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Yields of the Field Experiments 2020

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20/R/HB/2 Hoos Barley (Hoosfield)

Rothamsted Research

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20/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 169th year, spring barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-19/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 48 kg 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 2021
P2: 44 kg P as triple superphosphate since 2001
K: 90 kg K as sulphate of potash
(Na): (none), 16 kg Na as sulphate of soda until 1973
Mg: 35 kg 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

D1852: Farmyard manure at 35 t since 1852

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D2001: Farmyard manure at 35 t 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 48 kg 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, 144 kg as "Nitro-chalk" since 2003
Si: Silicate of soda at 450 kg (Note: S also refers to silicate of soda)
(Si): Silicate of soda omitted since 1980
P, (P), K, Mg, (Mg), (Na): as above

Phosphorus Test plots

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Treatments:

Since 2003 the remaining plots [ex-Castor meal (plots 14, 24, 34 & 44) and those testing combinations of NPK with and without Mg (Strip 5 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 2017.

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

Experimental Diary

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Date		Application	Rate	Units
18/09/2019	f	Applied TSP; Plots 631, 632, 633 and 634; JD6930 with Cascade Spreader	215	kg/ha
18/09/2019	f	Applied Kieserite; Plots 631, 632, 633 and 634; By Hand	233	kg/ha
20/09/2019	f	Applied Silicate of Soda; Plots 132, 133, 232, 233, 332, 333, 432, 433; JD6930 with Cascade Spreader	450	kg/ha
20/09/2019	f	Applied SOP (50% K2O5); Plots 311-314, 411-414, 321-324, 421-424, 331-334, 431-434, 631-634, 141-144, 241-244, 341-344, 441-444, 551, 552, 561, 562, 571, 572, 581, 582; JD6930 with Cascade Spreader	217	kg/ha
23/09/2019	f	Applied FYM; Plots 734, 733, 732, 731, 724, 723, 722, 721; Tym T503 with Muck spreader	35	t/ha
21/11/2019	a	Ploughing. Headlands; Direction thrown: S; NHT7210 with KV Five Furrow Plough	-	-
16/03/2020	p	Sprayed Buffalo Elite; NH T6030 with Knight Sprayer	1	l/ha
16/03/2020	p	Sprayed Samurai; NH T6030 with Knight Sprayer	3	l/ha
24/03/2020	s	Drilled spring barley, var: Diablo; JD6830 with Accord Combination Drill No. 4	350	seeds/m2
25/03/2020	a	Rolled; JD5620 with 6m Flexicoil Cambridge Roll	-	-
04/05/2020	f	Applied Nitro-chalk (27% N); Plots 111, 121, 214, 221, 311, 322, 413, 423, 614, 623, 633, 713, 724, 734; By Hand; By Hand	48	kg/ha
04/05/2020	f	Applied Nitro-chalk (27% N); Plots 113, 124, 211, 222, 313, 321, 412, 421, 611, 621, 631, 712, 721, 732; By Hand; By Hand	96	kg/ha
04/05/2020	f	Applied Nitro-chalk (27% N); Plots 112, 123, 212, 223, 314, 324, 414, 422, 613, 624, 634, 711, 722, 731; By Hand; By Hand	144	kg/ha
12/05/2020	f	Applied Nitram; to Series AA, Series C, strip 5 and commercial surrounds (not applied to plots 631, 632, 633, 634, 731, 732, 733, 734); By Hand; JD6930 with Cascade Spreader	417	kg/ha
14/05/2020	p	Sprayed Axial Pro; NH T6030 with Knight Sprayer	0.6	l/ha
14/05/2020	p	Sprayed Cello; NH T6030 with Knight Sprayer	1	l/ha
14/05/2020	p	Sprayed Presite SX; NH T6030 with Knight Sprayer	60	g/ha
14/05/2020	p	Sprayed Starane; NH T6030 with Knight Sprayer	0.4	l/ha

