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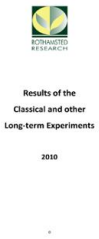
Yields of the Field Experiments 2010



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R/HB/2 Hoos Barley

Rothamsted Research

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10/R/HB/2

HOOS BARLEY

Object: To study the effects of organic manures and inorganic fertilizers on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised on parts of the experiment. The rotation was discontinued in 1979 and the whole experiment reverted to continuous s. barley. The experiment was modified for 2003. The main plots continue as previously. The Silicate Test plots continue but are not split to test rates of N (basal N is applied). The remaining plots are to be used to study the effect on yield of P residues, (basal N applied).

The 159th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-09/R/HB/2.

Main plots

Treatments:

Whole plots

1. MANURE	Plot	Fertilizers and Organic Manures		
		Form of N 1852-1966	Additional treatments 1852-2002	Treatments since 2003
---	11	None	-	-
-P-	21	None	P	(P)
--K	31	None	K (Na) Mg	K(Mg)
-PK	41	None	PK (Na) Mg	(P) K (Mg)
A--	12	A	-	-
AP-	22	A	P	(P)
A-K	32	A	K (Na) Mg	K(Mg)
APK	42	A	PK (Na) Mg	(P) K (Mg)
D1852	72	None	D	D
(D)	71	None	(D)	(D)
(A)	62	None	(Ashes)	(Ashes)
-	61	None	-	-
D2001 [(a)]	73[(a)]	-	D	D
P2KMg [(a)]	63 [(a)]	-	P2KMg	P2KMg

[(a)] Plots 63 and 73 started in 2001

Form of N: A, sulphate of ammonia to supply 48kg N
P: 35 kg P as triple superphosphate in 1974 and from 1988 to 2002, single superphosphate in other years
(P): (none), P application to be reviewed for 2013
P2: 44kg P as triple superphosphate
K: 90 kg K as sulphate of potash
(Na): (none), 16 kg Na as sulphate of soda until 1973
Mg: 35kg Mg as kieserite every third year since 1974 (applied at 30 kg in 1992, 1995 and 1998) (sulphate of magnesia annually until 1973). Annually to new plot 63.
(Mg): (none), Mg application to be reviewed for 2013

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D1852: Farmyard manure at 35t since 1852
D2001: Farmyard manure at 35t since 2001
(D): Farmyard manure 1852 – 1871 only
(Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

Sub-Plots

(2) N Nitrogen fertilizer (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):

0
48
96
144

Silicate Test plots

Treatments:

Whole plots

MANURE	Plot	Fertilizers: Additional treatment 1852-1979	Changes since 1980	Treatments since 2003
N----	131	-	-	N3
NP---	231	P	-	N3 (P)
N-K--	331	K(Na)Mg	-	N3 K(Mg)
NPK--	431	PK(Na)Mg	-	N3(P)K(Mg)
N—S-	134	Si	Si omitted	N3 (Si)
NP-S-	234	P Si	Si omitted	N3(P) (Si)
N-KS-	334	K(Na)MgSi	Si omitted	N3 K(Mg)(Si)
NPKS-	434	PK(Na)MgSi	Si omitted	N3(P)K(Mg)(Si)
N---S	132	-	Si added	N3 Si
NP--S	232	P	Si added	N3(P) Si
N-K-S	332	K(Na)Mg	Si added	N3 K(Mg) Si
NPK-S	432	PK(Na)Mg	Si added	N3(P)K(Mg) Si
N--SS	133	Si	-	N3 Si
NP-SS	233	P Si	-	N3(P) Si
N-KSS	333	K(Na)MgSi	-	N3 K(Mg) Si
NPKSS	433	PK(Na)MgSi	-	N3(P)K(Mg) Si

N: From 1852-1966 whole plots received 48kg N as nitrate of soda. Between 1968-2002 whole plots were split to test 4 rates of N as "Nitro-chalk" (cumulative applications until 1973, on a cyclic system from 1974).
N3: Basal N, 144kg as "Nitro-chalk" since 2003
Si: Silicate of soda at 450kg (Note: S also refers to silicate of soda)
(Si): Silicate of soda omitted since 1980
P, (P), K, Mg, (Mg), (Na): as above

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P Test plots

Treatments:

Since 2003 the remaining plots [ex-Castor meal (plots 14, 24, 34 & 44) and those testing combinations of NPK with and without Mg (plots 55, 56, 57 & 58)] have been used to study the effect of P residues on yield. Previous treatments have resulted in different levels of available P in the soil. Large dressing of K were applied to some plots to increase levels of exchangeable K in the soil such that K should not limit yield; plots 141 and 241 were sacrificed and used as discard areas so that the K application did not encroach on adjacent no K plots on the Silicate Test. Other plots received the normal rate of K. The level of exchangeable Mg in the soil is such that Mg should not limit yield; the need to apply Mg will be reviewed for 2011.

Whole plots
Manure

Plot	Treatment since 2003
142	N3K*
143	N3K*
144	N3K*
242	N3K*
243	N3K*
244	N3K*
341	N3K
342	N3K
343	N3K
344	N3K
441	N3K
442	N3K
443	N3K
444	N3K
551	N3K
552	N3K
561	N3K
562	N3K
571	N3K*
572	N3K*
581	N3K*
582	N3K*

N3: Basal N, 144kg as “Nitro-chalk”
K: 90kg K as sulphate of potash
K*: 450kg K as sulphate of potash

In 2005 the extra dressings of K (i.e. K*) was stopped and the whole experiment reverted to K dressings of 90 kg K/ha/year.

