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ROTHAMSTED  
RESEARCH

## Report for 1931

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## The Classical Experiments

### Rothamsted Research

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DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
<i>I. Arable and Replicated Experiments—</i>								
Pastures (1)	Mangolds	Yellow Globe	Jan. 26 plough, Feb. 26 horse harrow. April 15 roll. May 13, 29 and June 25 grubbed. June 2-3 side hoe. June 19-July 8 single. Hoed throughout summer.	2 S/Amm. 1 S/Potash ¾ Super.	April 14	—	Oct. 2 and 3	30 tons
(2)	Potatoes (Expt.)	Ally	Jan. 26, Mar. 4-21 plough. Mar. 28 cultivate with tractor, then roll and harrow. Mar. 30 cultivate 2nd time.	see p. 154	April 13	—	Sept. 30	see p. 154-5
(3)	Oats	Marvellous	Jan. 26 plough, Feb. 26 horse harrow. Feb. 27 harrow in.	—	Feb. 27	Aug. 18	Sept. 9	14 cwt.
(4)	Beans and Barley		Jan. 26 plough, Feb. 26 horse harrow. Feb. 27 harrow in.	—	Feb. 27	Aug. 21	Sept. 10	23 cwt.
(5)	Kale		June 27 plough in spring oats near gate. Work down and harrow in with tractor. Folded off in Sept.	1 S/Amm.	June 27	—	—	—
Gt. Harpenden (1)	Winter Oats	Grey Winter	Sept. 23, 1930, plough. Oct. 7 tractor harrow and harrow in oats. Mar. 23-25 harrow. April 24 sow N/Soda.	3 Super. 3 Potash Salt ¾ N/Soda late spring.	Oct. 6-7	Aug. 7	Aug. 24 and 25	18 cwt.
(2)	Wheat Varieties	Wilhelmina Swedish Iron Victor	Sept. 23, 1930, plough. Oct. 7 tractor harrow. Oct. 14-15 harrow in. April 24 sow N/Soda.	3 Super. 3 Potash Salt ¾ N/Soda late spring.	Oct. 14-15	Aug. 21	Aug. 24 and 25	17 cwt. (W) 19 " (S) 18 " (V)
(3)	Spring Oats (Expt.)	Marvellous, Victory and Golden Rain	Dec. 29, 1930-Jan. 12 horse plough. Feb. 25 horse harrow and then harrow in. Mar. 19 sow N/Soda.	3 Super. 3 Potash Salt ¾ N/Soda early spring.	Feb. 25	Aug. 17	Sept. 7	see p. 143-4

DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931 (Cont.)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Gt. Harpenden (cont.) (4)	Rye	—	Sept. 22, 1930, plough. Oct. 7 tractor harrow. Oct. 14-15 harrow in. April 24 sow N/Soda. All undersown trefoil (5 lb.) and Western Wolths Ryegrass (20 lb.) on April 15. April 17-24 horse harrow. Mar. 17 plough in dung with horses, harrow after with tooth harrows. May 1 harrow and roll. Hand dig the plots marked for this treatment. May 8 cultivate with Duotrac implements, harrow and roll. June 15-July 9 hand hoe. Oct. 3-10, 1930, cultivate. April 1 harrow and roll.	3 Super. 3 Potash Salt ¾ N/Soda late spring.	Oct. 14-15	Aug. 7	Aug. 24 and 25	18 cwt.
(5)	Sugar Beet (Expt.)	Kuhn	Mar. 17 plough in dung with horses, harrow after with tooth harrows. May 1 harrow and roll. Hand dig the plots marked for this treatment. May 8 cultivate with Duotrac implements, harrow and roll. June 15-July 9 hand hoe. Oct. 3-10, 1930, cultivate. April 1 harrow and roll.	see p. 157	May 8 and 9	—	Nov. 3	see p. 157-9
Little Hoos (1)	Wheat (Cultivation Expt.)	Million	Sept. 18, 1930, tractor plough. Oct. 10, tooth-harrow twice. Mar. 26 roll. Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	see p. 148	Oct. 10	Aug. 24	Sept. 9-11	see p. 148-9
(2)	Wheat (Top Dressing Expt.)	Million	Sept. 18, 1930, tractor plough. Oct. 10, tooth-harrow twice. Mar. 26 roll. Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	see p. 145	Oct. 10	Aug. 19-22	Sept. 7-9	see p. 145-6
(3)	Forage (Expt.)	Oats, Wheat, Vetches, Peas and Beans	Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	see p. 150	Oct. 9-11	July 9-14	Sept. 11-17	see p. 151-3
Pennell's Piece	Spring Oats	Marvellous	Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	—	Feb. 26	Aug. 20	Sept. 10	24 cwt.
Great Knott	Beans	Winter	Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	3 Potash Salt 3 Super.	Oct. 1	Aug. 10-12	Sept. 8-12	26 cwt.
Long Hoos (1)	Kale (after Rye for sheep)	Marrow-stem and Thousand-headed	Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	15 tons dung for rye. 2 N/Soda.	June 13	Sheep folded and February	January and February	16-18 tons
(II and III)	Linseed (after Rye for sheep)	Argentine ?	Sept. 18-23, 1930, horse plough. Oct. 10-11 horse drag and disc harrow. Mar. 26 tooth-harrow and roll. Jan. 13 plough. Feb. 26 horse harrow before and after drilling. Sept. 10-22, 1930, plough. Oct. 1 harrow in. Horse and hand hoe Feb.-June. Sept. 1930 cart dung and plough in. Sept. 26 sow rye. Eaten by sheep April-May. May 21-June 12 several times tractor plough and cultivate. Aug. 4 horse hoe. April 30-May 6 plough and cultivate. May 7 roll and harrow.	15 tons dung for rye. 1 S/Amm.	May 7	Sept. 16-19	Oct. 7	10½ cwt.

DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931 (Cont.)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per Acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Long Hoos (V) (cont.)	Temporary Ley (Expt.)	—	April 11 roll. June 16-18 plough with horses, plots that had one crop only.	see p. 141	April 11	July 2, 1st crop Aug. 27, 2nd crop	July 3, 1st crop, for silage Sept. 21, 2nd crop, for hay	see p. 141
(VI)	Maize after Rye	Giant Horse Tooth	May 20-21 tractor plough. May 30 harrow, then roll. Harrow in. June 1 roll. July 22-Sept. 1 hand and horse hoe.	2 S/Amm.	May 30	Sept. for cows	—	—
(VII)	Rape Kale (after Rye)	—	July 25 harrow. July 27-30 carting and spreading dung. Aug. 1 harrow and roll. Sept. 14-15 horse hoe.	20 tons dung.	Aug. 1	—	—	—
Fosters	Barley (Expt. undersown for ley)	Plumage Archer	Mar. 19-21 horse plough. Mar. 23 harrow twice. Mar. 24 harrow in Mar. 27 horse roll.	see p. 142	Mar. 23 barley April 23 the rest	Aug. 27	Sept. 14	see p. 142
	Forage (Expt.)	—	July 8-11 plough. July 16 tractor cultivate. July 20-21 harrow. July 25 harrow in all seeds.	3 Super. 2 Potash Salt 3 S/Amm. 2½ Super.	July 22-24	Nov. 17 and 18	Nov. 18 and 19	Expt. still in progress
	Seeds Hay	16lb. Ital. Rye Grass 12lb. Broad Red Clover	Dec. 3-4 sow manure. Mar. 4, 1st application of N/Soda. Apr. 25 2nd application of N/Soda. Apr. 7 horse roll.	3 Potash Salt (30% N). 2 N/Soda.	April 11, 1930	(1) June 11-12 for silage June 16 for Hay (2) Aug. 26	June 12-13 June 22-23 Sept. 21	40 cwt. (10 acr.) 20 cwt. (4 acr.)
II. Grass Land— Little Knott (1) (2) (3)	Grazing Grazing Grass for silage Grazing	— — —	— — —	— — —	— — —	— — —	— — —	— — —
Foster's Corner	Grazing	—	—	3 Potash Salt (winter)	—	June 23	June 24	—

DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931 (Cont.)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Great Knott (1)	Grazing then hay	—	June 27 turn hay.	—	—	June 20-22	June 29	15 cwt.
(2)	Grazing	—	June 20-22 topped with tractor mower.	—	—	—	—	—
Great Field	Grazing	—	Mar. 14 horse roll. June 9 topped section 2 with horse mower. July 13 topped section 1 with tractor mower.	3½ Potash Salt (winter)	—	—	—	—
New Zealand	Grazing	—	June 21 topped with tractor mower.	—	—	—	—	—
Stackyard	Grazing	—	June 19 topped with tractor mower.	—	—	—	—	—
West Barn-field (1)	Grazing	—	July 21 topped with tractor mower.	3 Potash Salt (winter)	—	—	—	—
(2)	Grazing	—	July 21 topped with tractor mower.	3 Potash Salt (winter)	—	—	—	—
Sawyers (1)	Grazing, then hay	—	Feb. 12-13 sow N/Soda. Jun. 19 tractor topped.	1 N/Soda.	—	June 29	July 6-8	20 cwt.
(2)	Grazing, then hay	—	Dec. 9-15, 1930, Super. and Potash Salt applied. June 30-31 topped with tractor mower.	3 Super.	—	July 1	July 9-11	20 cwt.
(3)	Hay, after early grazing	—	Dec. 9-15 Super. and Potash Salt applied. Feb. 12 N/Soda applied. May 10 closed for hay.	3 Potash Salt	—	June 26	July 3	30 cwt.
Gt. Harpenden	Grazing	—	Mid July topped with tractor mower. Then put up for crop of wild white clover seed, but weather prevented, so made into ordinary hay.	2½ Super. 2 Potash Salt 1 N/Soda (spring)	—	Sept. 16-21 (cut with tractor)	—	20 cwt.
III. Classical and Rotation—Experiments—Broadbalk	Wheat	Red Standard	Aug. 30 and Sept. 1, 1930, tractor cultivate. Oct. 2-7 tractor plough. Oct. 15 tractor drawing disc harrows followed by drag harrow. Oct. 16 harrow in seed.	see p. 126	Oct. 16	Aug. 17 and 18	Aug. 27-29	see p. 125-6

**DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931 (Cont.)**

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Hoos	Barley	Plumage Archer Spratt Archer	Sept. 15, 1930, cultivate. Mar. 7 plough in dung. Mar. 16 harrow all plots except 7 <sup>1</sup> and 7 <sup>2</sup> . Mar. 18 harrow in seed. Hand and horse hoe on various dates. May 11-July 23. Rows again 18 ins. apart. Nov. 17-19, 1930, steam plough. Mar. 26 and 27 cultivate across. April 15 cultivate for seed bed. May 21 preparing land for re-sowing. July to Aug. horse and hand hoe. Oct. 14 and 15, 1930, tractor plough. Oct. 31 disc harrow.	see p. 128	Mar. 17	Aug. 28 and 29	Sept. 24-25	see p. 128
Barnfield	Mangolds and Swedes	(M) Prize Winner Yel-low Globe (S) Purple Top	Oct. 14 and 15, 1930, tractor plough. Oct. 31 disc harrow.	see p. 120	April 15-17 Mangolds (Resown with Mangolds and Swedes May 26) Oct. 31 and Nov. 1	—	Oct. 19-28	see p. 120-1
Agdell	Wheat	Red Standard	Mar. 28 drag harrow. Mar. 30 horse roll.	see p. 118	—	Aug. 24	Aug. 26	see p. 118
Park	Hay	—	Aug. 5 and Oct. 29, 1930 plough Oct. 30 harrow before and after sowing seed. April 1 roll. Dec. 8-9, 1930, plough. May 8-9 plough and harrow after. May 20 harrow and roll. June 26 and Sept. 15 horse hoe. April 1, roll.	see p. 122	—	June 25-27 (1st crop) and July 1 Nov. 10-13 (2nd crop)	June 30 and July 1 Nov. 13	see p. 122
Gt. Hoos 4 Course Rotation	Wheat Swedes Seeds	Yeoman Garton's Magnificent Italian Rye Grass, Dutch White Clover, Alsike Clover	—	see p. 132	Oct. 30 May 20 April 22	Aug. 27 — June 24	Sept. 7 Nov. 6-17 June 24	see p. 133 see p. 133 see p. 133
	Barley	Plumage Archer	Dec. 8-10, 1930, plough. Mar. 6 harrow before and after sowing. Mar. 25 roll.	see p. 132	Mar. 6	Aug. 27	Sept. 14	see p. 134

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**DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, ROTHAMSTED, 1931 (Cont.)**

Field	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Long Hoos 6 Course Rotation	Wheat	Yeoman II	Aug. 20-26, 1930, cultivate.	see p. 131	Oct. 3	Aug. 21	Aug. 27	see p. 135
	Sugar Beet	Kuhn	Aug. 20-26, 1930, cultivate. Feb. 5-May 6 plough. May 7 harrow and roll. June 26-July 27 hand and horse hoe.	see p. 131	May 9	—	Nov. 3-6	see p. 135
	Barley	Plumage Archer	Aug. 20-26, 1930 cultivate. Feb. 5-6 plough. Mar. 6 harrow before and after sowing. Mar. 26 roll	see p. 131	Mar. 6	Aug. 29	Sept. 7	see p. 135
	Clover	Broad Red	Aug. 20-26, 1930, cultivate. April 1 roll.	see p. 131	April 22	June 10	June 10	see p. 136
	Potatoes	Ally	Aug. 20-26, 1930, cultivate. Feb. 4 plough. April 11 harrow	see p. 131	April 14	—	Oct. 1	see p. 136
	Forage	Rye, Beans, Vetches, followed by Mustard	Aug. 20-26, 1930, cultivate.	see p. 131	Oct. 3	June 10	June 10	see p. 136

## CROP YIELDS ON THE EXPERIMENTAL PLOTS

Notes.—In each case the year refers to the harvest, *e.g.*, Wheat 1931 means wheat harvested in 1931. In the tables, total straw includes straw, cavings and chaff. These were weighed separately prior to 1928. Since 1928 the figure given as total straw in the replicated experiments has been arrived at as the difference: total sheaf weight—weight of grain.

### CONVERSION TABLE.

1 acre .. .. =	0.405 Hectare .. ..	0.963 Feddan.
1 bushel (Imperial) .. =	0.364 Hectolitre (36.364 litres)	0.184 Ardeb.
1 lb. (pound avoirdupois) =	0.453 Kilogramme .. ..	1.009 Rotls.
1 cwt. (hundredweight, 112 lb.) .. .. =	50.8 Kilogrammes .. ..	} 113.0 Rotls. 1.366 Maunds.
1 ton (20 cwt. or 2,240 lb.) =	1016 Kilogrammes.	
1 metric quintal or Doppel Zentner (dz.) .. =	{ 100.0 Kilogrammes. 220.46 lb.	
1 bushel per acre .. =		0.9 Hectolitre per Hectare ..
1 lb. per acre .. =	1.12 Kilogramme per Hectare	1.049 Rotls per Feddan
1 cwt. per acre .. =	1.256 dz. per Hectare ..	117.4 Rotls per Feddan
1 ton per acre .. =	25.12 dz. per Hectare.	
1 dz. per Hectare .. =	0.796 cwt. per acre.	
1 kg. per Hectare .. =	0.892 lb. per acre .. ..	

In America the Winchester bushel is used = 35.236 litres. 1 English bushel = 1.032 American bushels.

