Yields of the Field Experiments 1987

87/R/CS/10 and 87/W/CS/10 Long-term Liming - Lupins

Rothamsted Research

87/R/CS/10 and 87/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 26th year, Lupinus albus.

For previous years see 'Details' 1967, 1973 and 74-86/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

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	
	R & W	R & W	R & W	R	W
0	0	0	0	0	0
P1	0	P1	P1	0	P2
P2	P	P1	0	P2	P2
P3	P	P3	P1	P2	P4

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

Sub plots

3. MANGNESE   Manganese applied in 1987:

0	None
MN	Manganese sprays

NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with
           crop, K was also applied cumulatively, to P1 and P3 plots.
           Since 1981 K has been applied basally (none in 1986 and 1987).
       (2) On Sawyers I (R) manganese was applied as manganese lignin
           polycarboxylate ('Stoller Manganese' at 3.0 l in 200 l on
           5 June, 1987 and at 9.0 l in 200 l on 11 Aug).
       (3) On Stackyard C (W) manganese was applied at 0.19 kg Mn on
           4 June, 1987 and 0.57 kg Mn on 4 Aug as manganese sulphate in
           200 l.

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87/R/CS/10 and 87/W/CS/10

Basal applications:-
    Sawyers I (R): Weedkillers: Terbutryne at 0.98 kg with terbuthylazine
        at 0.42 kg in 200 l. Fungicide: Benomyl at 0.50 kg applied with
        the insecticide and a wetting agent ('Agral' at 0.06 l) in 200 l.
        Insecticide: Pirimicarb at 0.14 kg.
    Stackyard C (W): Weedkillers: Glyphosate at 1.4 kg in 200 l.
        Terbutryne at 0.56 kg with terbuthylazine at 0.24 kg in 240 l.
        Fungicide: Benomyl at 1.0 kg applied with the pirimicarb and a
        wetting agent ('Enhance' at 0.06 l) in 200 l. Insecticides:
        Deltamethrin at 0.038 kg in 200 l. Pirimicarb at 0.15 kg.

Seed: Sawyers I (R): Vladimir, sown at 260 kg.
      Stackyard C (W): Vladimir, sown at 250 kg.

Cultivations, etc.:-
    Sawyers I (R): Chalk treatments applied: 13 Nov, 1986. Ploughed:
        14 Nov. Spring-tine cultivated, rotary harrowed, seed sown,
        harrowed: 31 Mar, 1987. Weedkillers applied: 13 Apr.   Fungicide
        and insecticide applied: 9 July. Combine harvested: 17 Nov.
    Stackyard C (W): Glyphosate applied: 16 Sept, 1986. Chalk treatments
        applied: 13 Nov. Ploughed: 28 Nov. Spike harrowed with crumbler
        attached, seed sown: 6 Apr, 1987. Harrowed, terbutryne and
        terbuthylazine applied: 13 Apr. Deltamethrin applied: 8 May.
        Benomyl and pirimicarb applied: 13 July. Combine harvested:
        18 Nov.

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

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
0	0.71	1.33	2.28	2.97	1.82
15	2.86	2.25	3.47	2.65	2.81
24.5	2.98	2.24	3.69	2.56	2.87
52.5	2.87	2.31	4.04	3.17	3.10
Mean	2.36	2.03	3.37	2.84	2.65

MANGNESE	0	MN	Mean
CHALK			
0	1.89	1.76	1.82
15	2.69	2.92	2.81
24.5	2.98	2.75	2.87
52.5	3.04	3.15	3.10
Mean	2.65	2.64	2.65

MANGNESE	0	MN	Mean
P			
0	2.38	2.33	2.36
P1	2.12	1.94	2.03
P2	3.32	3.42	3.37
P3	2.78	2.89	2.84
Mean	2.65	2.64	2.65

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

GRAIN TONNES/HECTARE

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

                  MANGNESE        0        MN
        CHALK        P
          0          0         0.66     0.77
                     P1        1.41     1.25
                     P2        2.25     2.32
                     P3        3.24     2.71
         15          0         2.73     2.98
                     P1        2.27     2.22
                     P2        3.52     3.43
                     P3        2.26     3.03
       24.5          0         3.02     2.94
                     P1        2.48     1.99
                     P2        3.86     3.52
                     P3        2.56     2.56
       52.5          0         3.10     2.64
                     P1        2.31     2.32
                     P2        3.68     4.40
                     P3        3.08     3.25

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

Table              CHALK           P    MANGNESE     CHALK
                                                         P
s.e.d.             0.233       0.233       0.114     0.466

Table              CHALK           P       CHALK
                MANGNESE    MANGNESE           P
                                        MANGNESE
s.e.d.             0.283       0.283       0.567
Except when comparing means with the same level(s) of
  CHALK            0.228
  P                            0.228
  CHALK.P                                  0.456

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

Stratum            d.f.         s.e.         cv%

BLOCK.WP            15         0.466        17.6
BLOCK.WP.SP         16         0.456        17.2

GRAIN MEAN DM%   65.2

SUB PLOT AREA HARVESTED   0.00177
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87/W/CS/10 STACKYARD C (W)

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
0	2.17	1.99	1.87	1.81	1.96
9	1.91	1.72	1.66	1.55	1.71
25.5	2.04	1.44	1.38	1.57	1.61
45.5	1.98	1.49	1.68	1.31	1.62
Mean	2.03	1.66	1.65	1.56	1.72

MANGNESE	0	MN	Mean
CHALK			
0	2.09	1.83	1.96
9	1.72	1.70	1.71
25.5	1.57	1.64	1.61
45.5	1.68	1.56	1.62
Mean	1.77	1.68	1.72

MANGNESE	0	MN	Mean
P			
0	2.12	1.94	2.03
P1	1.73	1.60	1.66
P2	1.57	1.73	1.65
P3	1.66	1.46	1.56
Mean	1.77	1.68	1.72

	MANGNESE	0	MN
CHALK	P		
0	0	2.63	1.72
	P1	1.82	2.17
	P2	1.84	1.90
	P3	2.08	1.54
9	0	1.95	1.88
	P1	1.89	1.56
	P2	1.35	1.97
	P3	1.71	1.39
25.5	0	1.78	2.29
	P1	1.47	1.41
	P2	1.37	1.40
	P3	1.67	1.46
45.5	0	2.09	1.87
	P1	1.74	1.25
	P2	1.71	1.66
	P3	1.17	1.44

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

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

Table	CHALK	P	MANGNESE	CHALK P
s.e.d.	0.107	0.107	0.098	0.214

Table	CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE
s.e.d.	0.175	0.175	0.351

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

CHALK	0.197		
P		0.197	
CHALK.P			0.393

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.214	12.4
BLOCK.WP.SP	16	0.393	22.8

GRAIN MEAN DM% 60.3

SUB PLOT AREA HARVESTED 0.00172

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