

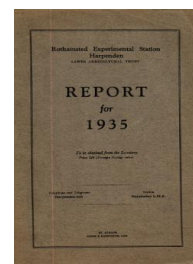
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## Report for 1935

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## The Classical Experiments

### Rothamsted Research

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## CROPS GROWN IN ROTATION, AGDELL FIELD

### PRODUCE PER ACRE

Year	Crop	O Unmanured since 1848.		M Mineral Manure‡ No Nitrogen		C Complete Mineral and Nitrogenous Manure		
		5 Fallow	6 Clover or Beans	3 Fallow	4 Clover or Beans	1 Fallow	2 Clover or Beans	
<b>Average of first twenty-two Courses, 1848-1935</b>								
	Roots (Swedes) ..	cwt.*	31.4	15.5	169.6	201.9	340.4	298.9
	Barley—							
	Dressed grain ..	bush.	20.8	19.0	22.1	26.0	29.1	33.6
	Total straw ..	cwt.†	13.0	12.8	13.3	15.4	18.0	21.3
	Beans—							
	Dressed Grain	bush.‡‡	—	12.6	—	18.9	—	21.2
	Total Straw ..	cwt.‡‡	—	9.4	—	14.9	—	15.4
	Clover Hay ..	cwt.§	—	25.6	—	52.1	—	52.0
	Wheat—							
	Dressed Grain	bush.	22.7	21.3	26.5	28.8	26.7	28.3
	Total Straw ..	cwt.†	22.8	21.2	28.5	29.7	29.4	29.0
<b>Present Course (22nd), 1932-35</b>								
1932	Roots (Turnips) ..	cwt.	20.2	5.4	86.0	118.0	120.0	98.6
1933	Barley—							
	Dressed Grain	bush.	6.0	2.2	9.5	13.9	3.7	5.4
	Total Grain ..	cwt.	3.3	1.3	5.2	7.4	2.0	2.9
	Weight per bushel	lb.	54.8	50.2	55.2	55.0	52.9	53.0
	Total Straw ..	cwt.†	6.3	4.8	7.4	11.4	9.1	14.0
1934	Beans—							
	Dressed Grain	bush.	—	9.2	—	24.6	—	13.1
	Total Grain ..	cwt.	—	5.6	—	15.2	—	8.1
	Weight per bushel	lb.	—	67.8	—	69.4	—	69.6
	Total Straw ..	cwt.	—	10.5	—	28.3	—	16.5
1935	Wheat—							
	Dressed Grain	bush.	14.6	13.7	19.5	16.0	10.5	12.0
	Total Grain ..	cwt.	9.3	8.7	12.6	10.1	6.6	7.6
	Weight per bushel	lb.	62.1	63.2	62.9	63.8	62.4	63.5
	Total Straw ..	cwt.†	22.4	20.2	33.9	28.5	28.3	23.5

\* Plots 1, 3 and 5 based upon 20 courses. Plots 2, 4 and 6 based upon 19 courses.

† Includes straw, cavings and chaff.

‡ Mineral manure : 528 lb. Superphosphate (35%) ; 500 lb. Sulphate of Potash ; 100 lb. Sulphate of Soda ; 200 lb. Sulphate of Magnesia, all per acre. Nitrogenous Manure ; 206 lb. Sulphate of Ammonia and 2,000 lb. Rape Dust per acre. Manures applied once every four years, prior to sowing of Swedes.

‡‡ Based on 9 courses.

§ Based on 13 courses.

CULTIVATIONS, ETC.—Ploughed : August 30-September 7. Cultivated : October 6 and 13. Harrowed : October 25. Rolled : May 4. Seed sown : October 25. Variety : Red Standard. Harvested : August 1.



## WHEAT AFTER FALLOW—HOOS FIELD

Without Manure 1851, and since.

### SCHEME FOR COMPARING A THREE YEAR FALLOW WITH A ONE YEAR FALLOW.

Each of the two strips on Hoos Wheat after Fallow is divided into four parts. In the year when a strip is in crop, one quarter continues to be fallowed, so that this quarter has a three-year fallow. Different quarters are selected for fallow in successive years in the rotation given in the following table :

#### Cropping of strips A and B

A W B

C=Crop. F=Fallow.

	1	2	3	4	Year	A1	A2	A3	A4	B1	B2	B3	B4
	1	1			1932	F	C	C	C	F	F	F	F
	2	2			1933	F	F	F	F	C	C	F	C
					1934	C	F	C	C	F	F	F	F
					1935	F	F	F	F	C	C	C	F
	3	3			1936	C	C	F	C	F	F	F	F
					1937	F	F	F	F	F	C	C	C
					1938	C	C	C	F	F	F	F	C
					1939	F	F	F	F	C	F	C	C
	4	4			1940	F	C	C	C	F	F	F	F

A comparison of the effect of a three-year fallow with the effect of a one-year fallow will be possible in every year.

