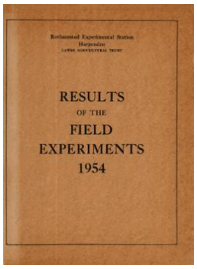
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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1954

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Rothamsted Experimental Station
Harpenden
LAWES AGRICULTURAL TRUST

RESULTS
OF THE
FIELD
EXPERIMENTS
1954

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Rothamsted Experimental Station

Harpenden

Lawes Agricultural Trust

RESULTS

of the

FIELD

EXPERIMENTS

1954

The summaries given in this report are similar to those contained in the appendices to the Annual Reports of the Station before the war. This year's report includes only experiments conducted at Rothamsted and Woburn. The design and supervision of these experiments are the responsibility of the Field Plots Committee (present members: F. Yates (Chairman), H.V. Garner (Secretary), F.C. Bawden, H.H. Mann, J.R. Moffatt, R.K. Schofield, R.G. Warren, D.J. Watson).

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*At Rothamsted unless otherwise stated.

P.T.O.

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54/A/1

WHEAT - BROADBALK 1954

The 111th year

For history, details of treatments etc. see "Results of the Field Experiments 1939-47" Vol. I, Section A/1.

Cultivations, etc.:

Cropped sections. Dung applied, ploughed all plots: Sept 16, 1953. Autumn fertilizers applied: Oct 21. Seed drilled at 3 bushels per acre: Oct 23. Spring fertilizers applied: Apr 22, 1954. Second dressing of nitrate of soda applied to plot 16: May 11. Harvested: Aug 30. Variety: Squareheads Master 13/4.

Fallow section. Ploughed: Sept 16, 1953, Dec 11 and June 17, 1954.

Summary of Results

	Grain (at 85% dry matter): cwt per acre					Straw (at 85% dry matter): cwt per acre				
Section	V	II	I	III		V	II	I	III	
Years after fallow	1	2	3	4	Mean	1	2	3	4	Mean
2A	27.6	22.7	15.7	19.0	21.3	62.3	49.0	42.9	42.3	49.1
2B	25.4	24.5	15.6	24.2	22.4	59.0	53.7	45.8	49.1	51.9
3	16.4	7.8	6.6	7.4	9.6	32.5	16.8	13.4	16.0	19.7
5	19.8	14.5	9.4	14.6	14.6	40.0	35.8	25.2	29.8	32.7
6	22.7	16.4	12.4	16.9	17.1	48.5	38.5	30.9	37.0	38.7
7	24.4	21.5	14.6	22.3	20.7	52.0	44.1	37.6	44.3	44.5
8	27.6	25.9	16.9	23.6	23.5	60.3	50.8	45.1	48.6	51.2
9	17.9	16.8	15.3	18.2	17.1	41.1	32.0	32.6	35.7	35.3
10	19.7	17.3	13.8	15.2	16.5	47.3	27.9	28.3	29.0	33.1
11	15.8	18.3	14.4	15.8	16.1	39.5	35.6	32.7	30.7	34.6
12	19.0	18.2	15.5	14.9	16.9	47.2	35.7	33.1	30.9	36.7
13	23.3	18.4	14.6	18.7	18.8	55.3	35.9	30.4	37.7	39.8
14	23.1	16.1	15.3	15.1	17.4	48.9	33.0	30.3	32.3	36.1
15	24.1	16.0	13.9	16.2	17.5	51.4	32.3	30.2	29.5	35.9
16	21.7	23.5	19.1	23.5	22.0	50.1	43.4	39.3	45.3	44.5
17	22.2	17.6	16.0	19.9	18.9	50.5	33.7	31.9	34.4	37.6
18	18.5	5.7	2.7	4.4	7.8	42.4	11.0	9.2	10.4	18.3
19	20.9	16.2	13.2	16.1	16.6	53.2	29.1	31.3	31.8	36.4
20	-	14.4	12.6	-	13.5	-	30.1	25.3	-	27.7

Mean dry matter % as harvested, Grain: 81.7
Straw: 81.9

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54/A/2

BARLEY - HOOSFIELD 1954

The 103rd year

For history, details of treatment, etc., see "Results of the Field Experiments 1939-47" Vol I, Section A/2.

Cultivations, etc.: Ploughed: Aug 11, 1953. Dung applied: Nov 24. Ploughed: Nov 25. Fertilizers applied, seed drilled at 3 bushels per acre: Apr 7, 1954. Sprayed with D.N.O.C.: June 3. Cut and discarded crop on plots 5A: July 23. Cut and discarded crop on parts of plots 1C, 2C, 1N, 2N: July 29. Cut and discarded parts of plots 3A and 4A: Aug 18. Harvested: Sept 16. Variety: Plumage Archer.

Note: Wild oats were hand pulled during July. Pre-harvest cuts were made to deal with wild oat infestations on parts of plots 1C, 2C, 1N, 2N, 5A and to remove before harvest areas of crop still green on plots 3A, 4A.

Summary of Results

Plot	Grain (at 85% dry matter) cwt per acre	Straw (at 85% dry matter) cwt per acre
1 0	10.8	10.5
2 0	12.6	10.0
3 0	8.8	8.2
4 0	11.8	11.3
5 0	8.2	7.2
1 A	10.4	11.8
2 A	17.5	16.3
3 A	15.9	16.6
4 A	18.5	18.1
5 A	Not recorded	
1 AA	14.0	18.0
2 AA	20.4	22.6
3 AA	13.3	14.3
4 AA	18.5	19.8
1 AAS	14.2	18.1
2 AAS	21.8	27.1
3 AAS	18.3	21.0
4 AAS	22.2	20.8
1 C	17.3	18.6
2 C	18.0	18.7
3 C	18.8	17.5
4 C	18.4	18.9
7 - 1	13.9	14.0
7 - 2	28.6	29.9
6 - 1	9.1	8.3
6 - 2	10.8	12.1
1 N	15.4	18.8
2 N	15.8	17.2

Mean dry matter % as harvested: Grain: 81.0. Straw: 80.9

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WHEAT AFTER FALLOW - HOOSFIELD 1954

Without manure 1851 and since

For history, details of treatments etc. see "Results of the Field Experiments 1939-47" Vol. I, Section A/3.

Cultivations, etc.:

Cropped plots. Ploughed: Sept 3, 1953. Seed drilled at 3 bushels per acre: Oct 22. Harvested: Sept 6, 1954. Variety: Squareheads Master 13/4.

Fallowed plots. Ploughed: Sept 3, 1953, Dec 3 and Sept 25, 1954.

Summary of Results

Mean yields (at 85% dry matter): cwt per acre

Plot	A1	A2	A3	
No. of years of fallow	1	1	3	Mean
Grain	10.7	10.6	12.0	11.1
Straw	18.5	17.9	20.2	18.9

Mean dry matter % as harvested, Grain: 81.1
Straw: 82.0

BARLEY - AGDELL 1954

For history, details of treatments etc., of the original experiment which terminated in 1952, see "Results of the Field Experiments 1939-47" Vol. I, Section A/4. Since 1953 the field has been cropped with barley. In 1954 plots 1 and 2 and the south ends of plots 3 and 4 received applications of ground chalk in the winter and spring. Basal nitrogen was applied and no yields were recorded.

Cultivations, etc.:

Ploughed: Sept 29, 1953. Ground chalk applied to certain areas: Jan 6, 1954 and Mar 19. Basal dressing of 2 cwt sulphate of ammonia per acre applied: Mar 19. Seed drilled at 3 bushels per acre, basal dressing of 3 cwt sulphate of ammonia per acre applied: June 18. Harvested: Oct 3. Variety: Plumage Archer.

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54/A/4.1

MANGOLDS AND SUGAR BEET - BARNFIELD 1954

The 79th and 9th years

For history, details of treatments etc, see "Results of the Field Experiments 1939-47" Vol.I, Section A/5.

Cultivations, etc.: Dung applied: Nov 16, 1953. Ploughed: Nov 21. Fertilizers applied: Apr 11, 1954. Seed drilled, Mangolds - 9 lb, Sugar beet - 18 lb per acre: Apr 15. Singled: June 19 - July 21. Sprayed with miscible D.D.T. 3 pints per acre: July 19. Top dressings applied: July 17. Lifted: Mangolds - Nov 5, Sugar beet - Nov 13. Varieties: Mangolds - Yellow Globe, Sugar beet - Klein E.

Summary of Results

Strip	Cross Dressing: 0	N	A	AC	C
		Mangolds, Roots: tons per acre			
1	8.63	20.52	21.50	19.41	20.09
2	10.06	23.17	21.43	20.06	19.38
4	1.73	(a) 12.56 (b) 10.45*	10.85	11.99	14.68
5	1.71	10.94	9.03	8.61	9.35
6	1.47	12.03	10.94	12.82	13.22
7	1.73	11.34	11.31	14.45	14.42
8	0.99	5.13	4.99	8.43	10.40
9	10.85				
		Mangolds, Leaves: tons per acre			
1	2.93	5.96	8.23	7.23	7.08
2	3.66	6.99	6.30	7.82	6.59
4	0.99	(a) 4.25 (b) 3.98*	4.25	6.28	5.74
5	0.83	3.57	3.00	3.86	3.81
6	0.84	3.76	3.74	4.23	4.23
7	0.94	3.76	4.86	6.30	6.06
8	0.66	2.64	3.52	4.27	5.08
9	4.20				
		Mangolds, Plant Number: thousands per acre			
1	18.1	22.0	20.7	19.3	21.4
2	22.0	22.8	22.2	20.9	21.9
4	20.3	(a) 21.9 (b) 23.2*	20.5	18.9	22.7
5	20.5	22.2	21.4	19.4	22.1
6	19.2	21.9	20.8	18.2	22.2
7	20.3	21.8	20.8	20.2	21.9
8	19.4	16.5	20.1	18.7	21.0
9	20.8				

*No nitrate of soda. Nitrogen applied as calcium and potassium nitrates.

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Strip	Cross Dressing 0	N	A	AC	C
	Sugar Beet, Roots (washed): tons per acre				
1	5.17	9.11	10.60	10.20	9.42
2	6.12	8.61	8.17	8.40	9.26
4	1.17	(b) 5.48*	5.91	8.81	7.23
5	1.60	5.09	5.21	6.88	5.95
6	1.00	5.09	5.75	8.82	6.88
7	1.38	5.61	5.08	7.28	6.63
8	1.22	3.38	3.96	6.13	5.73
	Sugar Beet, Tops: tons per acre				
1	5.62	13.68	19.05	14.95	13.63
2	6.94	15.39	13.34	13.38	11.38
4	1.34	(b) 8.99*	5.47	11.14	8.84
5	1.80	7.67	4.93	13.09	8.65
6	1.38	5.52	5.52	10.65	6.89
7	1.61	7.91	6.64	11.28	7.86
8	1.80	6.59	6.20	10.75	9.72
	Sugar Beet, Plant Number: thousands per acre				
1	20.4	20.1	21.5	21.5	22.4
2	22.8	22.3	22.0	19.9	21.9
4	23.5	(b) 23.6*	22.5	22.1	22.3
5	20.6	22.0	22.6	21.8	22.9
6	20.9	22.5	23.0	22.1	22.4
7	21.5	22.9	22.0	21.9	21.9
8	24.0	20.5	22.3	21.3	20.7
	Sugar Beet, Sugar Percentage				
1	16.4	16.0	15.5	16.2	16.9
2	16.5	16.1	16.2	15.0	16.0
4	16.1	(b) 15.4*	17.1	16.8	16.2
5	15.6	15.3	16.2	15.2	16.1
6	15.5	16.2	15.8	16.0	16.5
7	15.6	16.0	15.9	15.5	16.2
8	14.7	14.8	15.6	15.5	15.7

*No nitrate of soda. Nitrogen applied as calcium and potassium nitrates.

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54/A/5

HAY - THE PARK GRASS PLOTS 1954

The 99th year

For history, details of treatments etc. see "Results of the Field Experiments 1939-47" Vol.I, Section A/6.

Cultivations, etc.: Mineral fertilizers applied: Dec 15, 1953. Nitrogenous fertilizers applied: 1st dressing - Mar 10, 1954, 2nd dressing - Apr 22. Cut: 1st - June 25, 2nd - Nov 13.

Summary of Results

Yield of Hay: cwt per acre

Plot	Not limed 1st Crop	Not limed 2nd Crop	Not limed Total	Limed 1st Crop	Limed 2nd Crop	Limed Total
1	5.4	14.4	19.8	18.2	9.4	27.6
2	10.4	7.2	17.6	16.5	5.2	21.7
3	10.0	5.8	15.8	14.7	4.9	19.6
4-1	15.4	8.2	23.6	18.6	9.6	28.2
4-2	9.1	11.6	20.7	30.3	9.0	39.3
5-1	6.9	5.4	12.3			
5-2	18.4	11.8	30.2			
6	25.2	16.8	42.0			
7	23.7	19.0	42.7	31.9	17.9	49.8
8	19.1	13.5	32.6	14.6	17.1	31.7
9	7.1	28.1	35.2	41.6	19.5	61.1
10	8.2	16.6	24.8	29.3	13.9	43.2
11-1	4.8	30.2	35.0	49.0	24.0	73.0
11-2	21.9	32.5	54.4	57.7	30.2	87.9
12	10.5	12.4	22.9			
13	31.1	24.4	55.5	26.2	22.9	49.1
14	45.4	22.5	67.9	44.7	27.9	72.6
15	18.8	15.9	34.7	35.3	22.5	57.8
16	28.1	16.6	44.7	29.5	19.4	48.9
17	17.1	16.2	33.3	19.2	15.2	34.4
18	10.3	21.8	32.1	25.5*	11.5*	37.0*
				23.0+	13.5+	36.5+
19	25.5	18.8	44.3	19.9*	15.8*	35.7*
				25.8+	19.2+	45.0+
20	30.1	23.9	54.0	28.7*	19.6*	48.3*
				29.0+	18.0+	47.0+

*Heavy liming

+Light liming

Note: The second crop was carted green; hay yields were estimated from the dry matter.

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54/A/6

BARLEY - EXHAUSTION LAND HOOSFIELD 1954

For history, details of treatments etc., see "Results of the Field Experiments 1952", Section A/6.

Cultivations, etc.: Ploughed: Sept 2, 1953 and again Oct 21. Seed drilled at 3 bushels per acre, sulphate of ammonia applied: Mar 16, 1954. Harvested: Aug 28. Variety: Plumage Archer.

Summary of Results

Manuring to Potatoes 1876-1901*	Yields (at 85% dry matter): cwt per acre Grain	Straw
1 Unmanured	16.2	20.5
2 Unmanured after 6 years dung	19.0	28.3
3 Dung	29.9	32.1
4 Dung	28.7	32.9
5 Ammonium salts	20.5	22.1
6 Nitrate of soda	17.2	25.3
7 Ammonium salts and complete minerals	27.8	30.5
8 Nitrate of soda and complete minerals	27.0	34.7
9 Superphosphate	23.8	28.4
10 Complete minerals	26.6	31.0

*For certain changes see history.

Mean dry matter % as harvested, Grain: 81.4
Straw: 81.2

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WHEAT - WOBURN STACKYARD 1954

For history, details of treatments etc., see "Results of the Field Experiments 1939-47" Vol. I, Section A/7.

Cultivations, etc.: Ploughed: Sept 17, 1953. Seed drilled at 3 bushels per acre: Oct 23. Sprayed with D.N.O.C. 6 lb per acre in 80 gals.: Apr 27, 1954. Nitrochalk applied: Apr 28. Sprayed with 2; 4-D, 2 pints per acre at low volume: May 14. Harvested: Sept 8. Variety: Squareheads Master 13/4.

Summary of Results

Plot	Nitrochalk dressing cwt per acre	Grain: cwt per acre	Straw: cwt per acre
7	2	5.7	24.4
3	4	6.6	8.9
1	6	7.5	14.1
4	2	8.8	8.3
6	4	12.4	10.0
9	6	15.8	13.7
11b(1)	2	15.3	23.6
11b(2)	4	16.6	24.6
11b(3)	6	18.9	31.0
10b	2	3.3	3.5
11a	4	8.0	8.1
10a	6	6.8	11.6

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BARLEY - WOBURN STACKYARD 1954

For history, details of treatments etc., see "Results of the Field Experiments 1939-47" Vol. I, Section A/7 and Section A/8 of the 1953 "Results". In 1954 all plots were spring sown.

Cultivations, etc.: Ploughed: Sept 17, 1953. Seed drilled at 3 bushels per acre: Mar 17, 1954. Nitrochalk applied: Mar 19. Harvested: Sept 7. Variety: Plumage Archer.

Note: Due to an infestation of weeds, mainly Agrostis and Spurrey yields were not recorded on plots 7, 1, 10a, 10b, 11a. The yield of plot 3 is based on the ½ plot, 3aa + 3bb.

Summary of Results

Plot	Nitrochalk dressing cwt per acre	Grain: cwt per acre	Straw: cwt per acre
7	2	-	-
1	4	-	-
3	6	18.8	20.5
4	2	5.7	7.1
6	4	18.2	23.0
9	6	18.4	23.3
11b(2)	2	22.7	26.2
11b(3)	4	24.0	27.0
11b(1)	6	21.5	26.5
10a	2	-	-
10b	4	-	-
11a	6	-	-

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54/Ba/1.1

THREE COURSE ROTATION EXPERIMENT

3rd year of revised scheme

For details of treatments and rotation see "Results of the Field Experiments 1952", Section Ba/1.

Area of each plot: Potatoes (sub-plot) - 0.0092 acre;
Barley - 0.0200 acre; Sugar beet - 0.0204 acre.

Cultivations, etc.:

Potatoes. Straw applied, ploughed all plots: Dec 28, 1953. Fertilizers applied: Apr 8, 1954. Ridged: Apr 9. Potatoes planted: Apr 12. Earthed up: July 6. Sprayed (low volume) with copper fungicide at 5 lb powder per acre: July 27. Sprayed (low volume) with copper fungicide at ½ gallon paste per acre: Aug 23. Sprayed with 15% sulphuric acid: Sept 28. Lifted: Oct 2. Variety: Majestic.

Barley. Straw applied, ploughed all plots: Dec 28, 1953. Ground chalk applied at 22 cwt per acre: Jan 5, 1954. Fertilizers applied, seed drilled at 3 bushels per acre: Mar 15. Harvested: Aug 26. Variety: Plumage Archer.

Sugar beet. Straw applied, ploughed all plots: Dec 28, 1953. Fertilizers applied: Mar 29, 1954. Seed drilled at 18 lb per acre: Apr 5. Sprayed (at low volume) with D.D.T. emulsion at ½ lb per acre: May 12. Singled: June 1. Sprayed again as above: June 24. Lifted: Nov 16. Variety: Klein E.

Treatment symbols

Ar Complete artificials only
St1 Straw ploughed in in autumn, artificials applied in spring
St2 Straw ploughed in in autumn, artificials applied half in autumn, half in spring
Ad Adco ploughed in in autumn with supplementary artificials
St $53\frac{1}{3}$ cwt cut straw in autumn
Nitrogen dressing: 0.2; 0.4; 0.6 cwt N as sulphate of ammonia
K_s Muriate of potash equivalent to K_2O in straw
K 0.5 cwt K_2O as muriate of potash.

