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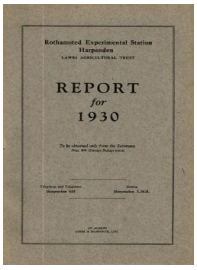
Report for 1930

Full Table of Content



Yields of Experimental Plots

Rothamsted Research

Rothamsted Research (1931) *Yields of Experimental Plots ;* Report For 1930, pp 110 - 171 **- DOI: https://doi.org/10.23637/ERADOC-1-63**

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THE USE OF THE SUMMARY TABLES

The summaries of the significant results from the replicated experiments, whether these are stated as produce per acre or as a percentage of the average yield, are accompanied by estimates of the standard errors to which these results are liable. The agricultural precautions which have to be taken in order that these shall be certainly valid were explained in the Report for 1925-26. An explanation of their purpose is desirable here in order that a full use of the summaries may be made by those who do not wish to make for themselves a detailed examination of the yields recorded for individual plots.

An experimental yield will differ from its true value either in excess or deficit by an amount exceeding its standard error almost as frequently as once in 3 trials; it will, however, be wrong by more than twice its standard error only about once in 22 trials, and by more than three or four times its standard error once in 370 or 15,780 trials respectively. The odds against an error of any size having occurred thus increase very rapidly in a small range of multiplies of the standard error. Whereas experimental differences of less than twice their standard error might always be ascribed to chance, and are, therefore, for safety, ignored as "insignificant," differences only slightly greater than these cannot reasonably be disregarded, but must be ascribed to genuine manurial or cultural effects, such as the experiment was designed to examine.

The rejection of the insignificant differences is thus a necessary preliminary, but only a preliminary, to the interpretation of the experimental results. So far as has been practicable all significant results are noted, and exhibited in the summaries of significant results. In the more successful and extensive experiments the standard error has been reduced to so low a figure, sometimes considerably less than 2 per cent, that quite small differences in yields can be detected, whereas with a standard error of 5 per cent, all but big and obvious differences in yield must be ignored. The change in precision from standard errors of 5 per cent, to standard errors of 2 per cent, or less, thus represents a very large extension in the range of agricultural effects which can be examined experimentally.

Once an effect is shown to be definitely significant it makes little difference whether the odds against its being due to chance are 100 to 1 or 1,000,000 to 1. Chance is effectively excluded in both cases, and the interest in the result is now concentrated on the actual gain in crop, either in yield per acre, or in yield per cent, which the experiment has demonstrated. The relation of

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this gain to any additional item of expense incurred, such as the cost of a manurial application, then determines the balance of advantage in practical procedure. Read in this way the summary tables give the direct results of critical experimentation.

THE NUMBERING OF THE FIELD PLOTS IN THE ROTATION AND REPLICATED EXPERIMENTS

Each plot designation consists of two letters and a number, with the addition that these may, for laboratory purposes, be prefixed by 31, 32, etc., to denote year.

The first letter signifies the place, and, in the case of the Rotation experiments, the nature of the experiment. Thus :

Rothamsted Four Course Rotation	=	A
Rothamsted Six Course Rotation	=	B
Woburn Six Course Rotation	=	C
Otherwise Rothamsted Experiments	=	R
And Woburn Experiments ..	=	W
Outside Centre Experiments	=	D, E, F, etc.
(Leaving out I)		

The second letter designates the crop, and is usually the first letter of the word for the crop. Thus :

Wheat ..	=	W	Turnips ..	=	T
Barley ..	=	B	Mangolds ..	=	M
Oats	=	O	Hay	=	H
Potatoes ..	=	P	Clover ..	=	C
Sugar Beet ..	=	S	Forage.. ..	=	F
Swedes ..	=	G	Rye	=	R
Lucerne ..	=	L, etc.			

The plots of each experiment are serially numbered from 1 to n. If more than one experiment is laid down on the same crop at the same centre, apart from the Rotation experiments, the plots are numbered 1 to p, p + 1 to q, q + 1 to r, etc.

The letters denoting outside centres remain the same for the same centre in different years, provided that if a centre drops out of the experimental programme, and is not likely to re-enter, its letter may be in time allotted to another centre. Both letters will be required to identify centre and crop, *i.e.*, the same letter may be used for two centres where the crops are very different and likely to remain different. It is recommended that the code letters for place and crop be used in all correspondence concerning these experiments.

Samples stored by the Chemistry Department bear a label giving the full plot symbol, as herein defined, together with the year, and such other notes, *e.g.*, grain, straw, etc., as may assist in identifying the sample where more than one has been taken from the same plot.

Illustrations :

AW 49	Rothamsted Four Course Rotation	wheat–plot 49
CS 36	Woburn Six Course Rotation	sugar beet–plot 36
RW 1–96	Rothamsted Wheat Experiment	variety trial
RW 97–144	Rothamsted Wheat Experiment	Great Knott
KP 7	(*e.g.*) Welshpool	potatoes–plot 7

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DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, 1930

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
I. Arable and Modern Experiments—								
Pastures (1)	Forage	Beans, Tares and Rye	Sept. 9–19 plough, 23 harrow, 24 and 25 drill and harrow in.	(1) Six course rotation expt. see p. 133	Sept. 24-25	—	—	see p. 133
(2)	Forage		Ploughed part of field after forage May 14-15. Harrow and drill Kale May 17 and roll. Re-drilled and rerolled June 4.	(2) Commercial forage 14 tons FYM 1 N/Soda	Forage Sept. 24-25	Folded off by sheep	—	—
(3)	Kale	Marrow Stem Thousand-Head	June 4 and 5 plough, and harrow rest of field, sow Kale harrow, drill, roll. June 21 drill and roll again where failed	(3) Kale 1 N/Soda, 3 S/Amm. 4 M/Pot. and 1¼ Super.	Kale May 17-June 21	Kale consumed Dec.-Feb.	—	18 tons
Gt. Harpenden	Forage	see p. 142	see p. 142	—	—	—	—	see p. 142
	Seeds	Ital. Rye Grass Broad Red Clover	—	1⅓ S/Amm. 1 M/Pot. 3 Super. 1⅓ S/Amm. later	—	June 16-23	June 27-30	2 tons
Little Hoos	Winter Oats	Grey Winter	Aug. 29-Sept. 7, 1929 tractor plough and cultivate, do. Sept. 14-16, drill and harrow Sept. 19, roll Mar. 25	1 S/Amm., 3 Super. and 1 M/Pot. (early spring) 1 S/Amm later	Sept. 14-16	July 19-25	Aug. 9-12	22 cwt.
Broad Baulk Fosters	Mangolds	see p. 149	see p. 149	—	—	—	—	see p. 149
	Wheat	Million	July 4-15, 1929, tractor plough clover stubble. Sept. 18-19 use thistle bar (tractor). Sept. 24 cultivate, 26 harrow for seed bed. Sept. 27 drill, 28 harrow in. Undersown with seeds April 10 and 11	1 S/Amm. 1 M/Pot. and 3 Super.	Sept. 27	Aug. 6-7	Aug. 18-19	18 cwt.
	One year Seeds	16lb. Ital. Rye Grass 12lb. Broad Red Clover			Seeds April 10 and 11			

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DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, 1930 (*Contd.*)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Great Knott	Wheat	Million	Ploughed in mustard June 22-29, 1929. Aug. 28 disc harrow and harrow behind. Reploughed Sept. 13-19. Horse harrow and drill, tractor harrow in. See also p. 138	Basal 1 S/Amm. 1 Pot. Salts 2½ Super. 1 S/Amm. 2nd dressing	Sept. 20-21	Aug. 7-14	Aug. 19-21	see p. 138
Long Hoos (1)	Winter Oats	Grey Winter	Sept. 28 and 30, 1929, tractor plough. Sept. 30 tractor harrow. Drill Oct. 1, harrow after. Rye Sown Sept. 26-30	1¾ cwt. S/Amm. in two dressings	Oct 1	July 26	—	22 cwt.
(2)	Forage and Mustard	Tares, Beans and Oats	Sept. 27, 1929 cultivate. Mar. 7-10, 1930 plough in dung. Mar. 13 harrow and drill forage. May 28 plough in forage, 29 harrow across. May 30 drill Kale, roll before and after. June 11, re-drill Kale, disc harrow in front, flat roll behind failed. July 11, sow mustard. Sept. 2-10 sheep penned on mustard. Rye sown Sept. 26–30	Dung 10-12 tons approx.	—	—	—	—
Long Hoos (3)	Wheat		see p. 135 Rye Sown Sept. 26-30.					see p. 135
(4)	Seeds		Six course rotation expt., see p. 132					see p. 132
(5)	Barley							see p. 132
(6)	Potatoes and Sugar Beet		Potatoes, see p. 133 Sugar Beet, see p. 132					see p. 133 see p. 132
II. Grassland—								
Gt. Harpenden	Grazing, then Hay New perm. grass	see 1927–8 Report see 1927–8 Report	Mar. 26 tractor harrow and roll	8 basic slag & 1 S/Amm.	—	June 12-13	June 19-July 9	1 ton
Fosters Corners	Grazing	see 1927–8 Report	—	—	—	—	—	—
Great Knott	Grazing	see 1927-8 Report	—	—	—	—	—	—

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DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, 1930 (*Contd.*)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per Acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
Great Field	Grazing	—	Mar. 28-29, tractor harrow and roll. July 6-7 topped	2 acre hockey pitch 10-12 tons Dung, 1 S/Amm., small paddock 1 S/Amm.	—	—	—	—
Little Knott	½ Grazing ½ Hay (after early Grazing)	—	—	Liquid Manure	—	July 8-9	July 17	25 cwt.
New Zealand	Grazing	—	Mar. 25 tractor harrow and roll	1¼ S/Amm. Autumn and 1 S/Amm. Spring	—	—	—	—
Stackyard	Grazing	—	Mar. 25 tractor harrow and roll July 8 topped	1¼ S/Amm. and 1 S/Amm. Spring	—	—	—	—
West Barnfield	Hay after early Grazing	—	April 25-28 chain harrow, April 29-30 horse roll	5 Basic Slag and 1 S/Amm.	—	June 10-11	June 17-20	28 cwt.
Sawyers E	Hay after early Grazing	—	—	2 N/Soda	—	June 6	June 14-18	30 cwt.
,, W	4 acres Hay rest Grazing	—	—	1 S/Amm. on 14 acres, 1 M/Amm.	—	June 18	June 25-July 1	—
,, NW	Grazing	—	Topped July 4-10	Autumn on 8 acres, 1 S/Amm. Spring on 16 acres	—	—	—	—

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DATES OF SOWING AND HARVESTING, AND YIELD PER ACRE, 1930 (*Contd.*)

Field.	Crop.	Variety.	Principal Cultivations and Dates.	Manuring, cwt. per acre.	Sowing Dates.	Cutting Dates.	Carting Dates.	Yield per acre.
III. Classical Experiments— Broadbalk	Wheat	Red Standard	Sept. 5 and 6, 1929 tractor cultivate across. Sept. 20 ditto, thistle bar attached. Oct. 1-8 plough. Oct. 14 and 15 harrow (tractor). 16 harrow in seed. Feb. 21 chain harrow I and II. April 23 harrow I and II across. 29 harrow whole field across. May 2 chain harrow I and II across and tooth harrow III, IV and V lengthwise	see pp. 122-3	Oct. 15	Aug. 18	Aug. 27-30	see pp. 122-3
Hoos	Barley	Plumage Archer Spratt Archer	Feb. 19 cultivate. 20-21 cultivate across. 25 and 27-Mar. 3 plough. 3-4 spring tined harrows followed by tooth harrows across. 6 roll, drag harrows, and spike harrows. 7 harrow in seed. May 1 harrow. Horse and hand hoe May 22-July 9	see p. 124	Mar. 6	Aug. 21 and Sept. 1	Sept. 8 and 9	see p. 124
	Four Course Rotation	see pp. 130-1						see pp. 130-1
Barnfield	Mangolds	Prize Winner Yellow Globe	Nov. 15, 1929 and Jan. 16-17 plough. Mar. 31-April 3 steam tackle. April 15-17 drag harrow. 23-28 horse roll. 29-May 1 applied manures and cultivate across 1 and 2 cultivate down. 9 and 10 tractor disc harrow, followed by roll down. 10 drill. 19-20 ring roll	see p. 120	May 10	—	Oct. 29-Nov. 10	see p. 120
Agdell	Clover and Fallow	—	Oct. 14 and 15 tractor plough. 31 disc harrow tractor. Nov. 1 harrow in wheat seed	see p. 119	—	July 5 1st crop. Oct 8 2nd crop	July 10 1st crop. Oct. 13 2nd crop	see p. 119
Park	Hay	—	Mar. 14 drag harrow. April 1 roll horses	see p. 121	—	June 26-28 1st crop Oct. 17-21 2nd crop	July 2-4 1st crop Oct. 22-24 2nd crop	see p. 121

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CROP YIELDS ON THE EXPERIMENTAL PLOTS

Notes.—In each case the year refers to the harvest, *e.g.*, Wheat 1930 means wheat harvested in 1930. 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 ..	0.191 Ardeb per Feddan
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, 1919–27. cwt.	Country.	Mean yield per acre, 1919–27. cwt.
Great Britain..	17.4	Denmark	22.5
England	17.3	Argentine	6.6
Hertfordshire	16.3	Australia	6.6
France	10.8	Canada	8.6
Germany	14.1	United States..	7.5
Belgium	20.0	U.R.S.S. (Europe and Asia)*	5.7

Note.—Figures for Great Britain, England and Hertfordshire are taken from the Ministry of Agriculture's "Agricultural Statistics," Vol. 62. Other figures from "International Year Book of Agricultural Statistics," 1922–28.
*1924–27.

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METEOROLOGICAL RECORDS, 1930

	Rain.		Drainage through soil.				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.	Bright Sun-shine.	Max.	Min.	1 ft. in ground	Solar Max.	Grass Min.
1930.	Inches.	No.	Inches.	Inches.	Inches.	Hours.	°F.	°F.	°F.	°F.	°F.
Jan. ..	3.247	18	3.016	3.084	2.911	48.8	46.3	36.4	40.2	68.4	32.8
Feb. ..	0.855	9	0.612	0.735	0.699	59.1	40.0	32.8	37.0	75.7	30.1
Mar. ..	1.451	10	0.712	0.753	0.706	123.5	48.1	34.3	39.9	99.5	30.2
April ..	2.308	15	0.858	0.964	0.886	114.8	52.2	39.7	45.2	104.5	36.3
May ..	2.904	18	0.531	0.587	0.561	166.3	58.2	44.5	51.7	119.9	40.8
June ..	0.939	4	0.116	0.148	0.145	242.6	68.0	50.3	59.7	129.1	45.9
July ..	2.321	14	0.233	0.183	0.212	194.6	66.1	52.0	61.4	129.3	47.6
Aug. ..	2.719	14	0.624	0.671	0.653	226.0	68.3	52.7	60.0	129.8	48.2
Sept. ..	3.498	17	1.694	1.710	1.669	125.0	62.3	50.8	58.2	114.9	47.4
Oct. ..	1.244	17	0.187	0.220	0.206	134.9	56.7	44.4	50.5	105.6	39.4
Nov. ..	5.114	19	4.354	4.476	4.339	76.6	48.6	36.3	43.5	78.1	32.8
Dec. ..	2.855	19	2.535	2.680	2.619	31.2	42.9	33.7	39.7	58.5	31.3
Total or Mean	29.455	174	15.472	16.211	15.606	1543.4	54.8	42.3	48.9	101.1	38.6

RAIN AND DRAINAGE.

MONTHLY MEAN FOR 60 HARVEST YEARS, 1870-1—1929-30.

	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. ..	2.363	0.804	0.779	0.717	34.0	33.0	30.3	1.559	1.584	1.646
Oct. ..	3.171	1.818	1.786	1.653	57.3	56.3	52.1	1.353	1.385	1.518
Nov. ..	2.844	2.168	2.223	2.094	76.2	78.2	73.6	0.676	0.621	0.750
Dec. ..	2.871	2.450	2.551	2.434	85.3	88.9	84.8	0.421	0.320	0.437
Jan. ..	2.422	1.987	2.183	2.082	82.0	90.1	86.0	0.435	0.239	0.340
Feb. ..	2.031	1.517	1.630	1.556	74.7	80.3	76.6	0.514	0.401	0.475
March ..	1.997	1.064	1.193	1.128	53.3	59.7	56.5	0.933	0.804	0.869
April ..	2.028	0.659	0.739	0.703	32.5	36.4	34.7	1.369	1.289	1.325
May ..	2.061	0.476	0.544	0.510	23.1	26.4	24.7	1.585	1.517	1.551
June ..	2.224	0.540	0.569	0.548	24.3	25.6	24.6	1.684	1.655	1.676
July ..	2.719	0.716	0.743	0.692	26.3	27.3	25.5	2.003	1.976	2.027
Aug. ..	2.649	0.702	0.715	0.671	26.5	27.0	25.3	1.947	1.934	1.978
Year ..	29.380	14.901	15.655	14.788	50.7	53.3	50.3	14.479	13.725	14.592

Area of each gauge 1/1000th acre.

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CHEMICAL ANALYSES OF FERTILISERS USED IN REPLICATED EXPERIMENTS

Fertilisers.	%N.	% Water Sol. P_2O_5	Citric Acid Sol. P_2O_5	% Total P_2O_5	% K_2O	%Cl.
Sulphate of Ammonia	20.9	—	—	—	—	—
Muriate of Ammonia	26.0	—	—	—	—	—
Nitrate of Soda	16.0	—	—	—	—	—
Urea	45.8	—	—	—	—	—
Cyanamide	19.6	—	—	—	—	—
Dried Blood	10.4	—	—	0.52	—	—
Superphosphate	—	16.4	—	17.4	—	—
Basic Slag—High Sol	—	—	96.5	14.9	—	—
Basic Slag —Low Sol..	—	—	23.0	15.1	—	—
Ground Mineral Phosphate	—	—	—	25.9	—	—
Steamed Bone Flour	—	—	—	29.2	—	—
Sulphate of Potash	—	—	—	—	48.9	—
Muriate of Potash	—	—	—	—	51.3	49.3
Potash Manure Salts (30%) ..	—	—	—	—	30.9	50.9
Potash Mineral	—	—	—	—	16.2	—
Agricultural Salt	—	—	—	—	—	56.5
Magnesium Sulphate	—	—	—	—	14.1 (MgO)	—

SOIL DATA FOR ROTHAMSTED.

ROTHAMSTED SOIL—MECHANICAL ANALYSES.

Diameter mm.	Great Harpenden. 0-10 cm.	Barnfield profile. 0-19 cm.	19-47 cm.	47-97 cm.	97-127 cm.	Broadbalk. Plot 14 :8 0-15 cm. *
Coarse sand 2-0.2 ..	9.6	6.7	1.9	2.2	6.4	9.2
Fine sand 0.2-0.02	39.6	33.0	19.1	13.1	25.0	36.0
Silt 0.02-0.002 ..	22.5	18.5	14.3	12.3	15.7	24.0
Clay below 0.002 ..	23.3	31.7	59.3	65.3	49.3	27.0
Moisture in air dry soil	2.9	4.1	6.9	8.4	6.1	2.1
Loss by solution ..	0.8	1.0	0.3	0.2	0.1	0.6
Difference	+1.3	+5.0	-1.8	-1.5	-2.6	+1.1
Total ..	100.0	100.0	100.0	100.0	100.0	100.0

* These results were obtained from the 1926 A.E.A. fractions

WOBURN DATA.

Soil Mechanical Analyses.

Diameter mm.	Woburn profile. 0-19 cm.	19-40 cm.	40-63 cm.
Coarse sand 2-0.2	39.4	41.2	32.2
Fine sand 0.2-0.02	29.8	31.9	37.3
Silt 0.02-0.002	11.5	12.3	16.5
Clay below 0.002	10.5	10.0	11.7
Air dry moisture	2.9	1.8	1.7
Loss by solution	1.0	0.7	0.3
Difference	+4.9	+2.1	+0.3
Total	100.0	100.0	100.0

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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.
Average of First Twenty Courses, 1848-1927.							
	Roots (Swedes) .. cwt.*	32.7	11.2	175.7	195.9	355.3	302.1
	Barley—						
	Dressed Grain bush.	22.2	20.2	23.1	27.4	31.1	35.4
	Total Straw† cwt.	13.6	13.4	13.7	15.7	18.8	21.8
	Beans—						
	Dressed Grain bush.	—	13.1	—	18.2	—	22.3
	Total Straw cwt.	—	9.2	—	13.2	—	15.3
	Clover Hay cwt.	—	27.1	—	52.3	—	52.6
	Wheat—						
	Dressed Grain bush.	24.0	22.3	28.1	30.6	28.9	30.4
	Total Straw† .. cwt.	23.4	21.6	28.6	29.8	30.8	29.8
Present Course (21st), 1928, 1929 and 1930.							
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	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

* Plots 1, 3 and 5 based upon 18 courses. Plots 2, 4 and 6 based upon 17 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.