### CONVERSION TABLE.—CWT. TO BUSHELS.

Crop.	Cwt.									
	1	2	3	4	5	10	15	20	25	30
Wheat (60 lb.) bushels ..	1.87	3.73	5.60	7.47	9.33	18.67	28.00	37.33	46.67	56.00
Barley (52 lb.) .. ..	2.15	4.31	6.46	8.62	10.77	21.54	32.31	43.08	53.85	64.62
Oats (42 lb.) .. ..	2.67	5.33	8.00	10.67	13.33	26.67	40.00	53.33	66.67	80.00

The yields of grain in the 1925-26 Report were given for the replicated experiments in standard bushels of 60, 52 and 42 lb. respectively.

### Average Wheat Yield of Various Countries.

Country.	Mean yield per acre, 1919-28. cwt.	Country.	Mean yield per acre, 1919-28. cwt.
Great Britain .. ..	17.5	Denmark .. ..	22.8
England .. ..	17.4	Argentina .. ..	6.6
Hertfordshire .. ..	16.4	Australia .. ..	6.4
France .. ..	10.9	Canada .. ..	8.9
Germany .. ..	14.5	United States .. ..	7.6
Belgium .. ..	20.3	U.R.S.S. (Europe and Asia)*	5.8

Note.—Figures for Great Britain, England and Hertfordshire are taken from the Ministry of Agriculture's "Agricultural Statistics," Vols. 54-63. Other figures from "International Year Book of Agricultural Statistics," 1919-29.  
\*1924-28.



## METEOROLOGICAL RECORDS, 1931

	Rain.		Drainage through soil.			Bright Sun- shine.	Temperature (Mean).				
	Total Fall 1/1000th Acre Gauge.	No. of Rainy Days (0.01 inch or more) 1/1000th Acre. Gauge.	20 ins. deep.	40 ins. deep.	60 ins. deep.		Max.	Min.	1 ft. in ground	Solar Max.	Grass Min.
1931.	Inches.	No.	Inches.	Inches.	Inches.	Hours.	°F.	°F.	°F.	°F.	°F.
Jan. ..	1.704	21	1.231	1.323	1.321	64.8	41.6	32.8	36.9	64.9	28.7
Feb. ..	1.870	20	1.180	1.329	1.301	65.4	42.7	32.7	37.1	81.4	29.8
Mar. ..	0.091	3	0.073	0.166	0.160	153.6	46.2	31.8	38.0	97.1	27.9
April ..	3.460	20	1.538	1.683	1.669	115.7	51.4	39.2	44.3	104.5	36.7
May ..	2.532	15	0.878	0.971	0.993	172.6	59.2	44.3	51.3	118.4	39.6
June ..	1.520	9	0.007	0.054	0.041	198.0	65.3	50.8	58.9	133.6	46.9
July ..	3.942	19	1.440	1.666	1.703	157.8	65.9	52.5	60.6	132.7	48.7
Aug. ..	3.455	17	1.609	1.681	1.662	155.6	64.1	51.3	58.7	127.8	47.8
Sept. ..	2.128	15	0.829	0.904	0.862	120.6	58.2	46.4	54.4	113.2	42.0
Oct. ..	0.664	9	0.000	0.010	0.003	118.4	54.4	40.9	49.2	101.1	35.7
Nov. ..	3.202	21	2.425	2.429	2.374	68.9	50.0	39.0	44.7	78.6	33.8
Dec. ..	1.109	12	0.643	0.696	0.662	40.5	44.6	36.2	41.1	62.9	32.3
Total or Mean	25.677	181	11.853	12.912	12.751	1431.9	53.6	41.5	47.9	101.3	37.5

### RAIN AND DRAINAGE.

#### MONTHLY MEAN FOR 61 HARVEST YEARS, 1870-1—1930-31.

	Rain- fall.	Drainage.			Drainage % of Rainfall.			Evaporation.		
		20-in. Gauge.	40-in. Gauge.	60-in. Gauge.	20-in. Gauge.	40-in. Gauge.	60-in. Gauge.	20-in. Gauge.	40-in. Gauge.	60-in. Gauge.
	Ins.	Ins.	Ins.	Ins.	%	%	%	Ins.	Ins.	Ins.
Sept. ..	2.381	0.819	0.794	0.733	34.4	33.3	30.8	1.562	1.587	1.648
Oct. ..	3.139	1.791	1.760	1.629	57.1	56.1	51.9	1.348	1.379	1.510
Nov. ..	2.881	2.204	2.260	2.131	76.5	78.4	74.0	0.677	0.621	0.750
Dec. ..	2.871	2.451	2.553	2.437	85.4	88.9	84.9	0.420	0.318	0.434
Jan. ..	2.410	1.975	2.169	2.070	81.9	90.0	85.9	0.435	0.241	0.340
Feb. ..	2.029	1.511	1.625	1.552	74.5	80.1	76.5	0.518	0.404	0.477
March ..	1.966	1.048	1.176	1.112	53.3	59.8	56.6	0.918	0.790	0.854
April ..	2.051	0.673	0.754	0.718	32.8	36.8	35.0	1.378	1.297	1.333
May ..	2.068	0.483	0.551	0.518	23.3	26.6	25.0	1.585	1.517	1.550
June ..	2.213	0.531	0.561	0.540	24.0	25.3	24.4	1.682	1.652	1.673
July ..	2.739	0.728	0.758	0.709	26.6	27.7	25.9	2.011	1.981	2.030
Aug. ..	2.663	0.717	0.731	0.687	26.9	27.5	25.8	1.946	1.932	1.976
Year ..	29.411	14.931	15.692	14.836	50.8	53.3	50.4	14.480	13.719	14.575

Area of each gauge 1/1000th acre.

### CHEMICAL ANALYSES OF MANURES USED IN REPLICATED EXPERIMENTS, 1931

Manures.	% N.	Manures.	Total.	% P <sub>2</sub> O <sub>5</sub>	
				Soluble in water.	Soluble in Cit. Acid
Sulphate of A mm. (1)	20.8	Superphosphate (3) ..	16.7	15.9	—
Sulphate of A mm. (2)	21.0	Superphosphate (4) ..	17.0	15.4	—
Muriate of Amm. ..	26.0	Superphosphate (5) ..	16.1	—	—
Nitrate of Soda ..	15.7	Mineral Phosphate ..	25.9	—	—
Cyanamide ..	20.0	(90% through 120 mesh)			
		Basic Slag—High Sol.	14.9	—	14.4
		Basic Slag—Low Sol. ..	15.1	—	3.5

Manures.	% K <sub>2</sub> O	% Cl	Manures.	% N.	% P <sub>2</sub> O <sub>5</sub>	% K <sub>2</sub> O
Sulphate of Potash	49.3	—	Chicken Manure ..	1.37	1.61	0.72
Muriate of Potash ..	51.4	—	Guano .. ..	12.1	10.3	2.82
Potash Manure Salts (30%) ..	31.2	—	Complete Fertiliser, I.C.I. .. ..	10.3	10.8	20.7
Agricultural Salt ..	—	56.8				

- (1) Used in R.F. 1-144, R.W. 1-48, R.O. 1-72, R.B. 1-32.
- (2) Used in R.P. 1-162, R.S. 1-48, W.S. 1-144.
- (3) Used in R.F. 1-144.
- (4) Used in R.P. 1-162, R.S. 1-48, W.S. 1-144.
- (5) Used in T.H. 1-25, M.A. 1-150, H.G. 1-25, O.G. 1-25, K.G. 1-16, F.G. 1-25.