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Summary of Results

Potatoes

Treatments applied			1953 / 1954	0		0.4N		St + 0.2N		St + 0.6N		K_s		K_s + 0.4N	
				-	K	-	K	-	K	-	K	-	K	-	K
1950	1951	1952 & 1954													
				Total tubers: tons per acre											
	Ar		0			4.92	5.98								
			0.4N	6.15	6.24										
Ar			0			4.18	5.62								
			0.4N	5.19	6.72										
	St1 St2		0			5.19	5.38			6.63	5.52			4.66	7.25
			0.4N	6.43	5.76			5.91	6.24			7.30	7.20		
St1 St2			0			4.37	4.47								
			0.4N	4.75	5.57										
			St+ 0.2N			7.68	7.44								
			St+ 0.6N	7.54	8.55										
			K_s			6.00	5.67								
			K_s+0.4N	5.57	7.15										
	Ad		0			5.47	6.82			7.68	5.28			4.95	6.10
Ad			0.4N	4.23	7.30										
			St+ 0.6N	5.38	5.52										
			K_s+0.4N	6.24	7.30										

54/Ba/1.2

Potatoes

Treatments applied		1953 / 1954	0		0.4N		St + 0.2N		St + 0.6N		K_s		K_s + 0.4N	
			-	K	-	K	-	K	-	K	-	K	-	K
1950	1951	1952 & 1954												
						Percentage Ware								
	Ar	0			76.8	79.4								
		0.4N	82.4	86.8										
Ar		0			72.3	76.8								
		0.4N	78.8	84.4										
	St1 St2	0			82.8	81.7			83.0	82.2			78.5	82.4
		0.4N	85.2	81.1			82.3	81.8			74.1	79.0		
St1 St2		0			77.1	82.7								
		0.4N	80.0	72.2										
		St+ 0.2N			79.9	83.0								
		St+ 0.6N	81.7	86.1										
		K_s			84.0	79.4								
		K_s+0.4N	82.0	84.2										
	Ad	0			80.7	81.7			87.3	78.8			86.4	80.1
Ad		0.4N	76.8	84.4										
		St+ 0.6N	80.3	82.7										
		K_s+0.4N	84.9	86.5										

54/Ba/1.3

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54/Ba/1.4

Barley

Treatments applied		1953	0	0.4N	St + 0.2N	St + 0.6N	K_s	K_s+ 0.4N
1950	1951	1952 & 1954						
Grain: cwt per acre								
	Ar	0		30.1				
		0.4N	29.9					
Ar		0		30.8				
		0.4N	30.5					
	St1 St2	0		24.3		30.5		28.3
		0.4N	34.7		31.4		34.3	
St1 St2		0		29.9				
		0.4N	30.7					
		St + 0.2N		23.5				
		St + 0.6N	33.0					
		K_s		28.5				
		K_s + 0.4N	34.3					
	Ad	0		28.9		27.0		32.6
Ad		0.4N	32.0					
		St + 0.6N	29.7					
		K_s + 0.4N	35.3					
Straw: cwt per acre								
	Ar	0		33.5				
		0.4N	41.8					
Ar		0		35.1				
		0.4N	40.2					
	St1 St2	0		27.6		42.0		32.8
		0.4N	42.7		43.6		39.6	
St1 St2		0		43.8				
		0.4N	34.3					
		St + 0.2N		26.5				
		St + 0.6N	44.6					
		K_s		31.8				
		K_s + 0.4N	44.1					
	Ad	0		33.5		30.9		34.9
Ad		0.4N	43.2					
		St + 0.6N	37.7					
		K_s + 0.4N	43.9					

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Sugar Beet

Treatments applied 1953			0	0.4N	St + 0.2N	St + 0.6N	K_s	K_s + 0.4N
1950	1951	1952 & 1954						
Roots (washed): tons per acre								
	Ar	0		7.90				
		0.4N	8.90					
Ar		0		6.46				
		0.4N	9.42					
	St1 St2	0		7.40		8.21		8.23
		0.4N	9.45		9.32		10.30	
St1 St2		0		8.29				
		0.4N	9.93					
		St+ 0.2N		8.75				
		St+ 0.6N	9.78					
		K_s		8.29				
		K_s+0.4N	10.93					
	Ad	0		7.77		6.66		8.07
Ad		0.4N	8.95					
		St+ 0.6N	9.65					
		K_s+0.4N	8.34					
Sugar Percentage								
	Ar	0		17.00				
		0.4N	17.08					
Ar		0		17.51				
		0.4N	17.25					
	St1 St2	0		16.82		17.48		17.08
		0.4N	17.19		17.22		17.34	
St1 St2		0		17.14				
		0.4N	17.08					
		St+ 0.2N		17.19				
		St+ 0.6N	17.16					
		K_s		16.88				
		K_s+0.4N	17.16					
	Ad	0		16.85		17.14		17.44
Ad		0.4N	16.93					
		St + 0.6N	17.77					
		K_s+0.4N	17.14					

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Sugar Beet

Treatments applied		1953	0	0.4N	St + 0.2N	St + 0.6N	K_s	K_s + 0.4N
1950	1951	1952 & 1954						
Total sugar: cwt per acre								
	Ar	0		26.8				
		0.4N	30.4					
Ar		0		22.6				
		0.4N	32.5					
	St1 St2	0		24.9		28.7		28.1
		0.4N	32.5		32.1		35.7	
St1 St2		0		28.4				
		0.4N	33.9					
		St +0.2N		30.1				
		St +0.6N	33.6					
		K_s		28.0				
		K_s +0.4N	37.5					
	Ad	0		26.2		22.8		28.2
Ad		0.4N	30.3					
		St+ 0.6N	34.3					
		K_s+0.4N	28.6					
Tops: tons per acre								
	Ar	0		8.28				
		0.4N	8.90					
Ar		0		6.07				
		0.4N	10.14					
	St1 St2	0		6.70		7.14		7.46
		0.4N	7.51		7.81		8.71	
St1 St2		0		9.62				
		0.4N	10.61					
		St + 0.2N		8.47				
		St + 0.6N	10.72					
		K_s		7.22				
		K_s+0.4N	13.33					
	Ad	0		6.35		9.47		7.59
Ad		0.4N	9.76					
		St + 0.6N	8.47					
		K_s+0.4N	6.72					

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Sugar Beet

Treatments applied		1953	0	0.4N	St + 0.2N	St + 0.6N	K_s	K_s + 0.4N
1950	1951	1952 & 1954						
			Plant number: thousands per acre					
	Ar	0		27.1				
		0.4N	27.4					
Ar		0		27.0				
		0.4N	27.0					
	St1 St2	0		27.2		27.9		27.0
		0.4N	25.8		26.8		27.6	
St1 St2		0		27.7				
		0.4N	26.7					
		St + 0.2N		26.6				
		St + 0.6N	27.4					
		K_s		27.1				
		K_s+0.4N	27.5					
	Ad	0		26.3		27.6		26.6
Ad		0.4N	26.5					
		St + 0.6N	26.2					
		K_s+0.4N	27.0					
			Noxious nitrogen:mg per 100g.					
	Ar	0		20.0				
		0.4N	15.0					
Ar		0		15.0				
		0.4N	17.5					
	St1 St2	0		15.0		20.0		15.0
		0.4N	15.0		15.0		15.0	
St1 St2		0		20.0				
		0.4N	15.0					
		St + 0.2N		20.0				
		St + 0.6N	25.0					
		K_s		15.0				
		K_s +0.4N	20.0					
	Ad	0		15.0		15.0		15.0
Ad		0.4N	20.0					
		St + 0.6N	15.0					
		K_s+0.4N	15.0					

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FOUR COURSE ROTATION EXPERIMENT

The 25th year

Direct and residual effects of organic manures and phosphatic fertilizers - Hoosfield 1954.

For details of treatments and rotation see "Results of the Field Experiments 1939-47" Vol.I, Section Ba/3.

Area of each plot: Potatoes (whole plot): 0.0228 acre. Barley, ryegrass and wheat: 0.0244 acre.

Manures (cwt per acre) applied 1953-54

	Organic manures and phosphates				Supplementary fertilizers		
Treatment	Organic matter	N	P_2O_5	K_2O	N as Sulph. of amm.	P_2O_5 as Super	K_2O as Mur. of potash
Dung (a)	50	1.236	0.534	2.331	0.564	0.666	0.669
Dung (b)	50	1.189	0.514	2.406	0.611	0.686	0.594
Adco	50	1.302	0.754	0.822	0.498	0.446	2.178
Straw (a)	167	0.533	0.100	0.550	1.267	1.100	2.450
Straw (b)	167	0.833	0.250	1.250	0.967	0.950	1.750
Super			1.2		0.36*		0.6*
Rock phosphate			1.2		0.36*		0.6*

Dung and straw: (a) applied to wheat and ryegrass; (b) to barley and potatoes.

*Yearly dressings totalling to the standard rates in the 5 year period.

Cultivations, etc.:

Potatoes.

Ploughed: Sept 2, 1953. Dung and adco applied: Nov 26. Straw, first dressing of fertilizers to straw plot and supplementary fertilizers to dung and adco plots applied, all plots ploughed: Nov 30. Second dressing of fertilizers to straw plot applied: Jan 18, 1954. Ridged, spring fertilizers including third dressing to straw plot and sulphate of ammonia to half plots applied, potatoes planted: Apr 20. Earthed up: July 21. Sprayed with copper fungicide, ½ gallon paste in 10 gals. water per acre: July 27. Sprayed with copper fungicide, 5 lb per acre: Aug 18. Sprayed with sulphuric acid, 15% B.O.V. 100 gallons per acre: Sept 28. Lifted: Oct 9. Variety: Majestic.

Barley.

Dung and adco applied: Nov 26, 1953. Straw, first dressing of fertilizers to straw plot and supplementary fertilizers to dung and adco plots applied, all plots ploughed: Dec 1. Ground chalk applied at 21 cwt per acre: Dec 5. Second dressing of fertilizer to straw plot: Jan 18, 1954. Spring fertilizers

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including third dressing to straw plot applied: Mar 12. Seed drilled at 3 bushels per acre: Mar 15. Harvested: Aug 27. Variety: Plumage Archer.

Ryegrass.

Dung and adco with supplementary fertilizers, straw with first dressing of fertilizers applied, all plots ploughed: Sept 23, 1953. Autumn fertilizers applied: Oct 8. Seed sown at 112 lb per acre: Oct 9. Second dressing of fertilizers to straw plot applied: Jan 18, 1954. Sulphate of ammonia, and third dressing of fertilizers to straw plot applied: Apr 29. Harvested: June 29. Variety: Western Wolths.

Wheat.

Dung and adco with supplementary fertilizers, straw with first dressing of fertilizers applied, all plots ploughed: Sept 23, 1953. Autumn fertilizers applied: Oct 9. Seed drilled at 3 bushels per acre: Oct 22. Second dressing of fertilizers to straw plot applied: Jan 18, 1954. Sulphate of ammonia and third dressing of fertilizers to straw plot applied: May 1. Harvested: Sept 6. Variety: Squareheads Master 13/4.

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Summary of Results

Manure[+]	Year of Cycle	Potatoes: Total tubers, tons per acre — Additional N: Without	With	Mean	Response to N	Potatoes: Percentage Ware — Additional N: Without	With	Mean	Response to N	Barley: Grain cwt per acre	Barley: Straw* cwt per acre	Ryegrass: Dry matter cwt per acre	Wheat: Grain* cwt per acre	Wheat: Straw* cwt per acre
Dung	I	5.02	5.81	5.42	+0.79	78.6	74.3	76.4	-4.3	32.2	43.3	36.9	28.0	42.2
	II	4.77	5.46	5.12	+0.69	86.0	78.1	82.0	-7.9	19.2	24.7	13.1	17.3	27.5
	III	4.24	4.32	4.28	+0.08	73.8	77.4	75.6	+3.6	24.8	27.9	21.0	16.6	21.6
	IV	3.45	4.80	4.12	+1.35	78.3	73.3	75.8	-5.0	15.0	18.4	13.0	16.5	20.6
	V	3.24	4.06	3.65	+0.82	76.9	81.7	79.3	+4.8	17.0	20.0	17.3	18.9	29.1
Adco (Straw compost)	I	4.17	5.07	4.62	+0.90	76.8	83.6	80.2	+6.8	28.9	32.9	32.2	27.0	41.1
	II	2.78	3.51	3.14	+0.73	69.5	72.0	70.8	+2.5	25.7	33.8	20.7	15.4	18.9
	III	2.29	2.78	2.54	+0.49	69.5	78.5	74.0	+9.0	22.1	28.7	17.4	16.8	20.6
	IV	2.53	2.36	2.44	-0.17	72.9	74.7	73.8	+1.8	20.8	24.9	13.1	18.0	26.4
	V	3.21	3.24	3.22	+0.03	69.7	77.6	73.6	+7.9	20.6	22.8	16.7	18.3	21.4
Straw	I	4.58	5.48	5.03	+0.90	76.7	76.2	76.4	-0.5	26.0	32.3	46.6	29.4	50.9
	II	2.86	4.06	3.46	+1.20	74.0	83.4	78.7	+9.4	20.0	25.5	11.9	13.2	15.3
	III	3.73	4.82	4.28	+1.09	74.1	85.5	79.8	+11.4	23.5	28.1	20.0	17.8	23.2
	IV	3.65	4.02	3.84	+0.37	78.8	77.4	78.1	-1.4	20.5	23.5	13.6	15.3	20.3
	V	5.46	5.40	5.43	-0.06	77.0	82.5	79.8	+5.5	20.0	24.4	17.1	15.5	18.4
Super-phosphate	I	4.36	5.56	4.96	+1.20	78.1	76.1	77.1	-2.0	23.0	29.9	25.7	20.2	26.3
	II	3.62	3.53	3.58	-0.09	78.2	74.3	76.2	-3.9	24.8	27.7	28.7	21.8	29.0
	III	4.24	2.70	3.47	-1.54	72.6	74.8	73.7	+2.2	25.4	29.9	28.4	22.3	30.3
	IV	3.54	4.11	3.82	+0.57	80.5	79.9	80.2	-0.6	23.8	27.0	30.7	18.2	24.7
	V	3.43	3.99	3.71	+0.56	74.0	82.1	78.0	+8.1	24.8	28.5	26.4	21.8	28.6
Rock phosphate	I	1.70	2.18	1.94	+0.48	62.4	67.6	65.0	+5.2	25.9	28.7	34.0	24.3	32.6
	II	2.14	2.66	2.40	+0.52	76.1	73.7	74.9	-2.4	23.2	32.1	24.9	22.3	31.1
	III	2.41	2.51	2.46	+0.10	79.5	70.0	74.8	-9.5	25.9	31.7	27.2	19.6	29.5
	IV	1.92	1.95	1.94	+0.03	70.1	69.5	69.8	-0.6	26.1	32.2	25.7	20.3	26.2
	V	2.33	1.83	2.08	-0.50	76.3	65.8	71.0	-10.5	24.9	31.1	23.4	22.8	31.6
										Mean Dry Matter %	82.5	74.7	79.5	75.6

54/Ba/2.3

*At 85% Dry Matter

[+]Note: All manures are supplemented by fertilizers as shown in table on page 54/Ba/2.1

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54/Ba/3.1

SIX COURSE ROTATION EXPERIMENT

The 25th year

Seasonal effects of fertilizers - Rothamsted Long Hoos IV and Woburn Stackyard 1954.

For details of treatments, rotation etc., see "Results of the Field Experiments 1939-47" Vol.I, Section Ba/4.

Area of each plot: Rothamsted - 0.0250 acre. Woburn - 0.0266 acre.

Cultivations, etc.:

Rothamsted

Sugar beet.
Ploughed: Aug 21, 1953, Oct 20 and Dec 1. Fertilizers applied: Mar 26, 1954. Seed drilled at 18 lb per acre: Mar 30. Singled: May 31. Lifted: Nov 17. Variety: Klein E.

Barley.
Ploughed: Nov 27, 1953. Ground chalk applied at 22 cwt per acre: Dec 4. Fertilizers applied, seed drilled at 3 bushels per acre: Mar 15, 1954. Harvested: Aug 25. Variety: Plumage Archer.

Clover.
Seed undersown in barley at 40 lb per acre: Apr 23, 1953. Autumn fertilizers applied: Nov 2. Sulphate of ammonia applied: Apr 30, 1954. Cut: July 13. Variety: Late flowering Montgomery Red.

Wheat.
Ploughed: July 10, 1953 and again Sept 17. Autumn fertilizers applied: Oct 9. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30, 1954. Harvested: Aug 26. Variety: Yeoman.

Potatoes.
Ploughed: Aug 29, 1953, Oct 20 and Nov 30. Ridged: Apr 13, 1954. Fertilizers applied, potatoes planted: Apr 14. Earthed up: July 6. Sprayed (low volume) with copper fungicide paste ½ gallon per acre: July 27 and again Aug 18. Sprayed with sulphuric acid 15% B.O.V: Sept 28. Lifted: Oct 2. Variety: Majestic.

Rye.
Ploughed: Sept 30, 1953. Ground chalk applied at 22 cwt per acre: Oct 3. Autumn fertilizers applied: Oct 10. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30,1954. Harvested: Aug 25. Variety: King II.

Note:- Clover: 6 plots were carted off in error when green. No summary of results can be shown.

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Woburn

Sugar beet.
Ploughed: Aug 20, 1953, Nov 3 and Jan 20, 1954. Fertilizers applied: Mar 29. Seed drilled at 18 lb per acre: Mar 30. Dusted with D.D.T: May 12. Singled: May 31. Sprayed with parathion ½ pint per acre: June 21. Lifted: Nov 2. Variety: Klein E. Previous crop: Rye. N.B. The crop was attacked by flea beetle and mangold fly.

Barley.
Ploughed: Nov 4, 1953. 2nd ploughing: Jan 20, 1954. Fertilizers applied: Mar 11. Seed drilled at 2½ bushels per acre: Mar 17. Harvested: Aug 28. Variety: Plumage Archer. Previous crop: Sugar beet.

Clover.
Seed undersown in barley at 40 lb per acre: Mar 26, 1953. Autumn fertilizers applied: Oct 23. Sulphate of ammonia applied: Apr 27, 1954. Cut: June 30. Variety: Montgomery Red. Previous crop: Barley. N.B. The crop was damaged by Sclerotinia and was very weedy.

Wheat.
Ploughed: July 3, 1953. 2nd ploughing: Sept 16. Autumn fertilizers applied: Oct 22. Drilled at 2½ bushels per acre: Oct 23. Sprayed with D.N.O.C. at 6 lb per acre in 80 gallons: Apr 27. Sulphate of ammonia applied: Apr 29. Harvested: Sept 7. Variety: Squareheads Master 13/4. Previous crop: Clover. N.B. The crop was very weedy.

Potatoes.
Ploughed: Sept 15, 1953, Nov 3 and Jan 20, 1954. Ridged, fertilizers applied, seed planted: Apr 18. Sprayed with copper fungicide: July 30. Sprayed with 15% sulphuric acid: Sept 23. Lifted: Oct 8. Variety: Majestic. Previous crop: Wheat.

Rye.
Ploughed: Oct 1, 1953. Autumn fertilizer applied, drilled seed at 2½ bushels per acre: Oct 22. Sulphate of ammonia applied: Apr 29. Harvested: Aug 28. Variety: King II. Previous crop: Potatoes.

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54/Ba/3.3

Summary of Results

Mean yields per acre and responses in yield per cwt of N, P_2O_5 and K_2O

		Rothamsted	Woburn	Rothamsted	Woburn
		Sugar Beet, roots (washed): tons per acre		Barley, grain: cwt per acre	
Mean		8.55	4.57	31.7	29.1
Response to:	N	+2.88	+1.14	+4.6	+25.6
	P	+3.05	+4.46	+0.4	-1.9
	K	-0.08	-0.07	-1.2	-1.0
		Sugar Beet, sugar percentage		Barley, straw: cwt per acre*	
Mean		16.30	16.29	36.0	29.9
Response to:	N	+0.22	+0.56	+12.8	+40.3
	P	-1.21	+1.03	+1.1	-7.1
	K	+0.28	+0.58	-1.9	+2.8
		Sugar Beet, total sugar: cwt per acre		Clover, hay: dry matter cwt per acre	
Mean		27.9	14.9		37.6
Response to:	N	+9.9	+4.2		-29.0
	P	+8.1	+15.7		+11.3
	K	+0.2	+0.2		+8.6
		Sugar Beet, tops: tons per acre		Wheat, grain: cwt per acre	
Mean		10.93	4.88	26.5	14.8
Response to:	N	+5.88	+0.69	+8.0	+19.3
	P	+1.93	+5.21	-10.7	-9.6
	K	+0.02	-0.55	+5.2	+10.1
		Sugar Beet, plant number: thousands per acre		Wheat, straw: cwt per acre	
Mean		26.0		48.2	18.6
Response to:	N	-1.1	†	+22.1	+22.7
	P	+3.1		-2.1	-9.8
	K	+1.7		-0.8	+12.7
		Potatoes, total tubers: tons per acre		Rye, grain: cwt per acre	
Mean		6.08	4.21	32.8	26.4
Response to:	N	+3.07	+4.49	+32.2	+24.6
	P	+0.57	+1.39	-3.7	+3.3
	K	+1.32	+0.30	+0.1	-1.1
		Potatoes, percentage ware		Rye, straw: cwt per acre	
Mean		78.9	80.5	40.2	30.9
Response to:	N	-10.7	+10.8	+23.6	+23.5
	P	-10.7	+6.6	-3.9	+8.9
	K	+6.5	+12.7	+2.0	-0.5

* corrected to 85% Dry Matter. Mean Dry Matter %: 83.6 † not recorded.

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54/Bb/1.1

DEEP CULTIVATION ROTATION EXPERIMENT

The 11th year

Deep ploughing, fertilizers and dung - Long Hoos I and II 1954.

For details of rotation and treatments etc. see "Results of the Field Experiments 1939-47" Vol. I, Section Bc/1.

Area of each plot: 0.0312 acre. Area harvested: Sugar beet (half plot), 0.0119 acre; barley, wheat, spring oats, 0.0265 acre; ley, 0.0275 acre; potatoes (half plot), 0.0107 acre.