Wheat after Fallow (without Manure, 1851 and since). Hoos Field, 1927-1930.

	1927	1928	1929	1930	Average 75 years 1856—1930
Dressed Grain { Yield per acre—bushels	0.48	10.47	12.23	9.52	14.22
Dressed Grain { Weight per bushel—lb.	57.0	55.6	60.3	62.0	59. 5
Offal Grain per Acre—lb.	20.0	—	4.8	118.5	51.2
Straw per Acre—lb.	229.0	1078.3	1038.6	898.0	—
Total straw per Acre—cwt.	2.7	9.6	9.3	10.7	12.4
Proportion of Total Grain to 100 of total Straw	15.8	54.0	71.4	59.2	—

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MANGOLDS—BARNFIELD, 1930

Roots each year since 1856. **Mangolds each year since 1876.**

PRODUCE PER ACRE.

	Strip.	Wide—normal spacing 26in. (as hitherto). Narrow—spacing of 20in. Strip Manures. (Amounts stated are per acre).		1930. Cross Dressings. O None.	N Nitrate of Soda (550 lb.)	A Sulphate of Ammonia (412 lb.)	AC Sulphate of Ammonia (412 lb.) & Rape Cake	C Rape Cake (2,000 lb.)	50-Year Average, 1876-1928† Cross Dressings. O None.	N Nitrate of Soda (550 lb.)	A Sulphate of Ammonia (412 lb.)	AC Sulphate of Ammonia (412 lb.) & Rape Cake	C Rape Cake (2,000 lb.)
				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
ROOTS	1	Dung only (14 tons)	Wide	7.65	15.39	11.55	16.68	16.69	17.47	26.16	21.70	23.58	23.53
			Narrow	11.77	17.96	12.72	19.82	18.84					
	2	Dung, Superphosphate (3½ cwt.), Sulphate of Potash (500 lb.)	Wide	11.77	16.00	10.18	20.48	18.06	18.94	26.68	24.71	27.57	26.50
			Narrow	10.43	12.75	14.10	19.47	16.39					
	4	Complete Minerals: Super. and Potash as 2, Salt (200 lb.), Sulphate of Magnesia (200 lb.)	Wide	3.21	(a)12.79*	15.75	26.78	19.02	4.60	(a)17.35	14.37	26.06	20.96
			Narrow	3.77	(b) 7.05	14.34	30.01	19.04		(b)17.81‡§			
	5	Superphosphate only (3½ cwt.)	Wide	3.62	4.39††	6.70	9.84	11.24	4.47	14.63	6.70	9.49	10.16
			Narrow	4.06		8.15	12.45	10.69					
	6	Super. (3½ cwt.) Sulphate of Potash (500 lb.) ..	Wide	4.37	5.85††	15.37	22.36	14.63	4.03	15.12	13.50	22.55	18.14
			Narrow	4.31		16.97	22.87	20.81					
	7	Super (3½ cwt.) Sulphate of Magnesia (200 lb.) & Sodium Chlodide (200 lb.)	Wide	4.23	6.04	16.39	21.48	14.99	4.86	16.04	14.70	22.31	19.10
			Narrow	4.09	7.56	19.74	22.43	19.18					
	8	No Mineral	Wide	3.55	3.37††	7.41	8.95	8.95	3.34	9.61	5.32	8.52	8.89
			Narrow	1.70		9.25	10.94	12.41					
	9	Sodium Chloride (200 lb.)., Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	Wide	21.28	—	—	—	—	—	—	—	—	—
			Narrow	20.08	—	—	—	—					
LEAVES	1	Dung only (14 tons)	Wide	2.48	4.20	3.86	6.24	5.73	3.04	4.65	4.93	5.25	4.54
			Narrow	3.31	4.34	3.82	6.38	6.72					
	2	Dung, Superphosphate (3½ cwt.), Sulphate of Potash (500 lb.)	Wide	2.90	3.98	2.56	5.18	4.80	3.16	5.15	5.49	6.29	4.80
			Narrow	2.93	3.19	3.83	5.23	4.40					
	4	Complete Minerals: Super. and Potash as 2, Salt (200 lb.) Sulphate of Magnesia (200 lb.)	Wide	0.79	(a) 3.21*	3.59	6.23	3.60	1.04	(a) 3.87	2.88	5.33	3.37
			Narrow	1.00	(b) 2.20	3.64	6.65	3.77		(b) 4.09‡§			
	5	Superphosphate only (3½ cwt.)	Wide	0.96	1.23††	2.91	4.18	4.29	1.05	3.19	2.61	3.29	2.84
			Narrow	1.12		3.58	5.00	4.35					
	6	Super. (3½ cwt.) Sulphate of Potash (500 lb.)	Wide	0.94	1.57††	3.72	6.14	3.18	0.93	3.04	2.81	5.20	2.87
			Narrow	1.10		3.55	5.55	3.75					
	7	Super. (3½ cwt.) Sulphate of Magnesia (200 lb.) and Sodium Chloride (200 lb.) ..	Wide	0.99	1.57	3.67	5.26	3.21	1.10	3.31	3.01	5.23	3.31
			Narrow	1.14	1.93	3.77	5.27	4.19					
	8	No Minerals	Wide	1.16	1.19††	3.05	3.64	3.73	0.98	3.19	2.52	3.30	2.84
			Narrow	0.75		3.38	4.00	4.19					
	9	Sodium Chloride (200 lb.), Nit. Soda (550 lb.), Sulph. Potash (500 lb.) and Sulph. Mag. (200 lb.)	Wide	3.57	—	—	—	—	—	—	—	—	—
			Narrow	3.10	—	—	—	—					

* 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; 4(*b*) receiving Superphosphate, Calcium Chloride (190 lb.), Potassium Nitrate (570 lb.), and Calcium Nitrate (100 lb.). Nitrogenous manures are applied as to one-third at time of sowing and 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 4.05 for leaves.

‡ Normal spacing. †† Wide and narrow bulked owing to small amount of produce.

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HAY—THE PARK GRASS PLOTS

Plot.	Manuring (amounts stated are per acre).		1930. Yield of Hay per acre. 1st Crop.	2nd* Crop.	Total.	Dry Matter per acre. 1st Crop.	2nd Crop.	Total.	Plot.
			cwt.	cwt.	cwt.	lb.	lb.	lb.	
1	Single dressing (206 lb.) Sulphate of Ammonia (=43 lb. N.); (with Dung also 8 years 1856–63)	not limed	27.7	12.3	40.0	2658	1105	3763	1
		limed ..	20.0	8.4	28.4	2052	750	2802	
2	Unmanured (after Dung 8 years, 1856–63) ..	not limed	22.8	8.8	31.6	2188	786	2974	2
		limed ..	20.9	6.2	27.1	1985	553	2538	
3	Unmanured	not limed	20.4	6.3	26.7	1862	562	2424	3
		limed ..	18.4	4.5	22.9	1686	400	2086	
4-1	Superphosphate of Lime (3½ cwt.)	not limed	25.8	5.5	31.3	2407	494	2901	4-1
		limed ..	19.0	3.0	22.0	1854	265	2119	
4-2	Superphosphate of Lime (3½ cwt.) and double dressing (412 lb.) Sulphate of Ammonia (=86 lb. N.)	not limed	8.9	1.1	10.0	780	95	875	4-2
		limed	41.3	6.9	48.2	4187	620	4807	
5-1	(N. half) Unmanured following double dressing Amm. salts (=86 lb. N.) 1856–97	not limed	17.1	4.0	21.1	1707	358	2065	5-1
5-2	(S. half) Superphosphate (3½ cwt.); Sulphate of Potash (500 lb.); following double dressing Amm. salts (=86 lb. N.) 1856–97	not limed	21.9	7.7	29.6	2196	687	2883	5-2
6	Complete Mineral Manure as Plot 7; following double dressing Amm. salts (=86 lb. N.) 1856–68	not limed	28.4	12.2	40.6	2877	1089	3966	6
7	Complete Mineral Manure: Super. (3½ cwt.); Sulphate of Potash (500 lb.); Sulphate of Soda (100 lb.); Sulphate of Magnesia (100 lb.) ..	not limed	31.2	13.6	44.8	3145	1215	4360	7
		limed ..	45.0	20.3	65.3	4192	1820	6012	
8	Mineral Manure without Potash	not limed	24.6	9.1	33.7	2425	811	3236	8
		limed ..	18.5	8.5	27.0	1887	762	2649	
9	Complete Mineral Manure and double dressing (412 lb.) Sulphate of Ammonia (=86 lb. N.) ..	not limed	31.3	23.0	54.3	3037	2059	5096	9
		limed ..	59.5	21.5	81.0	5999	1927	7926	
10	Mineral Manure (without Potash) and double dressing Amm. salts (=86 lb. N.)	not limed	19.5	14.8	34.3	2032	1325	3357	10
		limed ..	47.0	12.0	59.0	4709	1076	5785	
11-1	Complete Mineral Manure and treble dressing (618 lb.) Sulphate of Ammonia (129 lb. N.) ..	not limed	47.3	30.0	77.3	4806	2692	7498	11-1
		limed ..	63.4	19.0	82.4	6341	1699	8040	
11-2	As Plot 11-1 and Silicate of Soda	not limed	55.3	32.4	87.7	5594	2906	8500	11-2
		limed ..	63.2	28.2	91.4	6338	2529	8867	
12	Unmanured	not limed	17.9	9.0	26.9	1809	807	2616	12
13	Dung (14 tons) in 1905, and every fourth year since (omitted 1917), Fish Guano (6 cwt.) in 1907 and every fourth year since	not limed	42.6	22.9	65.5	4236	2048	6284	13
		limed ..	39.2	17.4	56.6	4015	1558	5573	
14	Complete Mineral Manure and double dressing (550 lb.) Nitrate of Soda (=86lb. N.) ..	not limed	59.1	24.8	83.9	5921	2218	8139	14
		limed (sun)	51.6	13.5	65.1	5190	1210	6400	
		lmd (shade)	40.6	7.5	48.1	4079	670	4749	
15	Complete Mineral Manure as Plot 7; following double dressing Nitrate of Soda (=86 lb. N., 1858–75)	not limed	35.8	17.7	53.5	3565	1583	5148	15
		limed ..	36.0	13.2	49.2	3544	1180	4724	
16	Complete Mineral Manure and Single Dressing (275 lb.) Nitrate of Soda (= 43 lb. N.)	not limed	40.1	14.7	54.8	4126	1320	5446	16
		limed	30.9	12.6	43.5	3115	1127	4242	
17	Single dressing (275 lb.) Nitrate of Soda (=43lb. N.)	not limed	30.6	10.4	41.0	2970	936	3906	17
		limed ..	30.4	7.3	37.7	3118	655	3773	
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	20.4	12.5	32.9	2026	1116	3142	18
		limed (6788 lb.)	53.9	21.7	75.6	5367	1945	7312	
		limed (3951 lb.)	40.8	17.0	57.8	4150	1523	5673	
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	29.1	18.8	47.9	2968	1688	4656	19
		limed (3150 lb.)	24.0	13.5	37.5	2325	1213	3538	
		limed (570 lb.)	24.4	11.5	35.9	2450	1032	3482	
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	36.9	16.1	53.0	3835	1445	5280	20
		limed (2772 lb.)	36.4	15.1	51.5	3826	1353	5179	
		limed (570 lb.)	38.1	14.1	52.2	3905	1260	5165	

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.

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WHEAT—BROADBALK FIELD, 1930

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	III	IV	V	I	II	III	IV	V	
		3rd year after fallow.		after 4 years' fallow.	after 2 years' fallow.		3rd year after fallow.		after 4 years' fallow.	after 2 years' fallow.		
2A	Farmyard Manure (14 tons)	7.5	16.8	34.7	35.9	26.1	5.4	10.2	23.4	23.1	17.3	16.3**
2B	Farmyard Manure (14 tons)	9.0	19.3	40.9	44.0	28.8	6.2	12.1	25.4	28.0	18.3	19.4
3	Unmanured since 1839	5.0	6.9	32.5	27.1	22.4	3.3	4.5	20.4	16.4	12.9	6.7
5	Complete Mineral Manure §§	4.6	6.3	34.9	29.5	25.2	3.1	4.3	21.5	18.5	14.2	7.8
6	As 5, and 206 lb. Sulphate of Ammonia	7.1	9.1	40.6	32.6	23.0	4.5	5.8	25.3	19.9	14.6	12.5
7	As 5, and 412 lb. Sulphate of Ammonia	9.1	14.9	38.9	34.6	24.2	5.8	9.4	25.9	22.6	16.2	17.6
8	As 5, and 618 lb. Sulphate of Ammonia	10.6	21.3	42.9	45.5	31.0	6.8	12.8	26.7	26.7	20.2	20.1
9	As 5, and 275 lb. Nitrate of Soda	9.9	15.8	39.1	38.7	31.2	6.4	9.4	24.6	22.8	18.3	13.9††
10	412 lb. Sulphate of Ammonia	8.0	12.7	44.1	35.5	22.4	5.3	8.1	26.2	21.8	14.8	10.9
11	As 10, and Superphosphate (3½ cwt.)	8.5	11.2	44.0	41.0	33.5	5.3	6.9	26.0	24.4	19.0	12.3
12	As 10, and Super. (3½ cwt.) and Sulph. Soda (366 lb.)	6.4	9.7	41.0	44.2	30.8	4.4	6.1	23.9	26.9	19.2	15.7
13	As 10, and Super (3½ cwt.) and Sulph. Potash (200 lb.)	6.5	10.9	42.3	37.9	29.2	4.6	7.1	25.3	23.0	17.1	17.0
14	As 10, and Super (3½ cwt.) and Sulph. Magnesia (280 lb.)	7.6	8.3	45.1	43.1	24.1	5.0	5.6	26.7	25.9	15.7	15.5
15	As 5, and 412 lb. Sulphate of Ammonia all applied in Autumn	7.2	10.5	41.1	39.8	24.5	4.7	6.8	24.8	23.7	14.2	16.1
16	As 5, and 550 lb. Nitrate of Soda	6.0	9.9	42.6	40.6	27.5	4.0	6.8	26.1	24.8	16.5	17.8††
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia	A6.1	9.4	39.2	33.3	22.5	4.0	6.0	23.7	20.3	14.3	A16.1*
18	alone in alternate years	M0.6	2.9	33.7	29.8	19.1	0.5	2.1	20.3	17.9	12.2	M 8.1
19	Rape Cake (1,889 lb.)	7.2	12.7	39.8	33.9	20.9	4.7	8.0	24.3	20.6	13.2	12.6‡
20	As 7, without Super.	5.2	—	—	—	—	3.5	—	—	—	—	10.3§

For notes see p. 123. *A = Ammonia series. M = Mineral series.

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WHEAT—BROADBALK FIELD, 1930

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.
		I	II	III	IV	V	I	II	III	IV	V	
		3rd year after fallow.		after 4 years' fallow.	after 2 years' fallow.		3rd year after fallow.		after 4 years' fallow.	after 2 years' fallow.		
2A	Farmyard Manure (14 tons)	60.5	61.0	62.2	62.5	61.5	26.8	27.1	56.6	56.3	60.0	32.1**
2B	Farmyard Manure (14 tons)	59.8	61.3	61.8	61.8	61.0	29.1	27.9	60.8	62.1	62.1	34.2
3	Unmanured since 1839	61.0	60.3	63.1	63.1	59.5	6.0	5.7	37.3	24.8	24.5	9.8
5	Complete Mineral Manure§§	60.5	60.5	63.2	62.6	58.7	7.0	8.7	41.0	33.3	30.3	11.5
6	As 5, and 206 lb. Sulphate of Ammonia	60.8	60.5	62.5	62.2	62.4	10.6	11.8	54.5	43.9	40.4	20.3
7	As 5, and 412 lb. Sulphate of Ammonia	60.5	61.5	61.5	61.1	60.9	23.2	21.4	59.8	59.0	60.8	32.1
8	As 5, and 618 lb. Sulphate of Ammonia	59.4	60.6	60.7	59.6	60.5	36.2	34.9	69.3	67.1	63.8	39.8
9	As 5, and 275 lb. Nitrate of Soda	60.5	60.3	61.0	60.9	60.3	21.2	22.4	61.4	57.4	59.8	24.6††
10	412 lb. Sulphate of Ammonia	60.8	62.4	62.1	62.5	62.6	19.6	17.1	52.1	45.0	39.4	17.8
11	As 10, and Superphosphate (3½ cwt.)	60.0	60.8	60.6	60.8	58.3	16.2	14.7	54.4	51.9	51.3	21.4
12	As 10, and Super (3½ cwt.) and Sulph. Soda (366 lb.)	60.5	60.3	60.2	60.2	59.4	13.6	13.3	59.4	64.9	58.3	26.8
13	As 10, and Super (3½ cwt.) and Sulph. Potash (200 lb.)	60.5	61.5	61.0	59.3	58.4	14.3	15.3	61.3	63.2	58.1	30.6
14	As 10, and Super (3½ cwt.) and Sulph. Magnesia (280 lb.)	60.3	60.8	61.1	60.2	60.6	13.5	12.4	60.0	64.9	50.8	26.8
15	As 5, and 412 Sulphate of Ammonia all applied in Autumn	60.3	61.6	61.5	62.1	59.4	10.0	11.6	51.9	51.6	35.1	28.2
16	As 5, and 550 lb. Nitrate of Soda	59.5	61.0	60.5	61.1	59.6	24.3	25.1	69.7	61.4	60.5	35.2††
17	Minerals alone as 5 or 412 lb. Sulphate of Ammonia	A59.8	61.0	61.2	61.0	61.2	11.6	14.2	53.3	56.3	50.6	A28.1*
18	alone in alternate years	M —	60.0	62.9	62.4	62.3	2.0	3.3	36.3	37.1	28.4	M12.3
19	Rape Cake (1,889 lb.)	60.0	61.0	62.0	62.3	61.8	13.7	14.9	49.5	50.1	40.7	22.0‡
20	As 7, without Super	58.5	—	—	—	—	12.6	—	—	—	—	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.

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PERMANENT BARLEY PLOTS

Hoos Field, 1930

Plot	Manuring (Amounts stated are per acre)	Total Grain per acre		76 Years' Average 1852-1928	Total Straw per acre.		76 Years' Average 1852-1928
		Plumage Archer cwt.	Spratt Archer cwt.	Dressed Grain per acre. bush.‖	Plumage Archer cwt.	Spratt Archer cwt.	Total Straw per acre. cwt.†
1O	Unmanured	0.3	0.4	13.4	1.0	0.8	7.8
2O	Superphosphate only (3½ cwt.) ..	4.9	4.6	19.0	4.1	3.8	9.8
3O	Alkali Salts only (200 lb. Sulphate of Potash; 100 lb. Sulphate of Soda; 100 lb. Sulphate of Magnesia)	1.8	1.5	14.3	2.8	2.1	8.7
4O	Complete Minerals; as 3O with Superphosphate (3½ cwt.) ..	3.6	4.8	19.0	3.3	4.1	11.2
5O	Potash (200 lb.) and Superphosphate (3½ cwt.)	4.2	4.2	15.5	4.1	4.6	9.4
1A	Ammonium Salts only (206 lb. Sulphate of Ammonia)	1.4	2.0	23.7	2.2	3.3	13.7
2A	Superphosphate and Amm. Salts ..	9.0	9.5	35.8	8.9	8.4	20.4
3A	Alkali Salts and Amm. Salts ..	3.9	2.6	25.8	5.5	4.1	16.0
4A	Complete Minerals and Amm. Salts	7.4	8.9	39.3	8.4	8.7	23.6
5A	Potash, Super. and Amm. Salts ..	6.6	6.1	33.8	9.7	8.6	21.7
1AA	Nitrate of Soda only (275 lb.) ..	2.4	2.4	24.3*	4.3	4.1	15.4*
2AA	Superphosphate and Nitrate of Soda	9.0	9.5	38.8*	9.3	9.4	23.1*
3AA	Alkali Salts and Nitrate of Soda ..	4.0	4.0	24.5*	5.5	5.5	16.6*
4AA	Complete Minerals and Nitrate of Soda	8.5	8.7	37.7*	9.3	8.5	23.6*
1AAS	As Plot 1AA and Silicate of Soda (400 lb.)	3.4	5.5	30.2*	3.8	6.7	18.2*
2AAS	As Plot 2AA and Silicate of Soda (400 lb.)	10.3	10.7	39.7*	10.5	11.2	23.9*
3AAS	As Plot 3AA and Silicate of Soda (400 lb.)	6.4	6.7	31.2*	7.2	7.1	19.9*
4AAS	As Plot 4AA and Silicate of Soda (400 lb.)	9.6	10.5	39.9*	10.3	10.4	25.4*
1C	Rape Cake only (1,000 lb.) ..	6.0	6.2	35.5	6.7	6.5	20.6
2C	Superphosphate and Rape Cake ..	9.0	9.1	38.1	10.7	9.9	22.0
3C	Alkali Salts and Rape Cake ..	7.3	8.2	33.7	9.6	9.3	20.4
4C	Complete Minerals and Rape Cake	8.3	8.9	37.5	10.0	10.1	22.6
7-1	Unmanured (after dung (14 tons) for 20 years (1852–71) ..	4.0	4.9	22.5‡	4.4	5.1	13.5‡
7-2	Farmyard Manure (14 tons) ..	7.7	8.1	44.6	9.1	10.0	28.1
6-1	Unmanured since 1852	1.6	0.9	14.7	2.7	2.3	8.6
6-2	Ashes from Laboratory furnace ..	2.3	2.9	15.7	2.7	3.3	9.3
1N	Nitrate of Soda only (275 lb.) ..	2.1	1.7	28.7§	2.6	2.4	17.8§
2N	Nitrate of Soda only (275 lb.) ..	6.8	5.1	31.7§§	8.8	7.2	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.

