

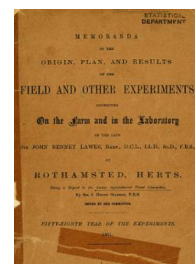
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Yields of the Field Experiments 1901

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Barley; Hoos Field

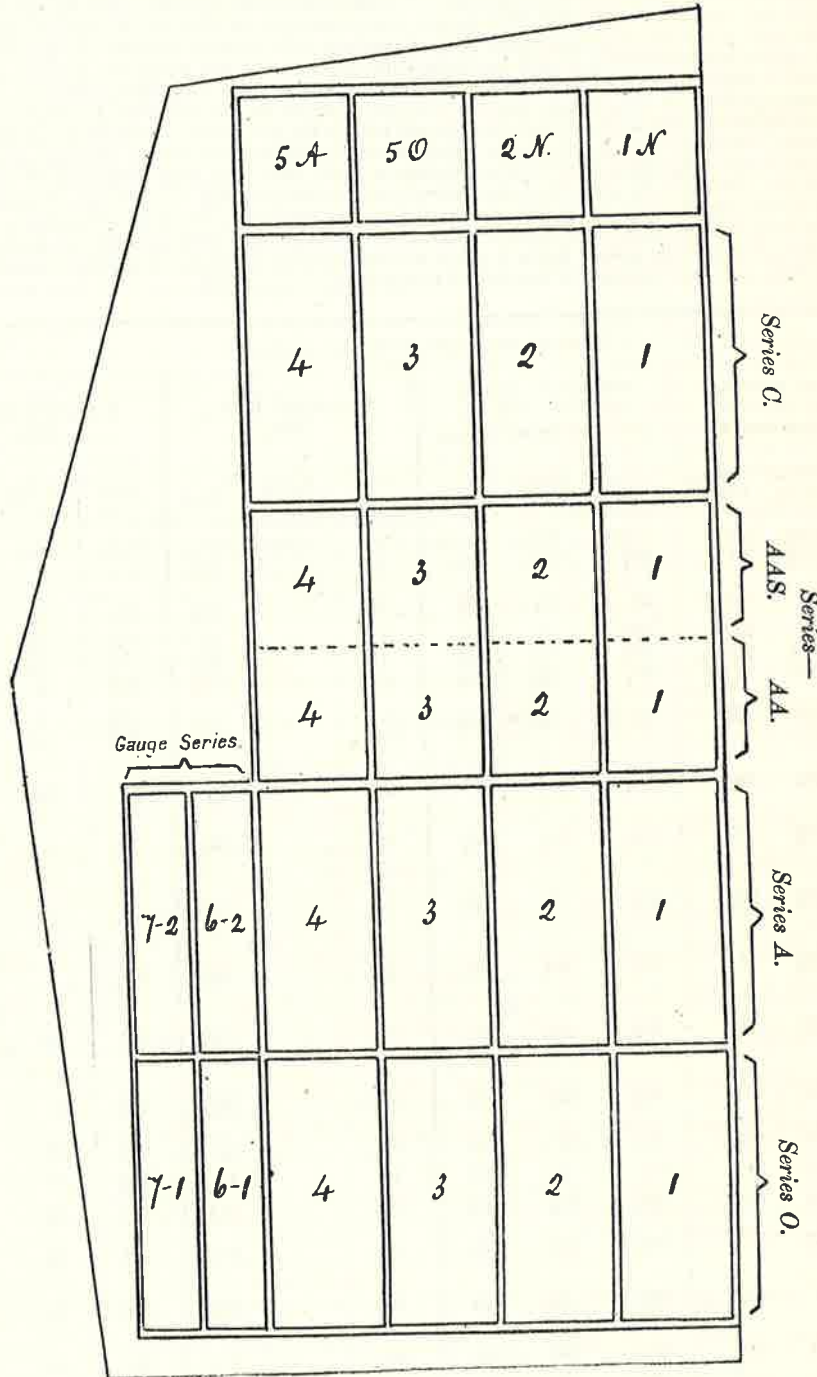
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PLAN OF THE PLOTS IN HOOS FIELD,
ON WHICH BARLEY HAS BEEN GROWN

for 50 years in succession, 1852 to 1901 inclusive.