Half the experiment continues to be wheat after one year fallow, and continuity with previous results will thus be maintained.

#### PRODUCE PER ACRE, 1935

	B1	B2	B3	Mean	Average, 79 years, 1856-1934
Dressed Grain—bushels .. ..	9.8	5.7	15.6	10.4	14.4
Total grain—cwt. . . . .	6.3	3.7	9.7	6.6	8.2
Weight per bushel—lb. . . . .	62.3	62.0	63.5	62.6	58.8
Total straw—cwt. . . . .	12.0	8.3	19.8	13.4	12.8

CULTIVATIONS, ETC.—Cropped sections. Ploughed : August 23. Cultivated : August 23. Harrowed : October 20, March 21. Rolled : March 26. Seed sown : October 20. Variety : Red Standard. Harvested : August 13. Fallowed section. Ploughed : August 23, May 28. Cultivated : August 23, May 11, July 3.

#### MANGOLDS—BARNFIELD, 1935.

No crop in 1935. See p. 84.



HAY—THE PARK GRASS PLOTS, 1935

Plot.	Manuring (amounts stated are per acre).	Yield of Hay per acre.			Dry Matter per acre.			
		1st Crop	2nd* Crop	Total	1st Crop	2nd Crop	Total	
1	Single dressing (206 lb.) Sulphate of Ammonia (=43 lb.N.), (with Dung also 8 years, 1856-63)	not limed	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
		limed	14.8	3.6	18.4	11.2	2.9	14.1
2	Unmanured (after Dung 8 years, 1856-63)	not limed	19.3	1.3	20.6	16.1	1.1	17.2
		limed	15.4	2.7	18.1	11.2	2.2	13.4
3	Unmanured	not limed	15.5	1.8	17.3	11.2	1.4	12.6
		limed	13.2	2.0	15.2	9.5	1.6	11.1
4-1	Superphosphate of lime (3½ cwt.)	not limed	15.4	1.1	16.5	11.4	0.8	12.2
		limed	14.7	2.2	16.9	10.8	1.8	12.6
4-2	Superphosphate of lime (3½ cwt.), and double dressing (412 lb.) Sulphate of Ammonia (=86 lb. N.)	not limed	15.0	1.5	16.5	10.5	1.2	11.7
		limed	31.8	1.7	33.5	25.9	1.4	27.3
5-1	(N. half) Unmanured following double dressing Ammonia salts (=86 lb. N.) 1856-97	not limed	33.5	3.0	36.5	27.1	2.4	29.5
5-2	(S. half) Superphosphate (3½ cwt.) Sulphate of Potash (500 lb.) following double dressing Amm. salts (=86 lb. N.) 1856-97	not limed	10.9	2.5	13.4	8.4	2.0	10.4
6	Complete Mineral Manure as Plot 7; following double dressing Amm. salts (=86 lb. N.) 1856-68	not limed	21.9	5.5	27.4	17.0	4.4	21.4
7	Complete Mineral Manure: Super. (3½ cwt.); Sulphate of Potash (500lb.); Sulphate of Soda (100lb.); Sulphate Magnesia (100lb.)	not limed	28.1	7.0	35.1	23.8	5.6	29.4
8	Mineral Manure without Potash	not limed	31.8	6.2	38.0	25.0	5.0	30.0
		limed	39.8	6.3	46.1	32.9	5.0	37.9
9	Complete Mineral Manure and double dressing (412 lb.) Sulphate of Ammonia (=86 lb. N.)	not limed	19.1	3.4	22.5	14.4	2.7	17.1
		limed	15.2	3.2	18.4	11.5	2.6	14.1
10	Mineral Manure (without Potash) and double dressing Amm. salts (=86 lb. N.)	not limed	52.9	3.1	56.0	41.4	2.5	43.9
		limed	49.7	3.9	53.6	40.1	3.1	43.2
11-1	Complete Mineral Manure and treble dressing (618 lb.) Sulphate of Amm. (129 lb. N.)	not limed	35.7	1.2	36.9	28.1	1.0	29.1
		limed	33.0	4.3	37.3	28.7	3.5	32.2
11-2	As Plot 11-1 and Silicate of Soda	not limed	35.8	15.0	50.8	29.9	12.0	41.9
		limed	50.9	8.6	59.5	40.4	6.8	47.2
12	Unmanured	not limed	49.2	15.6	64.8	35.5	12.5	48.0
		limed	54.4	11.2	65.6	40.5	9.0	49.5
13	Dung (14 tons) in 1905, and every fourth year since (omitted 1917)	not limed	13.2	4.2	17.4	10.8	3.3	14.1
		limed	39.1	7.3	46.4	32.8	5.9	38.7
14	Complete Mineral Manure and double dressing (550 lb.) Nitrate of Soda (=86 lb. N.)	not limed	45.2	9.7	54.9	37.5	7.8	45.3
		limed	54.1	10.7	64.8	42.5	8.5	51.0
15	Complete Mineral Manure as Plot 7: following double dressing Nitrate of Soda (=86 lb. N., 1858-75)	not limed	52.2	5.2	57.4	42.5	4.2	46.7
		limed	42.7	2.2	44.9	31.6	1.8	33.4
16	Complete Mineral Manure and single dressing (275 lb.) Nitrate of Soda (=43 lb. N.)	not limed	25.6	4.5	30.1	21.0	3.6	24.6
		limed	27.3	2.0	29.3	22.8	1.6	24.4
17	Single dressing (275 lb.) Nitrate of Soda (43 lb. N.)	not limed	38.3	4.6	42.9	32.2	2.7	35.9
		limed	34.2	3.3	37.5	28.0	2.6	30.6
18	Mineral Manure (without Super.), and double dressing Sulphate of Amm. (=86 lb. N.), 1905 and since; following Minerals and Amm. salts supplying the constituents of 1 ton of hay, 1865-1904	not limed	21.5	2.8	24.3	15.9	2.2	18.1
		limed	24.2	1.3	25.5	19.7	1.0	20.7
19	Farmyard Dung (14 tons) in 1905 and every fourth year since (omitted in 1917), following Nitrate of Soda (=43 lb. N.) and Minerals, 1872-1904	not limed	21.4	4.9	26.3	16.9	3.9	20.8
		limed	26.2	2.1	28.3	20.6	1.7	22.3
20	Farmyard Dung (14 tons) in 1905 and every fourth year since (omitted in 1917); each intervening year Plot 20 receives Sulphate of Potash (100 lb.); Superphosphate (200 lb.) and 1½ cwt. Nitrate of Soda (=26 lb. N.); following Nitrate of Potash and Superphosphate, 1872-1904	not limed	25.3	3.3	28.6	19.6	2.6	22.2
		limed	30.1	6.6	36.7	23.0	5.2	28.2
		not limed	31.7	5.6	37.3	24.1	4.5	28.6
		limed	27.4	4.1	31.5	21.9	3.3	25.2
		not limed	42.0	6.0	48.0	33.9	4.8	38.7
		limed	41.0	4.2	45.2	32.7	3.3	36.0
		not limed	43.9	4.0	47.9	35.9	3.2	39.1