Cultivations, etc.:

Sugar beet (Series 4)

Dung and fertilizers for ploughing in "deep" applied: Sept 25, 1953. "Deep" plots ploughed: Sept 29. Dung and fertilizers for ploughing in "shallow" applied, "shallow" plots ploughed: Sept 30. Fertilizers for surface application applied: Mar 29, 1954. Seed drilled at 18 lb per acre: Mar 30. Sprayed with DDT oil emulsion (15% DDT) at 3 pints per acre: May 12 and again June 24. Singled: June 3. Lifted: Nov 25. Variety: Klein E.

Barley (Series 5)

Ploughed: Dec 16, 1953. Ground chalk at 21 cwt per acre applied: Dec 21. Basic slag and sulphate of ammonia applied: Mar 12, 1954. Seed drilled at 2¾ bushels per acre: Mar 13. Harvested: Aug 27. Variety: Plumage Archer.

Ley (Series 1)

Seeds undersown in barley: Apr 23, 1953. Cut: July 23, 1954. Seeds mixture (per acre): 18 lb S.24 perennial ryegrass, 8 lb Montgomery red clover, 2 lb American Alsike clover.

Wheat (Series 6)

"Deep" and "shallow" plots ploughed: Sept 30, 1953. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30, 1954. Sprayed with MCPA, 2 pints per acre at medium volume: May 27. Harvested: Aug 27. Variety: Yeoman.

Potatoes (Series 2)

Dung and fertilizers for ploughing in "deep" applied: Sept 24, 1953. "Deep" plots ploughed: Sept 25. Dung and fertilizers for ploughing in "shallow" applied, "shallow" plots ploughed: Sept 26. Ridged: Apr 13, 1954. Fertilizers for surface application applied, potatoes planted: Apr 14. Earthed up: July 5. Sprayed with copper fungicide, ½ gallon paste in 10 gallons water per acre: July 27 and again Aug 18. Sprayed with sulphuric acid, 15% BOV: Sept 28. Lifted: Oct 25. Variety: Majestic.

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Spring oats (Series 3)
Ploughed: Sept 28, 1953. Ground chalk at 21 cwt per acre applied: Dec 4. Sulphate of ammonia applied: Mar 12, 1954. Seed drilled at 4 bushels per acre: Mar 13. Harvested: Aug 27. Variety: Star.

Standard errors per plot:

Sugar beet,	Total sugar.	Whole plot:	3.08 cwt per acre or 8.2% (4 d.f.)
		Sub plot:	2.88 cwt per acre or 7.7% (7 d.f.)
	Tops.	Whole plot:	0.658 tons per acre or 6.0% (4 d.f.)
		Sub plot:	2.50 tons per acre or 22.6% (7 d.f.)
Barley,	Grain:		1.82 cwt per acre or 5.5% (4 d.f.)
Ley,	Hay:		5.31 cwt per acre or 6.4% (4 d.f.)
Wheat,	Grain:		2.34 cwt per acre or 6.1% (4 d.f.)
Potatoes,	Total tubers,	Whole plot:	0.919 tons per acre or 10.6% (4 d.f.)
		Sub plot:	0.991 tons per acre or 11.4% (7 d.f.)
Spring Oats,	Grain:		3.82 cwt per acre or 11.0% (4 d.f.)

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Summary of Results

Series 4: Sugar Beet

Responses to treatments

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Roots (washed): Mean yield 11.16 tons per acre									
Ploughing deep-shallow	-0.31	-	-	+0.05	-0.67	-1.05	+0.43	-0.03	-0.59
Dung	+1.48	+1.84	+1.12	-	-	+0.76	+2.20	+2.19	+0.77
Phosphate	+0.68	-0.06	+1.42	-0.04	+1.40	-	-	+0.02	+1.34
Potash	+0.67	+0.95	+0.39	+1.38	-0.04	+0.01	+1.33	-	-
Sugar Percentage: Mean 16.85									
Ploughing deep-shallow	-0.25	-	-	+0.14	-0.64	-0.29	-0.21	-0.31	-0.19
Dung	-0.29	+0.10	-0.68	-	-	-0.24	-0.34	-0.04	-0.54
Phosphate	+0.04	0.00	+0.08	+0.09	-0.01	-	-	+0.35	-0.27
Potash	-0.02	-0.08	+0.04	+0.23	-0.27	+0.29	-0.33	-	-
Total Sugar: Mean yield 37.6 cwt per acre									
	(±1.54)					(±2.18)			
Ploughing deep-shallow	-1.6	-	-	+0.6	-3.8	-4.1	+0.9	-0.8	-2.4
Dung	+4.4	+6.6	+2.2	-	-	+2.1	+6.7	+7.4	+1.4
Phosphate	+2.3	-0.2	+4.8	0.0	+4.6	-	-	+0.7	+3.9
Potash	+2.2	+3.0	+1.4	+5.2	-0.8	+0.6	+3.8	-	-
Tops: Mean yield 11.03 tons per acre									
	(±0.329)					(±0.465)			
Ploughing deep-shallow	+0.92	-	-	+0.57	+1.27	+1.17	+0.67	+0.05	+1.79
Dung	+1.18	+0.83	+1.53	-	-	+0.99	+1.37	-0.05	+2.41
Phosphate	-0.27	-0.02	-0.52	-0.46	-0.08	-	-	-0.72	+0.18
Potash	-0.19	-1.06	+0.68	-1.42	+1.04	-0.64	+0.26	-	-
Plant Number: Mean 27.1 thousands per acre									
Ploughing deep-shallow	-0.3	-	-	0.0	-0.6	0.0	-0.6	+0.3	-0.9
Dung	-0.4	-0.1	-0.7	-	-	-0.1	-0.7	-0.4	-0.4
Phosphate	+0.2	+0.5	-0.1	+0.5	-0.1	-	-	+0.2	+0.2
Potash	-0.1	+0.5	-0.7	-0.1	-0.1	-0.1	-0.1	-	-
Noxious Nitrogen: Mean 33.1 mg. per 100 g.									
Ploughing deep-shallow	+5.0	-	-	+5.0	+5.0	+6.2	+3.8	+5.6	+4.4
Dung	0.0	0.0	0.0	-	-	-2.5	+2.5	+1.9	-1.9
Phosphate	+1.2	+2.4	0.0	-1.3	+3.7	-	-	-0.7	+3.1
Potash	-5.6	-5.0	-6.2	-3.7	-7.5	-7.5	-3.7	-	-

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Series 4: Sugar Beet

	Phosphate			Potash			
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	Mean
Roots (washed): tons per acre							
Shallow	11.34	11.43	11.12	10.84	11.37	12.20	11.31
Deep	10.29	12.39	11.04	10.81	11.20	11.21	11.00
No dung	10.44	10.70	10.09	9.72	11.11	11.10	10.42
Dung	11.20	13.13	12.07	11.92	11.45	12.31	11.90
Mean	10.82	11.91	11.08	10.82	11.28	11.71	11.16
Sugar Percentage							
Shallow	16.97	17.03	16.92	17.01	17.02	16.84	16.97
Deep	16.68	16.65	16.87	16.70	16.68	16.80	16.72
No dung	16.95	17.10	16.98	16.88	17.13	17.08	16.99
Dung	16.71	16.58	16.81	16.84	16.57	16.56	16.70
Mean	16.83	16.84	16.90	16.86	16.85	16.82	16.85
Total Sugar: cwt per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	38.4	39.0	37.5	36.9	38.7	41.0	38.3
Deep	34.4	41.1	37.2	36.1	37.2	37.7	36.8
No dung	35.4	36.6	34.1	32.8	38.0	37.8	35.4
Dung	37.5	43.5	40.6	40.2	37.9	40.8	39.8
Mean	36.4	40.0	37.4	36.5	38.0	39.3	37.6
Tops: tons per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	10.58	9.84	11.28	11.10	9.54	10.55	10.57
Deep	11.75	11.07	11.41	11.15	11.87	11.80	11.50
No dung	10.67	9.22	11.22	11.15	9.25	10.22	10.44
Dung	11.66	11.69	11.48	11.10	12.17	12.13	11.62
Mean	11.17	10.45	11.35	11.13	10.71	11.17	11.03
Plant Number: thousands per acre							
Shallow	27.1	27.5	27.5	27.0	27.5	27.6	27.3
Deep	27.0	27.1	26.7	27.3	26.6	26.6	27.0
No dung	27.1	27.5	27.6	27.3	27.1	27.5	27.3
Dung	27.0	27.1	26.6	27.0	27.0	26.7	26.9
Mean	27.0	27.3	27.1	27.2	27.1	27.1	27.1

	Total Sugar	Tops	
(a)	±1.54	±0.329	for use in comparisons other than horizontal
(b)	±1.44	±1.248	for use in horizontal comparisons
(c)	±1.85	±0.942	as (a).

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Series 4: Sugar Beet

	Phosphate			Potash			
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	Mean
Noxious Nitrogen: mg. per 100 mg.							
Shallow	29.4	27.5	36.2	33.1	26.2	30.0	30.6
Deep	35.6	35.0	36.2	38.3	32.5	32.5	35.6
No dung	33.8	26.2	38.8	35.0	27.5	35.0	33.1
Dung	31.2	36.2	33.8	36.9	31.2	27.5	33.1
Mean	32.5	31.2	36.2	35.9	29.4	31.2	33.1

Responses to treatments to previous Sugar Beet

Series 5: Barley

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 33.1 cwt per acre									
Ploughing	(±0.91)				(±1.29)				
deep-shallow	+0.2	-	-	+0.9	-0.5	-0.7	+1.1	+0.5	-0.1
Dung	+2.5	+3.2	+1.8	-	-	+2.4	+2.6	+2.6	+2.4
Phosphate	+0.4	-0.5	+1.3	+0.3	+0.5	-	-	+0.1	+0.7
Potash	+0.8	+1.1	+0.5	+0.9	+0.7	+0.5	+1.1	-	-
Straw: Mean yield 38.0 cwt per acre									
Ploughing									
deep-shallow	+1.1	-	-	+1.6	+0.6	+1.4	+0.8	+3.3	-1.1
Dung	+6.6	+7.1	+6.1	-	-	+6.0	+7.2	+6.1	+7.1
Phosphate	+1.1	+1.4	+0.8	+0.5	+1.7	-	-	+0.7	+1.5
Potash	+2.2	+4.4	0.0	+1.7	+2.7	+1.8	+2.6	-	-

Series 1: Ley

Hay: Mean yield 33.2 cwt per acre									
Ploughing	(±2.66)				(±3.76)				
deep-shallow	+1.9	-	-	+5.6	-1.8	-1.0	+4.8	+1.9	+1.9
Dung	+3.6	+7.3	-0.1	-	-	+3.4	+3.8	+7.7	-0.5
Phosphate	+3.4	+0.5	+6.3	+3.2	+3.6	-	-	+6.4	+0.4
Potash	+2.1	+2.1	+2.1	+6.2	-2.0	+5.1	-0.9	-	-

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Series 6: Wheat*

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 38.4 cwt per acre									
	(±1.17)				(±1.66)				
Ploughing deep-shallow	+2.1	-	-	+0.8	+3.4	+4.8	-0.6	+1.7	+2.5
Dung	+5.6	+4.3	+6.9	-	-	+5.7	+5.5	+3.6	+2.6
Phosphate	-1.4	+1.3	-4.1	-1.3	+1.5	-	-	-2.1	-0.7
Potash	+1.7	+1.3	+2.1	+4.7	-1.3	+1.0	+2.4	-	-
Straw: Mean yield 51.4 cwt per acre									
Ploughing deep-shallow	+2.7	-	-	+2.6	+2.8	+4.7	+0.7	+4.9	+0.5
Dung	+8.3	+8.2	+8.4	-	-	+9.7	+6.9	+11.4	+5.2
Phosphate	+0.3	+2.3	-1.7	+1.7	-1.1	-	-	+1.1	-0.5
Potash	-0.4	+1.8	-2.6	+2.7	-3.5	+0.4	-1.2	-	-

Series 2: Potatoes

Total tubers: Mean yield 8.70 tons per acre									
	(±0.459)				(±0.650)				
Ploughing deep-shallow	-1.11	-	-	-0.86	-1.36	-0.76	-1.46	-0.42	-1.80
Dung	+2.45	+2.70	+2.20	-	-	+3.35	+1.55	+3.36	+1.54
Phosphate	+0.62	+0.97	+0.27	+1.52	-0.28	-	-	+1.31	-0.07
Potash	+1.79	+2.48	+1.10	+2.70	+0.88	+2.48	+1.10	-	-
Percentage Ware ($1\frac{1}{2}$" riddle): Mean 84.1									
Ploughing deep-shallow	-1.0	-	-	+0.2	-2.2	+2.9	-4.9	+0.1	-2.1
Dung	+0.8	+2.0	-0.4	-	-	+2.8	-1.2	+1.9	-0.3
Phosphate	-3.2	+0.7	-7.1	-1.2	-5.2	-	-	-0.8	-5.6
Potash	+3.5	+4.6	+2.4	+4.6	+2.4	+5.9	+1.1	-	-

*Cultivation treatments direct to wheat, manures to previous sugar beet.

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Series 2: Potatoes

	Phosphate			Potash			
	None	Ploughed in	In ridges	None	Ploughed in	In ridges	Mean
	Total tubers: tons per acre						
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	8.78	9.45	10.03	8.02	10.39	10.60	9.26
Deep	8.01	8.52	8.05	7.60	8.67	8.73	8.15
No dung	6.72	7.75	8.73	6.13	8.48	9.18	7.48
Dung	10.07	10.22	9.35	9.49	10.58	10.15	9.93
Mean	8.40	8.99	9.04	7.81	9.53	9.67	8.70
	Percentage Ware ($1\frac{1}{2}$" riddle)						
Shallow	84.2	84.4	85.4	82.3	86.9	86.9	84.6
Deep	87.1	81.0	79.0	82.4	85.8	83.7	83.6
No dung	84.3	83.2	82.9	81.4	85.1	86.8	83.7
Dung	87.0	82.3	81.5	83.3	87.6	83.7	84.5
Mean	85.7	82.7	82.2	82.3	86.4	85.3	84.1

Responses to treatments to previous potatoes

Series 3: Spring Oats

Response to	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
	Grain: Mean yield 34.8 cwt per acre								
	(±1.91)				(±2.70)				
Ploughing deep-shallow	-2.0	-	-	-1.2	-2 8	-3.2	-0.8	-3.2	-0.8
Dung	+1.9	+2.7	+1.1	-	-	+0.6	+3.2	-0.3	+4.1
Phosphate	+2.1	+0.9	+3.3	+0.8	+3.4	-	-	+2.6	+1.6
Potash	-0.5	-1.7	+0.7	-2.7	+1.7	0.0	-1.0	-	-
	Straw: Mean yield 47.2 cwt per acre								
Ploughing deep-shallow	-1.7	-	-	-2.0	-1.4	-3.8	+0.4	-2.6	-0.8
Dung	+4.3	+4.0	+4.6	-	-	+4.2	+4.4	+3.7	+4.9
Phosphate	+0.3	-1.8	+2.4	+0.2	+0.4	-	-	+2.7	-2.1
Potash	-0.5	-1.4	+0.4	-1.1	+0.1	+1.9	-2.9	-	-

Total tubers
(a) ±0.459 for use in comparisons other than horizontal.
(b) ±0.495 for use in horizontal comparisons.
(c) ±0.578 as (a).

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LEY AND ARABLE ROTATIONS

Highfield and Fosters Field 1954 - the 6th year.

For details of treatments, rotations, etc., see "Results of the Field Experiments 1952", Section Bc/1.

Cultivations, etc.:

HIGHFIELD

1st year Treatment Crops

Cut grass, Grazed ley, Lucerne, Hay. Ploughed: Aug 31 and for leys again, Oct 3, 1953. Basal fertilizer applied: Hay plots - Dec 2, remainder - Apr 7, 1954.

Cut grass: Nitrochalk applied, seeds sown at 38 lb per acre: Apr 7, 1954. Cut: 4 times - June 21, July 21, Aug 11, Oct 11. Nitrochalk applied after each cut except the last.
Grazed ley: Nitrochalk applied, seeds sown at 55 lb per acre: Apr 7. Nitrochalk applied: June 28. Grazed: 9 circuits, June 13-Oct 20.
Lucerne: Seed drilled at 28 lb per acre: Apr 9. Cut twice: Aug 11 and Nov 18. Variety: Du Puits.
Hay: Undersown seeds failed. Resown at 38 lb per acre: Sept 18, 1953. Nitrochalk applied: Apr 2, 1954. Cut: June 22.

2nd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Potatoes. Basal fertilizer to leys applied: Dec 2, 1953.

Cut grass: Nitrochalk applied: Apr 2, 1954 and after each cut except the last. Cut: 5 times, May 20, June 21, July 22, Aug 17, Oct 11.
Grazed ley: Nitrochalk applied: Apr 6 and July 7. Grazed: 10 circuits, Apr 13 - Oct 20.
Lucerne: Cut: 3 times, June 23, Aug 11, Nov 18.
Potatoes: For cultivations see Potato Test Crop.

3rd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Barley. Basal fertilizer to leys applied: Dec 2, 1953.

Cut grass: Nitrochalk applied: Apr 2, 1954 and after each cut except the last. Cut: 5 times, May 20, June 21, July 23, Aug 17, Oct 8.
Grazed ley: Nitrochalk applied: Apr 2 and June 28. Grazed: 10 circuits, Apr 17 - Oct 20.
Lucerne: Cut: 3 times, June 22, Aug 11, Oct 8.
Barley: For cultivations see Barley Test Crop.

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1st Test Crop, Wheat

Ploughed after barley: Aug 31 and again Oct 3, 1953. Ploughed leys: Oct 16. Seed drilled at 3 bushels per acre with basal fertilizer: Oct 22. Nitrochalk applied: Apr 27, 1954. Combine harvested: Sept 2 and 7. Variety: Yeoman.

2nd Test Crop, Potatoes

Ploughed: Aug 24 and again Oct 26, 1953. Ridged, basal fertilizers applied: Apr 20, 1954. Dung and sulphate of ammonia applied, potatoes planted: Apr 22. Earthed up: July 9. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons per acre: July 28 and again Aug 23. Sprayed with 20% sulphuric acid: Sept 30. Lifted: Oct 26. Variety: Majestic.

3rd Test Crop, Barley

Ploughed: Oct 3, 1953. Ground chalk applied to blocks 2 and 3: Dec 3. Seed drilled at 2 bushels per acre with basal fertilizer, nitrochalk applied: Mar 17, 1954. Combine harvested: Sept 3. Variety: Proctor. Note. Crop yields were not taken owing to the condition of the crop after being laid since early July.

Permanent Grasses

4th year Reseeded. Permanent grass, Blocks 9-12.
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied: Apr 7, 1954 and July 7. Grazed: 8 circuits, Apr 21 - Oct 28.

5th year Reseeded. Permanent grass, Blocks 5-8.
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied: Apr 6 and June 28. Reseeded, grazed: 9 circuits, Apr 13 - Oct 28.
Permanent, grazed: 8 circuits, Apr 13 - Oct 20.

6th year Reseeded. Permanent grass, Blocks 1-4.
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied: Apr 2. Cut: June 22. Nitrochalk applied: June 25. Grazed: 4 circuits, July 16 - Oct 28.

FOSTERS

1st year Treatment Crops

Cut grass, Grazed ley, Lucerne, Hay. Ploughed (not hay plots): Aug 20, 1953 and again Sept 24. Basal fertilizer applied: Hay plots - Dec 1, remainder - Apr 7.

Cut grass: Nitrochalk applied, seeds sown at 38 lb per acre: Apr 7, 1954. Cut: 4 times, June 29, July 20, Aug 13, Oct 11. Nitrochalk applied after each cut except the last.
Grazed ley: Nitrochalk applied, seeds sown at 55 lb per acre: Apr 7. Nitrochalk applied: June 29. Grazed: 7 circuits, May 7 - Oct 21.
Lucerne: Seed drilled at 28 lb per acre: Apr 9. Cut twice: Aug 16, Nov 18. Variety: Du Puits.
Hay: Seeds undersown in barley at 38 lb per acre: May 4, 1953. Nitrochalk applied: Apr 1, 1954. Cut: June 23.

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2nd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Potatoes. Basal fertilizers to leys applied: Dec 1, 1953.

Cut grass: Nitrochalk applied: Apr 1, 1954 and after each cut except the last. Cut: 5 times, May 21, June 21, July 20, Aug 16, Oct 11.
Grazed ley: Nitrochalk applied: Apr 5 and July 9. Grazed: 10 circuits, May 7 - Oct 21.
Lucerne: Cut: 3 times, June 23, Aug 16, Nov 18.
Potatoes: For cultivations see Potato Test Crop.

3rd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Barley. Basal fertilizer to leys applied: Dec 1, 1953.

Cut grass: Nitrochalk applied: Apr 1, 1954 and after each cut except the last. Cut: 5 times, May 21, June 21, July 20, Aug16, Oct 8.
Grazed ley: Nitrochalk applied: Apr 5 and June 29. Grazed: 8 circuits, May 7 - Oct 21.
Lucerne: Cut: 3 times, June 24, Aug 16, Oct 8.
Barley: For cultivations see Barley Test Crop.