[For a brief summary of results and conclusions, see opposite page.]



Total area of ploughed land about $5\frac{1}{2}$ acres.

- Area of Plots. $\left\{ \begin{array}{l} 1, 2, 3, \text{ and } 4, \text{ of Series O, Series A, and Series C, each } \frac{1}{11} \text{ acre.} \\ 1, 2, 3, \text{ and } 4, \text{ of Series AA, and Series AAS, each } \frac{1}{11} \text{ acre.} \\ 1 \text{ N, } 2 \text{ N, } 5 \text{ O, and } 5 \text{ A, each } \frac{1}{11} \text{ acre.} \\ 6-1 \text{ and } 6-2, \text{ each about } \frac{1}{2} \text{ acre (0.137 acre).} \\ 7-1 \text{ and } 7-2, \text{ each about } \frac{1}{2} \text{ acre (0.118 acre).} \end{array} \right.$

The double lines indicate division paths between plot and plot.

[For details of the manuring and produce, see pp. 26 and 27.]

RESULTS OF EXPERIMENTS MADE IN HOOS FIELD ON THE GROWTH OF BARLEY,

for 50 years in succession on the same land—without manure, with Farmyard manure, and with various artificial manures.

The results show, that on the growth of Barley year after year on ordinary arable land, the produce by mineral manures alone is higher than that without manure; that nitrogenous manures alone give more produce than mineral manures alone; and that mixtures of both mineral and nitrogenous manures give much more than either used alone—indeed, generally twice, or more than twice, as much as mineral manures alone. Of mineral constituents, whether used alone or in mixture with nitrogenous manures, phosphates were much more effective than mixtures of salts of potash, soda, and magnesia. The averages show that, under all conditions of manuring (excepting with farmyard manure), the produce was less over the later than over the earlier periods of the experiments—a result partly due to the seasons. But the average produce for 48 years of continuous growth of Barley has, in all cases where nitrogenous and mineral manures (containing phosphates) were used together, been much higher than the average produce of the crop grown in ordinary rotation in the United Kingdom; and very much higher than the average in most other countries when so grown.

Barley is appropriately sown in a lighter soil than Wheat; and whilst Wheat is usually sown in the autumn, Barley is as a rule sown in the spring; and hence it relies in a much greater degree on the stores of the *surface* soil. Accordingly, it is more susceptible to exhaustion of the surface-soil in nitrogenous, and especially in mineral supplies; and hence, in the common practice of agriculture, it more generally requires the direct application of mineral manures, especially phosphatic manures, than does Wheat when grown under equal soil conditions. The exhaustion induced by both crops is, however, characteristically that of available nitrogen; and when, under the ordinary conditions of manuring and cropping, artificial manure is still required, nitrogenous manures are as a rule requisite for both crops; and for the spring sown Barley more generally than for Wheat, phosphatic manures also. It is not recommended that Barley should in practice be grown year after year on the same land by artificial manures as in these experiments; but, in addition to the lighter soils on which it is more appropriately grown in ordinary rotation, it may be grown, both in full quantity per acre and of good quality, after Wheat, or other grain crop, on the heavier soils, when the land is clean enough for a second cereal crop.

For details of the manuring and produce of the different plots, see pages 26 and 27.

EXPERIMENTS ON THE GROWTH OF **BARLEY** YEAR AFTER YEAR ON THE

Previous Cropping—1847, Swedish Turnips, with Dung and Superphosphate of Lime, the Roots carted off; 1848, Barley (with clover); 1849, Clover; 1850, Wheat; 1851, Barley manured with Amm.-salts.