Ground Lime was applied to the southern portion (limed) of the plots at the rate of 2,000 lb. to the acre in the winters, of 1903-4, 1907-8, 1915-16, 1923-24, 1927-28, 1931-32, and at the rate of 2,500 lb. to the acre in the winter of 1920-1921 except where otherwise stated.

Up to 1914 the limed and unlimed plot results were not separately given in the Annual Report but the mean of the two was given. From 1915 onwards the separate figures are given.

\*The second crop was carted green; the figures given are estimated hay yields, calculated from the dry matter.

CULTIVATIONS, ETC.—Harrowed: February 18. Rolled: March 25. Manures applied: February 26-27, March 1 and 28-29, May 3. Cut: 1st crop, June 24-26; 2nd crop, September 23-26.



### PARK GRASS PLOTS

#### BOTANICAL COMPOSITION PER CENT—1935 (1st Crop)

Plot	Manuring	Liming.	Gram-ineae.	Legum-inosae.	Other Orders.	" Other Orders " consist largely of
3	Unmanured	Limed	53.88	10.87	35.25	—
		Unlimed	46.67	9.74	43.58	—
7	Complete Mineral Manure	Limed	58.72	31.51	9.77	<i>Heracleum sphondylium</i>
		Unlimed	47.57	37.58	14.85	<i>Centaurea nigra</i> <i>Plantago lanceolata</i>
8	Mineral Manure (without potash)	Limed	62.83	8.68	28.49	<i>Plantago lanceolata</i> <i>Centaurea nigra</i>
		Unlimed	55.58	11.32	33.10	<i>Plantago lanceolata</i> <i>Heracleum sphondylium</i>
9	Complete Mineral Manure and double Amm. Salts	Limed	96.28	0.12	3.60	—
10	Mineral Manure (without potash) and double Amm. Salts	Unlimed	100.00	—	—	—
		Limed	99.31	—	0.69	—
		Unlimed	99.90	—	0.10	—
14	Complete Mineral Manure and double Nitrate of Soda	Limed (sun)	82.68	12.37	4.95	<i>Anthriscus sylvestris</i>
		Limed (shade)	94.46	4.29	1.25	—
		Unlimed	93.00	0.94	6.06	<i>Anthriscus sylvestris</i>
18	Mineral Manure (without Super) and double Sulphate Amm. 1905 and since.	L. 6,788 lb.	79.44	0.42	20.14	<i>Taraxacum vulgare</i>
		L. 3,951 lb.	83.36	0.08	16.56	<i>Rumex acetosa</i>
		Unlimed	99.64	—	0.36	—
19	Farmyard Dung in 1905 and every fourth year since (omitted 1917)	L. 3,150 lb.	88.59	4.87	6.54	<i>Achillea millefolium</i>
		L. 570 lb.	82.96	9.44	7.60	—
		Unlimed	81.49	6.98	11.53	—
20	Farmyard Dung in 1905 and every fourth year since (omitted in 1917): each intervening year Sulphate of potash, Super., and Nitrate of Soda	L. 2,772 lb.	80.46	10.67	8.87	—
		L. 570 lb.	89.18	4.89	5.93	<i>Achillea millefolium</i>
		Unlimed	90.20	3.89	5.91	—



