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Yields of the Field Experiments 2015

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R/EX/4 Exhaustion Land

Rothamsted Research

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15/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 160th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-14/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. In 2009 maintenance P applications were changed from 20 kg P/ha to 15 kg P/ha. This was not recorded in the yield books for 2009-13. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

	2009-Present	2000-08	1986-92
O	None	None	None
P (P1)	15 kg P	20 kg P	44 kg P
P (P2)	15 kg P	20 kg P	87 kg P
P (P3)	15 kg P	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

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

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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

Date		Application	Rate	Units
02/10/2014	f	Applied TSP	75	kg/ha
02/10/2014	f	Applied MOP onto plots 103 83 63 43 + 23	125	kg/ha
02/10/2014	f	Applied MOP onto plots 104-24, 91-11, 92-12, 93-13, 94-14.	250	kg/ha
08/10/2014	a	Ploughed ground (thrown North)	-	-
28/10/2014	s	Drilled Crusoe trt Redigo Deter	400	seeds/m^2
01/11/2014	a	Ring rolled all new drilling	-	-
10/11/2014	p	Sprayed Crystal	4	l/ha
04/12/2014	p	Sprayed Hallmark	50	ml/ha
23/03/2015	f	Applied Ammonia Sulphate (21%N) onto plots	238	kg/ha
05/04/2015	p	Sprayed Artemis	1	l/ha
05/04/2015	p	Sprayed Bravo 500	1	l/ha
05/04/2015	p	Sprayed Chlormequat 750	1.25	l/ha
05/04/2015	p	Sprayed Moddus	150	ml/ha
09/04/2015	f	Applied Nitram fertiliser (34.5%N) to Winter Wheat Plots	580	kg/ha
16/04/2015	f	Applied Kieserite to Winter Wheat Plots	80	kg/ha
27/04/2015	p	Sprayed Kingdom	1.25	l/ha
27/04/2015	p	Sprayed Balear720	700	ml/ha
30/04/2015	f	Applied Nitram fertiliser (34.5%N) to Winter Wheat Plots	145	kg/ha
27/05/2015	p	Sprayed Ally Max	30	gm/ha
27/05/2015	p	Sprayed Bassoon	750	ml/ha
27/05/2015	p	Sprayed Gemstone	1	l/ha
27/05/2015	p	Sprayed Bravo500	1	l/ha
15/06/2015	p	Sprayed Proline onto WW	500	ml/ha
06/08/2015	a	Topped Paths	-	-
07/09/2015	a	Harvested All Commercial WW; Swathed Straw	-	-
13/09/2015	a	Harvested All Plots for Grain Yield	-	-
13/09/2015	a	Sampled Baled and Weighed	-	-
17/09/2015	a	removed round bales from field	-	-

Note: Samples of grain and straw were taken for chemical analysis. The yield strips on plots 031, 034, 071, 074, 091 & 094 were made smaller this year to avoid areas where the crop had already been sampled by S. McGrath et al.

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P TEST

Grain tonnes/hectare

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

P_RES	O	P1	P2	P3	Mean
OLD_RES					
O	3.56	8.59	8.38	8.18	7.18
D	5.58	9.77	9.80	9.62	8.69
N	3.08	7.98	8.95	8.98	7.25
P	*7.31	*12.03	*10.62	*10.85	*10.20
NPKNAMG	5.15	9.37	10.07	10.86	8.86
Mean	4.94	9.56	9.57	9.65	8.43

Grain mean DM% 85.1
*Note: Yields estimated using grain/straw ratios for plots 072,073 & 074, because of a problem with the combine when harvesting.

Straw tonnes/hectare

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

P_RES	O	P1	P2	P3	Mean
OLD_RES					
O	1.91	3.99	4.17	4.17	3.56
D	2.21	4.59	4.78	4.71	4.07
N	2.05	4.29	4.55	3.94	3.71
P	3.18	6.33	5.59	5.71	5.20
NPKNAMG	2.24	4.82	5.41	5.52	4.50
Mean	2.32	4.80	4.90	4.81	4.21

Straw mean DM% 88.3

Plot area harvested 0.00538, 0.00252.

K TEST

Grain tonnes/hectare

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

K_Test	K0	K1	K2	Mean
OLD_RES				
O	7.61	8.90	9.14	8.31
D	7.57	9.77	9.90	8.70
N*	8.03	8.60	8.87	8.38
PK	9.70	9.96	10.13	9.87
N*PK	8.54	10.08	10.27	9.36
Mean	8.29	9.46	9.66	8.93

Grain mean DM% 85.0

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Straw tonnes/hectare

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

K_Test OLD_RES	K0	K1	K2	Mean
O	3.80	4.69	5.13	4.35
D	3.37	4.37	4.39	3.88
N*	3.98	4.34	4.34	4.16
PK	5.40	5.40	5.53	5.44
N*PK	4.36	5.13	5.2	4.76
Mean	4.18	4.78	4.92	4.52

Straw mean DM% 87.4 Plot area harvested 0.00538

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