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SCHEME FOR CONTINUOUS ROTATION EXPERIMENTS COMMENCING 1930

Rotation I.—FOUR COURSE ROTATION EXPERIMENT.

The Rotation experiment in Great Hoos field was designed primarily for investigating the residual effects of certain humic and phosphatic fertilisers. Previous rotation experiments, at Rothamsted and elsewhere, suffered from a radical defect in design, which resulted in large experimental errors. The arrangement of these experiments was such that with the same crop, the same treatment fell repeatedly on the same plot of land, and repetitions thus did nothing to eliminate permanent soil differences between the plots. The present experiment avoids this defect by ensuring that the period of the cycle of crop rotation differs from the period of the cycle of manurial treatment.

The cropping follows a Norfolk Rotation, involving a four year cycle of barley, seeds, wheat, swedes. The seeds mixture is Commercial White Clover and Italian Rye-grass, selected in order to lessen the risk of Clover sickness. To minimise the risk of Frit-fly attack in the subsequent wheat crop, the seeds ley is ploughed in before the middle of August.

There are four areas (termed "Series"), each bearing one crop of the rotation, so that all four crops are represented annually.

Treatments.

The Treatments compared are :

Humic fertilisers	1.	Dung.
	2.	Adco. compost.
	3.	Straw and Artificials.
Phosphatic fertilisers	4.	Superphosphate.
	5.	Rock phosphate (Gafsa).

Any given plot receives always the same treatment, but the treatment is applied to the plot only once in five years. The period of the manurial cycle (five years) thus differs from that of the crop rotation (four years).

Information is thus obtained of the effect of the fertilisers, not only in the year of application, but also in the first, second, third and fourth years after application.

Each "series" of the experiment comprises twenty-five plots, and in the fifth year of the experiment and in succeeding years, all plots will have been treated, and there will be represented for each treatment plots which have had application of fertilisers in the current year, and one, two, three, and four years previously. The harvest results for 1930–33, therefore, belong to the preparatory period, and will not be included in the final analysis.

There is no replication in any one year, but this will be provided by carrying on the experiment over a fixed period. In twenty years, on any given plot each stage of the treatment will have occurred once with every crop.

The quantities of fertilisers to be applied are calculated as follows :

Dung and Adco are each given in quantities which supply 50 cwt. of organic matter per acre. As much straw is applied as went to make the calculated amount of Adco, *i.e.*, that amount which gives 50 cwt. of organic matter per acre in the form of Adco. The quantity of straw applied will in general give a considerably greater amount of organic matter than the Dung or Adco, since there is a loss of organic matter during the maturation of these fertilisers.

The Adco is made in a pit or bin, so that there is no outside unrotted portion. To prevent straw (applied as chaff) blowing away, it is thoroughly soaked before application, and moistened subsequently if necessary.

The nutrient-content of the three humic fertilisers is equalised by adding sulphate of ammonia, muriate of potash and superphosphate, to raise the applications to 1.8 cwt. N per acre, 3.0 cwt. K_2O per acre, and 1.2 cwt. P_2O_5 per acre. The artificials given with the straw are applied in three doses, to minimise loss by leaching.

The phosphatic fertilisers of treatments 4 and 5 are given at the rate of 1.2 cwt. total P_2O_5 per acre, and with them are given sulphate of ammonia at the rate of 1.8 cwt. N per acre, and muriate of potash at the rate of 3.0 cwt. K_2O per acre.

The rock phosphate is Gafsa, ground so that 90 per cent passes through the 120 mesh.

The artificials given with the humic fertilisers are all applied with them in the first year of the manurial cycle.

The phosphatic fertilisers of treatments 4 and 5 are applied only in the first year of the manurial cycle, but the accompanying sulphate of ammonia and muriate of potash are applied one fifth annually throughout the cycle.

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Time of Application of Fertilisers.

In determining the time of application of the fertilisers, the principle followed has been to give the fertilisers to each crop at a time when they are likely to be most effective.

The scheme adopted is as follows :

(1) *Wheat.*—Dung and Adco and accompanying artificials in one dose in the Autumn.

Straw in one dose in Autumn, but accompanying artificials split into three doses, one applied in Autumn, the remainder through the Winter.

Treatments 4 and 5. Phosphates and potash in seed-bed.

Sulphate of Ammonia of treatments 4 and 5, split into two parts, one applied in the seed-bed, the other as a spring top dressing.

(2) *Clover.*—Dung and Adco and accompanying artificials in one dose in Autumn, unless plant is very weak, when the manures should be split into two or three doses.

Straw and artificials—application to be determined by state of plant, but to be completed by the end of January.

Treatments 4 and 5. Phosphates and potash in the Autumn.

Sulphate of Ammonia in two doses, one in Autumn, and one in Spring.

(3) *Barley and Swedes.*—Dung and Adco and accompanying artificials in one dose in Autumn.

Straw in one dose in Autumn, and accompanying artificials in three doses, one in Autumn, and the remaining two through the winter.

Treatments 4 and 5. All artificials to be given in the seed-bed.

Arrangement of Plots.

The experiment consists of four series of plots, each series growing one crop of the Norfolk rotation. Each series has 25 plots, in 5 blocks of 5 plots each. Each treatment is assigned to one plot in each block, chosen at random ; and each block has one treated plot in each year, chosen initially at random ; finally each treatment is applied once in each year to one plot in each series.

Hence treatments are assigned as to five Randomised blocks of five plots each in each series, but a Latin Square scheme determines the year of application of the treatment in each series.

The plots are approximately 1/40th acre in area (.02436 acre in series A, B and C, but .023347 acre in series D).

First Series (Plots 1-25).—Years of Application.

Treatments :	Blocks. A	B	C	D	E	
1	III	V	I	II	IV	(I. II, III, IV, V
2	I	III	IV	V	II	=the successive
3	V	I	II	IV	III	years of the
4	II	IV	III	I	V	cycle.)
5	IV	II	V	III	I	

(Hence treatment 1 is applied to the appropriate plot in block C in the first year of the experiment ; to that in block D in the second year ; A in the third, and so forth.)

First Series A H (Plots 1-25) Seeds Hay.—Layout in 1929-30.

BLOCKS					
a	1 / 5	2 / 2	3 / 1	4 / 3	5 / 4
b	6 / 5	7 / 1	8 / 3	9 / 4	10 / 2
c	11 / 3	12 / 2	13 / 5	14 / 4	15 / 1
d	16 / 1	17 / 3	18 / 4	19 / 5	20 / 2
e	21 / 4	22 / 1	23 / 5	24 / 3	25 / 2

Upper Figure—Plot Number
Lower Figure—Treatment Number

Hence plot 15 receives treatment 1 in the first year of the experiment, etc.

Second Series (Plots 26-50).—Years of Application.

Treatments :	Blocks. A	B	C	D	E
1	IV	II	III	I	V
2	I	III	II	V	IV
3	II	V	IV	III	I
4	III	I	V	IV	II
5	V	IV	I	II	III

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Second Series A W (Plots 26-50) Wheat.—Layout in 1929-30.

BLOCKS					
a	26 3	27 2	28 5	29 4	30 1
b	31 4	32 2	33 1	34 5	35 3
c	36 1	37 4	38 3	39 5	40 2
d	41 4	42 5	43 3	44 2	45 1
e	46 2	47 4	48 3	49 1	50 5

Third Series (Plots 51-75).—Years of Application.

TREATMENTS:	Blocks. A	B	C	D	E
1	V	III	IV	I	II
2	III	IV	I	II	V
3	I	V	II	IV	III
4	IV	II	V	III	I
5	II	I	III	V	IV

Third Series A B (Plots 51-75) Barley.—Layout in 1929-30.

BLOCKS					
a	51 3	52 4	53 1	54 2	55 5
b	56 3	57 4	58 5	59 2	60 1
c	61 2	62 4	63 3	64 1	65 5
d	66 5	67 1	68 3	69 4	70 2
e	71 4	72 2	73 1	74 5	75 3

Fourth Series (Plots 76-100).—Years of Application.

TREATMENTS:	Blocks. A	B	C	D	E
1	IV	II	I	V	III
2	I	IV	III	II	V
3	V	I	II	III	IV
4	II	III	V	IV	I
5	III	V	IV	I	II

Fourth Series A T (Plots 76-100) Turnips.—Layout in 1929-30.

BLOCKS					
a	76 4	77 2	78 5	79 3	80 1
b	81 5	82 2	83 1	84 4	85 3
c	86 2	87 1	88 5	89 4	90 3
d	91 2	92 4	93 1	94 5	95 3
e	96 5	97 2	98 3	99 1	100 4

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Rotation II.—SIX COURSE EXPERIMENT.

This experiment is designed to furnish data on the effect of varying amounts of the three standard fertilisers, nitrogen, phosphate, and potash, on the yield of six crops of a rotation in the different weather conditions of successive years.

Rotation.

The six courses of the rotation are : barley, clover hay, wheat, potatoes, forage-crop, sugar-beet. The forage-crop consists of equal parts (1 bushel per acre each) of rye, beans and vetches. It is sown in autumn, cut green and followed by a catch crop of mustard. The mustard is ploughed in in early autumn, and followed by rye to be ploughed in before sowing sugar-beet.

The variety of barley used is Plumage-Archer, and of wheat Yeoman II.

Arrangement.

There are six areas, called " series," in Long Hoos IV, which are cropped in this rotation so that each crop is represented every year. There are fifteen plots of 1/40th acre in each series, each of which receives a different treatment. Thus there is no replication of a given crop with a given treatment in any one year. Plots do not receive the same treatments throughout, but on each plot the fifteen treatments follow one another in a definite order in successive years, and in this way cumulative effects of a treatment are avoided.

Treatments.

The fifteen treatments are :

Nitrogen set. 4, 3, 2, 1, 0 units ef N, each with 2 units P and 2 units K.
Phosphate set. 4, 3, 2, 1, 0 units of P, each with 2 units K and 2 units N.
Potash set. 4, 3, 2, 1, 0 units of K, each with 2 units N and 2 units P.
1 unit of N=0.15 cwt. of N per acre
1 unit of P=0.15 cwt, of P_2O_5 per acre.
1 unit of K=0.25 cwt. of K_2O per acre.

The fertilisers used are Sulphate of Ammonia, Superphosphate and Muriate of Potash. The amount of Superphosphate applied is calculated on the basis of total P_2O_5 content.

The potassic and phosphatic fertilisers are applied to the autumn sown crops, wheat and forage-mixture, and to the clover, sown under barley in the previous spring, in the Autumn, and the nitrogenous fertiliser is given as a spring top dressing. The spring sown crops receive all their fertilisers at the time of sowing.

Within each of the three sets of treatments, the treatments 4, 3, 2, 1, 0 units follow each other in that order in successive years.

On series A, C, E the order of the sets of treatments is N, P, K, and on series B, D, F, the order is N, K, P, *i.e.*, on plots of series A, C, E treatment ON is followed by treatment 4P, OP by 4K, and OK by 4N, while on series B, D, F, ON is followed by 4K, OK by 4P, and OP by 4N.

Continuance of the Experiment.

After 30 years on the same land, each plot has completed 5 rotations by crops, and 2 by treatments. If continued for a further period, it will be necessary to omit one stage of the crop rotation on each series, without breaking the sequence of manurings. After two such breaks the experiment could be continued until every crop with every treatment had occurred on each plot.

Estimate of Error.

Although there is no actual replication, an estimate of error can be made from the deviations of the Yield/Quantity of fertiliser curve, from a smooth form.

In 1929–30 the six crops of the rotation were scattered in various fields of the farm, so that the experiment proper started on its permanent site in Long Hoos IV in season 1930–31. The lay-out of the plots in the latter season is shown in the plan.

Rotation II, Six Course –Long Hoos (Section 4) 1930-31.
First Series—B W (Plots 1-15) Wheat.

1 3P	2 OP	3 ON	4 4K	5 2K
6 4N	7 2P	8 3N	9 OK	10 1K
11 1P	12 2N	13 1N	14 3K	15 4P

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Second Series.—B S (Plots 16-30) Sugar Beet.

16 3N	17 4P	18 2P	19 3P	20 3K
21 ON	22 2N	23 1P	24 OK	25 4N
26 IN	27 OP	28 4K	29 2K	30 1K

Third Series.—B B (Plots 31-45) Barley.

31 2K	32 OK	33 OP	34 2P	35 3N
36 3K	37 1K	38 4N	39 4K	40 ON
41 4P	42 3P	43 1P	44 2N	45 1N

Fourth Series.—B C (Plots 46-60) Clover.

46 3P	47 OP	48 1K	49 4N	50 2N
51 1P	52 4K	53 2K	54 3N	55 1N
56 2P	57 OK	58 3K	59 ON	60 4P

Fifth Series.—B P (Plots 61-75) Potatoes.

61 4P	62 OK	63 1P	64 OP	65 1N
66 3K	67 1K	68 2P	69 ON	70 4K
71 2K	72 3P	73 4N	74 2N	75 3N

Sixth Series.—B F (Plots 76-90) Forage-Crop (followed by Mustard and Rye).

76 4K	77 OP	78 3K	79 OK	80 ON
81 2P	82 3P	83 4N	84 2N	85 3N
86 1P	87 2K	88 1K	89 4P	90 1N

Upper Figure—Plot Number.
Lower Figure—Treatment Symbol.

J

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Rotation I., Four-Course, Hoos Field, 1930 (First Preliminary year).

For full particulars of experiment see p. 125.

Plots $\frac{1}{40}$ acre.

TREATMENTS:
1. Farmyard manure. } 50 cwt. organic matter per acre.
2. Artificial farmyard manure prepared by Adco process. }
3. Straw equivalent to that used in (2) treated on land with artifical fertilisers.
4. Superphosphate (1.2 cwt. total P_2O_5 per acre) Muriate of Potash (3 cwt. K_2O per acre) Sulphate of Ammonia (altogether 1.8 cwt. N per acre). One-fifth only applied in 1930.
5. As (4) but equivalent Gafsa Phosphate instead of Superphosphate. Nutrient content of (1), (2) and (3) equalised by adding Sulphate of Ammonia, Muriate of Potash and Superphosphate to raise the applications to the level given in (4) and (5).

Plots treated in 1930 shown in bold type.

A H (Plots 1-25) Seeds Hay.

Seed sown: Oct. 3rd, 1929. Cut: July 9th.

Yield of Dry Matter in cwt. per acre.

N

BLOCKS							
a	1	5 13.6	2 **27.9**	1 11.4	3 10.7	4 11.8	5
b	6	5 9.6	1 8.9	3 **42.5**	4 11.4	2 12.9	10
c	11	3 9.3	2 8.2	5 10.0	4 10.7	1 **22.5**	15
d	16	1 9.3	3 8.6	4 **21.8**	5 11.1	2 15.7	20
e	21	4 10.7	1 10.7	5 **17.9**	3 13.6	2 10.7	25

A W (Plots 26-50) Wheat (harvested by sampling method.)

Seed sown: March 20th (autumn sowing failed). Harvested: Sept. 22nd. Variety: Little Joss.

Yield of Grain in cwt. per acre.

BLOCKS							
a	26	3 14.4	2 **17.2**	5 10.2	4 11.6	1 16.0	30
b	31	4 **19.8**	2 14.8	1 15.4	5 14.1	3 12.8	35
c	36	1 13.9	4 14.9	3 15.9	5 **20.8**	2 20.1	40
d	41	4 17.6	5 16.9	3 14.9	2 18.3	1 **15.9**	45
e	46	2 14.0	4 13.0	3 **24.5**	1 15.0	5 10.9	50

N.

Yield of straw in cwt. per acre.

26	3 24.2	2 **28.1**	5 15.2	4 17.1	1 26.3	30
31	4 **28.3**	2 22.9	1 21.3	5 22.2	3 20.8	35
36	1 21.0	4 22.4	3 24.3	5 **30.4**	2 29.5	40
41	4 28.6	5 25.9	3 22.7	2 29.0	1 **28.6**	45
46	2 23.2	4 20.2	3 **35.3**	1 24.7	5 24.2	50

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A B (Plots 51-75) Barley.

Seed sown: March 19th. Harvested: Sept. 1st. Variety: Plumage Archer.

Yield of Grain in cwt. per acre. **Yield of Straw in cwt. per acre.**

N.

BLOCKS													
		3	4	1	2	5			3	4	1	2	5	
a	51	**22.5**	11.7	12.7	10.4	11.8	55	51	**30.1**	33.1	30.8	26.1	28.7	55
		3	4	5	2	1			3	4	5	2	1	
b	56	15.1	11.3	**17.6**	10.6	11.0	60	56	39.0	38.8	**37.9**	30.8	32.7	60
		2	4	3	1	5			2	4	3	1	5	
c	61	**22.8**	11.1	13.1	10.5	12.7	65	61	**30.5**	42.5	42.2	31.3	37.0	65
		5	1	3	4	2			5	1	3	4	2	
d	66	14.6	**16.2**	10.7	10.0	12.5	70	66	31.6	**38.3**	34.2	28.6	31.1	70
		4	2	1	5	3			4	2	1	5	3	
e	71	**21.3**	9.9	10.6	12.1	13.1	75	71	**25.9**	23.7	27.9	29.3	27.4	75

A T (Plots 76-100) Turnips.

Seed sown: July 15th (after swedes, which failed). Lifted: Nov. 11th-13th Variety: Green Top.

Yield of Roots (washed) in tons per acre. **Yield of Tops in tons per acre.**

N.

BLOCKS														
		4	2	5	3	1			4	2	5	3	1	
a	76	7.39	**9.66**	6.54	3.23	3.71	80	76	4.39	**7.17**	4.04	2.45	3.06	80
		5	2	1	4	3			5	2	1	4	3	
b	81	6.93	6.32	5.27	2.11	**10.86**	85	81	4.45	3.68	3.93	1.96	**8.34**	85
		2	1	5	4	3			2	1	5	4	3	
c	86	6.98	**9.00**	4.37	1.69	2.27	90	86	4.26	**5.51**	3.88	1.60	2.84	90
		2	4	1	5	3			2	4	1	5	3	
d	91	6.46	3.41	3.61	**4.02**	2.44	95	91	3.94	2.21	3.50	**2.85**	2.19	95
		5	2	3	1	4			5	2	3	1	4	
e	96	6.26	1.06	2.18	1.55	**9.52**	100	96	4.27	0.94	2.58	1.61	**6.17**	100

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Rotation II., Six-Course, 1930.

For full particulars of experiment see p. 128

Plots $\frac{1}{40}$ acre

TREATMENTS:

N—4, 3, 2, 1 and 0 units of N, each with 2 units P_2O_5 and 2 units K_2O.
K—4, 3, 2, 1 and 0 units of K_2O, each with 2 units N and 2 units P_2O_5.
P—4, 3, 2, 1 and 0 units of P_2O_5, each with 2 units N and 2 units K_2O.

1 unit of N—0.15 cwt. N per acre as Sulphate of Ammonia.
1 unit of K—0.25 cwt. K_2O per acre as Muriate of Potash.
1 unit of P—0.15 cwt. P_2O_5 per acre as Superphosphate.

B S—Sugar Beet—Long Hoos VI.