#### FOUR-COURSE ROTATION

Manures.	% Organic matter		% N.		% P <sub>2</sub> O <sub>5</sub>		% K <sub>2</sub> O	
	1930	1931	1930	1931	1930	1931	1930	1931
Chaff .. ..	82.2	83.3	0.376	0.273	0.113	0.080	0.625	0.925
Dung .. ..	25.5	16.8	0.882	0.498	0.330	0.154	1.44	0.449
Adco .. ..	21.1	12.83	0.367	0.330	0.195	0.262	0.287	0.121
Superphosphate	—	—	—	—	17.4	16.7	—	—
Mineral Phosphate (90% through 120 mesh)	—	—	—	—	26.1	26.1	—	—
Muriate of Potash	—	—	—	—	—	—	52.6	51.4
Sulphate of Ammonia ..	—	—	21.2	20.8(1) 21.0(2)	—	—	—	—

- (1) Used on all cases except swedes, treatments 4 and 5.
- (2) Used for swedes treatments 4 and 5.

#### SIX-COURSE ROTATION

Manures.	% N.		% P <sub>2</sub> O <sub>5</sub>		% K <sub>2</sub> O	
	1930	1931	1930	1931	1930	1931
Sulphate of Ammonia	20.9	20.8(1) 21.0(2)	—	—	—	—
Superphosphate ..	—	—	17.4	16.7(1) 17.0(2)	—	—
Muriate of Potash	—	—	—	—	51.3	51.4

- (1) Used in all cases except potatoes and sugar beet at Rothamsted and Woburn.
- (2) Used for potatoes and sugar beet at Rothamsted and Woburn.

## 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-one Courses, 1848-1931.</b>								
	Roots (Swedes) .. cwt.*	32.0	16.1	174.0	206.5	352.0	310.0	
	Barley—							
	Dressed Grain bush.	21.6	19.8	22.7	26.6	30.3	35.0	
	Total Straw† cwt.	13.3	13.2	13.6	15.6	18.4	21.7	
	Beans—							
	Dressed Grain bush.‡‡	—	13.1	—	18.2	—	22.3	
	Total Straw cwt.	—	9.2	—	13.2	—	15.3	
	Clover Hay cwt.§	—	25.6	—	52.1	—	52.0	
	Wheat—							
	Dressed Grain bush.	23.1	21.6	26.9	29.4	27.5	29.0	
	Total Straw .. cwt.	22.9	21.2	28.2	29.8	29.4	29.3	
<b>Present Course (21st), 1928, 1929, 1930 and 1931.</b>								
1928	Roots (Swedes) cwt.	19.7	11.7	143.8	163.6	293.2	223.2	
1929	Barley—							
	Dressed Grain bush.	9.9	11.8	14.4	11.5	13.4	26.0	
	Offal Grain lb.	46.0	56.0	92.0	48.0	40.0	64.0	
	Straw lb.	516.0	750.0	765.0	1011.0	746.0	1619.0	
	Total Straw† cwt.	7.0	9.5	11.5	12.8	9.3	18.9	
	Wt. of Dressed Grain per bush. } lb.	55.3	53.2	55.8	56.6	55.4	56.9	
	Proportion of Total Grain to 100 of Total Straw } cwt.	75.6	64.5	69.6	48.8	74.7	72.9	
1930	Clover Hay (1st Crop) cwt.	—	4.3	—	36.2	—	28.9	
	(2nd „) cwt.**	—	3.3	—	13.6	—	15.6	
1931	Wheat—							
	Dressed Grain bush.	5.0	8.2	3.2	5.6	0.1	2.0	
	Offal Grain lb.	60.0	122.5	94.4	61.9	5.0	285.0	
	Straw lb.	1170.0	1441.0	1748.0	3000.0	194.0	2064.0	
	Total Straw† cwt.	11.8	14.2	20.2	29.1	2.8	20.3	
	Wt. of Dressed Grain per bush. } lb.	58.6	60.0	58.0	59.9	59.0††	58.2	
	Proportion of Total Grain to 100 of Total Straw } cwt.	26.6	38.4	12.5	12.3	3.2	17.8	

\* Plots 1, 3 and 5 based upon 19 courses. Plots 2, 4 and 6 based upon 18 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.  
 \*\* Estimated hay yields, calculated from the dry matter.  
 †† Estimated from the remaining plots.  
 ‡‡ Based on 8 courses.  
 § Based on 13 courses.

Wheat after Fallow (without Manure, 1851 and since).  
Hoos Field, 1931.

	1931	Average 76 years 1856—1931
Dressed Grain { Yield per acre—bushels	12.99	14.20
{ Weight per bushel—lb.	61.1	58.7
Offal Grain per Acre—lb. . . . .	100.0	51.1
Straw per Acre—lb. . . . .	1270.0	—
Total straw per Acre—cwt. . . . .	14.5	12.5
Proportion of Total Grain to 100 of total Straw . . . . .	54.9	—

**MANGOLDS AND SWEDES—BARNFIELD, 1931\***  
**Roots each year since 1856. Mangolds each year since 1876.**  
**PRODUCE PER ACRE, MIXED ROOTS.**

Strip.	Wide—normal spacing 26in. (as bitherto). Narrow—spacing of 20in.	Strip Manures. (Amounts stated are per acre).	50-Year Average, 1876-1928†												
			1931.					Cross Dressings.							
			O	N	A	AC	C	O	N	A	AC	C			
ROOTS	1	Dung only (14 tons)	17.47	29.10	23.91	25.67	24.33	17.47	26.16	21.70	23.58	23.53	23.53	23.53	23.53
	2	Dung, Superphosphate (3½ cwt.), Sulphate of Potash (500 lb.)	9.33	17.33	19.32	22.66	15.66	18.94	24.71	27.57	26.50	26.50	26.50	26.50	26.50
	4	Complete Minerals: Super. and Potash as 2	20.25	30.14	24.88	25.84	27.44	26.51	26.51	14.37	26.06	20.96	20.96	20.96	20.96
	5	Salt (200 lb.), Sulphate of Magnesia (200 lb.)	4.55	(b) 21.04	15.10	27.75	20.42	4.60	(a) 17.55	6.70	9.49	10.16	10.16	10.16	10.16
	6	Superphosphate only (3½ cwt.)	4.47	(a) 17.16**	15.32	25.46	17.54	4.47	14.63	6.70	9.49	10.16	10.16	10.16	10.16
	7	Super. (3½ cwt.) Sulphate of Potash (500 lb.)	3.64	17.87	12.51	12.13	13.05	4.03	15.12	13.50	22.55	18.14	18.14	18.14	18.14
	8	Sulph. Potash (500 lb.), Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	3.52	18.76	14.60	14.89	14.88	4.86	16.04	14.70	22.31	19.10	19.10	19.10	19.10
	9	Sulph. Potash (500 lb.), Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	3.62	19.05	15.00	24.81	15.08	3.34	9.61	5.32	8.52	8.89	8.89	8.89	8.89
	10	No Mineral	2.73	16.84	16.28	22.97	16.92	—	—	—	—	—	—	—	—
LEAVES	1	Dung only (14 tons)	5.66	9.05	8.81	8.68	7.42	3.04	4.65	4.93	5.25	4.54	4.54	4.54	
	2	Dung, Superphosphate (3½ cwt.), Sulphate of Potash (500 lb.)	3.27	5.61	7.22	6.82	4.75	3.16	5.15	5.49	6.29	4.80	4.80	4.80	
	4	Complete Minerals: Super. and Potash as 2	5.14	8.73	6.80	6.68	6.84	1.04	(a) 3.87	2.88	5.33	3.37	3.37	3.37	
	5	Salt (200 lb.), Sulphate of Magnesia (200 lb.)	6.30	10.13	8.58	9.03	8.07	1.04	(b) 4.09§§	2.61	3.29	2.84	2.84	2.84	
	6	Superphosphate only (3½ cwt.)	1.01	(b) 8.16	4.44	7.23	4.82	1.04	3.19	2.61	3.29	2.84	2.84	2.84	
	7	Super. (3½ cwt.) Sulphate of Potash (500 lb.)	0.92	(a) 5.61	4.45	7.42	4.33	0.93	3.04	2.81	5.20	2.87	2.87	2.87	
	8	Sulph. Potash (500 lb.), Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	0.84	6.04	4.44	8.20	4.47	1.10	3.31	3.01	6.23	3.31	3.31	3.31	
	9	Sulph. Potash (500 lb.), Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	0.94	4.86	2.94	6.63	3.85	0.98	3.19	2.62	3.30	2.84	2.84	2.84	
	10	No Minerals	0.85	6.37	4.17	8.44	5.30	—	—	—	—	—	—	—	

\* The first sowing of Mangolds failed. For the second sowing a mixture of Mangolds and Swedes was used.  
 \*\* From 1904 onwards plot 4N has been divided, 4(a) receiving Superphosphate, Sulphate of Potash, Sulphate of Magnesia, Sodium Chloride and Nitrate of Soda, amounts as above; two-thirds as top dressing at a later date, except with Rape Cake which all goes on with seed.  
 † Excluding 1885, when Nitrogenous fertilisers were not applied, owing to poor crop, and 1908 and 1927 when the crop was swedes.  
 ‡ 23 years only, 1904-1928. For this period the average yield of plot 4(a) was 18.11 for roots and 4.06 for leaves.  
 § Normal spacing.

