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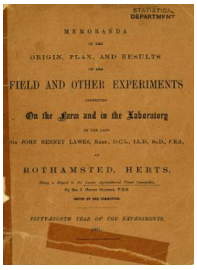
Yields of the Field Experiments 1901

Full Table of Content



Barley; Hoos Field

Rothamsted Research

Rothamsted Research (1902) *Barley; Hoos Field ;* Yields Of The Field Experiments 1901, pp 24 - 27 **- DOI: https://doi.org/10.23637/ERADOC-1-229**

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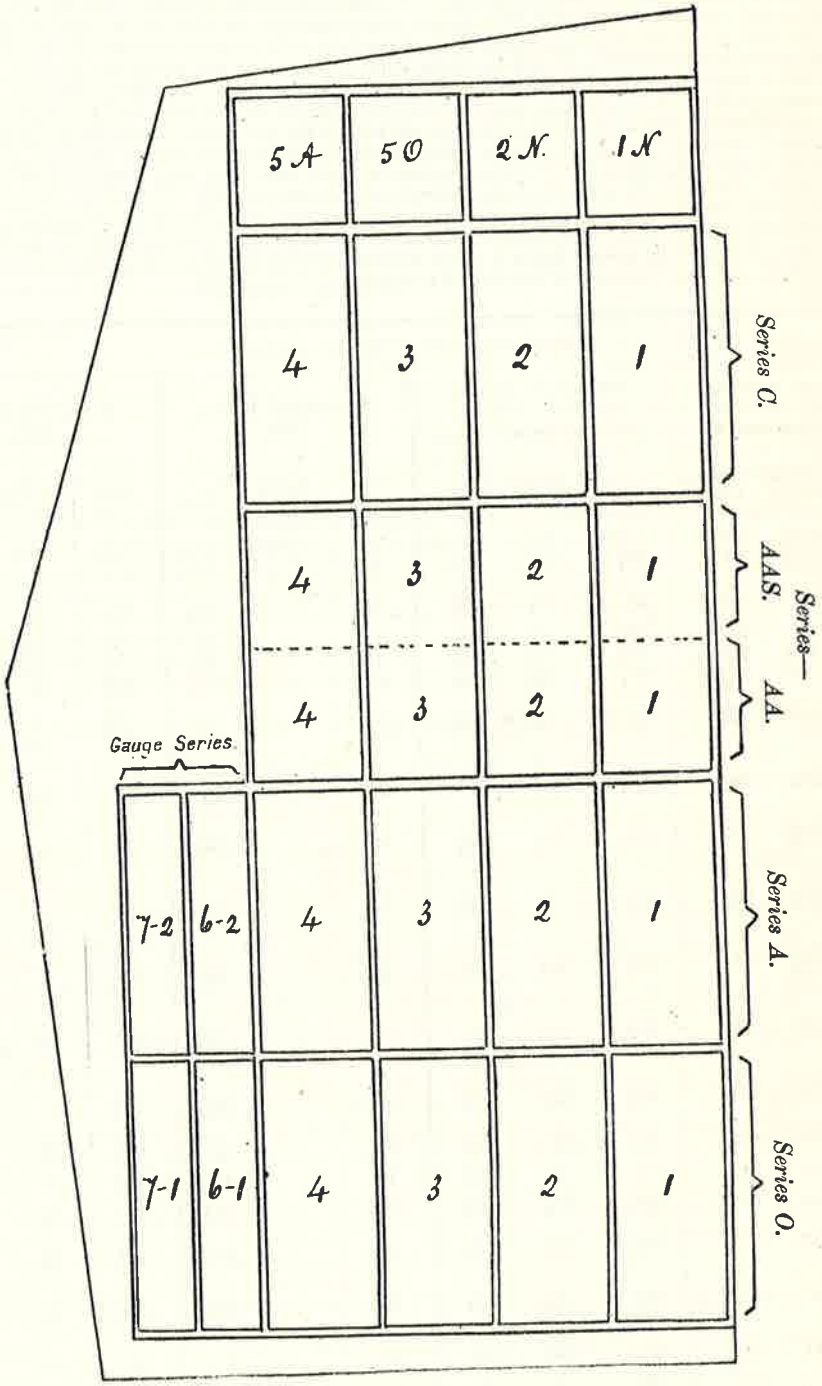
PLAN OF THE PLOTS IN HOOS FIELD, ON WHICH BARLEY HAS BEEN GROWN