First Experimental Barley Crop in 1852. Barley every year since. The crop of the present year, 1901, is, therefore, the 50th Barley crop in succession. Unless stated to the contrary in the Table, or in the foot-notes, the same Manure has been applied year after year to the same Plot. Description of

(Area under experiment,

PLOTS.	1 acre = (about) 0.404 Hectare or 1.585 Prussian Morgen.
	1 bushel = (about) 0.364 Hectolitre or 0.662 Prussian Scheffel.
	1 lb. (pound avoird.) .. = (about) 0.453 Kilogramme or 0.907 Zollverein Pfund.
	1 cwt. (hundredweight) = (about) 50.8 Kilogrammes or 1.016 Centner.
	1 bushel per acre = (about) 0.9 Hectolitre per Hectare .. or 0.418 Pr. Scheffel per Pr. Morgen.
	1 lb. per acre = (about) 1.12 Kilogramme per Hectare or 0.572 Zollv. Pfd. per Pr. Morgen.
	1 cwt. per acre = (about) 125.6 Kilogrammes per Hectare or 0.641 Centner per Pr. Morgen.
Manures, per acre, per annum. [In 1898 and since, 400 lbs. Basic Slag used throughout instead of Superphosphate.]	
1 O.	Unmanured continuously
2 O.	3½ cwts. Superphosphate of Lime ⁽¹⁾
3 O.	200 lbs. ⁽²⁾ Sulphate Potash, 100 lbs. ⁽³⁾ Sulphate Soda, 100 lbs. Sulphate Magnesia
4 O.	200 lbs. ⁽²⁾ Sulphate Potash, 100 lbs. ⁽³⁾ Sulphate Soda, 100 lbs. Sulphate Magnesia, 3½ cwts. Superphosphate
1 A.	200 lbs. Ammonium-salts ⁽⁴⁾
2 A.	200 lbs. Ammonium-salts, and 3½ cwts. Superphosphate
3 A.	200 lbs. Nitrate Soda, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia
4 A.	{ 200 lbs. Ammonium-salts, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosphate
5 {	1 AA. 275 lbs. Nitrate Soda
	2 AA. 275 lbs. Nitrate Soda, and 3½ cwts. Superphosphate
	3 AA. 275 lbs. Nitrate Soda, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia
	4 AA. { 275 lbs. Nitrate Soda, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosphate
6 {	1 AAS. 275 lbs. Nitrate Soda, 400 lbs. Silicate Soda ⁽⁵⁾
	2 AAS. 275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, and 3½ cwts Superphosphate ⁽¹⁾
	3 AAS. { 275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia
	4 AAS. { 275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia, and 3½ cwts. Superphosphate
7 {	1 C. 1000 lbs. Rape-cake
	2 C. 1000 lbs. Rape-cake, and 3½ cwts. Superphosphate
	3 C. 1000 lbs. Rape-cake, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia
	4 C. { 1000 lbs. Rape-cake, 200 lbs. ⁽²⁾ Sulph. Potash, 100 lbs. ⁽³⁾ Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosphate
8 {	1 N. 275 lbs. Nitrate Soda
	2 N. 275 lbs. ⁽⁵⁾ Nitrate Soda
5 O.	200 lbs. ⁽²⁾ Sulphate Potash, 3½ cwts. Superphosphate ⁽¹⁰⁾
5 A.	200 lbs. ⁽²⁾ Sulphate Potash, 3½ cwts. Superphosphate, and 200 lbs. ⁽¹¹⁾ Ammonium-salts
M.	100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate
6 {	1 Unmanured continuously
	2 Ashes (burnt soil and turf)
7 {	1 Farmyard Manure 14 tons, 20 yrs., 1852-71; unmanured since
	2 Farmyard Manure 14 tons, every year

(1) "Superphosphate of Lime," 1852 to 1887 inclusive, made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid, sp. gr. 1.7 (and water); 1888-1897, made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. In 1898, and since, 400 lbs. Basic Slag used throughout instead of Superphosphate.

(2) 300 lbs. per annum for the first six years, 1852-7.

(3) 200 lbs. per annum for the first six years, 1852-7.

(4) The "Ammonium-salts" (excepting in 1887), equal parts Sulphate and Muriate of Ammonia of Commerce. In 1887 Sulphate Ammonia only, 225 lbs. per acre, equal in Nitrogen to the "Ammonium-salts" of previous years. In 1901, the south half of Plots 1 A, 2 A, 3 A, and 4 A, received instead of "Ammonium-salts" as above, Bicarbonate of Ammonia containing an amount of nitrogen equivalent to that of the "Ammonium-salts" applied to the other half.