PLOT	7 U	7 L	8 U	8 L	9 U	9 L	10 U	10 L	14 U	14 L (sun)	14 L (shade)
	<i>Gramineae</i>										
1. <i>Agrostis vulgaris</i> ..	8.33	0.74	8.76	1.72	0.04	1.16	10.25	0.97	0.04	—	0.48
3. <i>Alopecurus pratensis</i> ..	3.62	11.30	0.85	2.67	—	62.09	0.21	55.22	61.91	22.28	20.01
4. <i>Anthoxanthum odoratum</i> ..	1.94	0.80	3.04	0.40	0.09	2.85	21.13	1.86	—	—	0.12
5. <i>Arrhenatherum avenaceum</i> ..	0.22	6.34	7.47	13.72	—	15.06	1.36	1.66	25.78	38.08	10.96
6. <i>Avena flavescens</i> ..	0.38	3.44	1.60	5.35	—	—	—	—	0.08	0.16	1.49
7. " <i>pubescens</i> ..	2.48	8.66	5.77	15.23	—	0.06	—	—	0.04	0.76	11.08
8. <i>Briza media</i> ..	—	—	0.37	1.36	—	1.28	—	—	1.72	0.36	0.65
9. <i>Bromus mollis</i> ..	—	2.95	—	0.10	—	—	—	—	—	—	—
10. <i>Cynosurus cristatus</i> ..	—	—	—	0.10	—	—	—	—	—	—	—
11. <i>Dactylis glomerata</i> ..	6.05	11.24	2.62	5.25	—	3.61	0.05	0.04	1.96	4.47	2.20
12. <i>Festuca ovina</i> ..	20.14	4.91	17.62	8.57	—	1.74	2.41	33.33	0.16	9.54	43.24
14. <i>Holcus lanatus</i> ..	3.02	0.18	6.41	5.14	99.87	4.36	64.44	—	—	0.04	0.18
15. <i>Lolium perenne</i> ..	—	—	—	0.10	—	—	—	—	0.74	4.55	3.22
16. <i>Poa pratensis</i> ..	1.35	4.48	1.07	1.51	—	4.07	—	6.23	0.57	2.44	0.83
17. " <i>trivialis</i> ..	0.05	3.69	—	1.61	—	—	0.05	—	—	—	—
<i>Leguminosae</i>											
1. <i>Lathyrus pratense</i> ..	30.99	23.59	0.32	0.66	—	0.12	—	—	0.94	12.37	4.17
2. <i>Lotus corniculatus</i> ..	2.75	—	4.43	3.43	—	—	—	—	—	—	—
4. <i>Trifolium pratense</i> ..	3.13	1.78	6.52	4.59	—	—	—	—	—	—	—
5. " <i>repens</i> ..	0.70	6.14	0.05	—	—	—	—	—	—	—	0.12
<i>Other Orders</i>											
1 & 2. <i>Ranunculus</i> spp. ..	0.27	0.25	0.80	0.50	—	—	—	—	—	—	—
4. <i>Cerastium vulgatum</i> ..	0.05	—	0.27	0.76	—	—	—	—	—	—	—
5. <i>Stellaria graminea</i> ..	0.16	0.74	0.21	0.05	—	—	—	—	—	—	—
7. <i>Agrimonia eupatoria</i> ..	—	—	—	0.66	—	—	—	—	—	—	—
12. <i>Spiraea ulmaria</i> ..	0.11	—	0.05	—	—	—	—	—	4.91	3.95	0.65
13. <i>Anthriscus sylvestris</i> ..	—	—	—	—	—	—	—	—	—	—	—
14. <i>Conopodium denudatum</i> ..	0.22	0.06	0.05	—	—	—	—	—	0.04	—	—
15. <i>Heracleum sphondylium</i> ..	2.32	2.95	0.11	—	—	2.79	—	—	—	—	—
16. <i>Pimpinella saxifraga</i> ..	—	0.06	0.59	0.81	—	—	—	—	—	—	—
17. <i>Galium verum</i> ..	—	—	1.39	—	—	—	—	—	—	—	—
18. <i>Scabiosa arvensis</i> ..	—	0.12	2.13	5.75	—	—	—	—	—	—	—
19. <i>Achillea millefolium</i> ..	1.84	0.55	3.63	0.81	—	—	—	—	—	—	0.18
20. <i>Centaurea nigra</i> ..	4.97	1.35	2.94	5.09	—	—	—	—	—	—	—
24. <i>Leontodon hispidus</i> ..	—	0.25	6.09	4.08	—	—	—	—	—	—	—
26. <i>Taraxacum vulgare</i> ..	0.05	0.98	0.11	0.30	—	0.64	0.05	0.20	0.25	0.20	0.18
29. <i>Plantago lanceolata</i> ..	3.40	1.29	12.97	7.82	—	—	—	—	—	—	—
30. <i>Veronica chamaedrys</i> ..	—	0.55	0.37	0.55	—	—	—	—	—	—	—
34. <i>Rumex acetosa</i> ..	0.60	0.61	0.75	1.11	—	0.17	0.05	0.49	0.86	0.80	0.24
35. <i>Luzula campestris</i> ..	0.86	—	0.64	0.20	—	—	—	—	—	—	—