**MANGOLDS AND SWEDES—BARNFIELD, 1931 (Continued)**  
**PERCENTAGE YIELD AND PLANT NUMBER OF MANGOLDS.**

Strip.	Yield of Mangolds Expressed as Percentage of Total Yield.						Plant Number of Mangolds Expressed as Percentage of Total Plant Number.						
	ROOTS.			LEAVES.			CROSS DRESSINGS.			CROSS DRESSINGS.			
	Cross Dressings.			Cross Dressings.			Cross Dressings.			Cross Dressings.			
	O	N	A	O	N	A	O	N	A	O	N	A	C
	None.	Nitrate of Soda (550 lb.)	Sulphate of Ammonia (412 lb.)	None	Nitrate of Soda (550 lb.)	Sulphate of Ammonia (412 lb.)	None	Nitrate of Soda (550 lb.)	Sulphate of Ammonia (412 lb.)	None	Nitrate of Soda (550 lb.)	Sulphate of Ammonia (412 lb.)	Rape Cake (2,000 lb.)
1	95.4	97.2	91.8	97.2	97.8	94.3	97.2	97.8	94.3	96.7	97.6	96.1	97.6
Narrow	87.7	92.9	66.6	93.4	95.4	71.8	93.4	95.4	71.8	94.2	94.8	83.6	88.3
2	99.5	97.8	94.5	99.7	98.7	96.4	99.7	98.7	96.4	98.8	99.0	97.6	99.2
Narrow	86.7	93.3	87.7	93.3	95.7	93.1	93.3	95.7	93.1	95.9	95.9	94.8	97.0
4	56.3	89.0	79.6	75.4	80.7	84.2	84.6	80.7	84.2	84.3	94.0	86.4	90.9
Narrow	63.8	79.6	66.3	81.3	88.9	82.4	84.6	88.9	82.4	88.4	89.5	88.0	91.5
5	57.7	76.2	39.1	76.7	83.3	52.4	84.4	83.3	52.4	87.9	89.0	81.0	85.7
Narrow	68.3	73.5	35.6	68.5	85.5	49.5	76.7	85.5	49.5	84.7	89.0	77.6	83.3
6	38.0	90.7	50.5	65.6	95.2	68.2	68.5	95.2	68.2	78.4	93.2	80.4	91.8
Narrow	35.2	79.5	53.8	66.3	89.8	70.1	66.3	89.8	70.1	80.0	90.7	83.2	90.5
7	48.3	76.0	63.8	66.3	86.7	64.7	76.6	86.7	64.7	82.9	89.0	87.1	90.2
Narrow	35.1	72.8	57.4	63.2	83.9	71.7	63.2	83.9	71.7	77.2	87.8	81.6	87.8
8	41.0	49.3	21.9	69.4	65.1	41.1	69.4	65.1	41.1	75.0	75.0	69.8	80.1
Narrow	65.5	51.7	12.8	87.7	66.1	26.5	83.4	66.1	26.5	83.4	75.6	66.3	75.9
9	57.4	—	—	83.2	—	—	83.2	—	—	81.4	—	—	—
Narrow	47.1	—	—	64.6	—	—	64.6	—	—	71.7	—	—	—

### HAY—THE PARK GRASS PLOTS

Plot.	Manuring (amounts stated are per acre).	1931.						Plot.	
		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. 22.5	cwt. 12.3	cwt. 34.8	lb. 2138	lb. 1103	lb. 3241	1
2	Unmanured (after Dung 8 years, 1856-63)	limed ..	19.8	8.8	28.6	1886	789	2675	2
3	Unmanured .. .. .	not limed	16.0	6.2	22.2	1501	559	2060	3
4-1	Superphosphate of Lime (3½ cwt.)	limed ..	18.1	6.7	24.8	1690	601	2291	3
4-2	Superphosphate of Lime (3½ cwt.) and double dressing (412 lb.) Sulphate of Ammonia (= 86 lb. N.)	not limed	12.1	6.1	18.2	1094	544	1638	4-1
5-1	(N. half) Unmanured following double dressing Amm. salts (= 86 lb. N.) 1856-97	limed ..	14.5	5.4	19.9	1314	488	1802	4-2
5-2	(S. half) Superphosphate (3½ cwt.) Sulphate of Potash (500 lb.); following double dressing Amm. salts (= 86 lb. N.) 1856-97	not limed	25.3	9.2	34.5	2442	820	3262	5-1
6	Complete Mineral Manure as Plot 7; following double dressing Amm. salts (= 86 lb. N.) 1856-68	limed ..	20.9	4.0	24.9	1982	357	2339	5-2
7	Complete Mineral Manure: Super. (3½ cwt.); Sulphate of Potash (500 lb.); Sulphate of Soda (100 lb.); Sulphate of Magnesia (100 lb.)	not limed	20.3	8.9	29.2	1897	794	2691	6
8	Mineral Manure without Potash .. .. .	limed	33.2	9.9	43.1	3250	890	4140	7
9	Complete Mineral Manure and double dressing (412 lb.) Sulphate of Ammonia (= 86 lb. N.)	not limed	21.1	10.8	31.9	2113	968	3081	8
10	Mineral Manure (without Potash) and double dressing Amm. salts (= 86 lb. N.)	limed ..	24.3	11.6	35.9	2326	1040	3366	9
11-1	Complete Mineral Manure and treble dressing (618 lb.) Sulphate of Ammonia (129 lb. N.)	not limed	28.3	15.0	43.3	2776	1343	4119	10
11-2	As Plot 11-1 and Silicate of Soda .. .. .	limed ..	31.6	13.2	44.8	2946	1185	4131	11-1
12	Unmanured .. .. .	not limed	36.2	13.8	50.0	3310	1232	4542	11-2
13	Dung (14 tons) in 1905, and every fourth year since (omitted 1917), Fish Guano (6 cwt.) in 1907 and every fourth year since .. .. .	limed ..	23.6	10.5	34.1	2308	943	3251	12
14	Complete Mineral Manure and double dressing (550 lb.) Nitrate of Soda (= 86 lb. N.)	not limed	21.5	10.6	32.1	2085	951	3036	13
15	Complete Mineral Manure as Plot 7; following double dressing Nitrate of Soda (= 86 lb. N., 1858-75)	limed ..	55.9	25.9	81.8	5320	2319	7639	14
16	Complete Mineral Manure and Single Dressing (275 lb.) Nitrate of Soda (= 43 lb. N.)	not limed	63.1	22.9	86.0	5992	2052	8044	15
17	Single dressing (275 lb.) Nitrate of Soda (= 43 lb. N.)	limed ..	36.6	15.8	52.4	3594	1414	5008	16
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	40.7	15.8	56.5	4110	1412	5522	17
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.	limed ..	49.7	27.6	77.3	5849	2474	8323	18
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	65.1	22.0	87.1	5917	1972	7889	19
		limed ..	54.4	32.4	86.8	4798	2900	7698	20
		not limed	67.7	27.3	95.0	5884	2444	8328	
		limed ..	17.0	6.6	23.6	1592	590	2182	
		not limed	51.9	21.9	73.8	4928	1966	6894	
		limed ..	50.9	18.8	69.7	4751	1680	6431	
		not limed	56.3	23.3	79.6	5396	2088	7484	
		limed (sun)	51.1	18.8	69.9	4961	1682	6643	
		limd (shade)	37.5	12.1	49.6	3376	1081	4457	
		not limed	32.3	14.1	46.4	3056	1263	4319	
		limed ..	31.6	9.5	41.1	2989	848	3837	
		not limed	41.7	13.0	54.7	3798	1163	4961	
		limed	33.4	10.8	44.2	3133	965	4098	
		not limed	24.4	8.3	32.7	1749	741	2490	
		limed ..	25.6	7.1	32.7	2376	638	3014	
		not limed	35.4	23.5	58.9	3465	2106	5571	
		limed	49.4	17.2	66.6	4541	1540	6081	
		not limed	37.3	15.9	53.2	3434	1429	4863	
		limed	26.8	17.4	44.2	2530	1562	4092	
		not limed	23.6	12.1	35.7	2194	1082	3276	
		limed	25.0	15.8	40.8	2292	1412	3704	
		not limed	41.6	17.1	58.7	4015	1529	5544	
		limed	39.1	14.7	53.8	3698	1319	5017	
		not limed	37.8	18.0	55.8	3627	1618	5245	