(5) First 6 years, 1852-7, instead of Nitrate of Soda, 400 lbs. Ammonium-salts per annum; next 10 years, 1858-67, 200 lbs. Ammonium-salts per annum; 1868, and since, 275 lbs. Nitrate of Soda per annum. 275 lbs. Nitrate of Soda is reckoned to contain the same amount of Nitrogen as 200 lbs. "Ammonium-salts."

FIELD.

SAME LAND, WITHOUT MANURE, AND WITH DIFFERENT DESCRIPTIONS OF MANURE.

Barley—29 years, 1852-1880, Chevalier; 10 years, 1881-1890, Archer's Stiff Straw; 7 years, 1891-1897, Carter's Paris Prize; 1898 and since, Archer's Stiff Straw. In the spring of 1894 permanent division paths were laid out between plot and plot. Below is given, besides the usual averages, the produce for both 1899 and 1900.

For Plan of the Plots, and brief summary of results and conclusions, see pp. 24-25. about 4½ acres.)

PLOTS.	PRODUCE PER ACRE.														PLOTS.	
	Dressed Grain.										Total Straw.					
	Quantity.					Weight per Bushel.					Averages.					
	Averages.			48th Year, 1899.	49th Year, 1900.	Averages.			48th Year, 1899.	49th Year, 1900.	Averages.			48th Year, 1899.		49th Year, 1900.
	24 Yrs. 1852-76.	24 Yrs. 1876-99.	48 Yrs. 1852-99.			24 Yrs. 1852-76.	24 Yrs. 1876-99.	48 Yrs. 1852-99.			24 Yrs. 1852-76.	24 Yrs. 1876-99.	48 Yrs. 1852-99.			
	Bush.	Bush.	Bush.	Bush.	Bush.	lbs.	lbs.	lbs.	lbs.	lbs.	Cwts.	Cwts.	Cwts.	Cwts.		
1 O.	18¾	12½	15⅞	8	8½	52½	51¾	52½	51⅞	51⅞	11	6⅞	9	5½	5⅞	
2 O.	24¼	16⅞	20½	11½	10¼	53½	53⅞	53½	54¼	52	12⅞	8⅞	10⅞	6⅞	6¼	
3 O.	21½	12⅞	16⅞	7⅞	7¼	53½	52⅞	52½	53⅞	52½	11⅞	6⅞	9¼	5⅞	3 O.	
4 O.	25⅞	16	21	11½	12⅞	53½	52⅞	53½	54⅞	52	13⅞	8½	10⅞	7⅞	4 O.	
1 A.	31⅞	22⅞	27¼	18½	16⅞	52¼	51⅞	52¼	52¼	51	17⅞	12⅞	15¼	11½	9	
2 A.	46⅞	35¼	40¼	28½	14¼	53½	52	52⅞	53	49⅞	26⅞	19¼	23	16	9⅞	
3 A.	34⅞	25⅞	30¼	23¼	20⅞	52⅞	52⅞	52¼	54	53	20	14⅞	17¼	13½	10¼	
4 A.	45¼	40¼	42⅞	29⅞	24¼	54¼	54	54¼	54⅞	53⅞	28	22⅞	25⅞	17⅞	14	
1 AA.	36	26¼	31½	29	21⅞	52¼	52⅞	52⅞	53	51⅞	21¼	15⅞	18⅞	17⅞	14¼	
2 AA.	48⅞	40⅞	44⅞	43¼	27⅞	53⅞	53⅞	53⅞	55¼	52⅞	29⅞	23⅞	26⅞	28⅞	17½	
3 AA.	36⅞	28	32¼	30¼	25⅞	52½	52⅞	52¼	54½	52⅞	23	17⅞	20⅞	18½	15½	
4 AA.	48⅞	39⅞	44¼	40½	31¼	53⅞	54	53⅞	56⅞	53½	31¼	24⅞	27⅞	26⅞	19¼	
1 AAS.	37⅞	33½	34⅞	35⅞	30⅞	54¼	53½	53⅞	54¼	52⅞	21⅞	19¼	20¼	21¼	18¼	
2 AAS.	47½	43⅞	44⅞	44	26⅞	55⅞	54	54⅞	56	53¼	28½	25⅞	26⅞	26¼	15½	
3 AAS.	42	35½	(12) 37⅞	35½	29⅞	54⅞	54	(12) 54¼	55⅞	53⅞	24⅞	20⅞	(12) 22¼	22¼	16⅞	
4 AAS.	48⅞	43½	45⅞	40½	36½	55¼	54¼	54⅞	56¼	53⅞	30⅞	27⅞	28⅞	26⅞	21¼	
1 C.	44½	35⅞	39¼	30⅞	25¼	53⅞	54	53⅞	54⅞	52¼	25⅞	19⅞	22⅞	16⅞	12⅞	
2 C.	46¼	38⅞	42⅞	33½	23¼	53⅞	54⅞	54¼	54⅞	52⅞	27⅞	21⅞	24⅞	18	13⅞	
3 C.	42¼	34⅞	38⅞	27⅞	20	53⅞	54⅞	54	54¼	52⅞	26	19⅞	22⅞	15¼	11⅞	
4 C.	46¼	37	41¼	31	22½	53¼	54¼	54	54⅞	52¼	28⅞	21⅞	25	17⅞	12	
1 N.	37	29⅞	(13) 33⅞	33	27⅞	52⅞	52⅞	(13) 52¼	54⅞	51⅞	22¼	17¼	(13) 19¼	19	14⅞	
2 N.	41	34¼	(13) 37⅞	37½	28⅞	52⅞	53¼	(13) 53⅞	54¼	50⅞	25¼	20½	(13) 22¼	22¼	16	
5 O.	21⅞	14½	(14) 17⅞	9⅞	7⅞	53⅞	53⅞	(14) 53¼	52	50¼	11⅞	8⅞	(14) 9⅞	6½	5⅞	
5 A.	43⅞	32	(14) 37⅞	27¼	20⅞	54	53⅞	(14) 53⅞	55⅞	53¼	27¼	20½	(14) 23¼	17½	15⅞	
M.	19⅞	18½	(14) 19¼	(15)	(15)	53¼	53¼	(14) 53¼	(15)	(15)	11⅞	9⅞	(14) 10¼	(15)	(15)	
6 1	20⅞	13¼	17¼	6½	10¼	52⅞	52¼	52⅞	52	51¼	11⅞	7⅞	9⅞	5⅞	7¼	
6 2	21	14⅞	17¼	7⅞	11⅞	52⅞	52⅞	52⅞	52	52¼	11⅞	7⅞	9⅞	5¼	6⅞	
7 1	48⅞	27⅞	(16) 36⅞	12⅞	15⅞	54⅞	54	(16) 54⅞	55¼	52⅞	28¼	15⅞	(16) 21	8	10¼	
7 2	48¼	48⅞	48⅞	42	31¼	54⅞	54⅞	54⅞	57	54¼	28⅞	30⅞	29⅞	28	18¼	