**WHEAT—BROADBALK FIELD, 1935**

Plot.	Manurial Treatment (amounts stated are per acre).	Dressed Grain, bushels per acre (in some cases estimated from half or quarter-bushel).					Total Grain, cwt. per acre					74-year Average 1852-1925 (prior to fallow). Total Grain, cwt.
		I	II	IV	V	Mean	I	II	IV	V	Mean	
		2A	Farmyard Manure (14 tons)	14.3	25.5	27.7	23.6	22.8	10.1	15.9	16.6	
2B	Farmyard Manure (14 tons)	20.6	23.7	25.7	21.4	22.8	13.9	14.9	16.0	12.8	14.4	19.4
3	Unmanured since 1839	7.0	3.5	20.5	3.7	8.7	5.8	3.1	12.4	3.0	6.1	6.7
5	Complete Mineral Manure §§	4.4	5.3	23.1	5.6	9.6	4.7	4.7	14.3	4.5	7.0	7.8
6	As 5, and 206 lb. Sulphate of Ammonia	9.0	11.0	27.5	16.5	16.0	6.4	7.8	16.9	10.3	10.4	12.5
7	As 5, and 412 lb. Sulphate of Ammonia	16.3	25.2	25.7	18.9	21.5	11.1	16.1	16.0	12.0	13.8	17.6
8	As 5, and 618 lb. Sulphate of Ammonia	13.4	24.2	31.3	17.6	21.6	9.7	15.1	19.2	11.7	13.9	20.1
9	As 5, and 275 lb. Nitrate of Soda	13.1	17.6	23.3	18.9	18.2	8.8	11.4	14.7	12.3	11.8	13.9††
10	412 lb. Sulphate of Ammonia	13.9	18.8	17.6	23.9	18.6	9.4	12.2	11.0	14.5	11.8	10.9
11	As 10, and Superphosphate (3½ cwt.)	12.4	15.5	17.8	15.4	15.3	8.3	10.0	11.0	9.6	9.7	12.3
12	As 10, and Super (3½ cwt.) and Sulph. Soda (366 lb.)	16.0	17.7	19.8	16.6	17.5	10.6	11.3	12.3	11.0	11.3	15.7
13	As 10, and Super (3½ cwt.) and Sulph. Potash (200 lb.)	15.3	22.5	25.6	18.1	20.4	10.0	14.3	15.7	12.1	13.0	17.0
14	As 10, and Super. (3½ cwt.) and Sulph. Magnesia (280 lb.)	13.6	18.1	24.4	14.9	17.8	9.5	11.8	14.3	10.1	11.4	15.5
15	As 5, and 412 lb. Sulphate Amm. all applied in Autumn	10.2	18.0	30.4	18.9	19.4	7.4	11.3	18.3	11.8	12.2	16.1
16	As 5, and 550 lb. Nitrate of Soda	11.8	23.6	25.1	19.8	20.1	8.8	15.0	15.4	12.4	12.9	17.8††
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia alone in alternate years	M 5.4	8.3	31.1	9.6	13.6	4.1	6.0	18.9	5.7	8.7	M 8.1*
18	Rape Cake (1,889 lb.)	A 8.2	19.0	22.0	17.9	16.8	6.4	12.4	13.5	11.1	10.8	A 16.1
19	As 7, without Super	9.9	15.9	29.7	25.5	20.2	7.2	10.0	18.3	16.3	13.0	12.6†
20	As 7, without Super	10.9	10.1	—	—	10.5	6.6	6.2	—	—	6.4	10.3§

