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Yields of the Field Experiments

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19/R/HB/2 - Hoos Barley (Hoosfield)

Rothamsted Research

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19/R/HB/2 HOOS BARLEY (Hoosfield)

Object: To study the effects of organic manures and inorganic fertilizers on continuous spring barley. From 1968 to 1978 a rotation of potatoes, beans and spring barley was practised on parts of the experiment. The rotation was discontinued in 1979 and the whole experiment reverted to continuous spring 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 168th year, spring barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-18/R/HB/2.

Main plots

Treatments:

Whole plots

MANURE		Fertilizers and Organic Manures:-		
	Plot	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 2018
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 2021

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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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Phosphorus 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 dressings 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 was reviewed for 2019.

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 all of the P test plots reverted to K

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Experimental Diary

Date		Application	Rate	Units
06/09/2018	f	Applied Chalk to plots 711-734, 411-551, 611-634, 311-561, 241-571, 141-581	4	t/ha
08/11/2018	f	Applied TSP - to plots 631-634	215	kg/ha
08/11/2018	f	Applied SOP - to plots 631-634, 411-551, 311-561, 241-571, 141-581	217	kg/ha
08/11/2018	f	Applied Kieserite - to plots 631-636	233	kg/ha
12/11/2018	p	Sprayed Buffalo Elite	1	lt/ha
12/11/2018	p	Sprayed Samurai	4	t/ha
15/11/2018	f	Applied Silicate of Soda - to plots 433-133, 432-132	450	kg/ha
16/11/2018	f	Applied FYM - to plots 721-734	35	t/ha
20/11/2018	a	Ploughed, thrown North	-	-
21/02/2019	a	Cousin cultivated trial and surrounds	-	-
22/02/2019	a	Ring Rolled All New Drilling	-	-
22/02/2019	s	Drilled KWS Irina,trt Redigo Pro	350	seed/m^2
11/04/2019	a	Rotavated Paths	-	-
18/04/2019	f	Applied N as Nitro-Chalk by hand - to plots 114,122, 213, 224, 312, 323, 411, 424, 612, 622, 632, 714, 723, 733	48	kg/ha
18/04/2019	f	Applied N as Nitro-Chalk by hand - to plots 111, 121, 214, 221, 311, 322, 413, 423, 614, 623, 633, 713, 724, 734	96	kg/ha
18/04/2019	f	Applied N as Nitro-Chalk by hand - to plots 113, 124, 211, 222, 313, 321, 412, 421, 611, 621, 631, 712, 721, 732	144	kg/ha
30/04/2019	p	Sprayed Hallmark	50	ml/ha
15/05/2019	p	Sprayed Refine Max	75	g/ha
15/05/2019	p	Sprayed Kingdom	1.5	lt/ha
15/05/2019	p	Sprayed Claw 500	1	lt/ha
15/05/2019	p	Sprayed Starane Hi	400	ml/ha
16/05/2019	f	Applied Nitram - to old series 5, c, aa - not plots 6, 7	417	kg/ha
02/07/2019	p	Sprayed Mobius	400	ml/ha
15/07/2019	a	Pulled Oats	13	plants
06/09/2019	a	Harvested All Plots	-	-
09/09/2019	a	Bale surplus straw from plots	-	-
10/09/2019	a	Straw Weights recorded in grams for all main plots	-	-

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Yields

Main Plots

Grain Yield, tonnes/hectare

Table of means

N MANURE	0	48	96	144	Mean
---	1.86	2.26	3.35	2.21	2.42
-P-	2.31	3.33	4.23	4.94	3.70
--K	3.08	4.00	4.62	3.88	3.90
-PK	2.99	5.19	6.15	5.94	5.07
A--	1.70	2.34	2.42	2.86	2.33
AP-	2.71	4.10	4.32	4.23	3.84
A-K	2.78	3.36	3.78	3.62	3.38
APK	3.34	4.99	6.14	5.86	5.08
FYM1852onwards	8.35	9.15	8.54	8.76	8.70
FYM1852-1871	2.95	5.78	5.81	5.06	4.90
(A)	3.37	3.58	4.18	3.82	3.74
-	2.45	3.54	4.04	3.78	3.45
FYM2001onwards	7.39	7.84	7.16	7.85	7.56
P2K	2.81	5.35	5.76	6.56	5.12
Mean	3.43	4.63	5.04	4.96	4.51
Grain mean DM%	87.00				

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Straw Yield, tonnes/hectare

Table of means

N MANURE	0	48	96	144	Mean
---	0.09	0.54	0.71	0.66	0.50
-P-	0.46	0.66	1.19	1.37	0.92
--K	0.56	0.97	1.42	1.10	1.01
-PK	0.70	1.65	2.14	2.21	1.68
A--	0.36	0.59	0.58	0.55	0.52
AP-	0.53	1.00	1.28	1.10	0.98
A-K	0.69	0.69	0.90	1.01	0.82
APK	0.84	1.86	2.13	1.60	1.61
FYM1852onwards	3.28	3.80	3.80	3.18	3.51
FYM1852-1871	0.93	1.77	0.99	1.35	1.26
(A)	0.95	0.96	1.15	0.68	0.93
-	0.20	0.98	1.04	0.47	0.67
FYM2001onwards	2.54	2.61	2.94	3.40	2.87
P2K	0.84	1.82	1.62	2.28	1.64
Mean	0.93	1.42	1.56	1.50	1.35

Straw mean DM%	84.70	
Plot Area	0.00244	0.00183

PHOSPHATE PLOTS

Grain Yield, tonnes/hectare

Tables of means

PLOTS

142	4.07
143	4.43
144	3.81
242	4.56
243	4.62
244	4.85
341	4.33

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342	4.50
343	5.38
344	5.44
441	3.71
442	4.96
443	5.55
444	5.60
551	6.09
552	6.15
561	5.80
562	6.09
571	5.25
572	5.68
581	2.56
582	2.46
Mean	4.81
Grain Mean DM%	85.2
Plot area Harvested	0.00244

SILICATE PLOTS

Grain Yield, tonnes/hectare

Tables of means

PK	N3--	N3P-	N3-K	N3PK	Mean
Silicate					
(-)-	3.21	3.96	3.18	5.32	3.92
Si)-	3.57	4.41	4.78	4.93	4.42
(-)Si	4.36	4.87	4.89	5.38	4.88
(Si)Si	4.28	5.03	5.05	6.03	5.10
Mean	3.85	4.57	4.48	5.41	4.58
Grain Mean DM%	85.2				
Plot area harvested	0.00244				

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