(6) The application of Silicates did not commence until 1864; in 1864-5-6 and 7, 200 lbs. Silicate of Soda and 200 lbs. Silicate of Lime were applied per acre; but in 1868, and since, 400 lbs. Silicate of Soda, and no Silicate of Lime. These plots ("AAS") comprise, respectively, one half of the original "AA" plots, and, excepting the addition of the Silicates, have been, and are, in other respects, manured in the same way as the "AA" plots.

(7) 2000 lbs. Rape-cake per annum for the first six years, and 1000 lbs. only, each year since.

(8) 300 lbs. Sulphate of Potash, and 3¼ cwt. Superphosphate of Lime, without Nitrate of Soda, the first year (1852); Nitrate alone each year since.

(9) 550 lbs. Nitrate of Soda for 1853-4-5-6, and 7; and 275 lbs. only, each year since.

(10) Ammonium-salts also the first year, but not since.

(11) By mistake 400 lbs. in 1880.

(12) Averages of 12, 24, and 36 years, 1864-99.

(13) Averages of 23, 24, and 47 years, 1853-99.

(14) Averages of 17, 17, and 34 years, 1858-78, and 1880-92. The produce of 1879 was not weighed, owing to the foulness of the plot, from the wet season.

(15) Not recorded.

(16) Averages of 20, 28, and 48 years, 1852-99.