Season	Season					Season
	I.	II.	III.	IV.	V.	
1925-26	F	F	F	C	C	1930-31 and 5-6
1926-27	F	F	F	C	C	1931-32 and 6-7
1927-28	C	C	F	F	F	1932-33 and 7-8
1928-29	C	C	F	F	F	1933-34 and 8-9
1929-30	C	C	C	C	C	1934-35 and 9-40

FOLLOWING ROTATION. After the fallows of 1925-6 to 1928-9 a regular cycle of fallowing was started in the season 1930-31. This cycle and the preceding fallows are shown in the accompanying diagram (C=crop, F=fallow). The sections (I. to V.) are numbered in order from the upper or western end of the field. Preparatory to the first fallow the field was harvested in five separate sections (1924-5).

For notes, see next page.



WHEAT—BROADBALK FIELD, 1935

Plot.	Manurial Treatment (amounts stated are per acre).	Bushel Weight in lb. (in some cases estimated from half or quarter-bushel).					Total Straw†, cwt. per acre.					74-year Average 1852-1925 (prior to fallow). Total Straw, cwt.
		Mean					Mean					
		I	II	IV	V	Mean	I	II	IV	V	Mean	
2A	Farmyard Manure (14 tons)	61.4	64.0	61.8	63.0	62.6	58.0	54.3	71.4	63.8	61.9	32.1**
2B	Farmyard Manure (14 tons)	61.9	64.2	62.9	63.3	63.1	66.0	62.8	70.9	74.4	68.5	34.2
3	Unmanured since 1839	61.8	61.6	63.9	62.0	62.3	16.8	9.5	24.8	8.2	14.8	9.8
5	Complete Mineral Manure§§	56.4	60.4	64.1	62.4	60.8	26.0	16.0	31.2	14.2	21.8	11.5
6	As 5, and 206 lb. Sulphate of Ammonia	61.2	63.0	64.2	65.0	63.4	25.3	21.4	45.6	32.3	31.2	20.3
7	As 5, and 412 lb. Sulphate of Ammonia	62.2	64.7	63.5	64.6	63.8	55.5	32.5	61.4	55.3	51.2	32.1
8	As 5, and 618 lb. Sulphate of Ammonia	60.7	63.7	62.5	62.6	62.4	66.3	63.7	71.4	72.7	68.5	39.8
9	As 5, and 275 lb. Nitrate of Soda	62.5	63.8	64.0	64.7	63.8	35.6	32.0	52.4	40.0	40.0	24.6††
10	412 lb. Sulphate of Ammonia	62.7	63.9	63.6	64.5	63.7	33.0	30.8	35.3	40.2	34.8	17.8
11	As 10, and Superphosphate (3½ cwt.)	63.2	64.4	64.0	63.8	63.8	36.5	31.3	41.3	41.2	37.6	21.4
12	As 10, and Super. (3½ cwt.) and Sulph. Soda (366 lb.)	63.5	64.0	63.5	64.0	63.8	42.5	34.9	46.2	43.3	41.7	26.8
13	As 10, and Super. (3½ cwt.) and Sulph. Potash (200 lb.)	62.7	64.4	63.1	63.4	63.4	43.2	39.6	59.9	52.4	48.8	30.6
14	As 10, and Super. (3½ cwt.) and Sulph. Magnesia (280 lb.)	63.6	64.3	62.0	63.6	63.4	50.8	33.9	52.9	45.7	45.8	26.8
15	As 5, and 412 lb. Sulphate Amm. all applied in Autumn	60.4	61.7	63.9	64.1	62.5	33.8	26.9	47.6	29.7	34.5	28.2
16	As 5, and 550 lb. Nitrate of Soda	61.4	62.8	62.8	64.0	62.8	53.2	50.3	63.2	56.9	55.9	35.2††
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia alone in alternate years	M59.2	62.6	64.1	64.2	62.5	13.0	15.4	36.6	14.4	19.8	M12.3*
18	Rape Cake (1,889 lb.)	A61.2	63.8	63.4	65.3	63.4	40.9	35.4	56.6	46.1	44.8	A28.1
19	As 7, without Super	60.4	62.0	63.9	63.6	62.5	31.7	24.7	60.3	37.9	38.6	22.0‡
20	As 7, without Super	50.0	54.0	—	—	52.0	37.4	23.3	—	—	30.4	18.6§

