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Yields of the Field Experiments 2011

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R/EX/4 Exhaustion Land

Rothamsted Research

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11/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986 (P test) and of additional potassium since 2007 (K test); on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 156th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-10/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:

	2000-11	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
07-Oct-10	f	Basal P (triple superphosphate) - plots 02,04,06,08 and 10	75	kg/ha
		Muriate of Potash - plots 23,43,63,83,103	125	kg/ha
		Muriate of Potash - plots 24,44,64,84,104	250	kg/ha
P Test				
07-Oct-10	f	Triple Super Phosphate - plots 011-013,031-033,051-053, 071-073, 091-093	75	kg/ha
07-Oct-10	f	Muriate of Potash - plots 011-014, 031-034, 051-054, 071-074, 091-094.	250	kg/ha
All Plots				
10-Oct-10	a	Ploughed		
10-Oct-10	a	Ploughed		
13-Oct-10	a	Cultipressed		
15-Oct-10	s	Drilled Xi 19 trt Anchor - 350 seeds / metre sq	145	kg/ha
16-Oct-10	a	Rolled		
17-Oct-10	p	Sprayed Regatta - water volume = 200 lt/ha	0.6	l/ha
14-Mar-11	f	Applied Ammonium Sulphate Fertiliser	238	kg/ha
28-Mar-11	p	Sprayed Cherokee - Water volume = 118 lt/ha. Applied to WW area only	1.25	l/ha
06-Apr-11	f	Applied Kieserite	80	kg/ha
13-Apr-11	f	Applied Nitram	580	kg/ha
05-May-11	p	Sprayed Bravo 500,	1.0	l/ha
		Tracker,	1.0	l/ha
		Agriguard Chlormequat 720,	2.25	l/ha
		Ally Max	42	g/ha
		and Starane 2 - 200 lt/ha water	0.75	l/ha
10-May-11	f	Applied Nitram	146	kg/ha
16-May-11	a	Cut paths		
19-May-11	p	Sprayed Opus,	0.8	l/ha
		Comet 200	0.6	l/ha
		and Bravo 500 - 100 l/ha water	1.0	l/ha
23-May-11	a	Cut paths		

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03-Jun-11	a	Rotavated paths
08-Jun-11	a	Cut paths
20-Jun-11	a	Cut paths
01-Aug-11	a	Cut paths
12-Aug-11	a	Combined O+Es - Opened up trials with commercial combine ready for yields to be taken
12-Aug-11	a	Baled O+Es - Baled area discard area cut to open out trials
16-Aug-11	a	Straw weights
16-Aug-11	a	Combined - O+Es
17-Aug-11	a	straw baled

P TEST

GRAIN TONNES/HECTARE

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

P_RES OLD_RES	O	P(P1)	P(P2)	P(P3)	Mean
O	2.54	4.97	5.35	5.76	4.65
D	4.40	7.32	7.26	7.41	6.60
N	1.76	6.15	7.27	6.70	5.47
P	3.91	7.28	8.21	7.42	6.70
NPKNAMG	3.50	5.62	7.04	7.72	5.97
MEAN	3.22	6.27	7.03	7.00	5.88

GRAIN MEAN DM% 86.0%

STRAW TONNES/HECTARE

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

P_RES OLD_RES	O	P1	P2	P3	MEAN
O	0.71	1.42	1.27	1.69	1.27
D	1.38	2.02	1.95	1.95	1.83
N	0.66	1.82	2.00	2.27	1.69
P	1.15	2.32	2.09	2.17	1.93
NPKNAMG	1.07	1.64	1.75	2.11	1.64
MEAN	1.00	1.85	1.81	2.04	1.67

STRAW MEAN DM% 84.1%

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K TEST

GRAIN TONNES/HECTARE

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

K_TEST OLD_RES	KO	K1	K2	Mean
O	6.24	7.64	7.36	6.87
D	7.81	8.25	7.98	7.96
N*	6.69	6.75	7.39	6.88
PK	7.43	6.50	7.62	7.25
N*PK	7.00	6.61	7.80	7.10
MEAN	7.03	7.15	7.63	7.21

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.		0.181	0.404	min.rep
	0.202	0.157	0.350	max-min
		0.128X	0.286	max.rep

(No comparisons in categories where s.e.d. marked with an X

Grain mean DM% 86.6

STRAW TONNES/HECTARE

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

K_TEST OLD_RES	K0	K1	K2	Mean
O	1.56	2.39	1.94	1.87
D	2.12	2.52	2.02	2.19
N*	1.62	1.75	2.33	1.83
PK	2.11	2.01	1.96	2.05
N*PK	1.55	1.76	2.55	1.85
MEAN	1.79	2.09	2.16	1.96
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.		0.124	0.278	min.rep
	0.139	0.108	0.241	max-min
		0.088X	0.197	max.rep

(No comparisons in categories where s.e.d. marked with an X

Straw mean DM% 85.1

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