Manures applied: May 8th. Seed sown: May 9th. Lifted: Sept. 26th-30th. Variety: Johnson P.

Washed Roots—tons per acre. N.W.

4N 6.96	0N 6.32	3P 7.05	4P 6.35	4K 5.44
1N 7.07	3N 8.03	2P 8.04	1K 6.97	0K 5.79
2N 5.95	1P 6.39	0P 5.54	3K 5.98	2K 5.24

Tops—tons per acre.

4N 11.65	0N 7.34	3P 9.83	4P 9.29	4K 9.38
1N 9.27	3N 10.53	2P 11.34	1K 9.69	0K 10.26
2N 7.76	1P 8.33	0P 8.50	3K 7.85	2K 9.16

B B—Barley—Long Hoos V.

Manures applied: Feb. 27th. Seed sown: Feb. 28th. Harvested: Aug. 15th. Variety: Plumage Archer.

Yield of Grain in cwt. per acre. N.E.

4P 25.5	1P 25.9	2K 29.4	0K 30.1	3N 22.3
2P 26.6	0P 28.0	3K 30.4	4N 30.5	2N 27.4
3P 25.4	1K 28.6	4K 28.9	1N 25.2	0N 21.2

Yield of Straw in cwt. per acre.

4P 37.0	1P 24.3	2K 40.3	0K 29.7	3N 23.0
2P 31.2	0P 30.4	3K 35.5	4N 34.8	2N 29.7
3P 38.6	1K 33.4	4K 33.2	1N 26.8	0N 23.1

B C—Clover Hay—Long Hoos IV.

Manures applied: Mar. 3rd. Seed sown: April 18th, 1929. Cut: June 14th.

Yield of Dry Matter in cwt. per acre.

N.E.

4P 38.8	1P 35.0	1N 32.7	0N 22.3	3K 36.9
0P 35.7	3P 35.7	4N 46.7	1K 37.1	2K 36.2
2P 35.9	3N 42.2	2N 34.2	4K 36.1	0K 33.1

B W—Wheat—Great Knott.

Manures applied: Mar. 4th. Seed sown: Sept. 20th, 1929. Harvested: Aug. 9-11th. Variety: Million.

Yield of grain in cwt. per acre. N.E.

0K 24.9	1K 26.7	2P 24.8	1P 20.3	2N —
4K 30.6	2K 31.1	3P 26.2	1N 21.6	0N —
3K 30.2	4P 31.2	0P 28.3	3N 25.6	4N —

Yield of straw in cwt. per acre.

0K 63.7	1K 65.1	2P 63.9	1P 58.1	2N —
4K 68.3	2K 81.2	3P 68.1	1N 52.7	0N —
3K 79.8	4P 71.1	0P 65.3	3N 68.1	4N —

The end three plots, and part of the adjoining three, were discarded owing to lodging.

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B P—Potatoes—Long Hoos VI.

Manures applied : April 1st. Planted : April 3rd. Lifted : Sept. 25th-26th. Variety : Ally.

Yield of Roots in tons per acre.

N.E.

0P 9.09	1P 6.67	4K 7.23	1K 5.13	1N 6.05
3P 7.14	4P 6.18	0K 3.70	3N 5.73	4N 6.72
2P 6.44	3K 6.91	2K 6.04	0N 4.50	2N 5.68

B F—Forage Crop—Pastures Field.

Manures applied : Mar. 25th. Seed sown : Sept. 24th-25th. Harvested : June 13th (followed by Mustard and Rye)

Yield of Dry Matter in cwt. per acre.

N.E.

3K 43.4	1K 48.4	1P 46.6	3P 48.7	4N 51.2
4K 45.4	2K 47.7	0P 50.0	0N 39.8	1N 46.5
0K 41.4	4P 45.9	2P 48.4	3N 53.2	2N 52.0

SUMMARY OF RESULTS.

1.—Table showing increments in yield per cwt. of N, P_2O_5 and K_2O, together with the standard errors of the increments.

Crop.	N		P		K	
Sugar Beet—Roots, tons	1.49	± 1.79	1.52	± 1.79	—0.68	± 1.08
Tops, tons	**6.59**	± 2.26	2.05	± 2.26	—1.44	± 1.36
Barley—Grain, cwt.	**10.5**	± 4.2	—3.7	± 4.2	—0.2	± 2.5
Straw, cwt.	13.1	± 9.1	18.3	± 9.1	3.6	± 5.4
Clover Hay—dry matter, cwt. ..	**38.9**	± 3.5	4.6	± 3.5	2.3	± 2.1
Wheat—Grain, cwt.	—		7.8	± 6.7	6.0	± 4.0
Straw, cwt.	—		14.4	± 14.0	9.6	± 8.4
Potatoes—tons	2.75	± 1.38	**—3.57**	± 1.38	**3.54**	± 0.83
Forage—dry matter, cwt. ..	**19.6**	± 6.0	—4.2	± 6.0	1.2	± 3.6

2.—Table showing the average percentage increments in yield for each application of N, P_2O_5 and K_2O, with their standard errors.

Crop.	N	P	K	Standard Error.
Sugar Beet—Roots	3.46	3.52	—2.61	± 4.16
Tops	**10.57**	3.30	—3.85	± 3.63
Barley—Grain ..	**5.81**	—2.03	—0.22	± 2.36
Straw ..	6.24	8.76	2.90	± 4.34
Clover Hay—dry matter ..	**16.24**	1.92	1.62	± 1.47
Wheat—Grain ..	—	4.27	5.43	± 3.65
Straw ..	—	3.16	3.49	± 3.08
Potatoes	6.63	**—8.61**	**14.23**	± 3.33
Forage—dry matter ..	**6.22**	—1.33	0.61	± 1.92

Significant results are in bold type. Negative sign means depression.

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Barley: Comparison of Nitrogenous Fertilisers, Sulphate and Muriate of Ammonia, Nitrate of Soda and Cyanamide.

R B—Long Hoos (Section 5), 1930.

N.E.

I.	C	S	N	M	O
II.	N	O	S	C	M
III.	S	N	M	O	C
IV.	M	C	O	N	S
V.	O	M	C	S	N

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 1/40th acre.
TREATMENTS:
O = No Nitrogen.
S = Sulphate of Ammonia.
M = Muriate of Ammonia
N = Nitrate of Soda.
C = Cyanamide.
} at the rate of 0.4 cwt. N per acre.
All manures applied Feb. 28th, except Cyanamide which was sown Mar. 3rd.
Drilled: Feb. 28th. Harvested: Aug. 15th.
Variety: Plumage Archer. Previous crop: Sugar Beet (tops eaten off by sheep).

Actual weight in lb.

	Grain.					Straw.				
Row.	O	S	M	N	C	O	S	M	N	C
I. ..	47.25	70.50	65.75	69.50	62.50	52.75	75.00	73.25	76.50	66.50
II. ..	67.00	72.25	64.75	68.00	64.25	74.00	86.25	67.50	80.00	74.25
III. ..	58.75	69.00	70.75	81.50	57.75	72.75	74.00	87.25	88.50	66.75
IV. ..	60.50	63.50	69.25	65.50	67.25	73.50	69.50	77.50	82.50	72.75
V. ..	53.25	63.00	71.50	68.50	60.50	54.25	68.00	69.75	69.50	84.50

Summary of Results.

	Average yield.	No Nitrogen	Sulphate of Ammonia.	Muriate of Ammonia.	Nitrate of Soda.	Cyanamide.	Mean.	Standard Error.
Grain ..	cwt. per acre	20.5	24.2	24.4	25.2	22.3	23.3	0.47
	per cent.	87.8	103.6	104.8	108.1	95.7	100.0	2.01
Straw ..	cwt. per acre	23.4	26.6	26.8	28.4	26.1	26.2	0.71
	per cent.	89.1	101.5	102.1	108.1	99.3	100.0	2.70

Significant response to all forms of nitrogenous fertiliser in both grain and straw. With grain the yield of the cyanamide plots is significantly below that of the others, while the highest yield of all is that from the Nitrate of Soda plots. With straw the yields are in the same order as with grain, but the differences in this case are hardly significant.

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WHEAT

(*a*) Variety Trial.
(*b*) Nitrogenous Fertilisers as Top Dressing: Sulphate and Muriate of Ammonia.

Each in single and double dressings.
R W—Long Hoos (Section 3), 1930.

A — S.E. — B

Sq, Sw, M, Y, Y, Sq, Sw, M, M, Y, Sw, Sq, Sq, Sw, M, Y, Sq, Y, M, Sw, M, Sw, Y, Sq, Y, M, Sw, Sq, Sw, Y, Sq, M

	S, L	M, E. & L	O(1)	S, E	S, E	O (2)	S, L	M, E & L	
C	S, L	O (1)	M, E & L	S, E	O (2)	S, E & L	M, L	M, E	D
	M, E	O (1)	S, E & L	M, L	S, E & L	M, E	M, L	O (2)	

E — F

SYSTEM OF REPLICATION: 6 randomised blocks.
AREA OF EACH BLOCKLET: 1/60th acre.
S=Sulphate of Ammonia } at the rate of
M=Muriate of Ammonia. } 0.2 cwt. N per acre.
O (1) and O (2)=No Top Dressing.
E=Early Top Dressing (Mar. 31st.)
L=Late Top Dressing (May 15th.)
E and L=Early and Late Top Dressing.
Basal Dressing: 3 cwt. Super. and 1½ cwt. Muriate of Potash per acre.

Strips running across the blocks were allotted to 4 varieties as indicated in plan.
Sq.=Square-Head's Master.
Sw.=Swedish Iron.
M=Million III.
Y=Yeoman II.
Wheat sown: Oct. 11th, 1929.
Harvested: Aug. 15th-16th, 1930.
Previous crop: Seeds.

Actual weights in lb.—Total Grain.

Variety.	Blocks.	O (1)	O (2)	S.E.	S.L.	M.E.	M.L.	S. E. & L.	M. E. & L.
Square-Head's Master	A and D	22.00	21.50	19.00	16.50	21.75	20.50	27.75	16.75
	C ,, F	24.50	23.50	28.75	29.50	25.75	20.50	28.25	25.50
	B ,, E	30.25	24.50	22.50	28.75	29.00	28.50	30.75	21.25
Average in cwt. per acre		13.1		12.5	13.3	13.7	12.4	15.5	11.3
Swedish Iron	A and D	31.50	31.50	31.00	26.50	29.50	31.75	36.75	27.00
	C ,, F	37.00	33.25	38.25	39.00	35.25	34.25	35.50	31.25
	B ,, E	39.50	39.25	34.75	38.75	39.00	35.00	32.75	39.00
Average in cwt. per acre		18.9		18.6	18.6	18.5	18.0	18.7	17.4
Million III	A and D	25.50	19.50	22.75	18.75	20.75	24.75	26.25	21.50
	C ,, F	30.50	23.75	23.50	34.75	25.75	21.00	24.50	29.75
	B ,, E	31.75	25.25	21.00	30.75	32.25	26.00	40.00	16.50
Average in cwt. per acre		14.0		12.0	15.0	14.1	12.8	16.2	12.1
Yeoman II	A and D	29.25	23.25	27.75	21.25	23.50	28.25	31.25	23.00
	C ,, F	30.00	29.25	24.50	29.25	28.00	30.25	28.50	28.50
	B ,, E	25.50	31.00	27.50	35.25	27.75	27.75	35.75	29.75
Average in cwt. per acre		15.0		14.2	15.3	14.2	15.4	17.1	14.5

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Wheat, Long Hoos, 1930 (*cont.*)

Actual weights in lb.—Total Straw.

Variety.	Blocks.	O (1)	O (2)	S.E.	S.L.	M.E.	M.L.	S. E. & L.	M. E. & L.
Square-Head's Master	A and D	35.50	34.50	42.50	49.50	41.75	32.50	49.25	49.25
	C ,, F	41.50	33.50	54.25	59.50	46.25	45.00	50.75	51.50
	B ,, E	46.75	48.00	48.00	46.50	50.00	39.50	52.25	44.25
Average in cwt. per acre		21.4		25.8	27.8	24.6	20.9	27.2	25.9
Swedish Iron	A and D	40.00	38.00	49.00	49.00	40.00	40.25	56.25	50.50
	C ,, F	50.00	41.75	53.75	53.00	47.75	38.75	49.00	50.25
	B ,, E	53.50	53.75	52.25	47.25	50.00	47.00	50.25	58.50
Average in cwt. per acre		24.7		27.7	26.7	24.6	22.5	27.8	28.4
Million III	A and D	41.00	30.50	45.25	51.25	43.25	33.75	42.25	44.00
	C ,, F	41.50	41.25	43.50	55.25	39.75	31.00	43.50	45.25
	B ,, E	44.25	38.75	50.00	43.25	49.75	40.50	55.50	48.50
Average in cwt. per acre		21.2		24.8	26.7	23.7	18.8	25.2	24.6
Yeoman II	A and D	39.75	29.75	44.25	47.25	37.50	40.75	55.75	58.00
	C ,, F	41.00	35.75	41.00	46.25	45.00	41.75	48.50	44.00
	B ,, E	36.00	47.00	49.50	55.75	42.25	39.25	53.25	49.75
Average in cwt. per acre		20.5		24.1	26.7	22.3	21.7	28.1	27.1

Summary of Results—(a) Effect of Top Dressing (averaging varieties).

Grain. cwt. per acre.	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	15.2	14.3	14.8	15.2	15.1	15.2	15.2	14.7	15.0
Applied late	15.6	16.9	16.2	14.7	13.8	14.2	15.2	15.4	15.3
Mean	15.4	15.6	15.5	15.0	14.4	14.7	15.2	15.1	15.1
Standard Errors	0.84 cwt. ; of margins 0.59 cwt.						0.59 cwt.; of margins 0.42 cwt.		

Grain. per cent.	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	100.9	94.9	97.9	100.9	99.9	100.4	100.9	97.4	99.2
Applied late	103.1	111.7	107.4	97.1	91.5	94.3	100.1	101.6	100.8
Mean	102.0	103.3	102.6	99.0	95.7	97.4	100.5	99.5	100.0
Standard Errors	5.54 ; of margins 3.92.						3.92 ; of margins 2.77.		

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Straw. cwt. per acre.	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	21.9	25.6	23.8	21.9	23.8	22.8	21.9	24.7	23.3
Applied late	27.0	27.1	27.0	21.0	26.5	23.8	24.0	26.8	25.4
Mean	24.4	26.4	25.4	21.4	25.2	23.3	23.0	25.8	24.4
Standard Errors	0.45 cwt. ; of margins 0.32 cwt.						0.32 cwt.; of margins 0.22 cwt.		

Straw. per cent.	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	90.1	105.1	97.6	90.1	97.8	94.0	90.1	101.5	95.8
Applied late	110.7	111.2	111.0	86.2	108.9	97.6	98.4	110.1	104.2
Mean	100.4	108.2	104.3	88.2	103.4	95.8	94.2	105.8	100.0
Standard Errors	1.94 ; of margins 1.37.						1.37 ; of margins 0.97.		

Summary of Results—(b) Varietal Response.

Grain.	Million III.	Yeoman II.	Square-Head's Master.	Swedish Iron.	Mean.	Standard Error.
cwt. per acre	13.8	15.1	13.1	18.5	15.1	0.34
per cent.	91.1	99.9	86.8	122.2	100.0	2.26
Straw.						
cwt. per acre	23.3	23.9	24.4	25.9	24.4	0.47
per cent.	95.6	98.0	100.1	106.3	100.0	1.94

Significant advantage of sulphate over muriate of ammonia with straw, but not with grain. With straw significant responses occur to sulphate applied late and to muriate applied early. Swedish Iron yielded significantly higher than the other varieties, while Yeoman showed an advantage in grain only over Million and Square-Head's Master.

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WHEAT

Nitrogenous Fertilisers as Top Dressings : Sulphate and Muriate of Ammonia.

Each in single and double dressings.

R W—Great Knott, 1930.

N.E.

A	M. E & L.	O(a)	S.L.	S.E.
	M.E	O (b)	M.L.	S.E & L.
B	S.L.	S.E.	O (a)	S.E & L.
	M.L.	M.E & L.	M.E.	O (b)
C	S.L.	S.E.	M.L.	M.E & L.
	S.E & L.	O (a)	M.E.	O (b)

SYSTEM OF REPLICATION : 6 randomised blocks of 8 plots each.
Only three blocks were harvested.
AREA OF EACH PLOT : 1/40th acre.
S=Sulphate of Ammonia. } at the rate of 0.2
M=Muriate of Ammonia . } cwt. Nitrogen per acre.
O (a), O (b)=No Top Dressing.
E=Early Top Dressing (Mar. 27th).
L=Late Top Dressing (May 16th).
E and L=Early and Late Top Dressing.
All plots received 2½ cwt. Superphosphate, and 1 cwt. Potash Salt (30 per cent) per acre.
Variety : Million.
Wheat sown : Sept. 20th, 1929. Harvested : Aug. 8th-11th, 1930.
Previous Crop : Sheep feed, followed by summer fallow.

Actual weights in lb.—Total Grain.

Blocks	O (a)	O (b)	S.E.	S.L.	M.E.	M.L.	S. E. & L.	M. E. & L.
A	74.25	78.50	64.50	78.75	63.50	96.75	63.50	85.25
B	85.00	61.00	67.00	60.00	84.75	68.25	53.00	75.00
C	81.50	74.75	79.00	85.75	81.50	86.25	77.50	65.75

Actual weights in lb.—Total Straw.

Blocks	O (a)	O (b)	S.E.	S.L.	M.E.	M.L.	S. E. & L.	M. E. & L.
A	151.50	165.50	154.75	152.50	180.00	166.50	156.75	182.75
B	163.75	131.00	187.00	179.50	190.75	176.75	159.00	180.00
C	176.50	119.25	183.00	187.75	174.50	156.75	207.50	153.75

Summary of Results.

Grain. cwt. per acre	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	27.1	25.1	26.1	27.1	27.4	27.2	27.1	26.2	26.7
Applied late	26.7	23.1	24.9	29.9	26.9	28.4	28.3	25.0	26.7
Mean	26.9	24.1	25.5	28.5	27.2	27.8	27.7	25.6	26.7
Standard Errors	2.13 cwt. ; of margins 1.51 cwt.						1.51 cwt.; of margins 1.06 cwt.		

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Grain. per cent	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	101.6	94.0	97.8	101.6	102.6	102.1	101.6	98.3	100.0
Applied late	100.3	86.7	93.5	112.2	100.9	106.6	106.2	93.8	100.0
Mean	101.0	90.4	95.7	106.9	101.8	104.3	103.9	96.1	100.0
Standard Errors	7.99 ; of margins 5.65.						5.65 ; of margins 4.00.		

Straw. cwt. per acre	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	54.0	62.5	58.2	54.0	64.9	59.4	54.0	63.7	58.8
Applied late	61.9	62.3	62.1	59.5	61.5	60.5	60.7	61.9	61.3
Mean	58.0	62.4	60.2	56.8	63.2	60.0	57.4	62.8	60.1
Standard Errors	4.12 cwt. ; of margins 2.91 cwt.						2.91 cwt. ; of margins 2.06 cwt.		

Straw. per cent	Sulph./Amm.			Mur./Amm.			Mean of Sulphate and Muriate		
	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.	Not applied early.	Applied early.	Mean.
Not applied late	89.9	104.0	97.0	89.9	108.1	99.0	89.9	106.0	98.0
Applied late	103.0	103.7	103.4	99.1	102.4	100.8	101.0	103.0	102.0
Mean	96.4	103.9	100.2	94.5	105.2	99.9	95.4	104.5	100.0
Standard Errors	6.85 ; of margins 4.84.						4.84 ; of margins 3.42.		

Muriate appears to do better than sulphate in yield of grain, but the difference is not significant. No significant response to the top dressing in grain, but with straw the single dressing, applied early, appears to be effective.

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Wheat: Comparison of Nitrogenous Fertilisers, Sulphate of Ammonia and Cyanamide, applied in Autumn and Spring.

Effect of Dicyanodiamide.

Effect of grazing with sheep in Spring.

R W—Long Hoos, (Section 3), 1930.

N.E.

