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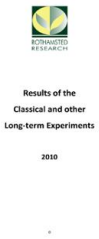
Yields of the Field Experiments 2010



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R/EX/4 Exhaustion Land

Rothamsted Research

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10/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 155th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-09/R/EX/4

Treatments: All combinations of:-

Whole plots (P test)

1. **OLD RES** Residues of manures applied annually 1876 – 1901:

O	None
D	Farmyard manure at 35 t
N	96 kg N as ammonium salts
P	34 kg P as superphosphate
NPKNAMG	N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia

2. **P** Maintenance P (20 kg P) applied annually from 2000 to maintain existing levels of available P In the soil. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

	2000-10	1986-92
O	None	None
P (P1)	20 kg P	44 kg P
P (P2)	20 kg P	87 kg P
P (P3)	20 kg P	131 kg P

NOTE: P treatments were applied at 61.5 kg P in error in 2000.

Plus

Whole plots (K test, previously N test until 1991

1. OLD RES Residues of manures applied annually 1876 – 1901:

O	None
D	Farmyard manure at 35 t
N*	96 kg N as nitrate of soda
PK	34 kg P as superphosphate, 137 kg K as sulphate of potash
N*PK	N, P and K as above

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2. K Potassium applied annually from 2007 as muriate of potash

O	None
K1	75 kg K_2O (62.2 kg K)
K2	150 kg K_2O (124.5 kg K)

Whole plots
Nitrogen: 50 kg N as ammonium sulphate (to supply sufficient S) during first two weeks in March, 200 kg N as ammonium nitrate at GS31/mid-April (whichever comes first) and 50 kg N as ammonium nitrate at GS37 (not later than mid-May)

Experimental diary

K Test			Rate	Unit
29-Sep-09	f	Basal P (triple superphosphate) – plots 02, 04, 06, 08 and 10	75.00	kg/ha
	f	Muriate of Potash, plots 23, 43, 63, 83 & 103	125.00	kg/ha
	f	Muriate of Potash, plots 24, 44, 64, 84, 104	250.00	kg/ha

P Test			Rate	Unit
29-Sep-09	f	Triple Superphosphate – plots 011 – 013, 031 – 033, 051 – 053, 071 – 073 and 091- 093	75.00	kg/ha
	f	Muriate of Potash, plots 01,03, 05, 07 & 09	250.00	kg/ha

All Plots			Rate	Unit
29-Sep-09	a	Spread fertiliser		
30-Sep-09	a	Plough		
01-Oct-09	a	Cultipressed		
02-Oct-09	a	Cultipressed - Second time		
05-Oct-09	a	Combination Drilled		
	s	Drilled Xi19 – at 350 seeds per m^2	166.00	kg/ha
	p	Liberator -200 lt water	0.60	l/ha
19-Mar-10	f	Sulphate of Ammonia - As indicated on plan	238.00	kg/ha
06-Apr-10	f	Kieserite	80.00	kg/ha
10-Apr-10	p	Cherokee - 146 l water	1.00	l/ha
15-Apr-10	f	Nitram	580.00	kg/ha
18-Apr-10	p	Attribut - 146 lt water	100.00	g/ha
	p	Amber - 146 lt water	1.00	l/ha
	p	Oxytril CM - 146 lt water	1.00	l/ha
06-May-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Tracker - 200 lt water	1.00	l/ha
	p	Chlormequat 3C - 200 lt water	2.25	l/ha
12-May-10	a	Mow / Rotavate paths		
18-May-10	p	Tomahawk	1.00	l/ha
	p	Cleancrop Gallifrey	1.00	l/ha
19-May-10	f	Nitram	145.00	kg/ha

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			Rate	Unit
02-Jun-10	p	Comet - 200 lt water	0.60	l/ha
	p	Opus - 200 lt water	0.60	l/ha
03-Jun-10	a	Rotavated paths		
17-Jun-10	a	Cut paths		
14-Jul-10	a	Mow / Rotavate paths		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
03-Sep-10	a	Combine harvest discards		
04-Sep-10	a	Baled		

NOTE: Samples of grain and straw were taken for chemical analysis.

P TEST

GRAIN TONNES/HECTARE

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

P_RES OLD_RES	O	P(P1)	P(P2)	P(P3)	Mean
O	2.27	5.74	6.48	7.14	5.41
D	4.14	7.26	7.80	7.59	6.70
N	1.61	6.71	7.73	7.94	6.00
P	4.45	7.38	8.15	7.57	6.89
NPKNAMG	3.80	6.95	7.68	8.49	6.73
MEAN	3.25	6.81	7.57	7.75	6.34

GRAIN MEAN DM% 85.9%

STRAW TONNES/HECTARE

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

P_RES OLD_RES	O	P1	P2	P3	MEAN
O	0.82	2.54	3.37	3.52	2.56
D	2.12	3.81	4.31	3.97	3.55
N	0.84	3.25	3.87	3.80	2.94
P	1.93	3.71	4.19	4.33	3.54
NPKNAMG	2.17	3.67	3.93	4.18	3.49
MEAN	1.58	3.40	3.93	3.96	3.22

STRAW MEAN DM% 93.5%

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10/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

K_TEST OLD_RES	KO	K1	K2	Mean
O	7.43	7.93	7.85	7.66
D	7.62	8.02	8.01	7.82
N*	7.88	7.87	8.36	8.00
PK	7.83	7.62	8.00	7.82
N*PK	7.59	7.88	8.59	7.91
MEAN	7.67	7.86	8.16	7.84

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.145	0.323	min.rep
	0.162	0.125	0.280	max-min
		0.102X	0.229	max.rep

(No comparisons in categories where s.e.d. marked with an X
Grain mean dm% 86.3

STRAW TONNES/HECTARE

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

K_TEST OLD_RES	K0	K1	K2	Mean
O	3.85	4.54	4.15	4.10
D	3.96	4.36	4.30	4.14
N*	4.18	4.21	4.31	4.22
PK	4.41	3.94	4.36	4.28
N*PK	4.01	4.15	4.23	4.10
MEAN	4.08	4.24	4.27	4.17
REP	10	5	5	

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.206	0.460	min.rep
	0.230	0.178	0.398	max-min
		0.146X	0.325	max.rep

(No comparisons in categories where s.e.d. marked with an X
Straw mean dm% 93.4

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