† Includes straw, cavings, and chaff. \*A=Ammonia series. M=Mineral series.  
 \*\* Twenty-six years only, 1900-25. †† Forty-one years only, 1885-1925. ‡ Thirty-three years only, 1893-1925. § Eighteen years only, 1906-1925 (no crop in 1912 and 1914).  
 §§ Complete mineral manure: 3½ cwt. Super., 200 lb. Sulph. Potash, 100 lb. Sulph. Soda, 100 lb. Sulph. Magnesia. Sulphate of Ammonia is applied as to one-third in Autumn and two-thirds in Spring except for Plot 15. Nitrate of Soda is all given in Spring, there being two applications at an interval of a month on Plot 16.  
 CULTIVATIONS, Etc.—Cropped sections: Ploughed: August 15-21, September 20-25. Harrowed: October 20-24. Seed sown: October 23-24. Variety: Red Standard. Manures applied: October 18-19, March 27-28, May 3. Harvested: August 6-8. Fallowed section: Ploughed: August 15-21, September 20-25, July 22, October 3-14. Harrowed: October 20-23. Cultivated: March 11, April 23, May 1 and 29, July 4.



**BROADBALK : SAMPLING FOR ROOT-ROTS, 1935.**

Each plot was divided into ten portions, two samples, each consisting of two half-metres of row length, being taken from each portion. Plants were classified as :

Vigorous : Ears over 1 in. long with good grain.

Weak : Ears less than 1 in. long with good grain.

Whiteheads : Plants dead, with very shrivelled or no grain.

Plants were also classified according to clean, slight or heavy blackening of the stem-bases and roots.

All plants with whiteheads had heavy blackening of the roots. The table shows a summary of the results.

Blackening (of the stem bases and roots) was due partly to *Ophiobolus graminis* and partly to *Cercospora herpotrichoides*. It was not found possible always to separate these two by a naked eye classification ; so that no attempt was made to distinguish between them in recording.

Series	Plot No.	Treatment	Ear classification			Root classification		
			Percentage of plants			Percentage of plants		
			Vigorous	Weak	White heads	Clean	Slight	Heavy
IV 1st year after fallow (Fallow, 1934)	2	Dung .. .. .	69.7	15.2	15.2	9.4	46.8	43.8
	3	Unmanured .. ..	69.5	18.5	12.0	34.9	36.3	28.8
	5	Complete minerals ..	64.7	21.0	14.3	19.3	39.4	41.3
	6	Minerals + sulph. amm.	79.4	11.5	9.1	11.3	39.0	49.7
V 2nd year after fallow (Fallow, 1933)	2	Dung .. .. .	73.1	13.8	13.1	11.1	56.3	32.6
	3	Unmanured .. ..	54.1	23.5	22.4	26.4	60.6	23.0
	5	Complete minerals ..	61.4	17.6	21.0	13.0	65.8	21.2
	6	Minerals + sulph. amm..	73.8	9.2	17.0	17.2	52.5	30.3
II 3rd year after fallow (Fallow, 1932)	2	Dung .. .. .	68.7	20.0	11.3	18.6	53.3	28.0
	3	Unmanured .. ..	33.4	32.2	34.4	22.7	47.4	29.9
	5	Complete minerals ..	36.7	24.7	38.6	23.4	45.1	31.5
	6	Minerals + sulph. amm.	44.6	23.8	31.6	21.4	47.1	31.4
Control Gt. Harpenden		Victor wheat—after beans	88.0	8.0	4.0	80.3	16.0	3.6

*Note.*—The figures for the root classification are taken from vigorous and weak plants only since all whiteheads showed heavy blackening of the roots.

In the unmanured and mineral fertiliser plots sampled the amount of whiteheads increased progressively the longer the time which elapsed from the last fallowing. For the first, second and third years after fallowing the average percentages of whiteheads for plots 3, 5 and 6 together were 11.8, 20.1 and 34.8 respectively. This is what would be expected, although the figures are probably higher this year than usual, owing to weather conditions having been favourable for cereal root-rots, for some reason not fully understood. The figures for the dunged plot were aberrant, being a little higher than the others for the first year after fallowing, and remaining at about the same level or possibly decreasing slightly instead of increasing in subsequent years as on the plots with no dung. This may be a real effect due to factors such as microbiological antagonism. There was also less disease in the plot with mineral fertilisers and ammonium sulphate than in the plot with minerals alone.

The figures for the root classification were not so consistent, but gave no indication that the percentage of plants with heavy blackening increased with the time since the last fallow, the percentage being highest the first year after fallowing on all but the unmanured plot. Apart from the anomalous behaviour of the unmanured plot in the first year after fallowing the percentages of heavy blackening were about the same on all plots.