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.
- 1, 2, 3, and 4, of Series O, Series A, and Series C, each $\frac{2}{11}$ acre.
- 1, 2, 3, and 4, of Series AA, and Series AAS, each $\frac{1}{11}$ acre.
- 1 N, 2 N, 5 O, and 5 A, each $\frac{1}{11}$ acre.
- 6–1 and 6–2, each about $\frac{1}{8}$ acre (0·137 acre).
- 7–1 and 7–2, each about $\frac{1}{9}$ acre (0·118 acre).

The double lines indicate division paths between plot and plot.

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

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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.

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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 avoir.) .. = (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. Ammonium-salts, 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 .. ..
(5) 2 AA.	275 lbs. Nitrate Soda, and 3½ cwts. Superphosphate .. ..
(5) 3 AA.	275 lbs. Nitrate Soda, 200 lbs. [2] Sulph. Potash, 100 lbs. [3] Sulph. Soda, 100 lbs. Sulph. Magnesia .. ..
(5) 4 AA.	275 lbs. Nitrate Soda, 200 lbs. [2] Sulph. Potash, 100 lbs. [3] Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosphate .. ..
(5) 1 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda [6] .. ..
(5) 2 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, and 3½ cwts Superphosphate [1] .. ..
(5) 3 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, 200 lbs. [2] Sulph. Potash, 100 lbs. [3] Sulph. Soda, 100 lbs. Sulph. Magnesia .. ..
(5) 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 .. ..
(7) 2 C.	1000 lbs. Rape-cake, and 3½ cwts. Superphosphate .. ..
(7) 3 C.	1000 lbs. Rape-cake, 200 lbs. [2] Sulph. Potash, 100 lbs. [3] Sulph. Soda, 100 lbs. Sulph. Magnesia .. ..
(7) 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 .. ..
(8) 2 N.	275 lbs. [9] 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 .. ..
6 2	Ashes (burnt soil and turf) .. ..
7 1	Farmyard Manure 14 tons, 20 yrs., 1852–71; unmanured since .. ..
7 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."

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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 4¼ acres.)

