled: 6 Mar. Simazine and trietazine applied: 12 Mar. Deltamethrin applied: 2 and 17 May. Pirimicarb applied: 5 June. Combine harvested: 15 Aug.

Stackyard C (W): Glyphosate applied: 1 Sept, 1989. Ploughed: 5 Jan, 1990. Phorate applied, power harrowed with crumbler attached, seed sown: 5 Mar. Simazine and trietazine applied: 13 Mar. Paraquat applied: 25 May.

- NOTES:** (1) At Woburn the crop established poorly as a result of bird damage. The few remaining plants were destroyed with weedkiller in May.
(2) At Rothamsted leaf samples were taken just after pod set to measure nutrient contents.
(3) At Rothamsted the components of yield were measured at maturity.
(4) At Rothamsted, most **CHALK 0** plots failed and yields of the rest of these plots were negligible. They have been omitted from the analysis.

90/R/CS/10 **SAWYERS I (R)**

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
15	1.64	1.82	1.93	2.27	1.91
24.5	2.10	2.74	2.66	2.79	2.57
52.5	2.52	3.07	3.21	3.38	3.05
Mean	2.09	2.54	2.60	2.81	2.51
MANGNESE	0	MN	Mean		
CHALK					
15	2.01	1.82	1.91		
24.5	2.59	2.56	2.57		
52.5	3.10	3.00	3.05		
Mean	2.56	2.46	2.51		

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

GRAIN TONNES/HECTARE

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

MANGNESE P	O	MN	Mean
0	2.15	2.02	2.09
P1	2.62	2.46	2.54
P2	2.61	2.60	2.60
P3	2.88	2.75	2.81
Mean	2.56	2.46	2.51

CHALK	MANGNESE P	O	MN
15	0	1.71	1.57
	P1	1.87	1.76
	P2	1.95	1.92
	P3	2.49	2.05
24.5	0	2.15	2.05
	P1	2.83	2.64
	P2	2.57	2.75
	P3	2.81	2.78
52.5	0	2.59	2.45
	P1	3.16	2.99
	P2	3.30	3.11
	P3	3.33	3.43

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

CHALK	P	MANGNESE	CHALK P
0.156	0.180	0.056	0.311
CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE	
0.170	0.196	0.340	
Except when comparing means with the same level(s) of			
CHALK	0.097		
P	0.112		
CHALK.P		0.193	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.311	12.4
BLOCK.WP.SP	12	0.193	7.7

GRAIN MEAN DM% 68.7

SUB PLOT AREA HARVESTED 0.00200