No connection was found between the percentage of whiteheads or of heavy blackening and plant number.



BARLEY—HOOS FIELD, 1935

Plot	Manuring (amounts stated are per acre).	Dressed Grain bushels per acre		Total Grain cwt. per Acre	Bushel weight in lb.	Total Straw cwt. per Acre †	
		1935	Average 1852-1928			1935	Average 1852-1928
1O	Unmanured .. .. .	8.6	13.4	5.2	55.2	11.1	7.8
2O	Superphosphate only (3½ cwt.) ..	18.7	19.0	10.6	57.3	14.7	9.8
3O	Alkali Salts only (200 lb. Sulphate of Potash; 100 lb. Sulphate of Soda; 100 lb. Sulphate of Magnesia) .. .. .	15.8	14.3	9.1	56.5	13.2	8.7
4O	Complete Minerals; as 3O with Superphosphate (3½ cwt.) ..	28.4	19.0	15.6	56.1	19.1	11.2
5O	Potash (200 lb.) and Superphosphate (3½ cwt.) .. .. .	18.4	15.5	10.5	58.1	14.0	9.4
1A	Ammonium Salts only (206 lb. Sulphate of Ammonia) .. .. .	16.3	23.7	10.2	53.6	19.8	13.7
2A	Superphosphate and Amm. Salts ..	51.1	35.8	28.3	57.2	31.1	20.4
3A	Alkali Salts and Amm. Salts ..	39.8	25.8	21.7	55.2	31.0	16.0
4A	Complete Minerals and Amm. Salts ..	57.2	39.3	31.0	57.6	35.3	23.6
5A	Potash, Super. and Amm. Salts ..	48.3	33.8	26.8	57.4	33.8	21.7
1AA	Nitrate of Soda only (275 lb.) ..	21.5	24.3*	12.5	52.7	23.8	15.4*
2AA	Superphosphate and Nitrate of Soda ..	55.1	38.8*	30.4	57.5	36.2	23.1*
3AA	Alkali Salts and Nitrate of Soda ..	33.6	24.5*	24.2	55.3	28.3	16.6*
4AA	Complete Minerals and Nitrate of Soda .. .. .	53.4	37.7*	30.5	57.7	37.1	23.6*
1AAS	As Plot 1AA and Silicate of Soda (400 lb.) .. .. .	42.7	30.2*	23.6	55.9	31.5	18.2*
2AAS	As Plot 2AA and Silicate of Soda (400 lb.) .. .. .	55.2	39.7*	30.6	58.0	35.2	23.9*
3AAS	As Plot 3AA and Silicate of Soda (400 lb.) .. .. .	45.0	31.2*	24.7	56.5	36.0	19.9*
4AAS	As Plot 4AA and Silicate of Soda (400 lb.) .. .. .	66.1	39.9*	35.6	57.5	35.2	25.4*
1C	Rape Cake only (1,000 lb.) ..	48.2	35.5	26.2	57.0	29.7	20.6
2C	Superphosphate and Rape Cake ..	57.6	38.1	31.8	57.8	34.3	22.0
3C	Alkali Salts and Rape Cake ..	48.7	33.7	27.6	57.5	30.5	20.4
4C	Complete Minerals and Rape Cake ..	58.3	37.5	31.4	57.6	34.5	22.6
7-1	Dung (14 tons) 1852-71; afterwards unmanured .. .. .	37.6	22.5‡	20.0	56.5	23.7	13.5‡
7-2	Farmyard Manure (14 tons) ..	57.7	44.6‡	33.9	57.1	59.3	28.1‡
6-1	Unmanured since 1852 .. .. .	19.7	14.7	11.0	54.2	18.4	8.6
6-2	Ashes from Laboratory furnace 1852-1933; afterwards unmanured ..	23.6	15.7	12.7	55.5	16.9	9.3
1N	Nitrate of Soda only (275 lb.) ..	35.0	28.7§	23.0	55.6	27.7	17.8§
2N	Nitrate of Soda only (275 lb.) ..	50.7	31.7§§	28.3	56.8	34.3	20.0§§

|| 1 cwt. = 2.15 bushels. 1912 and 1933 all plots were fallowed.

† Total straw includes straw, cavings and chaff.

\* 60 years, 1868-1928. ‡ 56 years, 1872-1928. § 75 years, 1853-1928. §§ 69 years, 1859-1928.

CULTIVATIONS, ETC.—Ploughed: September 5, January 8-22. Harrowed: March 6, 8-9. Rolled: May 8. Manures applied: January 8-22, March 4,5. Seed sown: March 8-9. Variety: Plumage Archer. Harvested: August 14.