A		B		C	
10	4	1	2	2	10
13	16	3	5	9	7
7	15	9	6	15	4
9	12	16	11	5	3
11	14	14	12	1	8
3	1	8	13	16	12
2	5	7	15	11	13
6	8	4	10	14	6

System of Replication: 3 randomised blocks.
Area of Each Plot: 1/60th acre.
Treatments: Sulphate of Ammonia and Cyanamide at the rate of 0.3 cwt. N. per acre, applied in Autumn and Spring.
Half of the plots grazed by sheep and half treated with Dicyanodiamide at the rate of 0.2 cwt. N. per acre, applied in Autumn, as shown in Key to Treatments.
All plots received 3 cwt. Super., 1½ cwt. Muriate of Potash per acre, applied Oct. 11th. Autumn dressings applied: Cyanamide and Dicyanodiamide, Oct. 15th, 1929; Sulphate of Ammonia, Oct. 22nd. Spring dressings applied April 15th. Sheep put on to "grazing" plots for one day, May 9th.
Variety: Million.
Wheat Sown: Oct. 22nd, 1929. Harvested Sept. 1st, 1930.
Previous Crop: Hay. The plots were harvested by the sampling method, 24 random metre lengths taken from each plot, constituting a single sample.

Key to Treatments.

Treatments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Sulph./Amm. in Autumn	x	x	x	x												
Sulph./Amm. in Spring ..					x	x	x	x								
Cyanamide in Autumn									x	x	x	x				
Cyanamide in Spring ..													x	x	x	x
Dicyanodiamide ..			x	x			x	x			x	x			x	x
Grazing		x		x		x		x		x		x		x		x

Actual weights in grams per sample.—Grain.

Blocks.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A ..	1046.5	885.0	893.0	604.0	819.5	783.5	1211.5	689.0	1004.5	746.0	1041.5	993.0	826.5	946.5	772.0	559.0
B ..	561.5	375.5	720.5	702.0	492.0	608.5	700.0	742.0	770.5	625.0	750.5	782.0	754.0	740.5	720.5	614.0
C ..	617.0	324.0	480.0	556.5	600.0	289.5	321.0	497.5	515.0	266.5	636.0	498.5	414.5	415.0	636.5	636.0

Actual weights in grams per sample.—Straw.

Blks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	1447.5	1216.5	1199.5	1112.5	1215.5	1088.0	1602.0	1049.5	1321.0	1264.5	1397.0	1431.0	1354.0	1269.0	1410.5	1038.0
B	1209.0	815.0	1246.0	1219.5	1238.5	1199.0	1264.0	1185.0	1142.5	1126.5	1384.5	1422.0	1377.0	1096.0	1253.0	1064.0
C	1191.0	866.5	1462.0	1154.5	1317.5	601.0	1440.0	1111.0	1250.0	802.5	1350.5	1180.0	1120.5	989.5	1109.0	1053.0

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Summary of Results.

	Grain.					Straw.				
Average Yield in cwt. per acre.	Sulph./ Amm. Autumn	Cyana-mide Autumn	Sulph./ Amm. Spring	Cyana-mide Spring	Mean	Sulph./ Amm. Autumn	Cyana-mide Autumn	Sulph./ Amm. Spring	Cyana-mide Spring	Mean
No Grazing, no Dicy.	16.1	16.6	13.9	14.5	15.3	27.9	27.0	27.4	28.0	27.6
Dicyanodiamide ..	15.2	17.6	16.2	15.5	16.1	28.4	30.0	31.3	27.4	29.3
Grazing	11.5	11.9	12.2	15.3	12.7	21.0	23.2	21.0	24.3	22.4
Grazing and Dicy. ..	13.5	16.5	14.0	13.1	14.3	25.3	29.3	24.3	22.9	25.4
Mean	14.1	15.6	14.1	14.6	14.6	25.6	27.4	26.0	25.6	26.2
Per cent.—										
No Grazing, no Dicy.	110.6	113.8	95.0	99.2	104.6	106.8	103.1	104.7	106.9	105.4
Dicyanodiamide ..	104.1	120.7	111.0	105.8	110.4	108.4	114.7	119.5	104.7	111.8
Grazing	78.8	81.4	83.6	104.5	87.1	80.4	88.6	80.1	93.1	85.6
Grazing and Dicy.	92.6	113.0	95.9	89.9	97.8	96.8	111.9	92.8	87.6	97.3
Mean	96.5	107.2	96.4	99.8	100.0	98.1	104.6	99.3	98.1	100.0
Standard Error ..	1.75 cwt. or 11.99 per cent.					1.73 cwt. or 6.62 per cent.				

The yield of the grazed plots is significantly below that of the ungrazed plots. The difference in yield in favour of the plots treated with cyanamide as against those treated with sulphate of ammonia is not significant, while the difference in favour of the plots having an autumn dressing of dicyanodiamide is significant only in the case of straw, but not where a Spring dressing of cyanamide was given. There are no differences in yield between the plots having autumn and spring applications of the nitrogenous fertilisers.

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Forage Crop: Comparison of Oats and Barley, Vetches and Peas.

Effect of Sulphate of Ammonia in single and double dressings.

Effect of Muriate of Potash and Superphosphate.

R F—Great Harpenden, 1930.

E.

	O	B	O	B	O	B	O	B	O	B	O	B	
I.	2	7	4	1	12	11	6	5	3	8	10	9	V
II.	1	12	6	5	11	10	8	9	4	2	3	7	P
III.	4	8	7	3	10	6	2	1	12	11	9	5	V
IV.	11	10	8	4	7	5	9	6	2	1	12	3	P
V.	12	2	9	8	5	1	4	3	10	7	11	6	V
VI.	8	9	3	11	2	4	10	7	5	6	1	12	P
VII.	5	4	1	6	3	8	11	10	9	12	7	2	V
VIII.	3	6	10	7	9	2	12	4	11	5	8	1	P
IX.	10	3	5	12	1	9	7	8	6	4	2	11	V
X.	9	5	11	10	8	12	1	2	7	3	6	4	P
XI.	6	1	12	2	4	7	3	11	8	9	5	10	V
XII.	7	11	2	9	6	3	5	12	1	10	4	8	P

SYSTEM OF REPLICATION: Latin Square.

AREA OF EACH PLOT: 1/50th acre. Half cut for hay, half harvested.

TREATMENTS: Sulphate of Ammonia at the rate of 0 ,0.2 and 0.4 cwt. N. per acre. Muriate of Potash at the rate of 0.5 cwt. K_2O per acre, and Superphosphate at the rate of 0.5 cwt. P_2O_5 per acre, alone and in combination.

Basal Crop: Beans (70-80 lb. per acre.)

O. B=Pairs of strips one way allotted to oats (Progress, 2 bushels per acre) and barley (Plumage Archer, 2 bushels per acre) respectively.

P, V=Pairs of strips the other way allotted to peas (1 bushel per acre) and vetches (1 bushel per acre) respectively.

Manures sown: Mar. 8th-13th.

Beans sown: Mar. 13th-22nd.

Other crops: Mar. 18th-19th.

Half-plots cut for hay: July 14.

Remainder harvested: Aug. 19.

Previous crop: Wheat.

Key to Treatments.

Treatments.	1	2	3	4	5	6	7	8	9	10	11	12
Sul./Amm. ..	0	0	0	0	1	1	1	1	2	2	2	2
Mur./Pot. ..	0	1	0	1	0	1	0	1	0	1	0	1
Superphosphate ..	0	0	1	1	0	0	1	1	0	0	1	1

(a) Produce weighed as hay.

Actual weights in lb. of Dry Matter.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I. ..	23.0	18.5	15.5	19.5	25.5	22.0	34.0	29.0	25.5	22.0	33.5	27.5
II. ..	24.5	26.5	19.5	17.0	32.5	18.5	31.5	25.0	32.0	35.0	32.5	43.0
III. ..	27.0	25.0	21.5	24.5	32.0	31.5	26.5	33.0	35.5	32.5	41.0	36.0
IV. ..	26.0	28.0	26.5	28.0	32.0	38.0	34.0	35.5	36.5	39.0	34.5	36.5
V. ..	28.5	32.5	29.5	23.0	31.0	35.0	38.0	43.5	34.5	38.5	40.5	40.0
VI. ..	19.5	21.5	29.0	25.5	31.5	35.5	31.5	32.0	40.5	31.0	37.5	34.5
VII...	23.0	24.5	23.0	29.5	29.5	36.0	23.0	33.5	34.5	41.0	33.0	41.5
VIII.	22.0	30.0	38.5	30.5	37.0	43.5	35.5	29.5	37.0	41.0	38.0	40.0
IX. ..	34.5	18.5	44.5	33.0	44.5	37.0	44.0	44.0	44.5	54.0	43.0	51.5
X. ..	34.5	35.5	38.5	33.0	43.5	36.0	42.5	44.0	48.0	48.0	47.0	46.0
XI. ..	37.0	34.0	31.5	35.0	40.0	40.0	41.5	43.5	48.5	41.0	48.5	44.5
XII...	36.0	43.5	34.5	38.5	40.5	40.5	41.0	39.5	54.0	52.5	52.5	49.5

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Summary of Results (Separate Treatments).

	Average yield of Dry Matter in cwt. per acre.	No Nitrogen.		Single Nitrogen.		Double Nitrogen.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
No Super	Oats with Vetches ..	25.7	18.5	32.4	29.5	31.1	32.8
	,, ,, Peas ..	25.6	27.7	32.1	28.3	36.2	32.1
	Barley ,, Vetches ..	25.8	27.1	25.7	30.5	35.3	36.6
	,, ,, Peas ..	21.4	27.4	32.4	34.8	37.6	39.0
Super	Oats with Vetches ..	20.8	22.8	27.8	38.8	32.8	33.0
	,, ,, Peas ..	25.9	24.8	35.0	29.6	33.9	34.2
	Barley ,, Vetches ..	28.4	27.9	33.8	32.7	37.1	41.5
	,, ,, Peas ..	29.6	26.1	29.3	35.3	40.2	38.6

Effect of Sulphate of Ammonia.

Average yield of Dry Matter in cwt. per acre.	No Nitrogen.	Single Sulph./Amm.	Double Sulph./Amm.	Mean.
Oats with Vetches ..	21.9	32.1	32.4	28.8
,, ,, Peas	26.0	31.3	34.1	30.5
Barley ,, Vetches ..	27.3	30.7	37.6	31.9
,, ,, Peas	26.1	32.9	38.9	32.6
Mean	25.3	31.8	35.8	31.0

The mixture containing barley has yielded better than the mixture containing oats. No difference between vetches and peas. Strong response to both single and double dressings of sulphate of ammonia. No effect of potash. The small response to superphosphate is not significant.

(b) Produce Threshed.

Actual weights in lb.—Grain.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I. ..	21.25	11.25	6.00	12.50	17.00	9.50	23.25	16.50	18.50	8.50	21.75	8.75
II. ..	13.25	19.75	8.75	10.25	22.25	12.75	19.00	11.50	20.50	21.25	11.75	25.25
III. ..	20.25	14.50	22.00	13.75	22.75	24.00	12.75	25.75	13.25	12.25	23.75	13.00
IV. ..	20.25	13.50	18.50	21.50	20.75	24.50	13.25	14.00	14.00	26.25	16.00	13.00
V. ..	25.50	27.50	25.25	19.25	13.75	24.75	23.50	28.00	14.00	14.50	14.00	17.50
VI. ..	14.75	19.00	18.25	27.75	15.75	28.50	29.50	19.00	26.50	14.25	31.25	24.75
VII...	14.00	22.50	18.00	27.00	16.00	28.50	12.50	28.25	14.25	29.00	13.75	26.25
VIII.	18.75	24.00	19.75	23.50	24.00	26.25	24.75	15.00	17.25	19.25	15.25	16.50
IX. ..	15.25	13.25	25.75	28.00	15.25	16.25	15.00	31.75	26.25	18.00	24.25	28.25
X. ..	17.25	28.00	25.25	28.00	29.75	15.75	16.25	23.00	17.00	30.00	20.00	28.75
XI. ..	29.75	31.75	19.00	21.75	13.00	17.50	31.25	15.00	26.75	28.25	28.75	18.25
XII...	20.00	24.00	32.00	20.00	16.75	22.25	20.00	29.00	32.25	30.25	28.50	30.75

Actual weights in lb.—Straw.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I. ..	22.25	30.00	18.00	31.00	25.00	31.50	26.75	21.50	24.00	24.00	29.00	33.00
II. ..	30.75	22.00	23.50	24.25	23.75	27.25	22.00	29.75	32.00	27.75	29.50	29.75
III. ..	26.25	33.00	25.00	34.50	26.25	29.75	27.25	28.25	34.50	37.50	30.75	34.50
IV. ..	19.00	26.75	20.00	24.50	25.00	32.25	30.50	28.50	33.75	30.75	36.25	32.00
V. ..	25.75	26.50	28.25	29.25	31.75	27.25	27.50	33.50	33.50	37.50	35.00	37.50
VI. ..	27.00	27.75	30.00	29.50	34.75	31.00	35.50	40.25	29.50	39.50	37.25	31.75
VII...	26.00	27.50	31.75	27.00	32.00	31.50	28.75	35.50	37.75	38.00	38.00	33.75
VIII.	21.25	25.25	32.75	25.25	29.75	27.25	27.25	29.50	34.25	37.75	33.25	35.50
IX. ..	27.25	27.75	26.25	31.00	37.00	35.50	36.25	39.75	34.75	39.25	33.75	35.75
X. ..	32.50	31.75	27.25	36.00	35.75	30.50	33.75	38.25	44.50	41.00	45.75	37.25
XI. ..	31.75	35.25	36.00	42.50	39.50	42.50	38.25	39.50	34.75	42.75	41.75	51.75
XII...	32.75	40.50	33.00	34.00	40.25	40.50	38.25	37.00	43.75	42.25	37.50	44.25

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Forage Crop, Great Harpenden, 1930 (*cont.*)

Summary of Results (Separate Treatments).

Grain.

	Average yield in cwt. per acre.	No Nitrogen.		Single Nitrogen.		Double Nitrogen.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
No Super	Oats with Vetches ..	13.1	11.6	12.9	12.9	12.4	11.9
	,, ,, Peas ..	14.6	16.8	14.5	15.1	14.4	15.0
	Barley ,, Vetches ..	21.6	24.3	17.8	23.0	21.3	25.6
	,, ,, Peas ..	17.4	21.4	21.6	23.6	23.6	24.1
Super	Oats with Vetches ..	12.8	15.0	12.0	13.4	12.4	12.8
	,, ,, Peas ..	13.9	13.5	14.7	14.7	14.1	13.2
	Barley , Vetches ..	21.7	24.6	23.2	23.3	22.0	24.3
	,, ,, Peas ..	22.5	22.5	21.8	25.9	26.7	24.4

Straw.

	Average yield in cwt. per acre.	No Nitrogen.		Single Nitrogen.		Double Nitrogen.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
No Super	Oats with Vetches ..	23.8	27.0	31.3	32.6	31.5	30.9
	,, ,, Peas ..	27.5	28.3	33.5	29.2	33.5	34.5
	Barley ,, Vetches ..	23.7	26.6	22.9	26.3	27.8	36.1
	,, ,, Peas ..	18.0	23.5	25.5	26.9	31.3	31.6
Super	Oats with Vetches ..	25.5	30.6	27.5	35.3	32.6	35.0
	,, ,, Peas ..	25.7	26.0	30.5	29.7	32.3	30.1
	Barley ,, Vetches ..	23.7	25.9	27.5	28.1	30.2	31.0
	,, ,, Peas ..	23.9	25.7	25.2	33.0	33.4	31.9

Effect of Potash and Superphosphate.

Average Yield in cwt. per acre.	Grain.					Straw.				
	Without Potash.	With Potash.	Without Super.	With Super.	Mean.	Without Potash.	With Potash.	Without Super.	With Super.	Mean.
Oats with Vetches ..	12.6	12.9	12.5	13.1	12.8	28.7	31.9	29.5	31.1	30.3
,, ,, Peas ..	14.4	14.7	15.1	14.0	14.6	30.5	29.6	31.1	29.1	30.1
Barley ,, Vetches ..	21.3	24.2	22.2	23.2	22.7	26.0	29.0	27.2	27.7	27.5
,, ,, Peas ..	22.3	23.6	21.9	24.0	22.9	20.9	34.1	26.1	28.9	27.5
Mean	17.6	18.9	17.9	18.6	18.2	26.5	31.2	28.5	29.2	28.8

Effect of Sulphate of Ammonia.

Average Yield in cwt. per acre.	Grain.			Straw.		
	No Nitrogen.	Single Sulph/Amm.	Double Sulph/Amm.	No Nitrogen	Single Sulph/Amm.	Double Sulph/Amm.
Oats with Vetches	13.1	12.8	12.4	26.7	31.7	32.5
,, ,, Peas	14.7	14.8	14.1	26.9	30.7	32.6
Barley ,, Vetches	23.1	21.8	23.3	24.9	26.2	31.3
,, ,, Peas	20.9	23.2	24.7	22.8	27.7	32.1
Mean	18.0	18.2	18.6	25.3	29.1	32.1

Oats have done better with peas than with vetches in the grain. The barley mixtures have yielded significantly better than the oats mixtures in grain, but the reverse is the case with straw. Response to potash only on mixtures containing barley. The small response to superphosphate is insignificant. Large response to sulphate of ammonia in straw, but nothing with grain.

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POTATOES

Nitrogenous Fertiliser: Sulphate of Ammonia.

Potassic Fertilisers: Sulphate and Muriate of Potash and Potash Salt (30%).

Each in single and double dressings.

Superphosphate.

R P—Long Hoos (Section 6), 1930.

S.W.

	G			D			A			
	4M —	2 —	9S —	9P —	3 —	— 1	— 2	6P —	— 4S	
	— 6S	3 —	1 —	4P —	— 5S	— 2	— 9M	— 1	7P —	
	— 7M	— 5P	8P —	7S —	— 8M	— 6M	— 5M	— 8S	— 3	
	— 4S	— 1	9M —	8P —	— 2	— 7M	1 —	4P —	— 2	
H	7P —	6P —	8S —	— 3	9S —	5P —	9P —	— 5S	7S —	B
	2 —	— 3	— 5M	— 6S	— 1	4M —	3 —	— 8M	— 6M	
	— 3	— 2	5S —	1 —	3 —	— 8S	— 8P	— 3	9S —	
	8M —	— 6M	— 9P	9M —	— 7P	— 6P	— 2	— 4M	6S —	
	1 —	4P —	7S —	— 4S	— 5M	2 —	7M —	— 1	5P —	
		I			F			C		

SYSTEM OF REPLICATION: 9 randomised blocks of 9 plots each. Each plot divided into 2 sub-plots.

AREA OF EACH SUB-PLOT: 1/100th acre.

TREATMENTS: Testing 0, 0.2 and 0.4 cwt. per acre N in form of Sulphate of Ammonia, 0, 0.4 and 0.8 cwt. per acre K_2O in form of Sulphate of Potash, Muriate of Potash and Potash Salt. Superphosphate at the rate of 0.5 cwt. per acre P_2O_5 applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.

Farmyard Manure (12-13 tons per acre) applied January 14.

Manures applied: April 1st-2nd.

Potatoes planted: April 2nd-3rd. Lifted: Sept. 24th-25th.

Variety: Ally. Previous Crop: Wheat.

Key to Treatments.

Treatment No.	1	2	3	4	5	6	7	8	9
Sulph./Amm.	0	1	2	0	1	2	0	1	2
Potash ..	0	0	0	1	1	1	2	2	2

Actual weights in lb.—Sub-plots with Phosphate.

S/Amm	Potash	Blocks. A	B	C	D	E	F	G	H	I
Quantities										
0	0	236.25	208.00	197.00	146.25	179.50	156.25	159.00	120.75	187.00
0	1	208.00	247.00	220.75	158.50	159.25	213.25	164.00	130.50	171.50
0	2	193.75	228.25	242.25	170.00	177.25	200.00	203.75	153.25	216.00
1	0	193.75	169.75	218.25	156.25	215.50	201.50	156.50	198.25	166.75
1	1	245.50	248.75	198.50	216.75	231.50	223.00	202.50	196.00	220.75
1	2	284.75	257.50	220.25	260.25	206.00	189.75	197.75	220.50	229.75
2	0	196.50	245.00	247.25	238.25	196.50	260.00	169.25	198.75	213.50
2	1	310.50	234.75	208.00	229.75	234.25	223.25	183.75	201.50	223.25
2	2	268.00	286.75	248.00	211.50	260.25	237.25	227.00	233.50	245.75

K

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Potatoes, Long Hoos, 1930 (*cont.*)

Actual weights in lb.—Sub-plots without Phosphate.