1st Test Crop, Wheat

Ploughed after barley: Aug 20, 1953 and again Sept 29. Ploughed leys: Oct 17. Seed drilled at 3 bushels per acre with basal fertilizer: Oct 22. Nitrochalk applied: Apr 28, 1954. Combine harvested: Sept 1. Variety: Yeoman.

2nd Test Crop, Potatoes

Ploughed: Aug 21, 1953 and again Oct 24. Ridged, basal fertilizers applied: Apr 20, 1954. Dung and sulphate of ammonia applied, potatoes planted: Apr 21. Earthed up: July 6. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons: July 28 and again Aug 23. Sprayed with 15% sulphuric acid: Sept 29. Lifted: Oct 9 and Oct 16. Variety: Majestic.

3rd Test Crop, Barley

Ploughed: Oct 2, 1953. Nitrochalk applied: Mar 16, 1954. Seed sown at 2 bushels per acre with basal fertilizer: Mar 17. Combine harvested: Sept 2. Variety: Proctor.

Permanent grasses

4th year reseeded grass

Basal fertilizer applied: Dec 1, 1953. Nitrochalk applied: Apr 7, 1954 and July 9. Grazed: 7 circuits, May 7 - Oct 21.

5th year reseeded grass

Basal fertilizer applied: Dec 1, 1953. Nitrochalk applied: Apr 5, 1954 and June 29. Grazed: 7 circuits, May 7 - Oct 21.

6th year reseeded grass

Basal fertilizer applied: Dec 2, 1953. Nitrochalk applied: Apr 1, 1954. Cut: June 23. Nitrochalk applied: June 25. Grazed: 4 circuits, July 25 - Oct 21.

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Standard errors per ¼ plot. Test crops.

Wheat, grain (at 85% dry matter).	Highfield:	2.48 cwt per acre or 8.9% (13 d.f.)
	Fosters:	1.82 cwt per acre or 5.2% (13 d.f.)
Potatoes, total tubers.	Highfield:	1.073 tons per acre or 10.1% (15 d.f.)
	Fosters:	0.876 tons per acre or 8.6% (15 d.f.)
Barley, grain (at 85% dry matter).	Highfield:	Crop failed
	Fosters:	1.87 cwt per acre or 4.2% (15 d.f.)

Summary of Results

Wheat 1st test crop
Previous rotation 1951, 1952, 1953

cwt N per acre	Lucerne	Ley	Cut Grass	Arable with hay	Mean
Grain (at 85% Dry Matter): cwt per acre					
Highfield					
Mean	28.6	32.7	22.7	27.9	28.0
To test crop					
0.3	29.5	34.8	24.8	28.6	29.4
0.6	27.8	30.6	20.6	27.1	26.5
Difference (±1.75)	-1.7	-4.2	-4.2	-1.5	-2.9 (±0.88)
To treatment crops					
Single rate		35.5	25.7	24.8	28.7
Double rate		29.9	19.7	30.9	26.8
Difference (±1.75)		-5.6	-6.0	+6.1	-1.9 (±1.01)
Fosters					
Mean	37.4	39.5	38.2	24.7	35.0
To test crop					
0.3	36.0	37.6	38.4	23.9	34.0
0.6	38.7	41.5	38.0	25.6	36.0
Difference (±1.28)	+2.7	+3.9	-0.4	+1.7	+2.0 (±0.64)
To treatment crops					
Single rate		39.4	39.1	22.3	33.6
Double rate		39.7	37.4	27.1	34.7
Difference (±1.28)		+0.3	-1.7	+4.8	+1.1 (±0.74)

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Wheat 1st test crop

cwt N per acre	Excluding Lucerne: N to previous treatment crop: Single rate	Excluding Lucerne: N to previous treatment crop: Double rate	Excluding Lucerne: Mean	Arable with hay only: Dung: tons per acre to potatoes 1952: None	Arable with hay only: Dung: tons per acre to potatoes 1952: 12	Arable with hay only: Mean
Grain (at 85% Dry Matter): cwt per acre						
Highfield						
To test crop	(±1.01)		(±0.71)	(±1.75)		(±1.24)
0.3	30.6	28.2	29.4	29.2	28.0	28.6
0.6	26.8	25.4	26.1	22.6	31.7	27.1
Mean	28.7	26.8	27.8	25.9	29.9	27.9
	(±0.71)			(±1.24)		
To previous treatment crops				(±1.75)		(±1.24)
Single rate				25.8	23.9	24.8
Double rate				26.0	35.8	30.9
Mean				25.9	29.9	27.9
				(±1.24)		
Fosters						
To test crop	(±0.74)		(±0.52)	(±1.28)		(±0.91)
0.3	32.7	33.9	33.3	24.0	23.8	23.9
0.6	34.5	35.5	35.0	28.1	23.1	25.6
Mean	33.6	34.7	34.2	26.1	23.4	24.7
	(±0.52)			(±0.91)		
To previous treatment crops				(±1.28)		(±0.91)
Single rate				25.0	19.7	22.3
Double rate				27.1	27.1	27.1
Mean				26.1	23.4	24.7
				(±0.91)		

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Wheat 1st test crop

cwt N per acre	Previous rotation 1951, 1952, 1953 Lucerne	Ley	Cut Grass	Arable with hay	Mean
Straw (at 85% Dry Matter): cwt per acre					
Highfield					
Mean	48.1	45.9	32.8	43.8	42.7
To test crop					
0.3	47.3	44.0	34.1	46.4	42.9
0.6	49.0	47.8	31.5	41.2	42.4
Difference	+1.7	+3.8	-2.6	-5.2	-0.5
To treatment crops					
Single rate		53.7	35.6	45.5	45.0
Double rate		38.1	29.9	42.1	36.7
Difference		-15.6	-5.7	-3.4	-8.3
Fosters					
Mean	61.6	55.9	50.6	47.9	54.0
To test crop					
0.3	61.2	53.0	48.9	43.7	51.7
0.6	62.1	58.8	52.3	52.2	56.3
Difference	+0.9	+5.8	+3.4	+8.5	+4.6
To treatment crops					
Single rate		56.9	51.2	46.8	51.6
Double rate		54.9	50.1	49.1	51.4
Difference		-2.0	-1.1	+2.3	-0.2

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Wheat 1st test crop

cwt N per acre	Excluding Lucerne: N to previous treatment crop: Single rate	Excluding Lucerne: N to previous treatment crop: Double rate	Excluding Lucerne: Mean	Arable with hay only: Dung: tons per acre to potatoes 1952: None	Arable with hay only: Dung: tons per acre to potatoes 1952: 12	Arable with hay only: Mean
Straw (at 85% Dry Matter): cwt per acre						
Highfield						
To test crop						
0.3	46.0	37.0	41.5	46.2	46.7	46.4
0.6	43.9	36.5	40.2	41.5	40.9	41.2
Mean	45.0	36.7	40.8	43.8	43.8	43.8
To previous treatment crops						
Single rate				46.9	44.2	45.5
Double rate				40.8	43.4	42.1
Mean				43.8	43.8	43.8
Fosters						
To test crop						
0.3	49.1	48.0	48.5	40.5	46.9	43.7
0.6	54.1	54.7	54.4	51.6	52.7	52.2
Mean	51.6	51.4	51.5	46.0	49.8	47.9
To previous treatment crops						
Single rate				45.6	47.9	46.8
Double rate				46.5	51.7	49.1
Mean				46.0	49.8	47.9

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Potatoes 2nd test crop. Total tubers: tons per acre

	Previous rotation 1950, 1951, 1952				
	Lucerne	Ley	Cut Grass	Arable with hay	Mean
Highfield					
N: cwt per acre					
0.5	9.88	10.90	10.42	10.41	10.40
1.0	11.04	11.15	10.41	10.94	10.89
Difference (±0.759)	+1.16	+0.25	-0.01	+0.53	+0.49 (±0.379)
Dung: tons per acre					
None	8.89	9.18	8.87	8.59	8.88
12	12.03	12.88	11.95	12.76	12.40
Difference (±0.759)	+3.14	+3.70	+3.08	+4.17	+3.52 (±0.379)
Mean	10.46	11.03	10.41	10.68	10.64
Fosters					
N: cwt per acre					
0.5	9.58	9.63	9.22	10.17	9.65
1.0	10.82	10.73	9.80	11.52	10.72
Difference (±0.619)	+1.24	+1.10	+0.58	+1.35	+1.07 (±0.310)
Dung: tons per acre					
None	7.59	9.23	7.74	9.75	8.58
12	12.81	11.12	11.28	11.95	11.79
Difference (±0.619)	+5.22	+1.89	+3.54	+2.20	+3.21 (±0.310)
Mean	10.20	10.18	9.51	10.85	10.18

	Highfield N: cwt per acre		Fosters N: cwt per acre	
	0.5	1.0	0.5	1.0
	(±0.379)		(±0.310)	
Dung: tons per acre				
None	8.63	9.14	7.99	9.17
12	12.18	12.63	11.31	12.27

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Potatoes 2nd test crop. Percentage ware

	Previous rotation 1950, 1951, 1952				
	Lucerne	Ley	Cut Grass	Arable with hay	Mean
Highfield					
N: cwt per acre					
0.5	82.6	81.2	81.0	82.1	81.7
1.0	84.4	81.2	77.8	82.8	81.6
Difference	+1.8	0.0	-3.2	+0.7	-0.1
Dung; tons per acre					
None	79.3	79.6	80.0	78.9	79.5
12	87.6	82.8	78.7	86.0	83.8
Difference	+8.3	+3.2	-1.3	+7.1	+4.3
Mean	83.5	81.2	79.4	82.5	81.6
Fosters					
N: cwt per acre					
0.5	83.6	83.2	84.3	84.5	83.9
1.0	84.4	78.5	83.0	86.4	83.1
Difference	+0.8	-4.7	-1.3	+1.9	-0.8
Dung: tons per acre					
None	82.7	80.1	82.8	84.8	82.6
12	85.4	81.6	84.5	86.1	84.4
Difference	+2.7	+1.5	+1.7	+1.3	+1.8
Mean	84.0	80.9	83.6	85.5	83.5

	Highfield N: cwt per acre		Fosters N: cwt per acre	
	0.5	1.0	0.5	1.0
Dung: tons per acre				
None	79.3	79.6	83.1	82.1
12	84.1	83.5	84.7	84.1

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Barley 3rd test crop. Grain (at 85% Dry Matter): cwt per acre

	Previous rotation 1949, 1950, 1951				
	Lucerne	Ley	Cut Grass	Arable with hay	Mean
			Fosters		
N: cwt per acre					
0.2	46.6	43.5	44.4	44.3	44.7
0.4	44.8	44.5	44.7	45.2	44.8
Difference (±1.32)	-1.8	+1.0	+0.3	+0.9	+0.1 (±0.66)
Dung to potatoes 1953: tons per acre					
None	45.8	43.9	44.7	44.6	44.8
12	45.7	44.1	44.4	44.9	44.7
Difference (±1.32)	-0.1	+0.2	-0.3	+0.3	-0.1 (±0.66)
Mean	45.7	44.0	44.6	44.7	44.8

	Fosters	
	N: cwt per acre	
	0.2	0.4
	(±0.66)	
Dung to Potatoes 1953: tons per acre		
None	44.7	44.8
12	44.7	44.8

Note: Highfield: No yields of grain and straw recorded.
Fosters: No straw yields recorded.

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Treatment crops Arable and Hay rotation

(values based on Mean of 2 sub plots only)

	Highfield N: cwt per acre applied in 1954			Fosters N: cwt per acre applied in 1954		
	Single rate	Double rate	Mean	Single rate	Double rate	Mean
Hay (dry matter): cwt per acre						
No dung	59.1	68.8	63.9	55.1	65.8	60.5
Dung in 1952	62.4	62.3	62.4	58.0	64.5	61.3
Mean	60.7	65.6	63.1	56.6	65.2	60.9
Potatoes, total tubers: tons per acre						
No dung	8.03	8.61	8.32	9.25	10.85	10.05
Dung in 1954	12.11	12.42	12.27	10.59	11.77	11.18
Mean	10.07	10.51	10.29	9.92	11.31	10.61
Potatoes, percentage ware						
No dung	77.8	81.0	79.4	82.6	84.4	83.5
Dung in 1954	79.6	83.1	81.4	88.1	85.6	86.8
Mean	78.7	82.1	80.4	85.4	85.0	85.2
Barley, grain (at 85% dry matter): cwt per acre						
No dung	No yields of grain recorded			41.6	44.2	42.9
Dung in 1953				43.6	43.3	43.4
Mean				42.6	43.8	43.2
	No yields of straw recorded			No yields of straw recorded		

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Cut grass. Dry Matter: cwt per acre

1st year	Highfield N: to previous 3 test crops Single rate	Highfield N: to previous 3 test crops Double rate	Highfield Dung to potatoes 1952 tons per acre None	Highfield Dung to potatoes 1952 tons per acre 12	Highfield Mean	Fosters N: to previous 3 test crops Single rate	Fosters N: to previous 3 test crops Double rate	Fosters Dung to potatoes 1952 tons per acre None	Fosters Dung to potatoes 1952 tons per acre 12	Fosters Mean
N(1) to cut grass										
Single rate	77.4	80.7	77.8	80.3	79.1	60.6	60.0	63.5	57.1	60.3
Double rate	81.6	89.4	89.0	82.1	85.5	73.9	76.4	73.6	76.7	75.1
N to test crops										
Single rate			80.1	78.9	79.5			67.2	67.3	67.3
Double rate			86.6	83.5	85.0			69.8	66.6	68.2
Mean			83.4	81.2	82.3			68.5	66.9	67.7

	Highfield N to cut grass (1) Single rate	Highfield N to cut grass (1) Double rate	Highfield Mean	Fosters N to cut grass (1) Single rate	Fosters N to cut grass (1) Double rate	Fosters Mean
2nd year (5 cuts)	59.1	75.3	67.2	71.1	76.6	73.8
3rd year (5 cuts)	57.5	72.7	65.1	65.5	74.4	70.0

(1) 0.15 v. 0.3 cwt N as Nitrochalk for every cut.

Lucerne. Dry Matter: cwt per acre

1st year (2 cuts)	Highfield N to 3 previous test crops Single rate	Highfield N to 3 previous test crops Double rate	Highfield Mean	Fosters N to 3 previous test crops Single rate	Fosters N to 3 previous test crops Double rate	Fosters Mean
Dung to potatoes 1952						
None	62.0	58.4	60.2	56.3	56.9	56.6
12 tons	57.6	57.3	57.4	56.3	60.6	58.4
Mean	59.8	57.9	58.8	56.3	58.7	57.5

	Highfield	Fosters
2nd year (3 cuts)	Mean 103.8	Mean 97.5
3rd year (3 cuts)	Mean 100.0	Mean 94.4

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54/Bc/1.13

Grazed Ley. Dry Matter: cwt per acre (estimated from sampling cuts)

	Highfield N: cwt per acre (yearly)			Fosters N: cwt per acre (yearly)		
	Single rate 0.15	Double rate 0.30	Mean	Single rate 0.15	Double rate 0.30	Mean
1st year	40.8	45.9	43.3	31.2	30.4	30.8
2nd year	39.2	52.2	45.7	40.5	53.4	46.9
3rd year	43.6	48.9	46.2	33.5	36.7	35.1

Reseeded Grass. Dry Matter: cwt per acre

	Cut for hay N			Grazed Estimated from sampling cuts N		
	Single rate	Double rate	Mean	Single rate	Double rate	Mean
Highfield						
4th year, grazing				49.9	47.6	48.7
5th year, grazing				42.5	45.7	44.1
6th year, hay	55.4	55.5	55.5	17.2*	21.2*	19.2*
Fosters						
4th year, grazing				41.4	41.6	41.5
5th year, grazing				44.1	43.3	43.7
6th year, hay	46.8	51.8	49.3	20.0*	20.4*	20.2*

Permanent Grass. Dry Matter: cwt per acre

Highfield						
Grazing, Blocks 9-12				40.0	39.9	39.9
Grazing, Blocks 5-8				36.6	36.6	36.6
Hay, Blocks 1-4	44.8	47.1	45.9	19.7*	20.7*	20.2*

*Aftermath grazing.

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54/Bd/1.1

GREEN MANURING EXPERIMENT

Woburn Stackyard - 1954, the 1st year of revised scheme

Original scheme: Details are given in "Results of the Field Experiments 1939-47", Vol I, Section Be/1. In 1950 the fallow, lupins and rye-grass plots were split for early and late planting of cabbages. The original scheme ended with the harvesting of barley in 1953 and the cabbages in 1953-4.

Revised scheme: From 1954 onwards the rotation is: early potatoes, barley. As before each of these two crops is grown in every year on one of two randomized blocks of 40 plots each. The green manuring crops are grown according to the following scheme which is repeated every two years:

1st main crop	Early Potatoes	Early Potatoes	Early Potatoes	Early Potatoes	Early Potatoes
Green manure	-	Ryegrass	Ryegrass	Trefoil	Trefoil
2nd main crop and green manure	Barley -	Barley undersown with Ryegrass	Barley -	Barley undersown with Trefoil	Barley -

8 plots of each block are allocated to each of these sequences. Half the plots of each group carrying ryegrass or trefoil after early potatoes are ploughed in autumn and the remainder are ploughed in the spring before the barley seedbed is prepared. The undersown green manures are ploughed in after February 1st for early potatoes.

In addition chaffed barley straw at the rate of 30 cwt per acre is applied after harvesting the barley to the plots receiving straw in the original scheme. Two levels of nitrogen are tested on each of the two main crops.

0.23 v. 0.46 cwt N per acre as nitrochalk to barley
0.6 v. 1.2 cwt N per acre as nitrochalk to potatoes

the higher level in each case being applied to the same plots.

The fallow plots of the original scheme remain fallow between each main crop in the revised scheme. The new green manuring treatments are superimposed on the plots carrying the original treatments in such a way that one comparison of the latter (lupins and rape v. clover and ryegrass) can be examined for possible residual effects. Residual effects of the original dung treatment, now discontinued, can also be determined, but any residual effects of the nitrogen treatments applied prior to 1954 have been eliminated by randomization. The green manuring and subsidiary treatments are arranged on the 32 non-fallow plots of each block in a quarter replicate with identities:

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I ≡ (D) SPUGN ≡ (D)(X)UN ≡ S(X)PG

where (D) = (residual) dung.
(X) = (residual) rape and lupins v. clover and ryegrass.
S = straw.
P = time of ploughing green manures after early potatoes.
U = green manures undersown (in addition to those sown after early potatoes).
G = trefoil v. ryegrass.
N = nitrogen levels to both crops.

Basal dressing: Early potatoes, 0.75 cwt P_2O_5, 1.5 cwt K_2O per acre as granular compound fertilizer, broadcast on the flat before machine planting. Barley and green manures, nil.

Varieties: Early potatoes: Ulster Chieftain
Barley: Herta
Trefoil: English
Ryegrass: English Leafy Italian.

Plot area: 0.0395 acre.

Transition Period:
The barley of 1954 received two levels of nitrogen and was undersown according to the new scheme.

The early potatoes of 1954 received two levels of nitrogen according to the new scheme. It is not possible to make full comparisons of the old treatments in either of these crops. A full analysis of the new scheme will first be possible in 1955.

Cultivations, etc.:
Green manures: Clover and ryegrass undersown in barley: Apr 24, 1953.
Barley: Ploughed: Mar 5, 1954. Ground chalk applied: Mar 11. Nitrochalk applied: Mar 16. Seed drilled at 3 bushels per acre: Mar 17. Trefoil and Italian ryegrass undersown: Apr 27. Harvested: Aug 30. Variety: Herta.
Early potatoes: Ploughed (except for green manured plots): Aug 21, 1953, Oct 2, Dec 2, and Mar 1, 1954. Ploughed (all plots): Mar 10. Nitrochalk and basal fertilizers applied: Mar 24. Potatoes mechanically planted: Mar 26. Earthed up: June 15 and again June 25. Lifted: July 28. Variety: Ulster Chieftain.

Standard errors per plot:
Early potatoes, Total tubers: 0.973 tons per acre or 21.8% (22 d.f.)
Barley, Grain: 3.01 cwt per acre or 7.8% (18 d.f.)

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Summary of Results

Early potatoes, total tubers: tons per acre

N in 1954: cwt per acre	Green manures and treatments to cabbages 1952							Mean
	Fallow	Clover* + Rye-grass*	Lupins + Rape	Dung: tons per acre None	Dung: tons per acre 10	Straw: tons per acre None	Straw: tons per acre 1½	
	(±0.486)	(±0.344)		(±0.308)				(±0.217)
0.6	3.69	4.22	4.19	3.24	4.96	4.03	4.17	4.10
1.2	4.37	4.82	4.65	4.02	5.30	4.32	5.00	4.66
Mean	4.03 (±0.344)	4.52	4.42 (±0.243)	3.63	5.13 (±0.217)	4.18	4.59	4.38

*Also undersown in barley 1953.