Plots.	Produce per Acre. Dressed Grain. Quantity. Averages. 24 Yrs. 1852–75.	24 Yrs. 1876–99.	48 Yrs. 1852–99.	48th Year, 1899.	49th Year, 1900.	Weight per Bushel. Averages. 24 Yrs. 1852–75.	24 Yrs. 1876–99.	48 Yrs. 1852–99.	48th Year, 1899.	49th Year, 1900.	Total Straw. Averages. 24 Yrs. 1852–75.	24 Yrs. 1876–99.	48 Yrs. 1852–99.	48th Year, 1899.	49th Year, 1900.	Plots.
	Bush.	Bush.	Bush.	Bush.	Bush.	lbs.	lbs.	lbs.	lbs.	lbs.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	
1 O.	18⅞	12½	15⅝	8	8¼	52½	51¾	52⅛	51⅜	51⅜	11	6⅞	9	5⅛	5⅜	1 O.
2 O.	24¼	16⅝	20½	11½	10¼	53¼	53⅝	53¼	54¼	52	12⅜	8⅜	10⅜	6¾	6¼	2 O.
3 O.	21⅛	12⅛	16⅝	7⅛	7¼	53⅛	52⅛	52⅝	53⅛	52⅛	11⅜	6⅞	9⅛	5⅝	5	3 O.
4 O.	25⅞	16	21	11½	12½	53½	52⅞	53¼	54⅝	52	13⅜	8½	10⅞	7⅛	8⅛	4 O.
1 A.	31⅝	22¾	27¼	18½	16⅛	52¼	51⅞	52⅛	52¼	51	17⅞	12¾	15¼	11⅛	9	1 A.
2 A.	46⅜	35¼	40¾	28¼	14⅛	53½	52	52¾	53	49⅝	26⅝	19½	23	16	9⅜	2 A.
3 A.	34⅜	25¾	30⅛	23¼	20¾	52⅞	52⅝	52¾	54	53	20	14⅞	17½	13½	10¾	3 A.
4 A.	45½	40¼	42⅞	29¾	24⅛	54¼	54	54⅛	54⅜	53⅝	28	22⅞	25⅜	17⅝	14	4 A.
1 AA.	36	26⅛	31⅛	29	21⅞	52¼	52⅛	52⅛	53	51⅜	21⅛	15⅝	18⅜	17¾	14⅛	1 AA.
2 AA.	48⅝	40¾	44⅜	43¼	27⅛	53⅜	53½	53⅜	55⅞	52⅜	29½	23¾	26⅝	28⅞	17½	2 AA.
3 AA.	36⅜	28	32¼	30¼	25¾	52½	52⅞	52¾	54⅛	52⅞	23	17⅜	20⅛	18½	15½	3 AA.
4 AA.	48⅝	39¾	44¼	40½	31¾	53⅝	54	53¾	56⅛	53½	31¼	24⅜	27⅞	26¾	19¾	4 AA.
1 AAS.	37⅜	33⅛	34⅝	35¾	30⅞	54¼	53½	53¾	54¾	52⅜	21⅜	19½	20⅛	21¼	18¼	1 AAS.
2 AAS.	47½	43⅛	44⅝	44	26⅜	55⅜	54	54⅜	56	53¼	28½	25⅜	26⅜	26¼	15½	2 AAS.
3 AAS.	42	35⅛	(12) 37⅜	35⅛	29⅜	54¾	54	(12) 54¼	55⅝	53⅜	24⅞	20⅞	(12) 22¼	22¾	16⅛	3 AAS.
4 AAS.	48⅞	43½	45⅜	40½	36½	55¼	54¾	54⅞	56¾	53⅜	30⅝	27⅛	28⅜	26⅝	21⅛	4 AAS.
1 C.	44½	35⅜	39⅞	30¾	25¼	53¾	54	53⅞	54⅜	52¼	25⅞	19⅞	22⅞	16¾	12⅞	1 C.
2 C.	46¼	38⅜	42⅜	33½	23¼	53⅞	54⅜	54¼	54⅝	52⅝	27⅜	21⅜	24⅜	18	13⅛	2 C.
3 C.	42¾	34⅛	38⅜	27⅞	20	53⅞	54⅛	54	54¾	52⅞	26	19¾	22⅞	15¼	11⅝	3 C.
4 C.	46¾	37	41⅞	31	22½	53¾	54¼	54	54⅝	52¾	28⅜	21⅝	25	17⅞	12	4 C.
1 N.	37	29⅞	(13) 33⅜	33	27⅝	52¾	52⅞	(13) 52¾	54⅜	51⅞	22½	17½	(13) 19⅞	19	14⅝	1 N.
2 N.	41	34¼	37½	37½	28¾	52⅞	53¼	53⅛	54½	50⅞	25¼	20½	22⅞	22⅞	16	2 N.
5 O.	21⅜	14⅛	(13) 17¾	9¾	7⅛	53½	53⅛	(13) 53¼	52	50¾	11⅜	8⅜	(13) 9⅞	6½	5⅜	5 O.
5 A.	43⅝	32	37⅝	27¼	20⅛	54	53⅞	53⅞	55⅜	53¼	27¼	20½	23¾	17½	15⅛	5 A.
M.	19⅞	18½	(14) 19¼	(15)	(15)	53¾	53¼	(14) 53⅜	(15)	(15)	11⅜	9⅞	(14) 10¾	(15)	(15)	M.
6 1	20⅝	13¾	17¼	6½	10¼	52⅝	52¼	52⅜	52	51⅛	11⅝	7¾	9⅝	5⅜	7½	6 1
6 2	21	14⅞	17⅞	7⅝	11⅛	52¾	52⅜	52⅝	52	52¼	11⅜	7⅞	9⅝	5¼	6⅝	6 2
7 1	48⅜	27⅞	(16) 36⅜	12⅜	15⅞	54⅜	54	(16) 54⅛	55¼	52⅝	28¼	15¾	(16) 21	8	10⅛	7 1
7 2	48¾	48⅜	48⅝	42	31⅞	54⅜	54⅜	54⅜	57	54¼	28⅝	30⅝	29⅝	28	18¼	7 2

(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 3½ cwts. 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.

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