S/Amm	Potash	A	B	C	D	E	F	G	H	I
Quantities										
0	0	225.00	181.25	209.50	138.00	171.25	150.00	157.75	150.50	138.00
0	1	233.00	222.25	187.00	139.25	135.25	200.50	138.75	148.75	135.00
0	2	160.50	202.25	198.50	196.00	169.25	179.50	157.25	174.75	177.00
1	0	178.75	161.50	184.50	187.50	243.00	175.00	136.25	199.25	171.00
1	1	218.00	268.00	183.50	226.00	185.00	220.00	177.25	187.50	206.75
1	2	268.00	222.75	206.25	215.00	176.50	185.75	205.75	210.75	230.75
2	0	182.25	221.50	211.75	227.50	195.50	207.75	140.00	179.25	204.25
2	1	271.00	197.00	213.25	154.00	197.50	188.25	198.75	202.25	192.75
2	2	237.00	229.25	181.75	206.00	203.00	211.00	181.75	181.50	226.75

Summary of Average Yields.—Separate Treatments.

Average yield in tons per acre.		Without Superphosphate.			With Superphosphate.		
		No S/Amm.	Single S/Amm.	Double S/Amm.	No S/Amm.	Single S/Amm.	Double S/Amm.
No Potash		7.55	8.12	8.78	7.89	8.32	9.75
Single Potash	Sulphate	8.66	10.43	9.07	8.21	10.21	9.32
	Muriate	6.86	9.31	8.09	8.10	9.89	10.23
	Potash Salts	7.39	8.12	9.84	8.59	9.41	10.94
Double Potash	Sulphate	8.56	9.89	8.43	9.14	10.34	10.94
	Muriate	7.81	9.95	9.37	9.27	11.12	10.99
	Potash Salts	7.66	8.76	9.85	8.14	9.29	11.07

Summary of Significant Results.

(*a*) Effect of Quantity of Nitrogenous and Potassic Fertilisers, in relation to Superphosphate.

		Average yield in tons per acre.				Average yield per cent.			
		No S/Amm.	Single S/Amm.	Double S/Amm.	Mean.	No S/Amm.	Single S/Amm.	Double S/Amm.	Mean.
Without Super	No Potash ..	7.55	8.12	8.78	8.15	84.1	90.5	97.9	90.8
	Single Potash..	7.64	9.29	9.00	8.64	85.1	103.5	100.3	96.3
	Double Potash	8.01	9.53	9.22	8.92	89.3	106.2	102.7	99.4
Mean		7.73	8.98	9.00	8.57	86.2	100.1	100.3	95.5
With Super	No Potash ..	7.89	8.32	9.75	8.65	87.9	92.7	108.6	96.4
	Single Potash..	8.30	9.84	10.16	9.43	92.5	109.7	113.3	105.2
	Double Potash	8.85	10.25	11.00	10.03	98.7	114.3	122.6	111.9
Mean		8.35	9.47	10.30	9.37	93.0	105.6	114.8	104.5
Mean of super and no super		8.04	9.22	9.65	8.97	89.6	102.8	107.6	100.0

Standard Error = 0.215 tons or 2.40 per cent.

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(*b*) Effect of Quantity and Quality of Potassic Fertilisers, in relation to Superphosphate.

		Average yield in tons per acre.			Average yield per cent.		
		Sulphate of Potash.	Muriate of Potash.	Potash Salt.	Sulphate of Potash.	Muriate of Potash.	Potash Salt.
Without Super	No Potash ..		8.15			90.8	
	Single Potash ..	9.39	8.09	8.45	104.6	90.1	94.2
	Double Potash ..	8.96	9.04	8.76	99.9	100.8	97.6
Mean of Single and Double Potash		9.18	8.56	8.60	102.3	95.4	95.9
With Super	No Potash ..		8.65			96.4	
	Single Potash ..	9.25	9.41	9.65	103.1	104.8	107.5
	Double Potash ..	10.14	10.46	9.50	113.0	116.6	105.9
Mean of Single and Double Potash		9.70	9.94	9.58	108.0	110.7	106.7

Standard Error = 0.215 tons or 2.40 per cent.

Significant response to first dressing of sulphate of ammonia both with and without superphosphate, and to second dressing only in the presence of superphosphate. The response to potash is small in the absence of superphosphate, but significant where superphosphate is also added. There is a significant response to superphosphate, especially on the higher yields.

Potatoes (Dr. Salaman's experiment).
Variety Test: Virus-free Strain and Scottish Stock Seed.
Effect of increasing dressings of complete fertiliser.
RP—Laboratory Garden, 1930.

N.

I.	P B T	T C P	P A T	P D T
II.	P C T	P D T	P B T	T A P
III.	P D T	P A T	T C P	P B T
IV.	T A P	P B T	T D P	T C P

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 20 in. x 225 in.
TREATMENTS:
A = No Fertiliser.
B = 1 unit of complete Fertiliser.
C = 2 units of complete Fertiliser.
D = 4 units of complete Fertiliser.
1 unit = { 1 cwt. per acre of Sulphate of Ammonia; 1 cwt. per acre of Sulphate of Potash; 2 cwt. per acre of Superphosphate.
Plots split at random for:
P = Scottish stock seed (from Perth).
T = Dr. Salaman's virus free strain (from Thetford).
Manures applied: May 23rd.
Potatoes planted: May 23rd. Lifted: Oct. 7th.

Actual weights in lb.

Row.	Scottish Stock Seed.				Virus-free Strain.			
	A	B	C	D	A	B	C	D
I. ..	15.5	24.0	29.0	26.0	16.5	27.0	27.5	36.0
II. ..	15.5	23.5	26.5	31.5	13.5	23.0	27.5	31.0
III. ..	18.5	17.5	29.0	32.0	17.5	21.5	28.0	33.5
IV. ..	18.0	23.5	27.0	28.5	20.0	25.0	25.5	33.0

Summary of Results.

Average yield per plot.	No Fertiliser.	Single Dressing.	Double Dressing.	Quadruple Dressing.	Mean.	Standard Error.
Scottish Stock Seed in lb. ..	16.9	22.1	27.9	29.5	24.1	0.96
,, ,, ,, per cent...	68.2	89.5	112.7	119.3	97.4	3.88
Virus-free Strain in lb. ..	16.9	24.1	27.1	33.4	25.4	0.96
,, ,, per cent. ..	68.2	97.5	109.7	134.9	102.6	3.88

Significant responses to all applications of complete fertiliser. The small advantage in yield of the virus-free strain over the Scottish seed is not significant. No significant difference between varieties in their response to the fertiliser.

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SUGAR BEET

Comparison of Chloride Dressings: Muriate of Potash and Agricultural Salt.

R S—Long Hoos (Section 6), 1930.

N.E.

I.	S	M & S	O	M
II.	M	O	M & S	S
III.	M & S	M	S	O
IV.	O	S	M	M & S

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 1/60th acre.
TREATMENTS:
O = No Chloride dressing.
M = Muriate of Potash. } at the rate of 0.8 cwt.
S = Agricultural Salt. } Chloride per acre.
All plots had dung (12-13 tons per acre) applied Jan. 14th; 2 cwt. per acre Nitrate of Soda and 3 cwt. per acre Superphosphate, applied May 23rd.
Chloride dressings applied: May 8th.
Seed sown: May 9th. Lifted: Sept. 30th-Oct. 2nd.
Previous Crop: Wheat.

Actual weights in lb.

Row.	Roots (unwashed) O	M	S	M & S	Tops. O	M	S	M & S
I. ..	399.5	398.0	391.0	386.5	357.5	397.5	353.0	372.5
II. ..	403.0	406.0	406.5	391.5	359.5	347.5	336.5	324.5
III. ..	370.0	407.5	385.5	397.0	314.5	347.0	305.0	329.5
IV. ..	379.5	390.0	425.5	390.5	319.0	325.0	344.5	335.5

Summary of Results.

Average yield.	No Muriate No Salt.	Muriate of Potash.	Salt.	Muriate of Pot. & Salt	Mean.	Standard Error.
Roots (washed)—						
tons per acre ..	7.30	7.53	7.57	7.37	7.44	0.129
per cent. ..	98.1	101.2	101.7	99.0	100.0	1.73
Tops, tons per acre ..	9.04	9.49	8.97	9.12	9.15	0.142
per cent. ..	98.8	103.6	97.9	99.6	100.0	1.55
Sugar percentage in roots	17.51	17.65	17.45	17.79	17.60	0.168

The response to Muriate of Potash and Salt is insignificant with roots. The tops appear to respond better to Muriate of Potash than to Salt, but the difference is scarcely significant.

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CULTIVATION EXPERIMENT

R M—Mangolds, The Broad Baulk, 1930.

S.W.

A		
P	Sf	Sr

B			C		
Sf	Sr	P	Sr	Sf	P

SYSTEM OF REPLICATION: 3 randomised blocks.
AREA OF EACH PLOT: 1/20th acre.
TREATMENTS:
P=Ploughed.
Sf=Simar cultivation—Land left flat.
Sr=Simar cultivation—Land ridged.
All plots had 3 cwt. super, 3 cwt. Sulphate of Ammonia and 4 cwt. Muriate of Potash per acre.
Ploughed and first Simar cultivation—Feb. 24th.
Second Simar cultivation—May 1st.
Manures applied: May 2nd.
All plots rolled and harrowed: May 5th.
Drilled: May 8th. Lifted: Oct. 27th.
Variety: Yellow Globe. Previous Crop: Swedes.

Actual yields.

Blocks.	Roots in lb.			Tops in lb.			No. of Roots.		
	P	Sf	Sr	P	Sf	Sr	P	Sf	Sr
A ..	4120	4080	3300	1133.0	1056.5	869.0	914	859	1018
B ..	2674	2126	2474	776.5	677.75	634.0	699	651	670
C ..	3576	2892	3668	835.5	701.0	897.0	841	789	883

Summary of Results.

Average yield.	Plots ploughed.	Simar cultivation land left flat.	Simar cultivation land ridged.	Mean.	Standard Error.
Roots, tons per acre ..	30.86	27.08	28.10	28.68	2.082
,, per cent. ..	107.6	94.4	98.0	100.0	7.26
Tops, tons per acre ..	8.17	7.25	7.14	7.52	0.538
,, per cent. ..	108.6	96.4	95.0	100.0	7.16
Roots, number per acre	16360	15327	17140	16276	456.0
,, ,, per cent.	100.5	94.2	105.3	100.0	2.80

The differences between the yields for the three cultivation treatments are not significant.

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WOBURN

Rotation II., Six-Course, Stackyard Field, 1930.

For full particulars of experiment see Rothamsted Report p. 128.

PLOTS: 1/40th acre.

TREATMENTS:

N=4, 3, 2, 1 and 0 units of N, each with 2 units P_2O_5 and 2 units K_2O.
K=4, 3, 2, 1 and 0 units of K_2O, each with 2 units N and 2 units P_2O_5.
P=4, 3, 2, 1 and 0 units of P_2O_5, each with 2 units N and 2 units K_2O.
1 unit of N=0.15 cwt. N per acre as Sulphate of Ammonia.
1 unit of K=0.25 cwt. K_2O per acre as Muriate of Potash.
1 unit of P=0.15 cwt. P_2O_5 per acre as Superphosphate.

C B—Barley (Plots 1-15).

Manures applied: Mar. 22nd. Seed sown: Mar. 28th. Harvested: Aug. 13th-14th. Variety: Plumage Archer.

Yield of grain in cwt. per acre. **Yield of straw in cwt. per acre.**

N.W.

1	1K 20.7	2K 19.6	0N 13.6	1N 18.9	2P 22.1	5
6	3K 21.1	0K 19.3	4N 23.0	1P 22.1	0P 22.0	10
11	4K 20.4	2N 18.2	3N 20.7	3P 19.4	4P 20.5	15

1K 33.5	2K 32.9	0N 29.4	1N 35.6	2P 36.7
3K 34.1	0K 33.3	4N 44.6	1P 37.6	0P 36.3
4K 36.3	2N 36.8	3N 46.4	3P 37.6	4P 39.3

C S—Sugar Beet (Plots 31-45).

Manures applied: April 29th. Seed sown: April 30th. Lifted: Oct. 9th. Variety: Johnson P.

Washed Roots—tons per acre. **Tops—tons per acre.**

N.W.

31	2N 3.20	1N 3.39	4P 3.45	1P 4.16	1K 4.12	35
36	3N 3.87	4N 4.50	2P 3.91	4K 4.43	0K 4.18	40
41	0N 3.41	3P 3.80	0P 4.11	2K 4.39	3K 4.14	45

2N 6.02	1N 4.61	4P 5.04	1P 6.29	1K 7.07
3N 5.54	4N 6.27	2P 4.80	4K 6.80	0K 7.05
0N 4.70	3P 5.64	0P 6.43	2K 7.34	3K 7.14

C P—Potatoes (Plots 61-75).

Manures applied: April 8th. Planted: April 10th. Lifted: Oct. 1st. Variety: Ally.

Yield of Roots in tons per acre.

N.W.

61	3K 11.83	1K 9.46	0N 8.23	4N 12.82	3P 9.90	65
66	2K 12.07	0K 11.16	2N 11.73	1P 11.83	0P 9.22	70
71	4K 12.66	3N 13.06	1N 11.17	4P 12.84	2P 10.74	75

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Summary of Results.

1. Table showing increments in yield per cwt. of N, P_2O_5 and K_2O, together with the standard errors of the increments.

Crop.	N		P		K	
Barley—Grain, cwt.	**13.7**	± 2.3	−3.8	± 2.3	1.0	± 1.4
Straw, cwt.	**27.5**	± 3.8	4.0	± 3.8	2.6	± 2.3
Sugar Beet—Roots, tons	**1.77**	± 0.49	**−1.12**	± 0.49	0.21	± 0.29
Tops, tons	**2.71**	± 0.91	**−2.29**	± 0.91	−0.17	± 0.55
Potatoes— tons	**7.38**	± 2.39	3.54	± 2.39	2.15	± 1.43

2. Table showing the percentage increments in yield for N, P_2O_5 and K_2O, with their standard errors.

Crop.	N	P	K	Standard Error.
Barley—Grain	**10.24**	−2.83	1.29	± 1.70
Straw	**11.23**	1.64	1.80	± 1.54
Sugar Beet—Roots ..	**6.76**	**−4.27**	1.32	± 1.87
Tops	**6.73**	**−5.67**	−0.71	± 2.26
Potatoes	**9.84**	4.72	4.77	± 3.18

Significant results are in bold type. Negative sign means depression.

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REPLICATED EXPERIMENTS AT WOBURN

Potatoes: Comparison of Sulphates of Potash and Magnesium and Mineral Potash. Effect of Superphosphate.

W P—Lansome, 1930.

S.W.

— / O	— / S	— / K	M / —
— / S	K / —	— / M	— / O
— / K	— / M	O / —	S / —
— / M	— / O	— / S	— / K
IV.	III.	II.	I.

SYSTEM OF REPLICATION : Latin Square. Each plot divided into two sub-plots.
AREA OF EACH WHOLE PLOT : 1/40th acre.
TREATMENTS :
O=No Potash or Magnesium.
M=Sulphate of Magnesium.
S=Sulphate of Potash.
K=Potash Mineral.
Sulphate of Potash and Potash Mineral at the rate of 0.6 cwt. K_2O per acre, Sulphate of Magnesium at the rate of 0.257 cwt. MgO per acre, equivalent to 0.6 cwt. K_2O, Superphosphate at the rate of 0.5 cwt. P_2O_5 per acre applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.
Land limed and dunged in 1929.
Manures applied : May 5th. Potatoes planted : May 6th.
Potatoes lifted : Sept. 30th-Oct. 1st. Variety : Ally.
Previous Crop : Potatoes followed by Fodder Crop (Rye, Vetches and Beans).

Actual weights in lb.

Column.	Superphosphate.				No Superphosphate.			
	O	M	S	K	O	M	S	K
I. ..	352.50	350.25	377.25	386.75	377.00	339.25	388.75	384.50
II. ..	358.00	315.75	305.00	291.00	319.75	336.25	338.25	306.75
III. ..	248.75	286.75	263.00	283.75	257.50	326.00	274.50	256.75
IV. ..	273.25	255.75	255.00	276.25	256.50	274.75	262.00	279.75

Summary of Results.

Average yield.	Tons per acre.				Per cent.			
	No Potash or Magn's'm	Sulphate of Magn's'm	Sulphate of Potash	Potash Mineral	No Potash	Sulphate of Magn's'm	Sulphate of Potash	Potash Mineral
Without Superphosphate ..	10.81	11.40	11.28	10.96	98.3	103.6	102.5	99.6
With Superphosphate ..	11.00	10.79	10.72	11.05	100.0	98.1	97.4	100.5

Mean 11.00 tons. Standard Error = 0.257 tons or 2.34 per cent.
No response to superphosphate, or to the potash or magnesium treatments.

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WOBURN

Potatoes: Nitrogenous Fertilisers, Sulphate of Ammonia and Cyanamide.

Phosphatic Fertilisers, Superphosphate and Slag.

W P—Lansome, 1930.

N.W.

I.	C Sl	C P	S P	S Sl
II.	C P	C Sl	S Sl	S P
III.	S Sl	S P	C Sl	C P
IV.	S P	S Sl	C P	C Sl

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 1/45th acre.
TREATMENTS: Sulphate of Ammonia and Cyanamide at the rate of 0.2 cwt. N per acre, and Superphosphate and Slag (High Soluble) at the rate of 0.5 cwt. P_2O_5 per acre, in combination as follows:
C, Sl.=Cyanamide and Slag.
C, P=Cyanamide and Superphosphate.
S, Sl.=Sulphate of Ammonia and Slag.
S, P=Sulphate of Ammonia and Superphosphate.
Land limed and dunged, 1929. Manures applied: May 5th.
Potatoes planted: May 7th. Lifted: Sept. 30th. Variety: Ally.
Previous Crop: Potatoes followed by Fodder Crop (Rye, Vetches and Beans).

Actual weights in lb.

Row.	C, Sl	C, P	S, Sl	S, P
I. ..	653.25	619.50	604.75	577.50
II. ..	638.25	642.75	530.25	601.25
III. ..	522.25	591.50	572.75	618.75
IV. ..	565.75	559.00	512.00	470.25

Summary of Results.

Average yield.	Cyanamide Slag.	Cyanamide Super.	Sulph./Amm. Slag.	Sulph./Amm. Super.	Mean.	Standard Error.
Tons per acre	11.95	12.12	11.15	11.39	11.65	0.406
Per cent.	102.6	104.0	95.7	97.8	100.0	3.48

There is a small non-significant advantage of the plots treated with cyanamide over those treated with sulphate of ammonia. No difference between plots treated with slag and super-phosphate.

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WOBURN

Sugar Beet: Potassic and Chloride Dressings, Muriate of Potash, Mineral Potash, Agricultural Salt.

Effect of Superphosphate.

S.W.

K / —	— / S	M / —	O / —
M / —	K / —	— / O	— / S
S / —	O / —	— / K	— / M
— / O	— / M	S / —	K / —
IV.	III.	II.	I.

W S—Lansome, 1930.

System of Replication: Latin Square. Each plot divided into two sub-plots.
Area of Each Whole Plot: 1/40th acre.
Treatments:
O = No Salt, no Potash.
M = Muriate of Potash. } at the rate of 0.6 cwt.
K = Potash Mineral. } K_2O per acre.
S = Salt to give same amount of Chloride as in Muriate of Potash.
Superphosphate at the rate of 0.5 cwt. per acre water soluble P_2O_5 applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.
Land dunged and limed, 1929. Manures applied: May 2nd.
Beet sown: May 3rd. Lifted: Oct. 7th-8th. Variety: Johnson's P.
Previous Crop: Potatoes followed by Fodder Crop (Rye, Vetches and Beans).

Actual yields in lb.

Column.		Roots (dirty). O	M	K	S	Tops. O	M	K	S
I.	Super	381	373	362	358	193	205	243	195
II.	Super	401	447	412	418	188	205	194	229
III.	Super	371	363	410	367	196	223	204	186
IV.	Super	391	399	422	433	199	174	214	188
I.	No Super	383	425	402	410	188	203	206	206
II.	No Super	393	413	446	426	183	195	219	225
III.	No Super	392	406	401	448	188	214	215	206
IV.	No Super	397	343	314	430	209	200	132	193

Summary of Results.

Average yield in tons per acre.		No Salt, No Potash.	Muriate of Potash.	Salt.	Potash Mineral.	Mean.	Standard Error.
Roots (washed)	No Super.	9.12	9.24	9.98	9.10	9.27	0.397
	Super.	8.99	9.21	9.18	9.35		
Tops	No Super.	6.86	7.25	7.41	6.89	7.16	0.336
	Super.	6.93	7.21	7.12	7.63		
Sugar percentage in roots	No Super.	19.24	19.36	19.29	19.32	19.35	0.196
	Super.	19.38	19.46	19.33	19.45		

Average yield per cent.		No Salt, No Potash.	Muriate of Potash.	Salt.	Potash Mineral.	Mean.	Standard Error.
Roots (washed)	No Super.	98.3	99.7	107.7	98.2	100.0	4.28
	Super.	97.0	99.4	99.0	100.9		
Tops	No Super.	95.7	101.2	103.5	96.2	100.0	4.68
	Super.	96.7	100.6	99.5	106.6		

The small response in roots to the application of salt in the absence of superphosphate is not significant. No response to muriate of potash, potash mineral or superphosphate. With tops there is a significant response to the potash and salt dressings but no differences between these, and no response to superphosphate.