Barley, grain: cwt per acre

N in 1954: cwt per acre	Green manures and treatments to cabbages 1953							Mean
	Fallow	Clover + Rye-grass	Lupins + Rape	Dung: tons per acre None	Dung: tons per acre 10	Straw: tons per acre None	Straw: tons per acre 1½	
	(±1.50)	(±1.06)		(±0.95)				(±0.67)
0.23	32.2	36.9	35.5	33.5	37.2	35.6	35.1	35.4
0.46	36.8	40.3	41.7	40.2	40.1	40.5	39.8	40.1
Mean	34.5 (±1.06)	38.6	38.6 (±0.75)	36.8	38.7 (±0.67)	38.1	37.5	37.8

Excluding fallow plots

N in 1954: cwt per acre	Undersown in barley 1954			Mean
	None	Trefoil	Ryegrass	
	(±1.06)	(±1.50)		(±0.75)
0.23	36.0	36.9	35.8	36.2
0.46	40.0	41.7	42.1	41.0
Mean	38.0 (±0.75)	39.3	39.0 (±1.06)	38.6

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Barley, straw: cwt per acre

N in 1954: cwt per acre	Green manures and treatments to cabbages 1953							Mean
	Fallow	Clover + Rye-grass	Lupins + Rape	Dung: tons per acre None	10	Straw: tons per acre None	1½	
0.23	31.5	34.6	33.3	30.2	36.7	33.5	33.4	33.5
0.46	35.8	39.3	39.4	37.6	39.7	38.0	39.3	38.6
Mean	33.7	37.0	36.3	33.9	38.2	35.8	36.3	36.1

Excluding fallow plots

N in 1954: cwt per acre	Undersown in barley 1954			Mean
	None	Trefoil	Ryegrass	
0.23	34.0	36.9	31.0	33.9
0.46	38.7	40.2	39.7	39.4
Mean	36.4	38.5	35.3	36.6

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54/Be/1.1

LEY AND ARABLE ROTATIONS

Woburn Stackyard - 1954 the 17th year.

For details of rotations and treatments etc., see "Results of the Field Experiments 1939-47", Vol.I, Section Bf/1 with the following exceptions:-
In 1949 and subsequently Rye replaced Wheat.
In 1954 the Seeds Hay plots were split into two after the first crop, for testing 0.15 v. 0.30 cwt N per acre applied as nitro-chalk.

Cultivations, etc.:

Treatment crops

Ley rotations

Ley 1st year. Ploughed twice: Sept 16 and Dec 30, 1953. Basal fertilizers applied: Apr 5, 1954. Seeds mixture hand sown: Apr 7. Nitrochalk applied: July 16. Grazed 7 times: June 17-21, July 7-15, July 24-Aug 1, Aug 11-21, Sept 8-17, Sept 25-Oct 1, Oct 19-27. Seeds mixture per acre: 21 lb S23 Perennial Ryegrass, 12 lb S143 Cocksfoot, 6 lb Late flowering Montgomery Red Clover, 3 lb S100 White Clover.

Ley 2nd year. Nitrochalk applied: May 25 and July 26. Grazed 9 times: May 17-25, June 8-17, June 21-29, July 15-24, Aug 1-11, Aug 21-30 Sept 17-25, Oct 3-11, Oct 27-Nov 4.

Ley 3rd year. Nitrochalk applied: May 25 and July 21. Grazed 5 times: May 13-17, May 31-June 8, June 29-July 7, Aug 30-Sept 8, Oct 11-19.

Lucerne 1st year. Ploughed twice: Sept 16 and Dec 30, 1953. Basal fertilizers applied: Apr 2, 1954. Seeds sown at 28 lb per acre: Apr 7. Dusted with 2% DDT: Apr 8. Cut twice: Aug 11 and Nov 3. Variety: Du Puits.

Lucerne 2nd year. Cut three times: June 24, Aug 11, Nov 3.

Lucerne 3rd year. Cut three times: June 24, Aug 11, Nov 3.

Arable rotations

Potatoes 1st course. Ploughed: Sept 16 and again Dec 30, 1953. Ridged, basal fertilizers applied: Apr 2, 1954. Potatoes planted with dropper: Apr 6. Earthed up: June 25. Sprayed with copper fungicide, 5 lb per acre: July 30, Aug 16 and Aug 27. Sprayed with sulphuric acid: Sept 23. Lifted: Oct 4. Variety: Majestic.

Rye 2nd course. Ploughed: Oct 1, 1953. Seed drilled at 3 bushels per acre: Oct 22. Nitrochalk applied: Apr 29, 1954. Seeds hay mixture undersown on 4 plots: May 7. Harvested: Aug 23.

Seeds Hay 3rd course. Seeds undersown in Rye: Apr 9, 1953. Basal nitrochalk applied: Apr 6, 1954. 1st cut: June 24. Nitrochalk applied: June 30. 2nd cut: Nov 3. Seeds mixture per acre: 27 lb S24 Perennial Ryegrass, 12 lb Montgomery Red Clover, 3 lb Canadian Alsike Clover.

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Sugar beet 3rd course. Ploughed: Aug 21 and again Nov 5, 1953. Basal nitrate of soda applied: Mar 29, 1954. Seed drilled at 18 lb per acre: Mar 30. Dusted with DDT: May 12. Singled: May 28. Sprayed with systemic insecticide ½ pint per acre, high volume: June 21. Lifted: Nov 2. Variety: Klein E.

Test Crops.

Potatoes 1st test crop. Ploughed: Nov 4, 1953. Ridged, dung applied: Apr 7, 1954. Basal fertilizers applied, potatoes hand planted: Apr 8. Earthed up: June 25. Sprayed with copper fungicide, 5 lb per acre: July 30, Aug 16 and Aug 27. Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 4. Variety: Majestic.

Barley 2nd test crop. Ploughed: Oct 2 and again Dec 30, 1953. Ground chalk applied: Mar 8, 1954. Nitrochalk applied: Mar 11. Seed drilled at 3 bushels per acre: Mar 17. Harvested: Aug 28. Variety: Plumage Archer.

Standard errors per plot, Test crops:

Potatoes, Total tubers, whole plot: 0.797 tons per acre or 7.3% (4 d.f.)

sub plot: 0.881 tons per acre or 8.1% (4 d.f.)

Barley, Grain, whole plot: 2.50 cwt per acre or 7.8% (4 d.f.)

sub plot: 2.12 cwt per acre or 6.7% (4 d.f.)

Summary of Results

Treatment crops

Ley, Sheep days of grazing per acre

1st year	2nd year	3rd year
1817	2616	1018

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Treatment crops

Lucerne, yield of hay (at 85% D.M.): cwt per acre

	1st crop	2nd crop	3rd crop	Total
1st year				
No dung	18.7	11.4		30.1
Dung in 1952	26.1	14.1		40.2
Increase	7.4	2.7		10.1
Previous Rotation				
Lucerne	20.9	12.3		33.2
Arable with Hay	23.9	13.2		37.1
Mean	22.4	12.8		35.2
2nd year				
No dung	38.0	24.0	9.0	71.0
Dung in 1951	44.3	25.8	11.8	81.9
Increase	6.3	1.8	2.8	10.9
Previous Rotation				
Lucerne	38.8	24.3	9.6	72.7
Arable with Sugar beet	43.5	25.5	11.2	80.2
Mean	41.2	24.9	10.4	76.5
3rd year				
No dung	32.5	18.9	6.4	57.8
Dung in 1950	39.2	24.9	11.0	75.1
Increase	6.7	6.0	4.6	17.3
Previous Rotation				
Lucerne	35.4	23.7	9.4	68.5
Arable with Hay	36.3	20.1	8.0	64.4
Mean	35.8	21.9	8.7	66.4

	Potatoes		Rye	
	Total tubers: tons per acre	Percentage ware	Grain: cwt per acre	Straw: cwt per acre
No dung	8.52	85.3	32.0	33.5
Dung*	11.71	88.3	35.3	37.9
Increase	3.19	3.0	3.3	4.4
Previous Rotation				
Ley	11.84	91.3	33.7	34.8
Lucerne	10.00	87.9	36.7	38.1
Arable with Hay	9.48	83.5	34.5	35.6
Arable with Sugar beet	9.13	84.4	29.8	34.3
Mean	10.12	86.8	33.7	35.7

*Dung applied: Potatoes:- 1952 Rye:- 1951.

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Treatment crops

	Hay Yield (at 85% D.M.): cwt per acre			
	1st crop	2nd crop	Total	2nd crop Response to N
No dung	39.4	2.7	42.1	0.5
Dung in 1950	40.5	4.9	45.4	2.0
Increase	1.1	2.2	3.3	1.5
Previous Rotation				
Lucerne	39.8	4.4	44.2	1.0
Arable with Hay	40.1	3.2	43.3	1.5
Mean	40.0	3.8	43.8	1.2

	Sugar Beet			
	Roots (washed): tons per acre	Sugar percentage	Total sugar: cwt per acre	Tops: tons per acre
No dung	9.06	17.0	30.9	8.06
Dung in 1950	10.18	17.0	34.7	8.44
Increase	1.12	0.0	3.8	0.38
Previous Rotation				
Ley	10.46	17.0	35.6	9.06
Arable with Sugar beet	8.78	17.1	30.0	7.44
Mean	9.62	17.0	32.8	8.25

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Test Crops

		Previous Rotation				
		Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
Potatoes, Total tubers: tons per acre						
No dung	(±0.715)*	11.90	8.90	8.34	5.78	8.73
Dung in 1954		14.14	14.86	13.02	10.44	13.12
Mean	(±0.564)	13.02	11.88	10.68	8.11	10.92
Increase	(±0.881)	2.24	5.96	4.68	4.66	4.39 (±0.440)
Potatoes, Percentage ware						
No dung		94.5	95.2	91.2	88.0	92.2
Dung in 1954		95.4	95.7	95.8	94.4	95.3
Mean		95.0	95.5	93.5	91.2	93.8
Increase		0.9	0.5	4.6	6.4	3.1
Barley, Grain: cwt per acre						
No dung	(±2.06)*	33.9	32.0	30.1	25.5	30.4
Dung in 1953		35.6	32.2	33.6	31.8	33.3
Mean	(±1.77)	34.7	32.1	31.9	28.6	31.8
Increase	(±2.12)	1.7	0.2	3.5	6.3	2.9 (±1.06)
Barley, Straw: cwt per acre						
No dung		42.1	35.2	30.5	27.4	33.8
Dung in 1953		48.9	44.4	41.9	39.7	43.7
Mean		45.5	39.8	36.2	33.5	38.8
Increase		6.8	9.2	11.4	12.3	9.9

*for use in comparisons other than vertical.

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WOBURN MARKET GARDEN EXPERIMENT

Organic manures and N - Lansome 1954 the 13th year.

The present cropping comprises two series, each carrying in turn the crops of a two course rotation: 1st year - Globe beet followed by spring cabbages; 2nd year - Leeks.

Note: The results for the spring cabbages 1954-55 will be included in the 1955 report.

System of replication (each series): 4 randomized blocks of 10 plots each, certain interactions being confounded with block differences.

Area of each plot: 0.0125 acre.

Treatments applied to each crop:

Organic manures: Dung; sewage sludge compost; sewage sludge (West Middlesex); vegetable compost, each at 10 and 20 tons per acre.

N (applied as nitrochalk): None; 0.3 cwt per acre on plots receiving organic manure. None; 0.3; 0.6; 0.9 cwt per acre on plots not receiving organic manure. The last two rates are applied in two equal dressings.

Basal manuring per acre to each crop: 0.3 cwt P_2O_5; 0.3 cwt K_2O, applied as granular fertilizer (13% P_2O_5; 13% K_2O).

Cultivations, etc.:

Globe beet. Organic manures applied and ploughed in: Mar 31. Nitrochalk and basal fertilizers applied: May 10. Seed drilled at 13 lb per acre: May 11. Singled: June 16. Second dressing of nitrochalk: June 25. Sprayed with systemic insecticide: June 21. Harvested: Aug 13 - Sept 21. Variety: Detroit.

Leeks. Organic manures applied and ploughed in: July 22. Nitrochalk and basal fertilizers applied: July 27. Planted: Aug 3. Second dressing of nitrochalk applied: Sept 22. Harvested: Mar 8 - 31, 1955. Variety: Musselburgh.

Standard errors per plot.

Globe beet, saleable bulbs: 1.15 tons per acre or 17.3% (17 d.f.)
Leeks, saleable produce: 0.316 tons per acre or 10.8% (17 d.f.)

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Summary of Results

Globe Beet

Organic manures	Level of manuring tons per acre	N: cwt per acre None	0.3	0.6	0.9	Mean
Saleable bulbs: tons per acre						
			(±0.813)			(±0.575)
None		0.59	3.17	3.63	0.69	1.88*
Dung	10	2.86	8.47			5.66
	20	12.64	12.69			12.67
Sludge compost	10	3.35	6.93			5.14
	20	6.85	8.46			7.66
Sludge	10	6.56	6.98			6.77
	20	8.18	9.97			9.08
Vegetable compost	10	4.92	6.20			5.56
	20	6.46	13.15			9.81
Mean (±0.288)		6.48+	9.11+			6.64
Total produce: tons per acre						
None		2.16	6.03	6.91	2.28	4.09*
Dung	10	5.23	13.52			9.37
	20	19.80	19.73			19.77
Sludge compost	10	6.05	11.32			8.68
	20	11.80	13.87			12.84
Sludge	10	11.67	12.28			11.97
	20	13.85	16.64			15.25
Vegetable compost	10	8.20	9.92			9.06
	20	10.42	20.56			15.49
Mean		10.88+	14.73+			11.11
Plant number: thousands per acre						
None		46.3	64.8	63.2	37.9	55.6*
Dung	10	49.8	69.5			59.7
	20	82.8	75.2			79.0
Sludge compost	10	52.9	75.8			64.4
	20	72.8	66.4			69.6
Sludge	10	66.6	75.6			71.1
	20	66.9	73.0			70.0
Vegetable compost	10	59.0	64.6			61.8
	20	59.4	83.2			71.3
Mean		63.8+	72.9+			65.3

*Mean over None and 0.3 cwt N per acre only.
+Excluding 'No organics'.

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Leeks

Organic manures	Level of manuring tons per acre	N: cwt per acre None	0.3	0.6	0.9	Mean
		Saleable produce: tons per acre				
			(±0.224)			(±0.158)
None		1.09	2.08	2.47	2.61	1.58*
Dung	10	2.87	3.47			3.17
	20	3.06	3.69			3.37
Sludge compost	10	2.85	3.46			3.16
	20	3.64	3.19			3.42
Sludge	10	2.92	2.83			2.87
	20	2.87	3.29			3.08
Vegetable compost	10	2.71	3.06			2.89
	20	3.05	3.54			3.30
Mean (±0.079)		3.00+	3.32+			2.94
		Percentage saleable (by number)				
None		75.3	89.2	94.9	93.4	82.2*
Dung	10	97.0	98.1			97.6
	20	97.0	96.7			96.8
Sludge compost	10	95.7	98.7			97.2
	20	99.6	95.3			97.4
Sludge	10	97.0	95.4			96.2
	20	96.0	98.7			97.3
Vegetable compost	10	93.8	95.7			94.8
	20	96.1	98.1			97.1
Mean		96.5+	97.1+			95.1

*Mean over None and 0.3 cwt N per acre only.

+Excluding 'No organics'.

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IRRIGATION EXPERIMENT

The 4th year

The effects of irrigation and nitrogen - Woburn Butt Close 1954.

The cropping comprises four series; three of these in turn carry the crops of a 3-course rotation:-

1st year: Potatoes
2nd year: Sugar beet
3rd year: Barley

The fourth series (formerly 3-year ley) was resown to 3-year S37 in 1954. Cocksfoot ley for cutting.

In 1954 maincrop potatoes replaced early potatoes followed by cabbages.

System of replication: 3 randomised blocks of 4 plots each, plots being split into two for the application of nitrogen.

Area of each sub plot: Cut grass - 0.0264, remainder - 0.0278 acre.
Area harvested: Cut grass - 0.0165, potatoes - 0.0155, sugar beet - 0.0176, barley - 0.0168 acre.

Treatments: All combinations of:-
Whole plots. Irrigation: None (0 and 3 other treatments A,B and C as specified below
N.B: On potatoes 0 = B. On sugar beet, 0 = B and A = C. On cut grass, 0 plots received .50" irrigation.
Sub plots. Nitrogen: 2 levels applied to crop as below.

Rainfall and Irrigation: inches

Week-ending	Rainfall	Potatoes			Sugar beet	Barley			Cut Grass			
		A	B	C	A & C	A	B	C	0	A	B	C
May 17	0.04					.50		.50	.50	.50	.50	.50
24	0.18				.50	.50		.50		.25	.25	.25
31	1.40	.50		.50							.25	.50
June 7	1.08											
14	1.73											
21	0.01											
28	0.08			.50							.50	.67
July 5	0.26	.85		.75	.75		.75	.75		.25	.25	.51
12	0.26	.40								.17		
19	0.90			.20							.27	.51
26	0.75	.42		.24								
Total	6.69	2.17		2.19	1.25	1.00	.75	1.75	.50	1.17	2.02	2.94

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Levels of nitrogen (in addition to N in basal dressing):

N cwt per acre as nitrochalk

Potatoes	None;	0.5
Sugar beet	None;	0.4
Barley	None;	0.2
Cut grass	0.15;	0.3 (in spring and after each cut)

Basal dressings: cwt per acre

	As compound fertilizer				
	N	P_2O_5	K_2O	Salt	Dung
Potatoes	0.5	0.5	0.75	-	15 tons
Sugar beet	0.4	0.4	0.6	5	-
Barley	0.2	0.2	0.3	-	-
Cut grass (yearly)	None	0.6	1.2	-	-

Cultivations, etc.:

Potatoes. Ploughed: Aug 25 and again Oct 21, 1953. F.Y.M. applied: Mar 23, 1954. Ploughed: Mar 23. Fertilizers applied: Mar 30. Potatoes planted by machine: Apr 6. Earthed up: June 15. Sprayed with copper fungicide, medium volume, 5 lb in 40 gallons per acre: July 30. At low volume, 5 lb in 10 gallons: Aug 16 and again Aug 27. Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 7. Variety: Majestic.

Sugar beet. Ploughed: Mar 2. Fertilizers applied: Mar 30. Seed drilled at 18 lb per acre: Apr 5. Singled: May 28. Sprayed with Parathion, low volume: June 18. Lifted: Oct 27. Variety: Klein E.

Barley. Ploughed: Dec 24, 1953. Fertilizers applied: Mar 15, 1954. Seed drilled at 3 bushels per acre: Mar 16. Harvested: Aug 16. Variety: Herta.

Cut grass. Ploughed: Nov 24, 1953. Basal fertilizer and nitrochalk applied: Apr 6, 1954. Grass seed sown at 28 lb per acre: Apr 7. Sprayed MCPA, low volume, 2 pints per acre: June 19. Cut: June 16, July 15 (high N plots), July 23 (low N plots), July 30 (high N plots), Aug 17, Sept 10, Nov 4. Nitrochalk applied after each cut except the last. Variety: Cocksfoot S37.

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Standard errors per plot:

Potatoes,	Total tubers,	whole plot:	0.731 tons per acre or 4.7%	(7 d.f.)
		sub plot:	1.069 tons per acre or 6.9%	(9 d.f.)
Sugar beet,	Total sugar,	whole plot:	4.83 cwt per acre or 10.9%	(8 d.f.)
		sub plot:	4.25 cwt per acre or 9.6%	(10 d.f.)
	Tops,	whole plot:	1.21 tons per acre or 12.5%	(8 d.f.)
		sub plot:	1.16 tons per acre or 12.0%	(10 d.f.)
Barley,	Grain,	whole plot:	1.08 cwt per acre or 3.1%	(6 d.f.)
		sub plot:	1.75 cwt per acre or 4.9%	(8 d.f.)
Cut grass (total of 6 cuts)	Hay (85% D.M.),	whole plot:	6.89 cwt per acre or 14.3%	(6 d.f.)
		sub plot:	5.01 cwt per acre or 10.4%	(8 d.f.)

Summary of Results

cwt N per acre	Irrigation 0 & B	A	C	Mean
	Potatoes, total tubers: tons per acre			
	(±0.429)*		(±0.607)*	
0.0	14.06	13.42	13.25	13.70
0.5	17.88	16.94	16.95	17.41
Mean (±0.422)	15.97(1)	15.18	15.10	15.55
Difference (±0.873)	3.82(2)	3.52	3.70	3.71 (±0.436)
	Potatoes, percentage ware			
0.0	87.0	83.7	85.5	85.8
0.5	91.2	88.2	88.4	89.8
Mean	89.1	86.0	87.0	87.6
Difference	4.2	4.5	2.9	4.0

(1) ±0.298

(2) ±0.617

*for use in comparisons other than vertical.