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, and at the rate of 2,500 lb. to the acre in the Winter of 1920-21, 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.

PARK GRASS PLOTS  
BOTANICAL COMPOSITION PER CENT.  
1926 (1st Crop)

Plot	Manuring.	Liming	Grami- neæ	Legumi- nosæ	Other Orders	" Other Orders " consist largely of
3	Unmanured.	Limed	61.7	7.8	30.5	<i>Plantago lanceolata</i>
		Unlimed	49.6	6.1	44.3	<i>Plantago lanceolata</i>
7	Complete Mineral Manure.	Limed	81.5	4.8	13.7	<i>Heracleum sphondylium</i>
		Unlimed	73.3	6.2	20.5	<i>Achillea millefolium</i> <i>Rumex acetosa</i>
9	Complete Mineral Manure and double Amm. Salts.	Limed	98.7	0.1	1.2	<i>Rumex acetosa</i>
		Unlimed	99.6	—	0.4	<i>Heracleum sphondylium</i>
14	Complete Mineral Manure and double Nitrate of Soda.	Limed (sun)	95.0	0.6	4.4	<i>Taraxacum vulgare</i> <i>Anthriscus sylvestris</i> <i>Rumex acetosa</i>
		Limed (Shade)	94.8	1.8	3.4	<i>Anthriscus sylvestris</i>
		Unlimed	97.9	0.1	2.0	<i>Anthriscus sylvestris</i> <i>Rumex acetosa</i>
15	As plot 7 following double Nitrate of Soda, 1858-75.	Limed	} Not analysed.			—
Unlimed		—				
17	Single Nitrate of Soda.	Limed				—
	Unlimed	—				
18	Mineral Manure (without Super) and double Sulphate Amm. 1905 and since	L. 6,788 lb.	93.8	0.1	6.1	<i>Rumex acetosa</i>
		L. 3,951 lb.	89.5	0.1	10.4	<i>Rumex acetosa</i>
19	Farmyard Dung in 1905 and every fourth year since (omitted 1917).	Unlimed	77.8	—	22.2	<i>Rumex acetosa</i>
		L. 3,150 lb.	90.4	1.2	8.4	<i>Rumex acetosa</i> <i>Ranunculus spp.</i>
		L. 570 lb.	84.1	1.6	14.3	<i>Rumex acetosa</i> <i>Ranunculus spp.</i>
		Unlimed	84.8	2.5	12.7	<i>Rumex acetosa</i> <i>Ranunculus spp.</i>
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.	87.6	3.5	8.9	<i>Ranunculus spp.</i> <i>Rumex acetosa</i> <i>Taraxacum vulgare</i>
		L. 570 lb.	90.6	1.2	8.2	<i>Ranunculus spp.</i> <i>Rumex acetosa</i> <i>Taraxacum vulgare</i>
		Unlimed	87.7	3.8	8.5	<i>Ranunculus spp.</i> <i>Rumex acetosa</i>



**PARK GRASS PLOTS  
BOTANICAL COMPOSITION PER CENT.  
1927 (1st Crop)**

Plot	Manuring	Liming	Grami- neæ	Legumi- nosæ	Other Orders	" Other orders " consist largely of
3	Unmanured.	Limed	62.4	4.4	33.2	<i>Plantago lanceolata</i>
		Unlimed	71.3	2.4	26.3	—
7	Complete Mineral Manure.	Limed	62.7	25.3	12.0	—
		Unlimed	69.4	9.7	20.9	—
9	Complete Mineral Manure and double Amm. Salts.	Limed	99.1	0.3	0.6	—
		Unlimed	99.3	—	0.7	<i>Heracleum sphondylium</i>
14	Complete Mineral Manure and Double Nitrate of Soda.	Limed (sun)	96.2	1.6	2.2	—
		Limed (shade)				
		Unlimed	97.4	1.0	1.6	<i>Taraxacum vulgare</i>
15	As plot 7 following double Nitrate of Soda, 1858-75.	Limed	58.3	28.7	13.0	<i>Plantago lanceolata</i>
						<i>Achillea millefolium</i>
		Unlimed	74.9	5.9	19.2	<i>Achillea millefolium</i>
						<i>Plantago lanceolata</i>
17	Single Nitrate of Soda.	Limed	82.4	1.3	16.3	<i>Plantago lanceolata</i>
		Unlimed	76.0	0.1	23.9	<i>Plantago lanceolata</i>
18	Mineral Manure (without Super.) and double Sulphate Amm. 1905 and since.	L. 6,788 lb.	97.7	0.1	2.2	<i>Heracleum sphondylium</i>
						<i>Rumex acetosa</i>
		L. 3,951 lb.	97.0	—	3.0	<i>Achillea millefolium</i>
						<i>Rumex acetosa</i>
		Unlimed	98.2	—	1.8	<i>Rumex acetosa</i>
19	Farmyard Dung in 1905 and every fourth year since (omitted 1917).	L. 3,150 lb.	87.9	3.0	9.1	<i>Heracleum sphondylium</i>
						<i>Ranunculus spp.</i>
		L. 570 lb.	88.0	2.1	9.9	<i>Ranunculus spp.</i>
						<i>Rumex acetosa</i>
		Unlimed	90.3	1.3	8.4	<i>Rumex acetosa</i>
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.	88.8	3.5	7.7	<i>Centaurea nigra</i>
						<i>Taraxacum vulgare</i>
		L. 570 lb.	94.3	0.6	5.1	<i>Centaurea nigra</i>
						<i>Conopodium denudatum</i>
		Unlimed	93.2	1.8	5.0	<i>Rumex acetosa</i>