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REPLICATED EXPERIMENTS AT OUTSIDE CENTRES

Grassland. Meadow Hay.

(Basic Slag Committee).

Mr. W. Eydes, Walton Lodge Farm, Walton, Chesterfield, Derby, 1930.

Permanent grass.

I.	H	L	M	O	S
II.	M	H	O	S	L
III.	S	O	L	M	H
IV.	L	M	S	H	O
V.	O	S	H	L	M

SYSTEM OF REPLICATION: Latin Square
AREA OF EACH PLOT: 1/15 acre.
Soil: Clay 6 in. deep.
TREATMENTS:
O=Control.
S=Super.
M=Mineral Phosphate.
L=Low Soluble Slag (23.0%).
H=High soluble Slag (96.5%).
Dressings providing 1 cwt. P_2O_5 per acre, applied Feb. 4th.
Hay cut: July 15th. Weighed: Aug. 7th-8th.

Actual weights in lb.

Row.	O	M	L	H	S
I. ..	175	183	165	152	203
II. ..	217	179	225	226	225
III. ..	197	224	236	235	186
IV. ..	231	210	216	254	292
V. ..	207	186	204	177	234

Summary of Results

Average Yield.	Control.	Mineral Phosphate.	Low Sol. Slag.	High Sol. Slag.	Super-Phosphate.	Mean.	Standard Error.
Cwt. per acre	27.5	26.3	28.0	28.0	30.5	28.1	1.28
Per cent. ..	98.0	93.7	99.8	99.6	108.8	100.0	4.54

The response to the dressings of mineral phosphate and high and low soluble slags are not significant. The plots treated with superphosphate give a significantly higher yield than any of the others.

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Grassland. Meadow Hay.
(Basic Slag Committee).
Mr. W. H. Limbrick, Badminton Farm, Badminton, Glos., 1930.

Permanent grass.

I.	S	O	L	M	H
II.	M	L	H	O	S
III.	O	H	M	S	L
IV.	H	S	O	L	M
V.	L	M	S	H	O

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 1/10th acre.
Soil: Light red loam 8 in. deep.
TREATMENTS:
O=Control.
S=Super.
M=Ground Mineral Phosphate.
L=Low soluble Slag (23.0%).
H=High soluble Slag (96.5%).
Dressings providing 1 cwt. P_2O_5 per acre, applied Jan. 31st-Feb. 1st.
Hay cut: June 16th. Weighed: June 20th-24th.

Actual weights in lb.

Row.	Hay as weighed.					Air dry weights.				
	O	M	L	H	S	O	M	L	H	S
I. ..	442	420	422	403	512	345	335	333	299	380
II. ..	472	402	446	478	490	362	332	355	368	380
III. ..	479	520	489	504	553	379	388	374	395	420
IV. ..	551	434	494	514	559	451	383	412	413	449
V. ..	458	547	489	516	497	337	439	410	421	382

Summary of Results.

Average yield.	Control.	Mineral Ph'phate.	Low Sol. Slag.	High Sol. Slag.	Super-ph'phate.	Mean.	Standard Error.
Hay as weighed—							
Cwt. per acre ..	42.9	41.5	41.8	43.1	46.6	43.2	1.33
Per cent. ..	99.3	96.1	96.8	99.9	108.0	100.0	3.07
Air dry weights—							
Cwt. per acre ..	33.5	33.5	33.6	33.9	35.9	34.1	1.01
Per cent. ..	98.2	98.4	98.7	99.4	105.4	100.0	2.96

There has been no response to the slags, or to mineral phosphate. The yield of hay as weighed in the field was significantly increased by the dressing of superphosphate. This increase, when expressed as air-dried hay was, however, much smaller, and hardly significant.

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Barley: Effect of Nitrogenous Fertilisers, and of Sulphate of Potash and Superphosphate.

H. G. Nevile, Esq., Wellingore, 1930.

Plan and Actual Weights in grams per sample.

Grain								Straw							
K 172	KP 265	K 177	KP 214	KP 262½	O 213½	P 124	K 115	K 211	KP 280½	K 179½	KP 234	KP 320½	O 246½	P 144½	K 159½
P 159	O 159	O 159	P 129	K 196½	P 219½	O 184½	KP 124	P 177	O 161	O 192	P 160½	K 261	P 291	O 226	KP 161½
P 128	K 182	K 236½	P 182½	K 116	P 146	KP 196½	P 199½	P 148½	K 229	K 250	P 201½	K 133½	P 159½	KP 234	P 253
KP 188	O 179½	KP 183	O 156	KP 98½	O 134	K 209½	O 170½	KP 216½	O 193	KP 208½	O 173½	KP 122	O 181½	K 237½	O 216
O 107½	KP 134	KP 167½	P 196½	P 189½	O 144½	KP 195½	O 159½	O 64	KP 134½	KP 194½	P 222½	P 214½	O 180½	KP 271½	O 204½
P 119½	K 118	K 134	O 149	KP 191	K 207½	P 190	K 214½	P 125½	K 115½	K 147½	O 166½	KP 205	K 223½	P 210	K 250½
P 191	KP 153½	K 103½	P 90	P 180	KP 225	K 198½	O 223½	P 201½	KP 162	K 99	P 99½	P 216	KP 255½	K 201½	O 237
O 155	K 170½	KP 97	O 80	K 153	O 172½	KP 212½	P 165½	O 167	K 172½	KP 103	O 84½	K 186½	O 222	KP 226	P 210½

Plan showing Nitrogenous Treatments applied to whole plots.

N	C	S	O
S	N	O	C
O	S	C	N
C	O	N	S

SYSTEM OF REPLICATION: Latin Square.

AREA OF EACH WHOLE PLOT: 1/50th acre.

Soil: Light loam on Oölitic limestone.

TREATMENTS:
O = No Nitrogen.
C = Cyanamide.
N = Nitrate of Soda.
S = Sulphate of Ammonia
} at the rate of 0.2 cwt. N per acre.

Plots sub-divided to receive no Potash or Superphosphate (O), Sulphate of Potash (K) at the rate of 0.6 cwt. K_2O per acre, Superphosphate (P) at the rate of 0.4 cwt. P_2O_5 per acre, and Sulphate of Potash and Superphosphate (KP).

Plots harvested by sampling method.

Manures applied: March 10th.

Barley sown: March 10th. Harvested: August 22nd.

Variety: Plumage Archer.

Previous Crop: Barley.

M

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Barley, Wellingore, 1930 (*cont.*)

Summary of Results.

Average Yield in cwt. per acre.	Grain					Straw				
	No Nitrogen	Cyana-mide	Nitrate of Soda	Sulph. Amm.	Mean	No Nitrogen	Cyana-mide	Nitrate of Soda	Sulph./ Amm.	Mean
No Potash or Super.	11.0	13.7	14.1	16.7	13.9	12.1	16.5	16.6	18.4	15.9
Sulphate of Potash ..	9.9	16.7	16.9	15.5	14.8	11.1	17.7	19.6	18.3	16.7
Superphosphate ..	10.4	15.4	15.5	15.5	14.2	11.5	18.1	17.5	19.0	16.5
Potash and Super. ..	9.9	16.4	18.9	18.1	15.8	11.3	18.2	22.1	20.9	18.1
Mean	10.3	15.6	16.4	16.4	14.7	11.5	17.6	19.0	19.2	16.8
Standard Error ..	1.14					1.25				
Per cent.										
No Potash or Super.	75.2	93.5	96.1	113.7	94.6	72.1	98.0	98.7	109.3	94.6
Sulphate of Potash ..	67.2	113.6	115.3	105.6	100.4	65.8	105.4	116.5	108.8	99.1
Superphosphate ..	71.2	105.3	105.7	105.4	96.9	68.6	107.6	104.3	113.1	98.4
Potash and Super. ..	67.4	112.2	129.0	123.4	108.0	67.6	108.3	131.8	124.2	108.0
Mean	70.2	106.2	111.6	112.0	100.0	68.6	104.8	112.8	113.8	100.0
Standard Error ..	7.78					7.44				

Significant response to all forms of nitrogenous fertiliser for both grain and straw, but the differences between the yields of plots having sulphate of ammonia, nitrate of soda and cyanamide are not significant. The response to potash is significant for grain, but only in the presence of a nitrogenous dressing: while that to phosphate is not significant for either grain or straw.

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Barley: Effect of Nitrogenous Fertilisers, and of Sulphate of Potash and Superphosphate.

Mr. J. M. Templeton, Farm Institute, Sparsholt, Winchester, 1930.

Plan and Actual Weights in grams per sample.

Grain								Straw							
P 219	KP 186½	O 162½	P 132½	K 146	KP 161	K 152	KP 90½	P 223½	KP 185½	O 174	P 152½	K 161½	KP 192½	K 136	KP 105
O 174½	K 188½	K 165	KP 164	O 131	P 192	P 147	O 163	O 167½	K 180½	K 138	KP 158½	O 148½	P 193½	P 152½	O 145
KP 209½	O 240½	O 171	KP 219	O 140	KP 209	KP 234½	P 159½	KP 206½	O 241	O 173	KP 206	O 157	KP 177½	KP 218½	P 153
K 203	P 259	P 207	K 151	P 205	K 206	K 183	O 201	K 204	P 245	P 186½	K 142	P 207	K 194½	K 185½	O 196½
P 236½	O 203	P 160½	KP 191	K 177	P 172½	KP 185	P 133½	P 229½	O 197	P 150½	KP 157½	K 178½	P 167	KP 168	P 135½
KP 257½	K 207½	O 160½	K 176½	KP 170½	O 163	K 173	O 156½	KP 249½	K 210	O 152½	K 171½	KP 176	O 173½	K 171½	O 161½
P 249½	KP 220½	K 215½	O 232½	P 150	KP 183	O 163½	P 126	P 229	KP 231½	K 213	O 228	P 163½	KP 179½	O 154½	P 135½
O 259	K 230	KP 245	P 262	K 175	O 207½	KP 174½	K 102	O 240½	K 215	KP 243	P 248	K 147	O 206	KP 160½	K 130

Plan showing Nitrogenous Treatments applied to whole plots.

O	C	N	S
C	S	O	N
N	O	S	C
S	N	C	O

SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH WHOLE PLOT: 1/50th acre.
Soil: Thin flinty loam on chalk.
Variety: Plumage Archer.

TREATMENTS:
O = No Nitrogen.
C = Cyanamide.
N = Nitrate of Soda.
S = Sulphate of Ammonia.
} at the rate of 0.2 cwt. N per acre.

Plots sub-divided to receive no Potash or Superphosphate (O), Sulphate of Potash (K), at the rate of 0.6 cwt. K_2O per acre, Superphosphate (P) at the rate of 0.4 cwt. P_2O_5 per acre, and Sulphate of Potash and Superphosphate (KP).

Plots harvested by sampling method.

Manures applied: March 25th-26th.

Barley sown: April 15th. Harvested: August 12th-13th.

Previous Crop: Barley.

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Barley, Sparsholt, 1930 (*cont.*)

Summary of Results.

Average Yield in cwt. per acre.	Grain.					Straw.				
	No Nitrogen	Cyana-mide	Nitrate of Soda	Sulph./ Amm.	Mean	No Nitrogen	Cyana-mide	Nitrate of Soda	Sulph./ Amm.	Mean
No Potash or Super.	11.9	14.3	14.3	14.1	13.6	11.8	14.6	14.4	13.7	13.6
Sulphate of Potash ..	12.6	13.4	14.0	13.3	13.3	12.6	12.3	14.4	12.5	13.0
Superphosphate ..	13.3	12.6	15.9	14.5	14.1	13.4	13.0	15.4	13.7	13.9
Potash and Super. ..	14.2	13.8	16.8	13.1	14.5	12.7	13.3	16.9	13.4	14.1
Mean	13.0	13.5	15.2	13.8	13.9	12.6	13.3	15.3	13.3	13.6
Standard Error ..	0.92					0.69				
Per cent.										
No Potash or Super.	85.9	103.2	103.3	101.7	98.5	86.5	107.2	105.5	100.3	99.9
Sulphate of Potash ..	90.5	96.3	101.2	95.5	95.9	92.7	90.5	105.5	92.0	95.2
Superphosphate ..	95.6	90.8	114.4	104.4	101.3	98.1	95.4	112.9	100.7	101.8
Potash and Super. ..	102.4	99.8	120.8	94.2	104.3	93.3	97.6	123.7	98.4	103.2
Mean	93.6	97.5	109.9	99.0	100.0	92.6	97.7	111.9	97.8	100.0
Standard Error ..	6.65					5.07				

Plots treated with nitrate of soda have given a significantly higher yield than all others. The response to sulphate of ammonia and cyanamide was not significant. No effect of potash. There was some evidence of a response to superphosphate, but the increase only approached significance in the presence of potash and nitrate of soda.

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Potatoes: Effect of Superphosphate on Two Varieties.
G. Major, Esq., Newton Farm, Lincs., 1930.

	B	A	A	B	B	A	B	A
I.	0	0	2½	2½	10	10	5	5
II.	5	5	10	10	2½	2½	0	0
III.	10	10	0	0	5	5	2½	2½
IV.	2½	2½	5	5	0	0	10	10

VARIETIES: British Queen (A) and King Edward (B) in random strips.
SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH SUB-PLOT: 1/60th acre.
TREATMENTS: Superphosphate at the rate of 0, 2½, (0.4 cwt. P_2O_5), 5 and 10 cwt. per acre. All plots received Sulphate of Ammonia at the rate of 0.8 cwt. N per acre and Sulphate of Potash at the rate of 2 cwt. K_2O per acre. Dunged in previous autumn.
Manures applied: April 2nd.
Potatoes planted: April 3rd. Lifted: Oct. 21st-22nd.
Previous Crop: Wheat.

Actual weights in lb.

Row.	British Queen.				King Edward.			
	0	2½	5	10	0	2½	5	10
I. ..	518	528	495	554	676	546	586	578
II. ..	476	558	532	512	559	562	611	598
III. ..	502	468	545	538	570	575	599	601
IV. ..	472	557	582	579	625	646	651	602

Summary of Results.

Average yield.	British Queen.				King Edward.			
	No Super.	2½ cwt. Super.	5 cwt. Super.	10 cwt. Super.	No Super.	2½ cwt. Super.	5 cwt. Super.	10 cwt. Super.
Tons per acre ..	13.18	14.14	14.42	14.62	16.27	15.60	16.39	15.93
Per cent. ..	87.5	93.8	95.7	97.0	108.0	103.5	108.7	105.7
Mean	14.09				16.05			
Standard Error ..	0.375 tons or 2.49 per cent.							

King Edwards yielded significantly better than British Queen. Significant response to British Queen variety with first dressing of superphosphate: further response to higher dressing is not significant. No response to superphosphate on King Edward variety.

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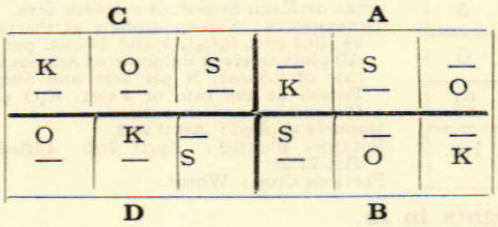
Potatoes: Effect of Sulphate of Potash and Mineral Potash. A. W. Oldershaw, Esq., Tunstall, Nr. Ipswich, 1930.



SYSTEM OF REPLICATION: 4 randomised blocks.
AREA OF EACH WHOLE PLOT: 1/60th acre. Each plot divided into two sub-plots.
Soil: Very light sand (almost out of cultivation).
Variety: Great Scott.
TREATMENTS:
O = Control.
S = Sulphate of Potash at the rate of 1.5 cwt. K_2O per acre.
K = Potash Mineral equivalent to Sulphate of Potash.
Sulphate of Magnesia, providing Magnesium equivalent to the Potash applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.
All plots received Nitrate of Soda at the rate of 0.6 cwt. N per acre, and basic Superphosphate at the rate of 0.6 cwt. P_2O_5 per acre.
Manures applied: April 1st, except Nitrate of Soda which was applied as an early top dressing.
Potatoes planted: April 6th. Lifted: Oct. 8th-10th.

Actual weights in lb.

Block.	With Sulphate of Magnesia.			Without Sulphate of Magnesia.		
	O	S	K	O	S	K
A ..	557	486	514	461	581	423
B ..	468	547	491	418	525	490
C ..	516	520	433	547	507	438
D ..	455	447	508	459	493	503
Average in tons per acre	13.37	13.39	13.03	12.62	14.10	12.42

Summary of Results.

Average Yield.	Control.	Sulphate of Potash	Potash Mineral.	Mean.	Standard Error.	Without S/Mag.	With S/Mag.	Mean.	Standard Error.
Tons per acre ..	12.99	13.75	12.72	13.16	0.541	13.05	13.26	13.16	0.287
Per cent.	98.8	104.5	96.7	100.0	4.12	99.2	100.8	100.0	2.18

Slight non-significant advantage due to sulphate of potash. No response to potash mineral or sulphate of magnesia.

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Potatoes: Effect of Superphosphate and Sulphate of Potash.
E. V. Cooke, Esq., The Limes, North Fen, Bourne, Lincs., 1930.

A			B		
0P 2K	1P 2K	1P 1K	0P 1K	0P 2K	1P 1K
2P 1K	0P 1K	2P 0K	2P 0K	1P 0K	2P 1K
1P 0K	2P 2K	0P 0K	1P 2K	2P 2K	0P 0K
1P 1K	0P 2K	2P 2K	1P 0K	2P 0K	0P 2K
0P 0K	1P 0K	1P 2K	1P 1K	2P 2K	1P 2K
2P 1K	2P 0K	0P 1K	0P 0K	0P 1K	2P 1K
C			D		

SYSTEM OF REPLICATION: 4 randomised blocks.
AREA OF EACH PLOT: 1/70th acre.
Soil: Black Fen land.
Variety: King Edward.
TREATMENTS: Superphosphate (P) at the rate of 0, 0.8 and 1.6 cwt. P_2O_5 per acre, and Sulphate of Potash (K) at the rate of 0, 1 and 2 cwt. K_2O per acre, in all combinations.
Manures applied: April 23rd.
Potatoes planted: April 25th.
Lifted: Sept. 25th.

Actual weights in lb.

Blocks.	1	2	3	4	5	6	7	8	9
A ..	372	293	392	360	459	388	344	439	406
B ..	334	444	437	393	385	434	366	438	439
C ..	234	291	279	295	339	297	332	413	479
D ..	262	385	338	335	382	367	297	365	421

Summary of Results.

Average yield.	Tons per acre.				Per cent.			
	No Super.	5 cwt. Super.	10 cwt. Super.	Mean.	No Super.	5 cwt. Super.	10 cwt. Super.	Mean.
No Potash ..	9.39	11.04	11.30	10.58	81.7	96.1	98.3	92.0
2 cwt. Sul./Pot. ..	10.80	12.23	11.61	11.55	94.1	106.4	101.1	100.5
4 cwt. Sul./Pot. ..	10.46	12.93	13.63	12.34	91.1	112.6	118.7	107.5
Mean	10.22	12.07	12.18	11.49	89.0	105.0	106.0	100.0
Standard Error ..	0.647				5.63			

Significant response to the single dressing of superphosphate—no further response to the double dressing. Significant response, on the average, to the single and double dressings of sulphate of potash.

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Potatoes: Effect of Inorganic and Organic Fertilisers.
Mr. Inskip, Stanford, Biggleswade, 1930.

1.—HEAVY LAND.

I.	4	3	2	1
II.	1	2	3	4
III.	3	4	1	2
IV.	2	1	4	3

VARIETY: King Edward.
SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH PLOT: 1/50th acre.
TREATMENTS:
1 = Blood, Superphosphate.
2 = Sulphate of Ammonia, Superphosphate.
3 = Sulphate of Ammonia, Steamed Bone Flour.
4 = Blood, Steamed Bone Flour.
Rates: 0.5 cwt. N and 0.6 cwt. P_2O_5 per acre. All plots received Sulphate of Potash at the rate of 1.25 cwt. K_2O per acre.
Manures applied: April 2nd-3rd.
Potatoes set: April 2nd.
Lifted: Oct. 1st.

Actual weights in lb.

