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Yields of the Field Experiments 2008

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R/EX/4 Exhaustion Land

Rothamsted Research

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08/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 153rd year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-07/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:

	2000-08	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
1-Oct-07	f	Muriate of Potash, plots 023, 043, 063, 083 & 103	125.00	kg/ha
	f	Muriate of Potash, plots 024, 044, 064, 084 & 104	250.00	kg/ha
	f	Basal P (triplesuperphosphate) plots 02, 04, 06, 08 & 10	98.0	Kg/ha

P test:

1-Oct-07	f	Triple Superphosphate, plots except 011 - 013, 031 - 033, 051 - 053, 071 - 073 & 091 - 093	98.00	kg/ha
	f	Basal K (muriate of potash) plots 01, 03, 05, 07 & 09	250.00	kg/ha

Selected plots:

6-Oct-07	f	Chalk, Plots 021, 022, 024, 061, 062, 063, 083, 102, 103, 104	2.00	t/ha
	f	Chalk, Plots 011, 023, 042, 044, 054, 064, 071, 082, 084	4.00	t/ha
	f	Chalk, Plots 041, 043, 051, 081, 101	6.00	t/ha

All plots

30-Sep-07	p	Glyphosate 360	3.00	l/200 l/ha
10-Oct-07	a	Plough/ S, completed 11-Oct-2007		
22-Oct-07	a	Combination Drilled		
	s	XI19 tr Redigo Twin + Deter	350.00	seeds/m^2
23-Oct-07	a	Rolled		
30-Oct-07	p	Huron	5.00	kg/ha
2-Nov-07	p	Liberator	0.60	l/200 l/ha
	p	Alpha Trifluralin 48 EC	2.00	l/200 l/ha
17-Nov-07	p	Stomp 400 SC	3.30	l/200 l/ha
	p	Arelon 500	2.00	l/200 l/ha
	p	Hallmark with Zeon Technology	50.00	ml/200 l/ha
1-Apr-08	f	Sulphate of Ammonia	238.00	kg/ha
18-Apr-08	f	Nitraprill	580.00	kg/ha

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			Rate	Unit
8-May-08	p	Deuce	1.00	l/150 l/ha
	p	Bravo 500	0.75	l/150 l/ha
	p	Flexity	0.20	l/150 l/ha
	p	BASF 3C Chlormequat 720	1.00	l/150 l/ha
19-May 08	p	Ally Max SX	42.00	g/200 l/ha
	p	Starane 2	0.75	l/200 l/ha
21-May-08	f	Nitraprill	145.00	kg/ha
31-May-08	p	Amistar Opti	1.25	l/200 l/ha
	p	Opus Team	1.00	l/200 l/ha
6-Jun-08	a	Mow / Rotavate paths		
16-Jun-08	a	Mow / Rotavate paths		
25-Jul-08	a	Rogue wild oats/thistles/weeds		
27-Aug-08	a	Combine harvest, plots for yield		
	a	Swath straw		
	a	Sample, bale and weigh straw		
30-Aug-08	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	P1	P2	P3	Mean
O	3.41	8.96	9.28	9.80	7.86
D	7.50	10.21	10.53	10.84	9.77
N	2.83	8.95	10.23	10.31	8.08
P	6.53	10.07	10.20	10.45	9.31
NPKNAMG	6.73	9.71	10.56	10.90	9.48
Mean	5.41	9.58	10.16	10.46	8.90

GRAIN MEAN DM% 84.1

STRAW TONNES/HECTARE

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

P_RES OLD_RES	O	P1	P2	P3	Mean
O	1.94	4.24	5.02	5.11	4.08
D	4.13	5.63	5.88	5.80	5.36
N	1.68	4.81	5.79	5.50	4.45
P	3.62	5.69	5.75	5.94	5.25
NPKNAMG	3.45	5.14	5.42	5.39	4.85
Mean	2.96	5.10	5.57	5.55	4.80

STRAW MEAN DM% 86.6

PLOT AREA HARVESTED 0.00538

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K TEST

GRAIN TONNES/HECTARE

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

K Test	K0	K1	K2	Mean
OLD_RES				
O	9.26	10.60	10.80	9.98
D	10.07	11.00	11.35	10.62
N*	9.56	9.99	10.40	9.88
PK	10.28	10.14	10.72	10.36
N*PK	9.64	10.09	11.18	10.14
Mean	9.76	10.36	10.89	10.20
Rep	10	5	5	

Standard errors of differences of means

Table	OLD_RES	K_Test	OLD_RES K_Test	
s.e.d.		0.326	0.728	min.rep
	0.364	0.282	0.631	max-min
		0.230X	0.515	max.rep

GRAIN MEAN DM% 83.9

STRAW TONNES/HECTARE

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

K_Test	K0	K1	K2	Mean
OLD_RES				
O	4.22	4.85	5.16	4.61
D	4.67	5.21	5.84	5.10
N*	4.82	4.63	4.84	4.78
PK	5.29	5.16	5.63	5.34
N*PK	4.59	4.76	5.52	4.86
Mean	4.72	4.92	5.40	4.94
Rep	10	5	5	

Standard errors of differences of means

Table	OLD_RES	K_Test	OLD_RES K_Test	
s.e.d.		0.181	0.405	min.rep
	0.203	0.157	0.351	max-min
		0.128X	0.286	max.rep

Stratum standard errors and coefficients of variation

Straw (at 85% dry matter) tonnes/hectare

Stratum	d.f.	s.e.	cv%
Blocks.Plots	4	0.286	5.8

Straw Mean DM% 86.8

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