**WHEAT—BROADBALK FIELD, 1931**

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 1862-1925 (prior to fallow). Total Grain, cwt.
		II	III	IV	V		II	III	IV	V		
2A	Farmyard Manure (14 tons)	14.0	18.4	22.1	18.9	9.6	11.9	14.7	12.8	16.3**		
2B	Farmyard Manure (14 tons)	13.5	20.1	23.4	22.2	9.3	13.0	15.2	14.3	19.4		
3	Unmanured since 1839	5.9	5.7	4.3	10.8	4.2	3.7	3.0	7.0	6.7		
5	Complete Mineral Manure §§	7.6	3.7	8.5	10.3	5.4	2.6	5.9	7.4	7.8		
6	As 5, and 206 lb. Sulphate of Ammonia	13.2	17.8	18.6	14.2	8.0	10.4	10.8	9.1	12.5		
7	As 5, and 412 lb. Sulphate of Ammonia	14.0	27.0	20.2	14.5	9.4	17.5	13.3	9.5	17.6		
8	As 5, and 618 lb. Sulphate of Ammonia	15.0	20.5	19.1	14.6	10.2	14.1	13.4	11.0	20.1		
9	As 5, and 275 lb. Nitrate of Soda	14.9	21.4	20.3	16.4	9.6	13.4	12.5	10.3	13.9††		
10	412 lb. Sulphate of Ammonia	20.8	28.7	26.0	24.3	12.6	17.0	16.1	15.2	10.9		
11	As 10, and Superphosphate (3½ cwt.)	23.8	31.2	29.8	25.8	14.8	18.8	18.1	16.0	12.3		
12	As 10, and Super. (3½ cwt.) and Sulph. Soda (366 lb.)	21.4	30.2	33.0	19.6	13.5	18.3	20.3	12.8	15.7		
13	As 10, and Super. (3½ cwt.) and Sulph. Potash (200 lb.)	15.7	21.8	24.5	13.9	9.8	14.2	15.3	9.4	17.0		
14	As 10, and Super. (3½ cwt.) and Sulph. Magnesia (280 lb.)	14.3	31.2	29.9	13.2	9.8	19.1	18.6	9.1	15.5		
15	As 5, and 412 lb. Sulphate of Ammonia all applied in Autumn	19.6	25.1	17.1	19.7	11.6	15.0	11.8	11.9	16.1		
16	As 5, and 550 lb. Nitrate of Soda	16.3	23.0	22.8	15.8	10.9	14.9	14.5	10.7	17.8††		
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia	M 9.7	9.0	9.3	3.7	6.0	5.5	5.7	2.4	M 8.1		
18	alone in alternate years	A 20.0	26.2	19.2	12.1	12.8	16.7	12.7	8.6	A 16.1*		
19	Rape Cake (1,889 lb.)	20.4	23.3	23.9	14.9	12.8	14.8	15.5	9.6	12.6†		
20	As 7, without Super.	14.5	—	—	—	8.7	—	—	—	10.3§		

For notes see p. 126.

WHEAT—BROADBALK FIELD, 1931

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.
		V					V					
		II	III	IV	V	VI	II	III	IV	V	VI	
2A	Farmyard Manure (14 tons)	58.0	59.8	60.0	59.8	37.1	45.2	46.0	47.1	32.1**		
2B	Farmyard Manure (14 tons)	58.5	60.8	60.5	60.8	43.3	40.5	42.4	44.9	34.2		
3	Unmanured since 1839	59.0	59.5	62.0	60.5	10.4	7.8	6.2	12.3	9.8		
5	Complete Mineral Manure §§	58.5	62.0	59.8	60.5	14.2	5.2	10.9	15.6	11.5		
6	As 5, and 206 lb. Sulphate of Ammonia	58.2	59.5	59.5	60.5	22.3	22.5	23.5	22.0	20.3		
7	As 5, and 412 lb. Sulphate of Ammonia	58.5	60.0	59.9	59.5	33.7	47.7	46.2	49.2	32.1		
8	As 5, and 618 lb. Sulphate of Ammonia	58.5	58.4	58.2	58.0	50.6	57.7	57.1	59.5	39.8		
9	As 5, and 275 lb. Nitrate of Soda	58.8	60.2	60.0	60.0	28.3	34.8	33.6	37.3	24.6††		
10	412 lb. Sulphate of Ammonia	59.2	59.8	59.8	59.8	29.2	37.4	37.8	39.1	17.8		
11	As 10, and Superphosphate (3½ cwt.)	59.5	59.7	59.8	59.5	31.8	40.5	40.5	39.6	21.4		
12	As 10, and Super. (3½ cwt.) and Sulph. Soda (366 lb.)	58.9	59.8	59.7	59.2	35.2	41.5	45.5	42.8	26.8		
13	As 10, and Super. (3½ cwt.) and Sulph. Potash (200 lb.)	59.5	60.8	59.5	58.8	35.7	40.8	47.5	49.5	30.6		
14	As 10, and Super. (3½ cwt.) and Sulph. Magnesia (280 lb.)	60.2	59.8	60.2	58.8	31.8	41.8	45.9	43.1	26.8		
15	As 5, and 412 lb. Sulphate of Ammonia all applied in Autumn	59.9	60.8	61.5	60.8	28.7	30.3	31.6	29.3	28.2		
16	As 5, and 550 lb. Nitrate of Soda	60.5	60.9	60.4	58.2	45.3	51.3	51.9	51.2	35.2††		
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia	M60.5	60.5	60.5	63.0	13.0	11.0	13.6	10.9	M12.3		
18	alone in alternate years	A60.8	60.9	61.0	60.0	36.6	41.3	41.0	44.8	A28.1*		
19	Rape Cake (1,889 lb.)	60.8	59.8	60.9	60.0	27.7	33.2	39.4	30.5	22.0†		
20	As 7, without Super	58.0	—	—	—	27.5	—	—	—	18.6§		

† Includes straw, cavings, and chaff. \*A = Ammonia series, M = Mineral series.  
 \*\* 26 years only, 1900-1925. †† 41 years only, 1885-1925. ‡ 33 years only, 1893-1925. § 18 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.  
 In 1926 and 1927 the crop was confined to the lower (eastern) part of the field (IV and V) the upper part (I, II and III) being completely fallowed for 2 years. This was the first complete fallow on this area since the experiment began in 1843. In October, 1927, the upper or western part (I and II) was sown with wheat, and again in 1928, while in 1929 the whole field was sown, and harvested in 1930 in five separate portions. In 1931 Section I was fallowed.

## BARLEY—HOOS FIELD, 1930

Corrected results to replace Table on p. 124 of 1930 Report.

As in 1929 the rows were widely spaced to facilitate weed control. In 1930, however, the field was sown longitudinally with a row spacing of 18 inches, instead of the 24 inch spacing adopted in 1929. The two varieties were sown by the half-drill strip method, and to equalise the area certain rows at the sides of each plot were not included in the weighed produce. In computing the yields per acre the whole area harvested experimentally was unfortunately taken as being the area occupied by each variety separately; the yields per acre published in the 1930 Report were therefore half what they should have been.

