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Results of the Classical and Other Long-term Experiments - 2017



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17/R/EX/4 Exhaustion Land (Hoosfield)

Rothamsted Research

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Results of the Classical and other Long-term Experiments 2017

17/R/EX/4 EXHAUSTION LAND (Hoosfield)

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 spring barley up to 1991, winter wheat since – Hoosfield.

The 162nd year, winter wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-16/R/EX/4

Treatments: All combinations of:

Whole plots (P test)

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

Main plot

- | | | |
|----|---------|--|
| 01 | O | None |
| 03 | D | Farmyard manure at 35 t |
| 05 | N | 96 kg N as ammonium salts |
| 09 | P | 34 kg P as superphosphate |
| 07 | 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. From 2016 onward P was withheld from the P(P1) sub-plots.

1986–1992:

	2016-Present	2009-2015	2000-08	1986-92
O	None	None	None	None
P (P1)	None	15 kg P	20 kg P	44 kg P
P (P2)	15 kg P	15 kg P	20 kg P	87 kg P
P (P3)	15 kg P	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:

Main Plot

- | | | |
|----|------|---|
| 02 | O | None |
| 04 | D | Farmyard manure at 35 t |
| 06 | N* | 96 kg N as nitrate of soda |
| 10 | PK | 34 kg P as superphosphate, 137 kg K as sulphate of potash |
| 08 | 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 (2 sub-plots within each treatment strip)
	K1	75 kg K ₂ O (62.2 kg K)
	K2	150 kg K ₂ O (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
26/09/2016	a	Topped all stubble	-	-
26/09/2016	f	Applied TSP to plots 101-104, 081-084, 061-064, 041-044, 021-024, 091-092, 071-072, 051-052, 031-032 and 011-012	75	kg/ha
26/09/2016	f	Applied MOP to plots 103, 083, 063,043, 023	125	kg/ha
26/09/2016	f	Applied MOP onto plots 104-094, 084-074, 064-054, 044-034 and 024-014	250	kg/ha
28/09/2016	a	Ploughed - thrown North	-	-
06/10/2016	a	Cultipressed - all ground and immediate surrounds	-	-
10/10/2016	a	Ring Rolled All New Drilling	-	-
10/10/2016	s	Drilled Crusoe Treated w/Redigo Pro + Deter	350	seeds/m ²
10/10/2016	a	Cultipressed - all sites and surrounds	-	-
15/10/2016	p	Sprayed Liberator	600	ml/ha
15/10/2016	p	Sprayed Defy	3	lt/ha
15/10/2016	p	Sprayed Deploy	400	ml/ha
02/12/2016	p	Sprayed Hallmark	50	ml/ha
14/03/2017	f	Applied Sulphate of Ammonia (21%N 60%SO ₃) to all plots	238	kg/ha

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21/03/2017	f	Applied Kieserite	80	kg/ha
04/04/2017	f	Applied Nitram	580	kg/ha
05/04/2017	p	Sprayed Artemis	1	lt/ha
05/04/2017	p	Sprayed Claw 500	1	lt/ha
05/04/2017	p	Sprayed 3C Chlormequat 750	2	lt/ha
27/04/2017	p	Sprayed keystone	600	ml/ha
27/04/2017	p	Sprayed epic	400	ml/ha
27/04/2017	p	Sprayed balear 720sc	700	ml/ha
05/05/2017	f	Applied Nitram (34.5% N)	145	kg/ha
08/06/2017	a	Cut Paths	-	-
19/06/2017	p	Sprayed Fezan (Tebuconazole)	750	ml/ha
26/06/2017	a	cut all paths	-	-
27/07/2017	a	cut all paths	-	-
01/09/2017	a	Harvested All Plots	-	-
02/09/2017	a	Completed Straw Samples and Weights	-	-
06/09/2017	a	harvested leftover wheat of harvested trials and surrounds	-	-
07/09/2017	a	Baled all remaining commercial swath	-	-

Yields

P TEST

Grain Yield, tonnes/hectare

Tables of means

P_RES OLD_RES	O	(P1)	(P2)	(P3)	Mean
O	1.87	4.18	5.69	6.14	4.47
D	3.49	6.23	7.49	7.68	6.22
N	1.76	5.19	6.56	7.74	5.31
P	2.44	5.66	7.28	7.31	5.67
NPKNAMG	3.22	5.86	6.47	7.12	5.67
Mean	2.56	5.43	6.70	7.20	5.47
Grain mean DM%	86.4				

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Straw Yield, tonnes/hectare

Tables of means

P_RES	O	(P1)	(P2)	(P3)	Mean
OLD_RES					
O	1.01	1.76	2.65	3.05	2.12
D	1.78	2.86	3.58	3.36	2.89
N	1.23	2.81	3.66	2.78	2.62
P	0.93	2.15	2.68	3.02	2.20
NPKNAMG	1.40	2.37	2.69	3.16	2.40
Mean	1.27	2.39	3.05	3.07	2.45

Straw mean DM% 96.2

Plot area harvested 0.00512.

K TEST

Grain Yield, tonnes/hectare

Tables of means

K_Test	K0	K1	K2	Mean
OLD_RES				
O	6.54	7.80	7.52	7.10
D	7.02	8.52	8.07	7.66
N*	7.04	7.96	8.19	7.56
PK	8.37	7.86	8.23	8.21
N*PK	7.81	7.48	8.14	7.81
Mean	7.36	7.92	8.03	7.67
Grain mean DM%	86.6			

Straw Yield, tonnes/hectare

Tables of means

K_Test	K0	K1	K2	Mean
OLD_RES				
O	2.31	3.65	3.68	2.99
D	2.62	3.55	3.51	3.08
N*	2.65	3.73	3.77	3.2
PK	3.20	3.15	3.30	3.21
N*PK	2.99	1.99	2.95	2.73
Mean	2.76	3.21	3.44	3.04

Straw mean DM% 97.0

Plot area harvested 0.00512