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cwt N per acre	Irrigation 0	A	B	C	Mean
	Barley, grain: cwt per acre (±0.949)*				
0.0	31.3	35.7	35.6	33.1	33.9
0.2	36.8	36.3	38.6	36.0	36.9
Mean (±0.625)	34.0	36.0	37.1	34.6	35.4
Difference (±1.428)	5.5	0.6	3.0	2.9	3.0 (±0.714)
	Barley, straw: cwt per acre				
0.0	25.5	29.3	28.4	28.3	27.9
0.2	35.7	35.0	33.8	36.3	35.2
Mean	30.6	32.1	31.1	32.3	31.5
Difference	10.2	5.7	5.4	8.0	7.3
	Cut grass, hay (at 85% D.M.) 6 cuts: cwt per acre (±4.47)*				
0.15	37.9	37.5	35.0	38.4	37.2
0.30	61.6	56.0	59.5	60.8	59.5
Mean (±3.98)	49.8	46.7	47.2	49.6	48.3
Difference (±4.09)	23.7	18.5	24.5	22.4	22.3 (±2.04)

cwt N per acre	Irrigation C & B	A & C	Mean
	Sugar beet, roots (washed): tons per acre		
0.0	12.26	12.46	12.36
0.4	13.56	13.30	13.43
Mean	12.91	12.88	12.90
Difference	+1.30	+0.84	+1.07
	Sugar beet, sugar percentage		
0.0	17.1	17.2	17.1
0.4	17.2	17.3	17.2
Mean	17.1	17.2	17.2
Difference	0.1	0.1	0.1

*for use in comparisons other than vertical

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cwt N per acre	Irrigation C & B	A & C	Mean
Sugar beet, total sugar: cwt per acre			
	(±2.32)*		
0.0	41.9	42.8	42.4
0.4	46.6	46.1	46.4
Mean (±1.96)	44.3	44.5	44.4
Difference (±2.46)	4.7	3.3	4.0 (±1.74)
Sugar beet, tops: tons per acre			
	(±0.597)*		
0.0	9.11	9.23	9.17
0.4	10.07	10.28	10.17
Mean (±0.494)	9.59	9.75	9.67
Difference (±0.672)	-0.96	1.05	1.00 (±0.475)
Sugar beet, noxious nitrogen: mg per 100 g.			
0.0	25	25	25
0.4	30	25	25
Mean	25	25	25
Difference	5	0	0

*for use in comparisons other than vertical.

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WHEAT

The effects of various crop sequences on the incidence of Eyespot (Cercosporella herpotrichoides) - Little Knott 1954, the 5th year.

Arrangement of previous treatment crops: 4 longitudinal and 8 cross strips, each plot being split into 2 for seed rates.

Area of each sub plot: In 3 longitudinal strips - 0.0249, in the other 0.0174. Area harvested: 0.0156 and 0.0108 acre, respectively.

Preparatory crops 1950-52:-

1950 North and South, strips of Fallow, Ryegrass, Wheat, Potatoes
1951 East and West, strips of Ryegrass, Wheat, Fallow, Potatoes
1952 East and West, strips $\frac{1}{2}$ width Ryegrass, Wheat, Oats, Beans
Wheat, Oats, Barley, Wheat

giving 32 crop sequences in all.

In 1949 the field carried a crop of wheat heavily infested with Eyespot, Take-all (Ophiobolous graminis) and weeds. Wheat was grown on all plots in 1953.

Seed rates: $1\frac{1}{2}$; 3 bushels per acre.

Basal dressing per acre: 1 cwt compound granular fertilizer (12% N, 12% P_2O_5, 12% K_2O) combine drilled with seed. 6 cwt nitrochalk in two equal applications in March and May.

Cultivations, etc: Ploughed: Sept 17, 1953. Seed combine drilled: Nov 6. 1st application of nitrochalk: Mar 13, 1954. 2nd application: May 10. Combine harvested: Sept 13. Variety: Cappelle. Previous crop: Wheat.

Note: Disease surveys were made and the results are available.

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Summary of Results

Grain (at 85% D.M.): cwt per acre

Previous crop 1950	1951	1952	1953	Seed rate: bushels per acre $1\frac{1}{2}$	3	$1\frac{1}{2}$ Mean	3 Mean
W	W	W	W	22.3	30.9	22.3	30.9
H	W	W	W	31.0	38.6		
P	W	W	W	36.3	39.9	31.3	38.3
F	W	W	W	26.6	36.3		
W	H	W	W	24.6	36.8		
W	P	W	W	30.9	38.9	27.1	35.7
W	F	B	W	25.8	31.4		
H	H	W	W	34.1	37.2		
P	H	W	W	35.1	38.6		
F	H	W	W	32.6	39.2		
H	P	W	W	31.9	39.0		
P	P	W	W	36.8	43.8	32.5	35.3
F	P	W	W	26.2	31.8		
H	F	B	W	31.7	27.6		
P	F	B	W	34.2	32.2		
F	F	B	W	30.2	28.3		
W	W	O	W	26.0	32.0	26.0	32.0
H	W	O	W	34.6	37.9		
P	W	O	W	43.1	46.1	37.1	38.3
F	W	O	W	33.8	30.8		
W	H	H	W	32.5	36.2		
W	F	O	W	32.0	38.3	32.7	37.0
W	P	Be	W	33.7	36.4		
H	F	O	W	43.0	42.8		
F	F	O	W	38.4	40.1		
P	F	O	W	42.7	45.2		
F	H	H	W	39.2	41.4		
F	P	Be	W	35.6	34.3	38.6	39.5
H	H	H	W	31.0	34.8		
P	H	H	W	36.3	39.1		
H	P	Be	W	40.9	39.6		
P	P	Be	W	40.7	38.5		
Mean						31.0	35.9

Mean dry matter % as harvested: 72.3

The plots are classified according to the occurrence in previous years of the more susceptible crops, wheat and barley.

Crop symbols: B - Barley. Be - Beans. F - Fallow. H - Ryegrass
O - Oats. P - Potatoes. W - Wheat.

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WHEAT

The effects of Crop sequences, Varieties, Seed rates and Nitrogen on the incidence of Eyespot (Cercosporella herpotrichoides) - Long Hoos 1, 2 and 3, 1954. The 1st preliminary year.

System of replication: 8 randomized blocks of 4 plots each, the interaction VRN being confounded with block differences.

Area of each plot: 0.0212 acre. Area harvested: 0.0148 acre.

Treatments: All combinations of:-
Varieties: Holdfast; Cappelle.
Seed rates: 1½; 3 bushels per acre.
Nitrogen: 0.46; 0.93 cwt N per acre applied as nitrochalk, half in March, half in May.

Crop sequences:
During the preliminary years 1954 and 1955 four cropping systems will be set up, each on four blocks; in 1956 wheat will be taken over all 16 blocks. The crops will be:-

1954	1955	1956
Wheat	Wheat	Wheat
Wheat	Potatoes	Wheat
Potatoes	Wheat	Wheat
Beans	Potatoes	Wheat

In 1954 the 4 blocks of potatoes (Majestic) received 10 tons dung and 12 cwt compound fertilizer, (7% N, 7% P_2O_5, 10½% K_2O), the 4 blocks of beans received 4 cwt compound fertilizer, (16% P_2O_5, 16% K_2O).

Basal dressing, per acre: 1 cwt compound granular fertilizer (12% N, 12% P_2O_5, 15% K_2O) combine drilled with seed. To correct some acid areas 25 cwt ground chalk and 23 cwt hydrated lime was applied to certain blocks.

Cultivations, etc.: Ploughed: Oct 6, 1953. Seed combine drilled: Oct 26. Ground chalk applied: Dec 29. Hydrated lime applied: Jan 18 - Feb 24. 1st application of nitrochalk: Mar 9. 2nd application: May 10. Sprayed with M.C.P.A., medium volume, 2 pints per acre: May 27. Combine harvested: Sept 6-7. Varieties: Holdfast and Cappelle. Previous crop: Potatoes.

Standard error per plot:
Grain (at 85% D.M.): 2.71 cwt per acre or 6.6% (18 d.f.)

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Summary of Results

Response to	Mean	Responses to treatments: Variety: Hold-fast	Variety: Capp-elle	Seed rate bushels per acre: 1½	Seed rate bushels per acre: 3	Nitrogen: cwt per acre: 0.46	Nitrogen: cwt per acre: 0.93
Grain (at 85% Dry Matter): Mean yield 41.0 cwt per acre							
	(±0.96)				(±1.36)		
Variety (Cappelle - Holdfast)	+3.4	-	-	-1.3	+8.1	+3.4	+3.4
Seed rate (3-1½)	+4.8	+0.1	+9.5	-	-	+4.7	+4.9
Nitrogen (0.93 - 0.46)	+3.2	+3.2	+3.2	+3.1	+3.3	-	-

Mean Dry Matter % as harvested: 78.0

Records of incidence of disease (Eyespot and Take-All) and counts of plant, shoot, and straw numbers were made.

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54/Ca/3

WHEAT

Residual effects of Dung, N, P and K - West Barnfield I, 1954.

System of replication - 4 randomized blocks of 8 plots each, the interaction DNPK being confounded with block differences.

Area of each plot: 0.0318 acre. Area harvested: 0.0150 acre.

Treatments, applied to potatoes in 1953: All combinations of:-
Dung: None; 10 tons per acre
N: None; 0.6 cwt per acre applied as sulphate of ammonia
P_2O_5: None; 0.6 cwt per acre applied as superphosphate
K_2O: None; 1.0 cwt per acre applied as muriate of potash.

Basal dressing: $2\frac{1}{2}$ cwt sulphate of ammonia per acre in spring.

Cultivations, etc.: Cultivated: Oct 7, 1953. Seed drilled at 3 bushels per acre: Nov 6. Sprayed with D.N.O.C. at high volume: Apr 26, 1954. Sulphate of ammonia applied: Apr 30. Combine harvested: Sept 9. Variety: Cappelle. Previous crop: Potatoes.

Standard error per plot:
Grain (at 85% D.M.): 1.79 cwt per acre or 4.5% (18 d.f.)

Note: For details of the preceding potato experiment see 53/Ce/1.

Summary of Results

Responses to Treatments

Response to	Mean	Dung: tons per acre 0.0	Dung: tons per acre 10	N cwt per acre 0.0	N cwt per acre 0.6	P_2O_5 cwt per acre 0.0	P_2O_5 cwt per acre 0.6	K_2O cwt per acre 0.0	K_2O cwt per acre 1.0
Grain (at 85% dry matter): Mean yield 39.9 cwt per acre	(±0.63)			(±0.90)					
Dung	+4.3	-	-	+3.4	+5.2	+3.9	+4.7	+3.7	+4.9
N	+2.2	+1.3	+3.1	-	-	+2.6	+1.8	+2.6	+1.8
P_2O_5	+0.3	-0.1	+0.7	+0.7	-0.1	-	-	-0.6	+1.2
K_2O	+1.8	+1.2	+2.4	+2.2	+1.4	+0.9	+2.7	-	-

Mean dry matter % as harvested: 74.7

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WHEAT

The residual effects of insecticides on the control of wireworm, 3rd year - Geescroft 1954.

System of replication: 3 randomized blocks of 8 plots each.

Area of each plot: 0.0289 acre. Area harvested: 0.0205 acre.

Treatments, applied autumn 1951 for wheat:

None (three plots per block)		(O)
Gammexane seed dressing 2 oz per bushel		(S)
Gammexane combine drilled with seed at	56 lb per acre 3.5% dust	(G)
Aldrin " " " " "	200 lb " " 1.78% "	(A)
Chlordane " " " " "	100 lb " " 5% "	(C)
D.D.T. " " " " "	150 lb " " 5% "	(D)

Basal dressing, per acre: 1¼ cwt compound granular fertilizer (12% N, 12% P_2O_5, 15% K_2O) combine drilled with seed. 2½ cwt sulphate of ammonia in spring.

Cultivations, etc.: Ploughed: Sept 23, 1953. Seed treated with mercurial seed dressing, combine drilled at 2½ bushels per acre: Nov 5. Sulphate of ammonia applied: Apr 30, 1954. Sprayed with M.C.P.A. high volume, 2 pints per acre: May 24. Combine harvested: Sept 7. Variety: Cappelle. Previous crop: Wheat.

Standard error per plot:
Grain (at 85% D.M.): 1.79 cwt per acre or 6.1% (16 d.f.)

Summary of Results

	O	S	G	A	C	D	Mean
Grain (at 85% dry matter): cwt per acre							
Mean (±1.03)	27.2(1)	29.4	32.9	31.0	29.7	29.2	29.2
Increase (±1.19)		2.2	5.7	3.8	2.5	2.0	

(1) ±0.60 Mean dry matter % as harvested: 74.9.

Note: Wireworm counts were made and are available.

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54/Ca/5

WHEAT

Methods of harvesting square plots and two N levels - West Barnfield II 1954.

System of replication: 4 randomized blocks of 4 plots each.

Area of each plot: 0.0265 acre. Area harvested: Binder - full area, Combine - 0.0225 acre.

Treatments: All combinations of:-
N: 0.3; 0.6 cwt per acre applied as Nitrochalk.
Methods of harvesting: Binder - full area; Combine (Massey Harris 780, 10' cut) - 3 cuts each of 0.0075 acre, recorded separately.

Basal dressing: None

Cultivations, etc.: Ploughed: Sept 24, 1953. Seed drilled at 3 bushels per acre: Nov 7. Nitrochalk applied: May 8, 1954. Harvested: Binder plots - Sept 1, Combine plots - Sept 13. Variety: Cappelle. Previous crop: Wheat

Standard error per plot:
Grain (at 85% D.M.): 3.33 cwt per acre or 11.8% (9 d.f.)

Estimated % S.E. (whole plot) measured by combine:-
3 cuts 11.8%
2 cuts 12.6%
1 cut 14.9%

Summary of Results

Grain (at 85% Dry Matter): cwt per acre

Methods of Harvesting	N: cwt per acre 0.3	0.6	Mean
	(±1.67)		(±1.18)
Binder	26.2	29.5	27.9
Combine	29.7	27.7	28.7
Mean (±1.18)	28.0	28.6	28.3

Mean dry matter % as weighed: Binder plots - 80.8; Combine plots - 72.3.

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54/Ca/6.1

WHEAT

Methods of harvesting, narrow plots and 2 levels of N - West Barnfield II 1954.

System of replication: Plots harvested along the rows - 2 randomized blocks of 10 plots each; Across the rows - 2 randomized blocks of 8 plots each.

Area of each whole plot: 0.0231 acre. Areas harvested: Binder - full area. Combine - 0.0164 acre.

Treatments: All combinations of
N: 0.3; 0.6 cwt N per acre applied as nitrochalk.
Methods of harvesting: Binder: Whole plot, or plot harvested as half and 2 adjacent quarter plots separately. Combine: Single cut full length of plot, single cut on half and 2 adjacent quarter plots separately, or single cut full length of plot between blank rows.

Basal dressing: None.

Cultivations, etc.: Ploughed: Sept 24, 1953. Seed drilled at 3 bushels per acre: Nov 7. Nitrochalk applied: May 8, 1954. Harvested: Binder plots - Sept 1, Combine plots - Sept 13. Variety: Cappelle. Previous crop: Wheat.

Standard errors per plot: Grain (at 85% dry matter).
Whole plot: 2.73 cwt per acre or 9.2% (16 d.f.)
Sub plot: 3.30 cwt per acre or 11.1% (14 d.f.)

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Summary of Results

Grain (at 85% dry matter): Mean 29.8 cwt per acre

Method of Harvesting	Harvested Along the rows	Harvested Across the rows	N: cwt per acre 0.3	N: cwt per acre 0.6	Harvested as ¼ plots	Harvested as ½ plots	Harvested as whole plots	Mean
	(±0.97)		(±0.97)		(1) and (2)		(±0.97)	(±0.68)
Binder	30.6	27.4	30.2	27.8	27.5	29.4	29.5	29.0
Combine	31.9	28.4	28.5	31.7	30.6	30.2	29.8	30.1
Mean (±0.68)	31.2	27.9	29.4	29.7	29.0(3)	29.8(3)	29.7	29.6

Whole plots. Harvested along the rows by Combine

	N: cwt per acre 0.3	N: cwt per acre 0.6	Mean
	(±1.93)		(±1.37)
Single cut	30.2	34.4	32.2
Area between blank rows	31.0	32.2	31.6

(1) ±1.17 for use in horizontal comparisons only.
(2) ±1.51 for use in all others
(3) ±0.82

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54/Ca/7.1

WHEAT

Varieties, seed rates, levels and time of N - Woburn, Roadpiece 1954.

System of replication: 4 randomized blocks of 8 plots each, certain high order interactions being confounded with block differences. In addition each block contained 2 plots with no nitrogen, the variety x seed rate interaction being confounded.

Area of each plot: 0.0159 acre.

Treatments: All combinations of:-
Varieties: Holdfast; Cappelle.
Seed rates: 1½; 3 bushels per acre.
Nitrogen: 0.5; 1.0 cwt N per acre as nitrochalk.
Time of application of N: In seed bed; in early March; early April; mid-May.

Basal dressing: None

Cultivations, etc.: Cultivated after potatoes: Oct 21, 1953. Seed-bed nitrogen applied: Oct 26. Seed drilled: Nov 6. March top dressing applied: March 2, 1954. April top dressing applied: April 6. All plots sprayed with D.N.O.C. at 6 lb per acre in 100 gallons, May top dressing applied: May 11. Harvested: Sept 15. Varieties: Holdfast and Cappelle. Previous crop: Potatoes.

Standard error per plot:
Grain: 4.10 cwt per acre or 14.9% (12 d.f.)

Note: Records of incidence of disease (Take-all and Eyespot) and counts of plants, shoots and ear numbers were made.

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Summary of Results

Grain: cwt per acre

	T_1	T_2	T_3	T_4	Mean
Mean (±1.45)	21.6	30.2	35.6	30.1	29.4
		(±2.05)			(±1.02)
V_1	21.4	25.7	33.7	28.1	27.2
V_2	21.8	34.7	37.6	32.1	31.5
Difference (±2.90)	+0.4	+9.0	+3.9	+4.0	+4.3 (±1.45)
R_1	19.8	29.4	33.0	28.2	27.6
R_2	23.4	31.0	38.3	32.0	31.1
Difference (±2.90)	+3.6	+1.6	+5.3	+3.8	+3.5 (±1.45)
N_1	22.8	25.3	29.2	26.5	26.0
N_2	20.4	35.1	42.1	33.6	32.8
Difference (±2.90)	-2.4	+9.8	+12.9	+7.1	+6.8 (±1.45)

	R_1	R_2	Diff.	N_0	N_1	N_2	Mean
Mean (±1.02)				19.7 (2)	26.0	32.8	27.4
	(±1.45)		(±2.05)	(±2.05)	(±1.45)		(±0.92)
V_1	26.0	28.4	+2.4	20.5	24.2	30.2	25.9
V_2	29.2	33.9	+4.7	18.9	27.7	35.4	29.0
Diff. (±2.05)	+3.2	+5.5	+2.3	-1.6 (1)	+3.5	+5.2	+3.1
				(±2.05)	(±1.45)		(±0.92)
R_1				18.9	23.6	31.6	25.9
R_2				20.5	28.3	34.0	29.0
Diff. (±2.05)				+1.6 (1)	+4.7	+2.4	+3.1

(1) ±2.90 (2) ±1.45

Treatments

V_1 Holdfast
V_2 Cappelle

R_1 1½ bushels per acre
R_2 3 bushels per acre

N_0 No N
N_1 0.5 cwt N per acre
N_2 1.0 cwt N per acre

T_1 Nitrochalk in seedbed
T_2 Nitrochalk in early March
T_3 Nitrochalk 5 weeks after T_2
T_4 Nitrochalk 5 weeks after T_3

The V × R table does not include the plots receiving no nitrogen.