Plot	Manuring (Amounts stated are per acre)	Total Grain per acre		76 Years' Average 1852-1928 Dressed Grain per acre.	Total Straw per acre.		76 Years Average 1852-1928 Total Straw per acre.
		Plumage Archer	Spratt Archer		Plumage Archer	Spratt Archer	
		cwt.	cwt.	bush.	cwt.	cwt.	cwt.†
1O	Unmanured .. .. .	0.7	0.7	13.4	1.9	1.6	7.8
2O	Superphosphate only (3½ cwt.) ..	9.8	9.1	19.0	8.2	7.6	9.8
3O	Alkali Salts only (200 lb. Sulphate of Potash; 100 lb. Sulphate of Soda; 100 lb. Sulphate of Mag- nesia) .. .. .	3.6	3.0	14.3	5.6	4.3	8.7
4O	Complete Minerals; as 3O with Superphosphate (3½ cwt.) ..	7.2	9.5	19.0	6.7	8.1	11.2
5O	Potash (200 lb.) and Superphos- phate (3½ cwt.) .. .. .	8.4	8.3	15.5	8.3	9.2	9.4
1A	Ammonium Salts only (206 lb. Sul- phate of Ammonia) .. .. .	2.9	4.1	23.7	4.3	6.6	13.7
2A	Superphosphate and Amm. Salts ..	18.0	18.9	35.8	17.7	16.8	20.4
3A	Alkali Salts and Amm. Salts ..	7.8	5.3	25.8	11.1	8.2	16.0
4A	Complete Minerals and Amm. Salts	14.8	17.7	39.3	16.9	17.3	23.6
5A	Potash, Super. and Amm. Salts ..	13.3	12.1	33.8	19.4	17.3	21.7
1AA	Nitrate of Soda only (275 lb.) ..	4.7	4.8	24.3*	8.6	8.3	15.4*
2AA	Superphosphate and Nitrate of Soda	18.1	19.0	38.8*	18.6	18.8	23.1*
3AA	Alkali Salts and Nitrate of Soda ..	8.0	8.0	24.5*	11.0	10.9	16.6*
4AA	Complete Minerals and Nitrate of Soda .. .. .	17.0	17.4	37.7*	18.7	16.9	23.6*
1AAS	As Plot 1AA and Silicate of Soda (400 lb.) .. .. .	6.9	11.0	30.2*	7.6	13.4	18.2*
2AAS	As Plot 2AA and Silicate of Soda (400 lb.) .. .. .	20.5	21.4	39.7*	21.1	22.4	23.9*
3AAS	As Plot 3AA and Silicate of Soda (400 lb.) .. .. .	12.8	13.5	31.2*	14.3	14.2	19.9*
4AAS	As Plot 4AA and Silicate of Soda (400 lb.) .. .. .	19.2	21.0	39.9*	20.7	20.8	25.4*
1C	Rape Cake only (1,000 lb.) ..	11.9	12.5	35.5	13.3	12.9	20.6
2C	Superphosphate and Rape Cake ..	18.0	18.1	38.1	21.3	19.8	22.0
3C	Alkali Salts and Rape Cake ..	14.6	16.4	33.7	19.1	18.6	20.4
4C	Complete Minerals and Rape Cake	16.6	17.8	37.5	19.9	20.2	22.6
7-1	Unmanured (after dung (14 tons) for 20 years (1852-71) ..	7.9	9.8	22.5‡	8.8	10.1	13.5‡
7-2	Farmyard Manure (14 tons) ..	15.3	16.3	44.6	18.2	19.9	28.1
6-1	Unmanured since 1852 .. .. .	3.3	1.9	14.7	5.4	4.6	8.6
6-2	Ashes from Laboratory furnace ..	4.6	5.7	15.7	5.4	6.6	9.3
1N	Nitrate of Soda only (275 lb.) ..	4.2	3.4	28.7§	5.2	4.8	17.8§
2N	Nitrate of Soda only (275 lb.) ..	13.5	10.3	31.7§§	17.5	14.4	20.0§§

|| 1 cwt = 2.15 bushels. 1912, 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.

BARLEY—HOOS FIELD, 1931

Plot.	Manuring. (Amounts stated are per acre).	Dressed Grain, (in some cases estimated from half or quarter bushel).		Total Grain, cwt. per acre.		76 Years' Average, 1852-1928 Dressed Grain per acre bush.		Bushel Weight in lb. (in some cases estimated from half or quarter bushel).		Total Straw, cwt. per acre.		76 Years' Average, 1852-1928 Total Straw per acre cwt. †
		Plumage Archer.	Spratt Archer.	Plumage Archer.	Spratt Archer.	Plumage Archer.	Spratt Archer.	Plumage Archer.	Spratt Archer.	Plumage Archer.	Spratt Archer.	
10	Unmanured	12.6	17.4	6.0	8.2	13.4	51.5	10.6	13.0	7.8		
20	Superphosphate only (3½ cwt.)	16.4	16.4	7.9	7.9	19.0	52.5	11.5	17.9	9.8		
30	Alkali Salts only (200 lb. Sulphate of Potash; 100 lb. Sulphate of Soda; 100 lb. Sulphate of Magnesia)	8.8	16.8	4.3	8.2	14.3	54.0	9.6	13.1	8.7		
40	Complete Minerals; as 30 with Superphosphate (3½ cwt.)	22.8	25.6	11.0	12.4	19.0	53.0	14.7	18.7	11.2		
50	Potash (200 lb.) and Superphosphate (3½ cwt.)	14.1	21.4	7.2	10.7	15.5	55.0	11.0	13.0	9.4		
1A	Ammonium Salts only (206 lb. Sulphate of Ammonia)	8.9	12.9	5.8	7.6	23.7	54.0	12.7	14.4	13.7		
2A	Superphosphate and Amm. Salts	25.7	31.0	13.8	16.4	35.8	53.2	19.0	17.5	20.4		
3A	Alkali Salts and Amm. Salts	3.6††	13.3	2.4	7.9	25.8	54.0	15.4	13.9	16.0		
4A	Complete Minerals and Amm. Salts	27.3	37.6	14.6	20.0	39.3	54.5	19.2	19.1	23.6		
5A	Potash, Super. and Amm. Salts	26.1	30.3	12.8	14.9	33.8	53.5	19.0	21.3	21.7		
**1AA	Nitrate of Soda only (275 lb.)	11.2	22.1	6.5	12.2	24.3*	54.5	18.2	16.3	15.4*		
1AAS	As 1AA and Silicate of Soda (400 lb.)	..	..	..	..	30.2*	..	..	..	18.2*		
**2AA	Superphosphate and Nitrate of Soda	28.0	36.1	14.6	19.0	38.8*	53.2	19.0	18.7	23.1*		
2AAS	As 2AA and Silicate of Soda (400 lb.)	..	..	..	..	39.7*	..	..	..	23.9*		
**3AA	Alkali Salts and Nitrate of Soda	7.7	20.6	4.7	11.6	24.5*	53.5	15.9	15.4	16.6*		
3AAS	As 3AA and Silicate of Soda (400 lb.)	..	..	..	..	31.2*	..	..	..	19.9*		
**4AA	Complete Minerals and Nitrate of Soda	29.7	38.3	16.0	20.5	37.7*	54.1	16.4	21.0	23.6*		
4AAS	As 4AA and Silicate of Soda (400 lb.)	..	..	..	..	39.9*	..	..	..	25.4*		
IC	Rape Cake only (1,000 lb.)	25.3	34.3	13.8	18.2	35.5	55.0	17.8	19.7	20.6		
2C	Superphosphate and Rape Cake	32.3	41.8	17.1	22.4	38.1	54.0	23.9	21.8	22.0		
3C	Alkali Salts and Rape Cake	15.8	30.0	8.9	16.2	33.7	54.5	13.0	18.3	20.4		
4C	Complete Minerals and Rape Cake	31.0	37.3	16.7	20.5	37.5	55.2	18.3	21.4	22.6		
7-1	Unmanured after dung (14 tons) for 20 years (1859-71)	29.8	35.2	14.5	16.8	23.5†	53.2	21.4	23.3	13.5†		
7-2	Farmyard Manure (14 tons)	31.9	41.6	17.6	23.4	44.6	54.2	26.8	32.6	28.1		
6-1	Unmanured since 1852	11.6††	15.8	5.8	7.6	14.7	..	9.9	11.6	8.6		
6-2	Ashes from Laboratory furnace	9.3	15.9	4.7	7.7	15.7	53.0	8.8	12.3	9.3		
1N	Nitrate of Soda only (275 lb.)	13.7††	16.8	6.8	8.5	28.7§§	..	11.3	13.9	17.8§		
2N	Nitrate of Soda only (275 lb.)	22.9	28.7	11.1	13.8	31.7§§§	53.0	17.7	22.0	20.0§§§		

|| 1 cwt. 2.15 bushels. 1912, all plots were followed. † Total straw includes straw, cavines and chaff. \* Sixty years, 1868-1928. ‡ 56 years, 1872-1928. § 75 years, 1863-1928. §§ 69 years, 1859-1928. \*\* Produce from the pairs of these plots bulked together. †† Estimated. In 1931 the same procedure of sowing in widely spaced drills (18 inches apart) was adopted as in 1930. The two varieties were again sown by the half-drill strip method, the whole of the area of each variety being included in the weighed produce.