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Experimental Diary

			Rate	Unit
10-Dec-09	f	Triple Superphosphate	215.00	kg/ha
	f	Kieserite	233.00	kg/ha
	f	Potassium Sulphate	217.00	kg/ha
16-Dec-09	f	FYM	35.00	t/ha
17-Dec-09	a	Plough		
09-Mar-10	a	Spring tined		
11-Mar-10	s	Tipple - 350 seeds per m2	170.00	kg/ha
	a	Rolled		
	a	Combination Drilled		
15-Apr-10	a	Rotavated paths		
20-Apr-10	f	Nitrachalk to the main plots as indicated on the plan		
23-Apr-10	f	Nitram – Silicate Test, P Test, headlands & O+E's	420.00	kg/ha
12-May-10	a	Rotavate		
24-May-10	p	Kestral - Started	0.50	l/ha
	p	Jenton - Started	0.50	l/ha
	p	Bravo 500 - Started	1.00	l/ha
25-May-10	p	Kestral	0.50	l/ha
	p	Jenton	0.50	l/ha
	p	Bravo 500	1.00	l/ha
26-May-10	p	Harmony M SX - 200 lt water	100.00	g/ha
28-May-10	p	Dow Shield - 200 lt water	0.35	l/ha
04-Jun-10	p	Axial - 200 lt water	0.40	l/ha
	p	Axial - 200 lt water	0.40	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
16-Jun-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Mobius - 200 lt water	0.43	l/ha
	p	Standon Fenpropimorph 750 - 200 lt water	0.50	l/ha
	p	Corbel - 200 lt water	0.50	l/ha
18-Jun-10	a	Rotavated paths		
09-Jul-10	a	Other operation - pulled wild oats, none found		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
05-Sep-10	a	Combine harvest		
09-Sep-10	a	Baled		
22-Sep-10	a	Other operation - removed bales		

NOTE: Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.

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MAIN PLOTS

GRAIN TONNES/HECTARE

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

MANURE	N	O	48	96	144	MEAN
---		1.07	1.52	1.54	1.92	1.51
-P-		1.78	2.87	3.59	3.77	3.00
--K		0.69	1.52	1.90	2.29	1.60
-PK		1.43	2.92	3.51	4.59	3.11
A--		0.96	1.31	1.53	1.71	1.38
AP-		1.90	2.90	3.68	4.00	3.12
A-K		0.85	1.32	1.46	2.12	1.44
APK		1.35	2.71	3.65	4.03	2.93
FYM1852onwards		5.04	6.69	7.02	6.97	6.43
FYM1852-1871		1.10	1.78	4.31	3.36	2.64
(A)		1.11	2.44	2.31	2.83	2.17
-		0.95	1.25	1.27	1.82	1.32
FYM2001onwards		3.42	5.95	5.92	5.60	5.22
P2K		2.19	2.78	4.74	5.07	3.69
MEAN		1.70	2.71	3.32	3.58	2.83

Grain Mean DM% 91.0

STRAW TONNES/HECTARE

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

MANURE	N	0	48	96	144	MEAN
---		0.17	0.50	0.41	0.71	0.45
-P-		0.46	0.90	1.17	1.27	0.95
--K		0.00	0.46	0.75	0.82	0.51
-PK		0.30	1.18	1.37	1.85	1.17
A--		0.19	0.37	0.47	0.58	0.40
AP-		0.34	0.88	1.45	1.39	1.02
A-K		0.16	0.26	0.50	0.80	0.43
APK		0.33	1.01	1.55	1.57	1.11
FYM1852onwards		1.73	2.65	3.03	2.97	2.59
FYM1852-1871		0.14	0.72	1.57	1.13	0.89
(A)		0.25	0.91	0.74	0.93	0.71
-		0.22[a]	0.29[b]	0.44	0.64	0.26
FYM2011onwards		1.02	2.18	2.28	2.47	1.99
P2K		0.48	0.85	1.66	1.95	1.24
MEAN		0.37	0.94	1.24	1.36	0.98

Straw Mean DM% 83.7

[a] Straw Yield estimated from Grain/Straw ratio on N48[b]

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SILICATE PLOTS

GRAIN TONNES/HECTARE

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

Silicate	PK	N3--	N3P-	N3-K	N3PK	MEAN
(-)-		1.91	4.36	1.49	5.03	3.20
(Si)-		2.38	4.79	2.81	5.41	3.85
(-)Si		2.69	4.10	2.48	5.40	3.97
(Si)Si		2.86	4.01	3.11	5.49	3.87
MEAN		2.46	4.31	2.47	5.33	3.64

Grain Mean DM% 84.9

PHOSPHATE PLOTS

GRAIN TONNES/HECTARE

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

PLOTS	
142	2.35
143	2.42
144	2.36
242	5.08
243	4.95
244	4.94
341	3.02
342	3.35
343	3.12
344	3.53
441	4.54
442	5.12
443	4.85
444	5.03
551	5.23
552	5.06
561	4.41
562	4.55
571	1.98
572	2.74
581	1.09
582	0.84
MEAN	3.66

Grain Mean DM% 85.0

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