ROTHAMSTED RESEARCH

Yields of the Field Experiments 1989

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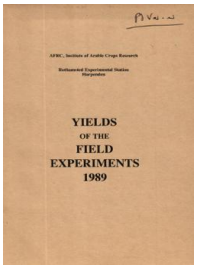

89/R/CS/10 and 89/W/CS/10 Long-term Liming - S. Beans

Rothamsted Research

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89/R/CS/10 and 89/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.

Sponsor: S.P. McGrath, J.M. McEwen, D.P. Yeoman.

The 28th year, s. beans.

For previous years see 'Details' 1967, 1973 and 74-88/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):

R	W	Rothamsted total 1962-78	Rothamsted total 1982-87	Woburn total 1962-78	Woburn total 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 R & W	1981 R & W	1982 R & W	1983 R	1983 W	1988 R	1988 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

3. **MANGNESE** — Manganese in 1989, cumulative to earlier applications:

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, 1987 and 1989).

(2) Manganese was applied at 0.19 kg Mn, as 'Vytel', in 200 l on 17 May, 1989 (R), in 220 l on 22 May (W) repeated at 0.10 kg Mn in 200 l on 13 June (R), in 220 l on 15 June (W).

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89/R/CS/10 and 89/W/CS/10

Basal applications:

Sawyers I (R): Weedkillers: Simazine at 0.17 kg and trietazine at 1.2 kg in 200 l. Fungicides: Benomyl at 0.55 kg in 200 l. Fenpropimorph at 0.75 kg in 200 l. Insecticides: Deltamethrin at 7.5 g in 400 l applied on two occasions. Pirimicarb at 0.14 kg in 200 l.

Stackyard C (W): Weedkillers: Simazine at 0.14 kg and trietazine at 1.0 kg in 220 l. Alloxydim-sodium at 1.5 kg in 220 l. Fungicides: Fenpropimorph at 0.75 kg in 220 l. Benomyl at 0.55 kg applied with a wetting agent in 220 l. Insecticides: Deltamethrin at 6.2 g in 220 l and at 7.5 g in 220 l on a second occasion. Pirimicarb at 0.14 kg in 220 l.

Seed: Alfred, sown at 200 kg (R & W).

Cultivations, etc.:-

Sawyers I (R): Ploughed: 20 Dec, 1988. Heavy spring-tine cultivated, rotary harrowed: 29 Mar, 1989. Rotary harrowed, seed sown, harrowed, rolled: 30 Mar. Weedkiller applied: 31 Mar. Deltamethrin applied: 10 May and 31 May. Pirimicarb applied: 14 June. Benomyl and fenpropimorph applied: 14 July. Combine harvested: 14 Aug.

Stackyard C (W): Ploughed: 14 Dec, 1988. Spring-tine cultivated: 28 Mar, 1989. Rotary harrowed, seed sown: 31 Mar. Simazine and trietazine applied: 21 Apr. Deltamethrin applied: 22 May and 7 June. Alloxydim-sodium applied: 7 June. Pirimicarb applied: 22 June. Benomyl and fenpropimorph applied: 12 July. Combine harvested: 22 Aug.

NOTES: (1) Establishment counts were made and components of yield were measured at maturity.
(2) Soils were sampled for pH, P, K and Mg.
(3) Most CHALK 0 plots failed and yields of the rest of these plots were negligible. They have been omitted from the analysis.

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

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
15	0.80	0.71	0.94	1.16	0.90
24.5	0.84	1.22	1.06	1.03	1.04
52.5	1.12	1.48	1.52	1.47	1.40
Mean	0.92	1.14	1.17	1.22	1.11

MANGNESE	O	MN	Mean
CHALK			
15	0.96	0.84	0.90
24.5	1.06	1.01	1.04
52.5	1.50	1.30	1.40
Mean	1.17	1.05	1.11

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

GRAIN TONNES/HECTARE

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

MANGNESE	O	MN	Mean
P			
0	0.95	0.89	0.92
P1	1.17	1.10	1.14
P2	1.29	1.05	1.17
P3	1.29	1.15	1.22
Mean	1.17	1.05	1.11

CHALK	MANGNESE P	O	MN
15	0	0.78	0.82
	P1	0.67	0.75
	P2	1.18	0.69
	P3	1.21	1.11
24.5	0	0.93	0.75
	P1	1.05	1.38
	P2	1.03	1.08
	P3	1.24	0.82
52.5	0	1.13	1.11
	P1	1.80	1.16
	P2	1.64	1.39
	P3	1.42	1.52

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

CHALK	P	MANGNESE	CHALK P
0.203	0.234	0.099	0.405

CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE
0.236	0.273	0.472

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

CHALK	0.171
P	0.198
CHALK.P	0.342

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.405	36.5
BLOCK.WP.SP	12	0.342	30.8

GRAIN MEAN DM% 87.4

SUB PLOT AREA HARVESTED 0.00200

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

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
9	0.68	0.58	0.34	0.85	0.61
25.5	1.17	0.50	1.01	1.33	1.00
45.5	1.17	1.44	1.21	1.38	1.30
Mean	1.01	0.84	0.85	1.19	0.97

MANGNESE	O	MN	Mean
CHALK			
9	0.59	0.64	0.61
25.5	0.97	1.04	1.00
45.5	1.21	1.39	1.30
Mean	0.92	1.02	0.97

MANGNESE	O	MN	Mean
P			
0	0.91	1.10	1.01
P1	0.84	0.84	0.84
P2	0.76	0.95	0.85
P3	1.19	1.19	1.19
Mean	0.92	1.02	0.97

	MANGNESE	O	MN
CHALK	**P**		
9	0	0.75	0.61
	P1	0.59	0.57
	P2	0.29	0.39
	P3	0.73	0.97
25.5	0	0.97	1.37
	P1	0.57	0.43
	P2	0.96	1.05
	P3	1.36	1.30
45.5	0	1.01	1.33
	P1	1.35	1.52
	P2	1.01	1.40
	P3	1.46	1.31

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

GRAIN TONNES/HECTARE

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

	CHALK	P	MANGNESE	CHALK P
	0.162	0.187	0.052	0.324

	CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE
	0.174	0.201	0.348

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

CHALK	0.090
P	0.104
CHALK.P	0.180

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.324	33.3
BLOCK.WP.SP	12	0.180	18.5

GRAIN MEAN DM% 88.8

SUB PLOT AREA HARVESTED 0.00265

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