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23/06/2020	p	Sprayed Cello; NH T6030 with Knight Sprayer	0.6	l/ha
20/07/2020	a	Hand Weeding of 2 Wild Oats	-	-
01/09/2020	a	Harvest; Haldrup C-85	-	-
01/09/2020	a	Harvest strip next to yield strip to allow baler to bale swaths for straw weights; Haldrup C-85 2m cut	-	-
02/09/2020	a	Straw Weights; Tym T503 with New Holland Baler	-	-
02/09/2020	a	Harvesting, Commercial; Claas Tucano 430	-	-
06/09/2020	a	Baling; JD6830 with Claas Baler	-	-

Yields

Main Plots

Grain Yield, tonnes/hectare

Table of means

N MANURE	0	48	96	144	Mean
---	0.63	0.96	0.72	0.73	0.76
-P-	1.99	2.02	3.06	3.08	2.54
--K	0.91	1.30	1.19	1.35	1.19
-PK	1.72	2.55	3.69	3.64	2.90
A--	0.47	0.75	1.00	0.90	0.78
AP-	2.28	2.82	3.00	2.96	2.77
A-K	0.72	0.83	0.93	1.01	0.87
APK	1.48	2.46	3.32	3.47	2.68
FYM1852onwards	5.92	6.70	6.38	6.73	6.43
FYM1852-1871	2.59	1.95	1.75	1.50	1.95
(A)	0.99	0.88	0.99	1.63	1.12
-	0.86	0.75	1.00	0.91	0.88
FYM2001onwards	4.51	5.70	5.65	6.01	5.47
P2K	2.06	2.13	3.69	3.34	2.80
Mean	1.94	2.27	2.60	2.66	2.37
Grain mean DM%	86.9				

Straw Yield, tonnes/hectare

Table of means

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N	0	48	96	144	Mean
MANURE					
---	0.11	0.32	0.22	0.11	0.19
-P-	0.36	0.47	0.98	0.71	0.63
--K	0.17	0.24	0.13	0.25	0.20
-PK	0.47	0.52	0.77	0.93	0.67
A--	0.07	0.21	0.20	0.26	0.18
AP-	0.39	0.58	0.74	0.66	0.59
A-K	0.10	0.16	0.19	0.27	0.18
APK	0.33	0.54	0.81	0.78	0.62
FYM1852onwards	1.70	2.21	1.83	2.49	2.06
FYM1852-1871	0.73	0.48	0.45	0.28	0.49
(A)	0.25	0.29	0.22	0.41	0.29
-	0.26	0.23	0.23	0.24	0.24
FYM2001onwards	1.61	1.73	1.83	1.65	1.70
P2K	0.53	0.18	0.50	0.73	0.49
Mean	0.51	0.58	0.65	0.70	0.61

Straw mean DM%	86.3	
Plot Area (ha)	0.00244	0.00183

PHOSPHATE PLOTS

Grain Yield, tonnes/hectare

Tables of means

PLOTS

142	2.07
143	2.02
144	1.51
242	4.56
243	4.52
244	4.41
341	2.06
342	2.55
343	3.20
344	3.89
441	3.27
442	3.93
443	3.57
444	4.25

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551	4.86
552	4.42
561	4.75
562	4.56
571	3.20
572	3.54
581	0.66
582	0.70
Mean	3.30
Grain Mean DM%	86.5
Plot area Harvested (ha)	0.00244

SILICATE PLOTS

Grain Yield, tonnes/hectare

Tables of means

PK Silicate	N3--	N3P-	N3-K	N3PK	Mean
(-)-	-	3.90	1.04	3.68	2.15
(Si)-	1.11	3.51	1.70	4.05	2.59
(-)Si	1.88	3.78	1.46	4.71	2.96
(Si)Si	1.79	3.70	1.75	4.40	2.91
Mean	1.59	3.72	1.49	4.21	2.65
Grain Mean DM%	86.6				
Plot area harvested (ha)	0.00244		Means exclude missing values		

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