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Straw: cwt per acre

	T_1	T_2	T_3	T_4	Mean
Mean	23.7	37.1	40.2	32.3	33.3
V_1	25.5	35.2	43.2	34.3	34.5
V_2	22.0	38.9	37.2	30.3	32.1
Difference	-3.5	+3.7	-6.0	-4.0	-2.4
R_1	20.4	36.2	36.1	29.4	30.5
R_2	27.1	37.9	44.2	35.2	36.1
Difference	+6.7	+1.7	+8.1	+5.8	+5.6
N_1	25.7	29.7	32.9	28.7	29.2
N_2	21.8	44.4	47.5	35.9	37.4
Difference	-3.9	+14.7	+14.6	+7.2	+8.2

	R_1	R_2	Diff.	N_0	N_1	N_2	Mean
Mean				21.0	29.2	37.4	30.9
V_1	32.2	36.9	+4.7	22.6	30.6	38.5	32.2
V_2	28.9	35.3	+6.4	19.5	27.9	36.3	29.6
Difference	-3.3	-1.6	+1.7	-3.1	-2.7	-2.2	-2.6
R_1				20.8	26.1	34.9	28.6
R_2				21.3	32.4	39.9	33.2
Difference				+0.5	+6.3	+5.0	+4.6

Treatments

V_1 Holdfast
V_2 Cappelle

R_1 1½ bushels per acre
R_2 3 bushels per acre

N_0 No N
N_1 0.5 cwt N per acre
N_2 1.0 cwt N per acre

T_1 Nitrochalk in seedbed
T_2 Nitrochalk in early March
T_3 Nitrochalk 5 weeks after T_2
T_4 Nitrochalk 5 weeks after T_3

The V × R table doesnot include the plots receiving no nitrogen.

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54/Cb/1

BARLEY

Seed rates and levels of nitrogen - Long Hoos V 1954.

System of replication: 3 randomized blocks of 9 plots each.

Area of each plot: 0.0112 acre.

Treatments: All combinations of:-
Seed rates: 1; 2; 3 bushels per acre.
Nitrogen: 0.3; 0.6; 0.9 cwt N per acre applied as sulphate of ammonia.

Basal dressing: None.

Cultivations, etc.: Ploughed: Sept 16, 1953 and again Nov 25. Sulphate of ammonia applied, seed drilled at 3 bushels per acre: Mar 18, 1954. Sprayed with M.C.P.A. medium volume, 2½ pints per acre: May 14. Combine harvested: Sept 2. Variety: Proctor. Previous crop: Beans.

Standard error per plot:
Grain (at 85% D.M.): 1.49 cwt per acre or 3.5% (16 d.f.)

Summary of Results

N cwt per acre	Seed rates: bushels per acre 1	2	3	Mean
Grain (at 85% dry matter): cwt per acre				
		(±0.86)		(±0.50)
0.3	41.3	43.5	43.7	42.8
0.6	42.3	43.9	44.5	43.6
0.9	39.7	43.4	43.4	42.1
Mean (±0.50)	41.1	43.6	43.9	42.9

Mean dry matter % as harvested: 77.9

Estimates of % area lodged and counts of plant, straw and ear numbers were made. There was no Eyespot or Take-All.

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54/Cb/2

BARLEY

Methods of harvesting square plots and two N levels - Great Harpenden I 1954.

System of replication: 4 randomized blocks of 4 plots each.

Area of each plot: 0.0265 acre. Area harvested: Binder - full area, Combine - 0.0225 acre.

Treatments: All combinations of:-
N: 0.3; 0.6 cwt per acre applied as Nitrochalk in seedbed.
Methods of harvesting: Binder - full area; Combine (Massey Harris 780, 10' cut) - 3 cuts each of 0.0075 acre, recorded separately.

Basal dressing: None

Cultivations, etc.: Ploughed: Nov 13, 1953. Nitrochalk applied: Mar 23, 1954. Seed drilled at 3 bushels per acre: Mar 24. Sprayed with M.C.P.A., low volume, 2 pints per acre: May 19. Harvested: Binder plots - Aug 26, Combine plots - Aug 30. Variety: Herta. Previous crop: Barley.

Standard error per plot:
Grain (at 85% D.M.): 0.988 cwt per acre or 2.8% (9 d.f.)

Estimated % S.E. (whole plot) measured by combine:-
3 cuts 2.8%
2 cuts 4.3%
1 cut 7.2%

Summary of Results

Grain (at 85% Dry Matter): cwt per acre

Methods of Harvesting	N: cwt per acre 0.3	0.6	Mean
		(±0.49)	(±0.35)
Binder	32.7	38.0	35.3
Combine	33.9	36.8	35.4
Mean (±0.35)	33.3	37.4	35.3

Mean dry matter % as weighed: Binder plots - 84.0; Combine plots - 82.1.

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54/Cb/3.1

BARLEY

Methods of harvesting, narrow plots and 2 N levels - Great Harpenden I 1954.

System of replication: Plots harvested along the rows - 2 randomized blocks of 10 plots each; Across the rows 2 randomized blocks of 8 plots each.

Area of each whole plot: 0.0231 acre. Area harvested: Binder - full area. Combine - 0.0164 acre.

Treatments: All combinations of:
N: 0.3; 0.6 cwt N per acre applied as nitrochalk.
Methods of harvesting: Binder: Whole plot, or plot harvested as half and 2 adjacent quarter plots separately.
Combine: Single cut full length of plot, single cut on half and 2 adjacent quarter plots separately, or single cut full length of plot between blank rows.

Basal dressing: None.

Cultivations, etc.: Ploughed: Nov 13, 1953. Nitrochalk applied: Mar 23, 1954. Seed drilled at 3 bushels per acre: Mar 24. Sprayed with M.C.P.A., low volume, 2 pints per acre: May 19. Harvested: Binder plots - Aug 26, Combine plots - Aug 30. Variety: Herta. Previous crop: Barley.

Standard errors per plot: Grain (at 85% dry matter).
Whole plot: 2.51 cwt per acre or 7.0% (16 d.f.)
Sub plot: 1.17 cwt per acre or 3.1% (14 d.f.)

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Summary of Results

Grain (at 85% dry matter): Mean 35.6 cwt per acre

Method of Harvesting	Harvested Along the rows	Harvested Across the rows	N: cwt per acre 0.3	N: cwt per acre 0.6	Harvested as ¼ plots	Harvested as ½ plots	Harvested as whole plots	Mean
	(±0.89)		(±0.89)		(1) and (2)		(±0.89)	(±0.63)
Binder	37.0	36.2	34.4	38.9	38.2	38.2	35.1	36.6
Combine	34.4	33.6	32.2	35.9	35.6	35.0	32.8	34.0
Mean (±0.63)	35.7	35.0	33.3	37.4	36.9(3)	36.6(3)	33.9	35.3

Whole plots. Harvested along the rows by Combine

	N: cwt per acre 0.3	N: cwt per acre 0.6	Mean
		(±1.77)	(±1.25)
Single cut	33.2	32.8	33.0
Area between blank rows	35.2	40.2	37.7

(1) ±0.39 for use in horizontal comparisons
(2) ±0.97 for use in all others
(3) ±0.28

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54/Cc/1.1

WINTER BEANS

Control of Weeds - Little Knott I 1954.

System of replication: 4 randomized blocks of 8 plots each.

Area of each plot: 0.0175 acre.

Treatments: Additional cultivations:-

None	(1)
Harrow (only)	(2)
Mechanical weeder (only)	(3)
Extra horse hoeing	(4)
Harrow and extra horse hoeing	(5)
Weeder and extra horse hoeing	(6)
Clean weeding by hand pulling	(7)
Clean weeding by hand hoeing	(8)

Basal cultivations: A single horse hoeing.

Basal dressing: 5 cwt compound granular fertilizer (16% P_2O_5, 16% K_2O) per acre.

Cultivations, etc.: Ploughed: Sept 18, 1953. Seed drilled at 280 lb per acre: Oct 20. Fertilizer applied: Oct 21. Horse hoed all plots: May 5, 1954. Dusted with 3% nicotine dust: June 24. Harvested: Sept 11. Variety: Deneb (stock strain). Previous crop: Barley.

Treatment cultivations:

Treatments 2 and 5 harrowed: May 10.
" " 3 and 6 cleaned by mechanical weeder: May 10.
" " 4, 5, 6 horse hoed: May 21 and again June 5.
" " 7 hand weeded: May 24-26 and again June 5.
" " 8 hand hoed: May 20-26.

Standard error per plot:
Grain: 2.65 cwt per acre or 12.7% (21 d.f.)

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Summary of Results

	Treatment Cultivations 1	2	3	4	5	6	7	8	Mean
Grain: cwt per acre									
Mean (±1.33)	19.0	21.7	22.3	18.9	21.1	23.0	20.7	21.0	21.0
Increase (±1.88)		+2.7	+3.3	-0.1	+2.1	+4.0	+1.7	+2.0	
Straw: cwt per acre									
Mean	30.8	32.5	35.1	30.9	30.2	34.5	28.9	31.2	31.8
Increase		+1.7	+4.3	+0.1	-0.6	+3.7	-1.9	+0.4	

Treatment Cultivations

1. None
2. Harrow (only)
3. Mechanical weeder (only)
4. Extra horse hoeing
5. Harrow and extra horse hoeing
6. Weeder and extra horse hoeing
7. Clean weeding by hand pulling
8. Clean weeding by hand hoeing

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54/Cc/2.1

BEANS

Control of Black Aphis - Little Hoos 1954.

System of replication: 4 pairs of randomized blocks of 5 plots each.

Area of each plot: 0.0361 acre.

Treatments:
Blocks. Time of sowing: Autumn (A); Spring (S).
Plots. Insecticidal sprays 80 gallons per acre: None (1); Systox (0.05% active ingredient) applied three times (2); Systox applied once (3); D.D.T. emulsion (0.2% active ingredient) applied four times (4); D.D.T. suspension (0.2% active ingredient) applied once (5).

Basal dressing: 5 cwt compound fertilizer (16% P_2O_5, 16% K_2O) per acre.

Cultivations, etc.: Ploughed: Sept 23, 1953. Basal dressing applied on all blocks, beans drilled at 280 lb per acre on 'A' blocks: Oct 20. Ploughed 'S' blocks: Dec 15. Beans drilled at 190 lb per acre on 'S' blocks: Mar 12, 1954. Harvested: 'A' blocks - Sept 9, 'S' blocks - Sept 20. Varieties: Autumn sown - P/L 14, Spring sown - Garton's Yearling.

Sprayings:	(2)	(3)	(4)	(5)
	June 4	June 21	June 4	June 21
	June 21		June 21	
	July 17		July 3	
			July 18	

Standard error per plot:
Grain: 3.36 cwt per acre or 14.3% (24 d.f.).

Note: Aphis counts were made and are available.

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Summary of Results

Time of Sowing	Insecticides 1	2	3	4	5	Mean
	Grain: cwt per acre					
			(±1.68)*			
Autumn	11.8	27.5	28.8	15.3	12.9	19.3
Spring	16.8	37.5	35.5	23.9	25.2	27.8
Mean (±1.19)	14.3	32.5	32.1	19.6	19.0	23.5
Difference (±2.38)**	5.0	10.0	6.7	8.6	12.3	8.5
	Straw: cwt per acre					
Autumn	19.7	27.5	29.1	22.6	23.6	24.5
Spring	23.4	39.8	36.9	28.1	28.9	31.4
Mean	21.5	33.7	33.0	25.4	26.2	28.0
Difference	3.7	12.3	7.8	5.5	5.3	6.9

*For use in horizontal comparisons only.

**For use in comparison of two differences only.

Insecticides

1 None
2 Systox applied three times
3 Systox applied once
4 D.D.T. emulsion applied four times
5 D.D.T. suspension applied once.

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54/Cd/1

POTATOES

Dung, N, P and K - Sawyers I 1954.

System of replication: 4 randomized blocks of 8 plots each, the interaction DNPK being confounded with block differences.

Area of each plot: 0.0210 acre. Area harvested: 0.0140 acre.

Treatments: All combinations of:-
Dung: None; 10 tons per acre.
N: None; 0.6 cwt per acre applied as sulphate of ammonia.
P_2O_5: None; 0.6 cwt per acre applied as superphosphate.
K_2O: None; 1.0 cwt per acre applied as muriate of potash.

Basal dressing: None.

Cultivations, etc.: Dung applied: Nov 30, 1953. Ploughed: Dec 2. Ridged and fertilizers applied in ridges: Apr 23, 1954. Potatoes hand planted: Apr 24. Earthed up: July 6. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons per acre: July 29 and again Aug 23. Sprayed with 15% sulphuric acid: Sept 25. Lifted: Oct 16 and again Oct 23. Variety: Majestic S.S. Previous crop: Dredge corn.

Standard error per plot:
Total tubers: 0.997 tons per acre or 11.4% (18 d.f.)

Summary of Results

Responses to Treatments

Response to	Mean	Dung: tons per acre		cwt per acre N		P_2O_5		K_2O	
		0	10	0.0	0.6	0.0	0.6	0.0	1.0
Total tubers: Mean yield 8.75 tons per acre									
	(±0.352)			(±0.498)					
Dung	+2.04	-	-	+1.56	+2.52	+2.28	+1.80	+4.03	+0.05
N	+2.08	+1.60	+2.56	-	-	+1.11	+3.05	+1.17	+2.99
P_2O_5	+0.67	+0.91	+0.43	-0.30	+1.64	-	-	+0.83	+0.51
K_2O	+1.56	+3.55	-0.43	+0.65	+2.47	+1.72	+1.40	-	-
Percentage ware ($1\frac{1}{2}$" riddle): Mean 82.9									
Dung	+2.1	-	-	+0.7	+3.5	+1.5	+2.7	+6.1	-1.9
N	+2.6	+1.2	+4.0	-	-	+0.9	+4.3	+0.3	+4.9
P_2O_5	-2.4	-3.0	-1.8	-4.1	-0.7	-	-	-0.2	-4.6
K_2O	+3.1	+7.1	-0.9	+0.8	+5.4	+5.3	+0.9	-	-

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POTATOES

Methods of planting, Levels of compound fertilizer and Late N and K - Deacons Field 1954.

System of replication: 4 randomized blocks of 12 plots each, plots being split into 2 for the late application of N and K with the NK interaction confounded with whole plot differences and certain high order interactions confounded with block differences.

Area of each sub plot: 0.0140 acre. Area harvested: 0.0105 acre.

Treatments:

Whole plots: All combinations of:-

Compound granular fertilizer (7% N, 7% P_2O_5, 10.5% K_2O): None; $7\frac{1}{2}$; 15 cwt per acre.

Methods of planting and fertilizer application: Ridge, broadcast fertilizer, hand plant and split back ridges at once (A); Ridge, expose ridges for 7 days, broadcast fertilizer, hand plant same time as A and split back ridges (B); Broadcast fertilizer on flat, plant from flat with dropper (C); Plant from flat with dropper, fertilizer placed 2" to side of seed (D).

Sub plots: All combinations of:-

N: None; 0.53 cwt per acre applied as sulphate of ammonia.

K_2O: None; 0.79 cwt per acre applied as muriate of potash.

Both N and K_2O were applied as top dressings before the final earthing up.

Basal dressing: None.

Cultivations, etc.: Ploughed: Oct 21, 1953. Ridged 'B' plots: Apr 23, 1954. Ridged 'A', fertilizers applied to 'B' and 'C': Apr 28. Applied fertilizer to 'A', planted 'A' and 'B', machine planted 'C' and 'D' with placed fertilizer on 'D': Apr 29. Late NK dressings applied: July 7. Earthed up: July 9. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons per acre: July 29 and again Aug 26. Sprayed with sulphuric acid, 20% B.O.V.: Oct 6. Lifted: Oct 26. Variety: Majestic. Previous crop: Barley.

Standard errors per plot: Total tubers.

Whole plot: 1.26 tons per acre or 12.1% (33 d.f.)

Sub plot: 0.860 tons per acre or 8.2% (24 d.f.)*

*2 missing sub plot values.

Summary of Results

	Compound fertilizer: cwt per acre												
	None			7.5				15.0					
	A	B	C+D	A	B	C	D	A	B	C	D	Mean	
Total tubers: tons per acre													
	(±0.701)*		(±0.496)*	(±0.701)*									
N: cwt per acre													
None	5.99	7.31	8.06	10.77	10.93	10.42	10.17	12.78	11.72	11.75	12.01	10.00	
0.53	7.89	9.60	9.31	12.57	11.03	12.23	11.65	11.70	11.53	11.50	12.23	10.88	
Difference (±0.608)	+1.90	+2.29	+1.25(1)	+1.80	+0.10	+1.81	+1.48	-1.08	-0.19	-0.25	+0.22	+0.88	(±0.175)
	(±0.701)*		(±0.496)*	(±0.701)*									
K_2O: cwt per acre													
None	6.51	8.13	8.47	11.68	10.66	11.44	11.25	12.11	12.30	12.43	12.21	10.47	
0.79	7.38	8.78	8.90	11.66	11.30	11.21	10.58	12.37	10.96	10.82	12.03	10.41	
Difference (±0.608)	+0.87	+0.65	+0.43(1)	-0.02	+0.64	-0.23	-0.67	+0.26	-1.34	-1.61	-0.18	-0.06	(±0.175)
Mean (±0.632)	6.94	8.46	8.68(2)	11.67	10.98	11.33	10.91	12.24	11.63	11.62	12.12	10.44	

(1) ±0.430 (2) ±0.447

*for use in comparisons other than vertical.

A. Ridge, broadcast fertilizer, hand plant and split back ridges at once.
B. Ridge land, expose for 7 days then broadcast fertilizer over ridges, hand plant, split back ridges.
C. Broadcast fertilizer on flat, plant from flat with dropper,
D. Plant from flat with dropper, fertilizer placed 2" to side of seed.

K_2O: cwt per acre	N: cwt per acre None	0.53
	(±0.365).	
None	10.07	10.86
0.79	9.92	10.90

54/Cd/2.2

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	Compound fertilizer: cwt per acre											
	None			7.5				15.0				
	A	B	C+D	A	B	C	D	A	B	C	D	Mean
	Percentage ware											
N: cwt per acre												
None	76.6	79.8	76.5	78.6	77.7	76.7	72.8	79.8	78.5	78.0	69.3	76.7
0.53	75.9	80.4	72.6	79.3	77.2	75.7	74.1	73.9	73.3	67.4	71.8	74.5
Difference	-0.7	+0.6	-3.9	+0.7	-0.5	-1.0	+1.3	-5.9	-5.2	-10.6	+2.5	-2.2
K_2O: cwt per acre												
None	77.8	78.1	73.7	81.1	79.6	76.9	74.6	77.6	74.5	76.3	69.6	76.1
0.79	74.7	82.2	75.5	76.8	75.3	75.5	72.3	76.2	77.3	69.1	71.5	75.2
Difference	-3.1	+4.1	+1.8	-4.3	-4.3	-1.4	-2.3	-1.4	+2.8	-7.2	+1.9	-0.9
Mean	76.2	80.1	74.6	78.9	77.4	76.2	73.5	76.9	75.9	72.7	70.6	75.6

A. Ridge, broadcast fertilizer, hand plant and split back ridges at once.
B. Ridge land, expose for 7 days then broadcast fertilizer over ridges, hand plant, split back ridges.
C. Broadcast fertilizer on flat, plant from flat with dropper.
D. Plant from flat with dropper, fertilizer placed 2" to side of seed.

	N: cwt per acre	
	None	0.53
K_2O: cwt per acre		
None	77.7	74.5
0.79	75.8	74.5

54/Cd/2.3

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54/Cd/3

POTATOES

Control of Blight - Great Field I 1954.

System of replication: 4 × 4 Latin Square, plots being split into 2 for determination of tractor damage.

Area of each sub plot: 0.0140 acre.

Treatments:

Whole plots: No Spray; Copper fungicide 5 lb in 40 gallons per acre sprayed twice; 100 gallons sulphuric acid, 20% B.O.V. sprayed to destroy haulms; Copper fungicide and sulphuric acid sprayed as above. The tractor used for spraying was driven over all the plots on each occasion.

Sub plots: 4 rows damaged by three passages of the tractor were compared with 4 undamaged rows.

Basal dressing, per acre: 10 tons F.Y.M. and 10 cwt compound granular fertilizer (7% N, 7% P_2O_5, 10½% K_2O).

Cultivations, etc.: F.Y.M. applied: Jan 18. Ploughed: Jan 20 - Feb 24. Fertilizer applied: Apr 21. Ridged: Apr 22. Planted: Apr 23. Cultivated with mechanical weeder: June 1, 25, 29. Ridged: June 3 and again July 14. Fungicide treatment applied: July 30 and again Aug 16. Sulphuric acid treatment applied: Sept 13. Lifted: Oct 23. Variety: Majestic S.S. Previous crop: Wheat.

Standard errors per plot: Total tubers.
Whole plot: 0.594 tons per acre or 5.8% (6 d.f.)
Sub plot: 0.969 tons per acre or 9.5% (12 d.f.)

Note: Blight counts were made and are available.

Summary of Results

	Spray				
	None	Copper fungicide	Sulphuric Acid	Copper fungicide and Sulphuric Acid	Mean
	Total tubers: tons per acre (±0.454)*				
Undamaged rows	9.30	12.56	9.56	12.52	10.99
Damaged rows	8.01	9.99	9.12	10.91	9.51
Mean (±0.297)	8.66	11.27	9.34	11.71	10.25
Difference (±0.685)	-1.29	-2.57	-0.44	-1.61	-1.48 (±0.343)
	Percentage ware				
Undamaged rows	86.2	87.0	86.8	82.4	85.6

*for use in comparisons other than vertical.