Row.	1	2	3	4
I. ..	645	667	670	787
II. ..	752	637	655	576
III. ..	642	627	686	575
IV. ..	621	762	596	660

Summary of Results.

Average Yield.	Blood Super.	Sulph/Amm. Super.	Sulph/Amm. Steamed Bone Flour.	Blood Steamed Bone Flour.	Mean.	Standard Error.
Tons per acre ..	14.84	15.03	14.55	14.50	14.73	0.311
Per cent. ..	100.8	102.0	98.8	98.4	100.0	2.11

No significant differences in yield.

2.—LIGHT LAND.

— / 1	— / 2	— / 3	4 / —
— / 4	— / 3	1 / —	2 / —
— / 2	1 / —	4 / —	— / 3
3 / —	4 / —	— / 2	— / 1
IV	III.	II.	I.

VARIETY: Great Scott.
SYSTEM OF REPLICATION: Latin Square.
AREA OF EACH WHOLE PLOT: 1/50th acre. Each plot divided into two sub-plots.
TREATMENTS:
1 = Blood, Superphosphate.
2 = Sulphate of Ammonia, Superphosphate.
3 = Sulphate of Ammonia, Steamed Bone Flour.
4 = Blood, Steamed Bone Flour.
Rates: 0.3 cwt. N and 0.4 cwt. P_2O_5 per acre. Sulphate of Potash at the rate of 0.88 cwt. K_2O per acre applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.
Manures applied: April 2nd-3rd.
Potatoes planted: April 2nd.
Lifted: Sept. 5th.

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Actual weights in lb.

Row.	Potash.				No Potash.			
	1	2	3	4	1	2	3	4
I. ..	118.0	118.0	104.5	125.0	105.5	116.0	96.5	96.0
II. ..	128.0	125.0	113.5	106.5	116.5	125.0	130.5	104.0
III. ..	99.5	124.5	126.5	123.0	128.5	124.5	97.5	108.0
IV. ..	125.0	140.5	144.0	129.0	125.0	115.5	138.0	115.0
Average in tons per acre	5.25	5.67	5.45	5.40	5.31	5.37	5.16	4.72

Summary of Results.

Average Yield.	Blood, Super.	Sulph/Amm. Super.	Sulph/Amm. Bone Flour.	Blood, Bone Flour.	Mean.	Standard Error.
Tons per acre ..	5.28	5.52	5.31	5.06	5.29	0.127
Per cent. ..	99.8	104.3	100.3	95.6	100.0	2.40

Average yield.	Without Potash.	With Potash.	Mean.	Standard Error.
Tons per acre ..	5.14	5.44	5.29	0.124
Per cent.	97.1	102.9	100.0	2.35

The differences between the nitrogenous and phosphatic treatments are not significant. There is a small, non-significant advantage due to the potassic dressing.

3.—EXPERIMENT ON FISH MEAL.

A	A	B	B
B	B	A	A
I.	II.	III.	IV.

Soil: Heavy loam.
VARIETY: King Edward.
SYSTEM OF REPLICATION: 4 randomised blocks.
AREA OF EACH PLOT: 1/50th acre.
TREATMENT:
A=Sulphate of Ammonia and Superphosphate.
B=Sulphate of Ammonia and Fish Meal.
Rates: 0.5 cwt. N and 0.6 cwt. P_2O_5 per acre. All plots received Sulphate of Potash at the rate of 1.25 cwt. K_2O per acre.
Manures applied: April 3rd.
Potatoes planted: April 1st. Lifted: Oct. 1st.

Actual weights in lb.

Treatment.	I.	II.	III.	IV.
A	756	658	757	712
B	790	701	714	682

Summary of Results.

Average yield.	S./Ammonia Super.	S./Ammonia Fish Meal.	Mean.	Standard Error.
Tons per acre	16.09	16.11	16.10	0.346
Per cent.	99.9	100.1	100.0	2.15

No difference in yield.

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Sugar Beet: Effect of Nitrogenous Fertilisers, and of Muriate of Potash and Agricultural Salt.

Farm of Messrs. C. S. and G. M. Wilson, Colchester.

A			B		
7	9	8	2	7	5
4	1	5	4	9	6
6	2	3	1	3	8
5	2	8	4	9	7
4	6	9	8	5	1
7	1	3	3	2	6
C			D		

SYSTEM OF REPLICATION: 4 randomised blocks of 9 plots each.
AREA OF EACH PLOT: 1/60th acre.
TREATMENTS: Sulphate of Ammonia and Nitrate of Soda at the rate of 0.4 cwt. N per acre, Muriate of Potash at the rate of 0.8 cwt. K_2O per acre, and Salt equivalent in Chloride to Muriate of Potash, as shown in the Key to Treatments.
All plots received dung, and Superphosphate at the rate of 0.4 cwt. P_2O_5 per acre.
Soil: Light sandy gravel.
Manures applied: April 25th.
Seed sown: April 28th. Lifted: Nov. 6th-7th.
Variety: Kuhn P.

Key to Treatments.

Treatment.	1	2	3	4	5	6	7	8	9
Nitrogen ..				S/A	S/A	S/A	N/S	N/S	N/S
M/Potash		x	x		x	x		x	x
Salt ..			x			x			x

Actual weights in lb.

Treatments. N	Treatments. K	Roots (dirty). A	B	C	D	Tops. A	B	C	D
O	O	239	263	412	501	177	145	323	285
O	M/P	349	352	456	436	301	256	360	317
O	M/P & S	286	369	352	327	234	257	286	256
S/A	O	213	359	463	380	195	256	305	267
S/A	M/P	221	267	466	468	202	291	364	368
S/A	M/P & S	389	304	478	529	331	351	430	453
N/S	O	256	383	482	507	236	366	347	411
N/S	M/P	357	399	495	523	352	456	417	384
N/S	M/P & S	329	370	514	502	340	363	427	379

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Summary of Results.

Average yield in tons per acre.	Roots (washed).				Tops.				Average Sugar Percentage.			
	No Potash	Mur./ Pot.	M/Pot. & Salt.	Mean	No Potash	Mur./ Pot.	M/Pot. & Salt.	Mean	No Potash	Mur./ Pot.	M/Pot. & Salt.	Mean.
No Nitrogen ..	8.59	9.68	8.10	8.79	6.23	8.26	6.92	7.14	18.94	18.79	19.36	19.03
Sulph./Amm.	8.59	8.64	10.33	9.19	6.85	8.20	10.48	8.51	18.85	18.14	18.66	18.55
Nitrate of Soda	9.89	10.77	10.42	10.36	9.11	10.77	10.10	9.99	18.55	18.74	18.72	18.67
Mean	9.02	9.70	9.62	9.45	7.40	9.08	9.17	8.55	18.78	18.56	18.91	18.75
Standard Error	0.607				0.523				0.241			

Average yield per cent.	Roots (washed).				Tops.			
	No Potash	Muriate of Potash	M/Potash and Salt	Mean	No Potash	Muriate of Potash	M/Potash and Salt	Mean
No Nitrogen ..	91.0	102.4	85.8	93.1	72.9	96.7	80.9	83.5
Sulph./Amm. ..	91.0	91.5	109.3	97.3	80.1	96.0	122.6	99.6
Nitrate of Soda ..	104.7	114.1	110.3	109.7	106.5	126.1	118.2	116.9
Mean	95.6	102.7	101.8	100.0	86.5	106.3	107.2	100.0
Standard Error ..	6.43				6.12			

Significant response to sulphate of ammonia when applied to those plots having muriate of potash and salt. Nitrate of soda plots significantly superior to sulphate of ammonia plots except in the presence of muriate of potash and salt. The response to muriate of potash is only significant with tops; further response is produced by adding salt only on those plots having sulphate of ammonia. The application of nitrogenous dressing has lowered the sugar percentage significantly.

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Experiments at other centres, carried out by the local workers on the lines of those described on the preceding pages.

Potatoes. Mr. J. E. Arden, Owmby Cliff, Lincolnshire, 1930.

Latin Square: Plots 1/80th acre. Soil: Cliff (limestone).
Basal Manuring: 4 cwt. Sulphate of Ammonia and 3 cwt. Muriate of Potash per acre.
Variety: King Edward. Potatoes planted: April 17th. Lifted: Oct. 10th.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	11.37	12.19	11.85	12.34	11.94	0.169
Per cent. ..	95.2	102.1	99.3	103.4	100.0	1.41

Significant response to the first dressing of superphosphate. No further response to the higher dressings.

Potatoes. Midland Agricultural College, Loughborough, 1930.

Randomised blocks: Plots 1/48.4 acre. Soil: Light gravel.
Basal Manuring: 3 cwt. Sulphate of Ammonia and 3 cwt. Sulphate of Potash per acre.
Variety: King Edward. Potatoes planted: April 11th. Lifted: Sept. 19th. Previous Crop: Spring Oats.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	10.03	10.98	9.05	9.70	9.94	0.449
Per cent. ..	100.9	110.5	91.1	97.6	100.0	4.52

The yield has been significantly depressed by the heavier dressings (4 and 8 cwt.) of superphosphate.

Potatoes. County School, Welshpool, Montgomeryshire, 1930.

Randomised blocks: Plots 1/160th acre. Soil: School Garden.
Basal Manuring: 10 tons of F.Y.M. per acre, Sulphate of Ammonia at the rate of 0.8 cwt. N per acre, and Sulphate of Potash at the rate of 2 cwt. K_2O per acre.
Variety: Great Scott. Potatoes planted: May 7th. Lifted: Sept. 29th-Oct. 3rd.
Previous Crop: Sugar Beet.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	9.18	11.64	13.29	12.36	11.62	0.339
Per cent. ..	79.0	100.2	114.4	106.4	100.0	2.92

Significant responses to dressings of 2 and 4 cwt. of superphosphate. Slight set-back with the highest dressing, which, however, is not significant.

Potatoes. Mr. J. Clarke, Eskham House, Nateby, Lancashire, 1930.

Latin Square: Plots 1/62 acre. Soil: Moss soil on deep peat.
Basal Manuring: Dung at the rate of 12 tons per acre, 2 cwt. per acre Sulphate of Potash and 2 cwt. Sulphate of Ammonia per acre.
Variety: King Edward. Potatoes planted: May 1st. Lifted: Sept. 22nd.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	9.24	9.54	9.50	9.44	9.43	0.269
Per cent. ..	98.0	101.2	100.7	100.1	100.0	2.85

No response to superphosphate.

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Potatoes. Mr. George, Great Nash, Llangwm, 1930.

Latin Square: Plots 1/185th acre. Soil: Sandy-hungry.
Basal Manuring: 2 cwt. per acre Sulphate of Ammonia and 2 cwt. per acre Sulphate of Potash.
Variety: Kerr's Pink. Potatoes planted: May 2nd. Lifted: Jan. 5th, 1931.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	7.94	9.21	9.68	9.96	9.20	0.216
Per cent. ..	86.4	100.1	105.2	108.3	100.0	2.34

Significant response to superphosphate. The increment in yield falls off at the higher levels.

Potatoes. Grammar School, Burford, Oxon, 1930.

Latin Square: Plots 1/100th acre. Soil: Light loam on limestone.
TREATMENTS: Sulphate of Ammonia and Blood at the rate of 0.6 cwt. N per acre. Superphosphate and Bone Flour at the rate of 0.8 cwt. P_2O_5 per acre.
Basal Manuring: Sulphate of Potash at the rate of 1.4 cwt. K_2O per acre.
Variety: Kerr's Pink. Potatoes planted: April 10th. Lifted: Oct. 7th.

Average Yield.	Sulph/Amm. Bone Flour.	Dried Blood, Bone Flour.	Dried Blood, Super.	Sulph/Amm. Super.	Mean.	Standard Error.
Tons per acre ..	9.03	8.82	9.91	9.05	9.20	0.554
Per cent. ..	98.1	95.8	107.7	98.4	100.0	6.02

No significant differences between treatments.

Potatoes. Sailors' Orphan Homes School, Hull, 1930.

Latin Square: Plots 1/435 acre. Soil: Heavy Clay.
TREATMENTS: Sulphate of Ammonia at the rate of 0.4 cwt. N per acre, and Superphosphate at the rate of 0.5 cwt. P_2O_5 per acre.
Basal Manuring: Sulphate of Potash at the rate of 1 cwt. per acre K_2O.
Variety: Kerr's Pink. Potatoes planted: April 29th-30th. Lifted: Oct. 1st.

Average Yield.	Sulph/Amm. Super.	Sulph/Amm. Bone Flour.	Super Blood.	Bone Flour. Blood.	Mean.	Standard Error.
Tons per acre ..	11.69	9.86	10.88	9.01	10.36	0.425
Per cent. ..	112.9	95.2	105.0	87.0	100.0	4.10

Yield of plots receiving superphosphate significantly better than that of those receiving bone flour, irrespective of the source of nitrogen. The mean of all plots having sulphate of ammonia is significantly higher than that of those having nitrogen in the form of blood.

Sugar Beet. County School, Welshpool, Montgomeryshire, 1930.

Randomised blocks: Plots 1/160th acre. Soil: School Garden.
TREATMENTS: Sulphate of Ammonia, Cyanamide and Nitrate of Soda at the rate of 0.4 cwt. N per acre.
Basal Manuring: F.Y.M. at the rate of 10 tons per acre, Superphosphate at the rate of 0.8 cwt. P_2O_5 per acre and Muriate of Potash at the rate of 1 cwt. K_2O per acre.
Variety: Garton's Warrington. Beet sown: May 20th. Lifted: Oct. 28th-30th. Previous Crop: Mangolds and Swedes.

Average Yield.	No Nitrogen.	Nitrate of Soda.	Sulphate of Ammonia.	Cyanamide.	Mean.	Standard Error.
Roots (washed), tons per acre	11.59	12.57	13.32	11.96	12.36	0.135
Roots, per cent.	93.7	101.8	107.7	96.8	100.0	1.09
Tops, tons per acre	17.11	20.50	21.86	18.82	19.57	0.270
Tops, per cent.	87.4	104.7	111.7	96.2	100.0	1.38
Sugar percentage in roots ..	16.49	16.75	16.47	16.83	16.63	0.235

Significant responses to all forms of nitrogenous fertiliser. Sulphate of ammonia has proved significantly superior to nitrate of soda, while nitrate of soda in turn has produced a significantly higher yield than cyanamide. No significant differences in sugar percentage.

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Sugar Beet. South Eastern Agricultural College, Wye, Kent, 1930.

Latin Square: Plots 1/50th acre. Soil: Light chalk loam.
TREATMENTS: Sulphate of Ammonia with seed at the rate of 3 cwt. per acre, Nitrate of Soda, top dressed, at the rate of 444 lb. per acre and Calcium Cyanamide before drilling at the rate of 3 cwt. per acre.
Basal Manuring: Superphosphate at the rate of 4 cwt. per acre, and Muriate of Potash at the rate of 2 cwt. per acre.
Variety: Klein Wanzleben. Beet sown: May 8th. Lifted: Oct. 28th-30th.
Previous Crop: Sugar Beet.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Nitrate of Soda.	Cyanamide.	Mean.	Standard Error.
Roots (washed) tons per acre..	10.61	12.44	12.72	12.65	12.11	0.187
Roots, per cent.	87.6	102.8	105.1	104.5	100.0	1.55
Tops, tons per acre	11.90	15.36	18.19	16.15	15.40	0.401
Tops, per cent.	77.3	99.7	118.1	104.9	100.0	2.60
Sugar percentage in roots ..	17.83	17.53	17.59	17.85	17.70	0.566

Significant responses to all forms of nitrogenous fertiliser. Nitrate of soda plots significantly better than the sulphate of ammonia and cyanamide plots in tops, but not in roots. No significant differences in sugar percentage.

Sugar Beet. South Eastern Agricultural College, Wye, Kent, 1930.

Latin Square: Plots 1/50th acre. Soil: Light chalk loam.
TREATMENTS: Muriate of Potash at the rate of 2 cwt. per acre and Salt (176 lb. per acre) providing equivalent Chlorine to Muriate of Potash.
Basal Manuring: Superphosphate at the rate of 4 cwt. per acre and Sulphate of Ammonia at the rate of 3 cwt. per acre.
Variety: Klein Wanzleben. Beet sown: May 8th. Lifted: Oct. 22nd-25th.
Previous Crop: Sugar Beet.

Average Yield.	Control.	Salt.	Muriate of Potash.	Muriate of Potash & Salt	Mean.	Standard Error.
Roots (washed) tons per acre..	12.58	13.02	13.29	13.27	13.04	0.137
Roots, per cent.	96.5	99.8	102.0	101.7	100.0	1.05
Sugar percentage in roots	16.42	16.66	16.80	16.60	16.62	0.128

Significant response to the potassic and salt dressings. No further response to the double dressing.

Sugar Beet. County Farm Institute, Moulton, Northampton, 1930.

Latin Square: Plots 1/50th acre. Soil: Sandy loam.
TREATMENTS: Muriate of Potash at the rate of 2 cwt. per acre and Salt (196 lb. per acre) providing equivalent Chlorine to Muriate.
Basal Manuring: Superphosphate at the rate of 2 cwt. per acre, Steamed Bone Flour at the rate of 1 cwt. per acre, 2 cwt. Sulphate of Ammonia per acre.
Variety: Klein Wanzleben E. Beet sown: May 2nd. Lifted: Oct. 22nd.

Average Yield.	Control.	Muriate of Potash.	Salt.	Muriate of Potash & Salt	Mean.	Standard Error.
Roots (washed) tons per acre..	10.08	11.76	11.85	11.54	11.31	0.483
Roots, per cent.	89.2	104.0	104.8	102.0	100.0	4.27
Tops, tons per acre	13.70	13.48	14.43	14.48	14.02	0.854
Tops, per cent...	97.7	96.1	102.9	103.2	100.0	6.09
Sugar percentage in roots ..	17.02	17.52	17.81	18.26	17.65	0.175

Significant response in roots to muriate of potash and salt applied separately, but no further response when they were applied together. With tops the small response to salt is insignificant. Muriate of potash and salt have significantly increased the sugar percentage in roots, while on the plots receiving both muriate of potash and salt the sugar percentage is significantly greater than on the plots receiving the dressings separately.

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Sugar Beet. The University of Leeds, Askham Bryan, Yorks, 1930.

Latin Square: Plots 1/20th acre. Soil: Light drift on Sandstone.
TREATMENTS: Nitrate of Soda with seed, Sulphate of Ammonia with seed and Nitrate of Soda as top dressing. Applications equivalent to 2 cwt. Sulphate of Ammonia per acre.
Variety: Johnson's Improved. Beet sown: May 3rd. Lifted: Oct. 29th-30th.
Previous Crop: Wheat.

Average Yield.	No Nitrogen.	N./Soda top dressing.	N./Soda with seed.	S/Ammonia with seed.	Mean.	Standard Error.
Roots (washed) tons per acre..	8.23	9.17	9.76	10.08	9.31	0.233
Roots, per cent.	88.4	98.5	104.8	108.3	100.0	2.50
Tops, tons per acre	9.48	10.94	11.59	11.62	10.90	0.221
Tops, per cent...	86.9	100.3	106.3	106.5	100.0	2.03
Sugar percentage in roots ..	18.01	18.26	18.02	17.89	18.05	0.215

Significant response to all forms of nitrogenous fertiliser with both roots and tops. Yield of plots having the dressing with the seed is significantly greater than that of plots having the top dressing. No difference between sulphate of ammonia and nitrate of soda when applied with seed. No significant differences in sugar percentage.

Barley. South Eastern Agricultural College, Wye, Kent, 1930.

Latin Square: Plots 1/50th acre. Soil: Light chalk loam.
TREATMENTS: Salt at the rate of 88 lb. per acre and Muriate of Potash at the rate of 1 cwt. per acre.
Basal Manuring: Superphosphate at the rate of 4 cwt. per acre and Sulphate of Ammonia at the rate of 1 cwt. per acre.
Variety: Plumage Archer. Barley sown: Mar. 4th. Harvested: Aug. 12th.
Previous Crop: Barley.

Average Yield.	No Salt or Potash.	Muriate of Potash.	Salt.	Muriate of Potash & Salt	Mean.	Standard Error.
Grain, cwt. per acre	19.4	20.0	20.2	20.3	20.0	0.77
Grain, per cent.	97.3	100.1	101.2	101.5	100.0	3.88
Straw, cwt. per acre	17.4	17.4	16.6	16.7	17.0	0.71
Straw, per cent.	102.1	102.1	97.5	98.2	100.0	4.16
Nitrogen percentage in grain..	1.33	1.31	1.30	1.30	1.31	0.009

No response to the potassic or salt fertilisers. Application of salt has depressed the nitrogen percentage significantly, while muriate of potash has been without effect.