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73/R/W/CS/10 - Long Term Liming - Barley

Rothamsted Research

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73/R/CS/10 and 73/W/CS/10

LONG TERM LIMING

Object: To study the effects of different amounts of lime on the yields of a range of crops. The effects of P and K are also studied - Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsors: J. Bolton, D.B. Slope.

The twelfth year, barley.

For previous years see 'Details' 1967, 68/C/3(t), 69/R&W/CS/10, 70/R&W/CS/10(t) and 71-72/R&W/CS/10.

Design: 2 randomised blocks of 16 plots.

Whole plot dimensions: 6.40 x 18.3. Area harvested: Sawyers I (R): 0.00512. Stackyard C (W): 0.00518.

Treatments: All combinations of:-

1. Ground chalk (tonnes CaCO ₃) (total applied 1962-63):			LIME	
	Rothamsted (R)	Woburn (W)	R	W
	None	None	0	0
	5	5	5	5
	10	12	10	12
	20	19	20	19
2. Phosphate, applied annually as superphosphate (kg P ₂ O ₅):			P ₂ O ₅	
		None	0	
		63	63	
3. Potassium, applied annually as muriate of potash (kg K ₂ O):			K ₂ O	
		None	0	
		126	126	

Basal applications:

Sawyers I (R): Manures: 90 kg N as 'Nitro-Chalk' combine drilled. Weedkiller: MCPA, mecoprop and dicamba ('Banlene Plus' at 5.6 l in 220 l).

Stackyard C (W): Manures: 130 kg N as 'Nitro-Chalk' broadcast before sowing. Weedkiller: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 280 l.

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Seed: Sawyers I (R): Julia, dressed with ethirimol, sown at 160 kg.

Stackyard C (W): Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Sawyers I (R): Ploughed: 29 Nov, 1972. P and K applied: 26 Feb, 1973.

Power harrowed, seed sown: 12 Mar. Weedkiller applied: 15 May.

Plots without lime rotary cultivated: 2 July. Combine harvested: 10 Aug.

Stackyard C (W): Deep-tine cultivated: 28 Sept, 1972. Ploughed:

27 Dec. P and K applied: 28 Feb, 1973. N applied: 8 Mar.

Seed sown: 12 Mar. Weedkiller applied: 11 May. Certain plots

without lime rotary cultivated: 2 July. Combine harvested:

13 Aug.

NOTE: Plots which had received no lime grew little crop and became very weedy. At Rothamsted all these plots were cut green in July, no yields, and rotary cultivated. At Woburn yields were taken from combinations of no lime with P and K together (both blocks) and with P alone (one block only), the remaining plots with no lime were cut green in July and rotary cultivated.

Standard errors per plot. Grain, tonnes/hectare:

Sawyers I (R): 0.910 or 23.0% (11 d.f.)

Stackyard C (W): 0.476 or 11.4% (11 d.f.)

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TABLES OF MEANS

GRAIN: TONNES/HECTARE

SAWYERS I (R)

		LIME			Mean
		5	10	20	
P205	0	2.17	3.04	3.55	2.92
	63	4.31	5.09	5.59	4.99
K20	0	2.91	3.83	4.12	3.62
	126	3.57	4.30	5.02	4.30
Mean		3.24	4.07	4.57	3.96

		P205	
		0	63
K20	0	2.59	4.65
	126	3.26	5.34

LIME K20	5		10		20		
	0	126	0	126	0	126	
P205	0	2.45	1.90	2.68	3.41	2.65	4.46
	63	3.38	5.24	4.98	5.19	5.59	5.58

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GRAIN: TONNES/HECTARE

STACKYARD C (W)

	5		LIME 12	19		Mean			
P205	-----								
0	2.85		3.59	4.50		3.64			
63	4.49		4.75	4.96		4.73			
K20	-----								
0	3.49		4.35	4.62		4.15			
126	3.85		3.99	4.84		4.23			
Mean	3.67		4.17	4.73		4.19			
	0		P205 63	-----					
K20	-----								
0	3.64		4.66						
126	3.64		4.81						
LIME K20	0	5	126	0	12	126	0	19	126
P205	-----								
0	2.67	3.03	3.98	3.20	4.29	4.70			
63	4.31	4.67	4.73	4.78	4.95	4.97			

73/R/CS/10 and 73/W/CS/10

GRAIN: TONNES/HECTARE

SAWYERS I (R)

STANDARD ERRORS OF DIFFERENCES

LIME	P205	K20	LIME P205	LIME K20	P205 K20	LIME P205 K20
0.455	0.371	0.371	0.643	0.643	0.525	0.910
Mean D.E. $\frac{1}{2}$ 81.3						

GRAIN: TONNES/HECTARE

STACKYARD C (W)

STANDARD ERRORS OF DIFFERENCES

LIME	P205	K20	LIME P205	LIME K20	P205 K20	LIME P205 K20
0.238	0.194	0.194	0.337	0.337	0.275	0.476
Mean D.E. $\frac{1}{2}$ 83.4						

73/R/CS/10 and 73/W/CS/10

STRAW: TONNES/HECTARE

SAWYERS I (R)

	LIME			Mean
	5	10	20	
P205				
0	3.01	4.10	4.75	3.95
63	6.15	6.17	7.45	6.59
K20				
0	4.08	4.52	4.93	4.51
126	5.08	5.75	7.27	6.03
Mean	4.58	5.13	6.10	5.27

	P205	
	0	63
K20		
0	3.30	5.72
126	4.61	7.46

LIME	5		10		20	
K20	0	126	0	126	0	126
P205						
0	3.44	2.57	3.56	4.64	2.89	6.61
63	4.72	7.58	5.47	6.87	6.97	7.94

Mean D.M. % 93.6

73/R/CS/10 and 73/W/CS/10

SPRAW: TONNES/HECTARE

STACKYARD C (W)

	5	LIME 12	19	Mean
P205				
0	2.02	2.20	3.03	2.42
63	3.23	3.62	3.52	3.46
K20				
0	2.14	2.65	2.70	2.50
126	3.11	3.17	3.85	3.38
Mean	2.63	2.91	3.27	2.94

	P205		K20		LIME		K20	
	0	63	0	126	0	126	0	126
K20								
0	2.21	2.78						
126	2.62	4.13						
LIME								
K20								
P205								
0	1.86	2.18	2.35	2.06	2.43	3.63		
63	2.43	4.04	2.95	4.28	2.97	4.07		

Mean D.M. % 93.7