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POTATOES

Placement of N and K - Deacons Field 1954.

System of replication: 6 randomized blocks of 12 plots each with levels of N by levels of K partially confounded with block differences.

Area of each plot: 0.0141 acre. Area harvested: 0.00566 acre.

Treatments: All combinations of:-
N: None; 0.5; 1.0 cwt per acre as sulphate of ammonia.
K_2O: None; 0.75; 1.5 cwt per acre as sulphate of potash.
Methods of placement: Broadcast on flat before planting;
Side band placement at planting.

Basal dressing: 1.0 cwt P_2O_5 per acre as superphosphate, placement drilled as above.

Cultivations etc.: Ploughed: Oct 21, 1953. Applied broadcast fertilizers, machine planted with placed fertilizers: Apr 26, 1954. Earthed up: July 9. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons per acre: July 29 and again Aug 26. Sprayed with sulphuric acid, 20% B.O.V.: Oct 6. Lifted: Oct 15. Variety: Majestic. Previous crop: Barley.

Standard error per plot:
Total tubers: 0.999 tons per acre or 9.9% (31 d.f.)

Summary of Results

Total tubers: tons per acre

K_2O: cwt per acre	N: cwt per acre					Mean
	None	Broadcast 0.5	Broadcast 1.0	Placed 0.5	Placed 1.0	
	(±0.385)	(±0.545)				(±0.204)
None	8.06	9.22	11.27	9.69	11.51	9.64
	(±0.545)	(±0.771)				(±0.288)
Broadcast						
0.75	7.84	10.55	11.73	10.82	11.88	10.11
1.5	8.13	9.53	11.54	11.12	12.08	10.09
Placed						
0.75	7.94	10.30	11.05	11.58	14.69	10.58
1.5	8.67	11.20	11.88	9.60	12.80	10.47
Mean	8.12 (±0.204)	10.00	11.46	10.42	12.41	10.09
		(±0.288)				

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54/Ce/1.1

LUCERNE

Fertilizer placement and potash top dressings - Highfield, 5 1954 - the 3rd year.

System of replication: 8 randomised blocks of 8 plots each, a high order interaction being confounded with block differences. After first cut, plots split into two for potash top dressing.

Area of each plot: 0.0136 acre. Area of each sub plot: 0.0068 acre.

Treatments, applied 1952: All combinations of:-
P_2O_5: None; 1.0 cwt per acre applied as superphosphate.
K_2O: None; 1.0 cwt per acre applied as muriate of potash.
Method of placement: Broadcast on seedbed; Ploughed in 10".
Starter: None; 2 cwt granular superphosphate per acre placed beneath seed.
Applied 1954 to sub plots (after 1st cut):-
None; 1.0 cwt K_2O per acre as muriate of potash.

Basal dressing: None.

Cultivations, etc.: 1st cut: June 8. Applied potash top dressing: June 18. 2nd cut: Aug 15. 3rd cut: Nov 3.

Standard errors per plot. Dry Matter:

1st cut, whole plot:	2.89 cwt per acre or 12.6%	(42 d.f.)
2nd cut, whole plot:	2.10 cwt per acre or 10.1%	(42 d.f.)
2nd cut, sub plot:	2.18 cwt per acre or 10.5%	(48 d.f.)
3rd cut, whole plot:	1.19 cwt per acre or 20.2%	(42 d.f.)
3rd cut, sub plot:	0.83 cwt per acre or 14.1%	(48 d.f.)
Total of 3 cuts, whole plot:	4.35 cwt per acre or 8.8%	(42 d.f.)

Note: For previous year's results see 53/Cg/1 and 52/Cf/1.

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Summary of Results

Dry Matter: cwt per acre

Treatments applied 1952

	No fertilizer	Superphosphate Broadcast	Superphosphate Ploughed in	Muriate of Potash Broadcast	Muriate of Potash Ploughed in	Superphosphate and Muriate of Potash Broadcast	Superphosphate and Muriate of Potash Ploughed in	Mean
1st cut								
Mean (±1.02)	21.8 (1)	22.2	21.8	23.4	23.5	24.3	24.3	22.9
Starter	(±1.02)			(±1.44)				
None	21.3	22.7	19.8	25.1	23.3	24.0	24.7	22.8
Super	22.3	21.7	23.9	21.7	23.7	24.6	23.9	23.0
Difference (±2.04)	+1.0 (2)	-1.0	+4.1	-3.4	+0.4	+0.6	-0.8	+0.2 (1)
2nd cut								
Mean (±0.74)	20.2 (1)	18.7	19.0	22.8	21.5	22.8	21.2	20.8
Starter	(±0.74)			(±1.05)				
None	20.1	19.6	20.5	22.0	22.0	21.9	21.0	20.9
Super	20.3	17.8	17.5	23.6	20.9	23.7	21.3	20.7
Difference (±1.49)	+0.2 (2)	-1.8	-3.0	+1.6	-1.1	+1.8	+0.3	-0.2 (1)
K_2O+: cwt per acre	(±0.65)*			(±0.92)*				
None	19.0	16.6	18.9	20.1	20.2	21.5	19.7	19.4
1.0	21.5	20.9	19.1	25.5	22.8	24.1	22.6	22.2
Difference (±1.09)	+2.5 (3)	+4.3	+0.2	+5.4	+2.6	+2.6	+2.9	+2.8 (4)

(1) ±0.72
(2) ±1.44

(1) ±0.53 (3) ±0.77
(2) ±1.05 (4) ±0.38

*for use in comparisons other than vertical.

+applied June 1954.

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54/Ce/1.3

Dry Matter: cwt per acre

Treatments applied 1952

	No fertilizer	Superphosphate Broadcast	Superphosphate Ploughed in	Muriate of Potash Broadcast	Muriate of Potash Ploughed in	Superphosphate and Muriate of Potash Broadcast	Superphosphate and Muriate of Potash Ploughed in	Mean
3rd cut								
Mean (±0.42)	5.2 (1)	4.7	5.4	7.0	6.6	6.3	6.8	5.9
Starter	(±0.42)			(±0.60)				
None	4.9	5.4	5.3	6.0	6.3	6.2	7.0	5.8
Super	5.4	4.0	5.5	8.1	6.8	6.4	6.5	6.0
Difference (±0.84)	+0.5 (2)	-1.4	+0.2	+2.1	+0.5	+0.2	-0.5	+0.2 (1)
K_2O+: cwt per acre	(±0.33)*			(±0.47)*				
None	4.2	3.2	4.6	6.1	5.2	5.3	5.9	4.8
1.0	6.2	6.1	6.2	8.0	8.0	7.3	7.7	7.0
Difference (±0.42)	+2.0 (3)	+2.9	+1.6	+1.9	+2.8	+2.0	+1.8	+2.2 (4)

(1) ±0.30 (3) ±0.29
(2) ±0.60 (4) ±0.15

Total of 3 cuts

Mean (±1.54)	47.2 (1)	45.6	46.3	53.2	51.6	53.4	52.2	49.6
Starter	(±1.54)			(±2.18)				
None	46.3	47.7	45.6	53.1	51.7	52.2	52.8	49.5
Super	48.1	43.5	46.9	53.4	51.4	54.7	51.7	49.7
Difference (±3.08)	+1.8 (2)	-4.2	+1.3	+0.3	-0.3	+2.5	-1.1	+0.2 (1)

(1) ±1.09
(2) ±2.18

*for use in comparisons other than vertical

+applied June 1954.

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54/Cf/1

BROCCOLI

Effect of manuring on Virus spread - Stackyard Field 1954.

System of replication: 5 randomized blocks of 6 plots each.

Area of each plot: 0.0167 acre. Area harvested: 0.0116 acre.

Treatments: All combinations of:
Hoof: None; 5; 10 cwt per acre.
Dung: None; 20 tons per acre.

Basal dressing, per acre: 4 cwt superphosphate and 2 cwt muriate of potash.

Cultivations, etc.: Ploughed: Oct 22, 1952. Dung applied: Mar 5,1953. Ploughed: Mar 9. Hoof applied: June 12. Basal fertilizers applied, broccoli planted: June 15. Harvested: Various days Apr 1954 - May 1954. Variety: St. George. Previous crop: Wheat.

Standard error per plot:
No. of saleable curds: 0.681 thousands per acre or 26.7% (20 d.f.)

Summary of Results

Dung: tons per acre	Hoof: cwt per acre None	5	10	Mean
No. of saleable curds: thousands per acre				
		(±0.305)		
None	3.17	2.93	1.93	2.67
20	2.93	2.36	1.98	2.42
Mean (±0.215)	3.05	2.64	1.95	2.55
Difference (±0.431)	-0.24	-0.57	+0.05	-0.25 (±0.249)
Weight per saleable curd: lb				
None	0.84	0.89	0.75	0.83
20	0.83	0.90	0.81	0.85
Mean	0.84	0.90	0.78	0.84
Difference	-0.01	+0.01	+0.06	+0.02
Percentage of plants surviving at harvest				
None	69.4	65.0	51.0	61.8
20	63.8	57.0	47.9	56.2
Mean	66.6	61.0	49.4	59.0
Difference	-5.6	-8.0	-3.1	-5.6

General means: Total no. of curds: 4.99 thousands per acre
Plant no. at harvest: 7.64 " " "
Percentage saleable curds out of total no. of curds: 50.1 .

Records of incidence of Cauliflower Mosaic were made.

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CARROTS

Residual effects of soil conditioners - Rothamsted (R), Long Hoos VI and Stackyard; Woburn (W), Stackyard and Warren Field.

System of replication: 4 × 4 Latin square.

Area of each plot: 0.00207 acre. Area harvested: 0.00138 acre.

Treatments applied in 1953:
None and 3 proprietary soil conditioners A, B and C each at 10 cwt per acre active material, rotary cultivated in to 6".

Basal dressing: 5 cwt compound fertilizer (7% N; 7% P_2O_5; 10.5% K_2O) per acre.

Cultivations, etc.:
Long Hoos VI (R). Ploughed: Dec 30, 1953 and again Mar 17, 1954. Roto tilled twice: Apr 23 and Apr 26. Basal fertilizer applied, seed hand drilled at 8 lb per acre: Apr 26. Thinned: July 21. Lifted: Dec 15.
Stackyard (R). Ploughed: Mar 17 and again Apr 14. Roto tilled 3 times: Apr 23, 24, 26. Basal fertilizer applied, seed hand drilled at 8 lb per acre: Apr 26. Thinned: Aug 9. Lifted: Dec 15.
Stackyard (W). Roto tilled: May 10. Basal fertilizer applied, seed drilled: May 18. Singled: Aug 18. Lifted: Dec 15.
Warren Field (W). Roto tilled: May 6. Basal fertilizer applied, seed drilled: May 17. Lifted: Dec 3.
All fields. Variety: James' Scarlet Intermediate.

Standard errors per plot. Roots: tons per acre.
Long Hoos VI (R): 1.49 tons per acre or 7.8% (6 d.f.)
Stackyard (R): 1.41 tons per acre or 28.7% (6 d.f.)
Stackyard (W): 1.04 tons per acre or 13.1% (3 d.f.)*
Warren Field (W): 0.386 tons per acre or 6.8% (6 d.f.)

*1 row of the Latin square received incorrect treatments.

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Summary of Results

	Soil conditioners 10 cwt per acre active material applied 1953				Mean
	None	A	B	C	
Roots: tons per acre					
Rothamsted, Long Hoos VI					
Mean (±0.746)	18.94	20.48	19.36	18.09	19.22
Increase (±1.055)		+1.54	+0.42	-0.85	
Rothamsted, Stackyard					
Mean (±0.706)	5.13	4.72	3.96	5.87	4.92
Increase (±0.999)		-0.41	-1.17	+0.74	
Woburn, Stackyard					
Mean (±0.639)	7.67	7.95	7.14	9.07	7.96
Increase (±0.904)		+0.28	-0.53	+1.40	
Woburn, Warren Field					
Mean (±0.193)	5.08	5.55	5.52	6.37	5.63
Increase (±0.273)		+0.47	+0.44	+1.29	

General Means:	Plant number thousands per acre	Percentage over $1\frac{1}{2}$" diameter
Woburn, Stackyard	137	51.6

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CHEMICAL ANALYSES OF MANURES USED IN THE THREE, FOUR AND SIX COURSE ROTATION EXPERIMENTS 1954

Manures	% Organic Matter	% N	% P_2O_5	% K_2O
Three Course Rotation				
Wheat Straw	81.2	0.45	0.10	0.67
Sulphate of Ammonia		21.0		
Superphosphate			19.7 (Total)	
Muriate of Potash				58.4
Four Course Rotation				
Wheat Straw				
For wheat and ryegrass	79.1	0.32	0.06	0.33
For barley and potatoes	80.0	0.50	0.15	0.75
Adco Compost	14.6	0.38	0.22	0.24
Dung				
For wheat and ryegrass	17.8	0.44	0.19	0.83
For barley and potatoes	18.5	0.44	0.19	0.89
Sulphate of Ammonia		21.0		
Superphosphate			19.4 (Total)	
Mineral Phosphate			27.9	
Muriate of Potash				58.4
Six Course Rotation				
Sulphate of Ammonia		21.0		
Superphosphate			Autumn 19.4 (Total) Spring 19.7 (Total)	
Muriate of Potash				58.4

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METEOROLOGICAL RECORDS ROTHAMSTED 1954

(Departure from long period means in brackets)

Month	Total Hours of Sunshine	Mean Temperature (°F) Air[1]	Dew Point	In ground 1 ft	In ground 4 ft	Ground Frosts[2]	Total Rainfall (in) 1/1000 acre Gauge	Rain Days[3]	Drainage through 20 in soil	Wind[4] m.p.h.
Jan.	66 (+14)	32.7 (-4.7)	32.1	37.7	45.1	20	1.21 (-1.30)	15	0.81	7.4
Feb.	60 (-9)	35.7 (-2.7)	32.7	35.4	41.3	16	2.33 (+0.41)	17	1.23	5.0
Mar.	99 (-19)	41.9 (+0.6)	37.5	40.7	42.0	10	2.59 (+0.68)	17	1.20	5.6
Apr.	175 (+19)	44.7 (-1.1)	35.4	44.9	44.6	18	0.30 (-1.67)	6	0.16	5.6
May	140 (-57)	52.0 (+0.1)	44.2	51.0	47.1	3	2.47 (+0.33)	14	0.16	5.0
June	138 (-66)	56.1 (-1.2)	49.7	56.7	51.4	0	3.67 (+1.52)	15	1.94	4.8
July	147 (-48)	57.5 (-3.2)	51.4	58.2	54.6	0	3.63 (+1.08)	18	0.85	4.4
Aug.	122 (-63)	58.2 (-2.0)	53.8	58.1	56.0	0	3.63 (+1.05)	18	1.62	3.6
Sept.	160 (+15)	55.0 (-1.0)	46.0	55.9	56.1	0	1.96 (-0.42)	19	0.00	4.3
Oct.	91 (-14)	53.3 (+4.4)	50.2	52.6	54.1	1	2.10 (-0.89)	21	0.70	4.4
Nov.	53 (-10)	43.7 (+1.3)	40.6	45.0	50.9	11	5.31 (+2.50)	20	4.64	4.3
Dec.	53 (+8)	42.5 (+3.9)	38.8	41.7	46.7	11	2.00 (-0.56)	17	1.76	6.6
Year*	1304 (-230)	47.8 (-0.4)	42.7	48.2	49.2	90	31.20 (+2.73)	197	15.07	5.1

(1) Mean of maximum and minimum.
(2) Number of nights grass minimum was 30°F or less
(3) Number of days rainfall was 0.01 in. or more.
(4) At 2 metres above ground level.

* Mean or total.

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METEOROLOGICAL RECORDS WOBURN 1954

Month	Total hours of Sunshine	Mean Temperature (°F) Air(1)	Mean Temperature (°F) In ground 1 ft.	Grass minimum: °F	Total rainfall (in.) 8" gauge	Rain(2) days
January	62	36.1	37.6	27.0	0.91	9
February	69	36.0	35.9	25.6	2.22	17
March	101	42.0	41.3	32.1	2.38	13
April	175	44.2	46.8	28.3	0.23	7
May	133	51.9	52.7	39.1	2.61	16
June	132	56.4	58.6	45.1	3.03	17
July	135	58.1	60.2	45.5	2.47	20
August	120	58.6	59.2	47.0	3.50	20
September	166	55.5	56.3	43.2	1.99	20
October	100	53.5	52.8	43.6	2.28	21
November	55	44.0	44.6	32.5	4.17	23
December	61	43.3	41.6	33.5	2.24	15
Year*	1309	48.3	49.0	36.9	28.03	198

(1) Mean of maximum and minimum.

(2) Number of days rainfall was 0.01 in. or more.

* Mean or total.

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CONVERSION FACTORS

Factors for the Conversion of Imperial to Metric Units

1 inch (in.)	= 2·540 centimetres (cm)
1 foot (ft) (=12 in.)	= 30·48 cm
1 yard (yd) (=3 ft)	= 0·9144 metre (m)
1 square yard (yd²)	= 0·8361 m²
1 acre (ac) (=4840 yd²)	= 0·4047 hectare (ha)
1 ounce (oz)	= 28·35 grams (g)
1 pound (lb)	= 0·4536 kilogram (kg)
1 hundredweight (cwt) (=112 lb)	= 50·80 kg
1 ton (=2240 lb)	= 1016 kg = 1·016 metric tons (tonnes) (t)
1 pint	= 0·5682 litre (l)
1 gallon (gal) (=8 pints)	= 4·546 litres
1 fluid ounce = 1/20 pint	= 0·02841 litre = 28·41 ml
1 cubic foot	= 28·32 litres

To convert	*Multiply by*
oz ac^{-1} to g ha^{-1}	70·06
lb ac^{-1} to kg ha^{-1}	1·121
cwt ac^{-1} to kg ha^{-1}	125·5
cwt ac^{-1} to t ha^{-1}	0·1255
ton ac^{-1} to kg ha^{-1}	2511
ton ac^{-1} to t ha^{-1}	2·511
gal ac^{-1} to l ha^{-1}	11·233

The following factors are accurate to about 2 parts in 100:

1 lb ac^{-1} = 1·1 kg ha^{-1}
1 gal ac^{-1} = 11 litres ha^{-1}
1 ton ac^{-1} = 2·5 t ha^{-1}

In general reading of the text there will be no great inaccuracy in regarding:

1 lb = 0·5 kg
1 lb ac^{-1} = 1 kg ha^{-1}

Temperatures

To convert °F into °C subtract 32 and multiply by $\frac{5}{9}$ (0.556)
To convert °C into °F multiply by $\frac{9}{5}$ (1·8) and add 32

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CONVERSION FACTORS

Factors for the Conversion of Metric to Imperial Units

1 centimetre (cm)	=	0·3937 inch (in.) = 0·03281 ft
1 metre (m)	=	1·094 yards (yd)
1 square metre (m^2)	=	1·196 square yards (yd^2)
1 hectare (ha)	=	2·471 acres (ac)
1 gram (g)	=	0·03527 ounce (oz)
1 kilogram (kg)	=	2·205 pounds (lb)
1 kg	=	0·01968 hundredweight (cwt) = 0·0009842 ton
1 metric ton (tonne) (t)	=	0·9842 ton
1 litre	=	1·760 pints = 0·2200 gallon (gal)

1 litre = 1000 millilitres (ml) = 35·20 fluid ounces = 0·03531 cubic foot (ft^3)

To convert	*Multiply by*
g ha^{-1} to oz ac^{-1}	0·01427
kg ha^{-1} to lb ac^{-1}	0·8921
kg ha^{-1} to cwt ac^{-1}	0·007966
t ha^{-1} to cwt ac^{-1}	7·966
kg ha^{-1} to tons ac^{-1}	0·0003983
t ha^{-1} to tons ac^{-1}	0·3983
l ha^{-1} to gal ac^{-1}	0·08902

Plant nutrients

Plant nutrients are best stated in terms of amounts of the elements (P, K, Na, Ca, Mg, S); the old 'oxide' terminology (P_2O_5, K_2O, Na_2O, CaO, MgO, SO_3) is still used in work involving fertilisers and liming since Regulations require statements of P_2O_5, K_2O, etc.

For quick conversions

(accurate to within 2%) the following factors may be used:

$2\frac{1}{3} \times P = P_2O_5$	$\frac{3}{7} \times P_2O_5 = P$
$1\frac{1}{5} \times K = K_2O$	$\frac{5}{6} \times K_2O = K$
$1\frac{2}{5} \times Ca = CaO$	$\frac{7}{10} \times CaO = Ca$
$1\frac{2}{3} \times Mg = MgO$	$\frac{3}{5} \times MgO = Mg$

For accurate conversions:

To convert	*Multiply by*	*To convert*	*Multiply by*
P_2O_5 to P	0·4364	P to P_2O_5	2·2915
K_2O to K	0·8301	K to K_2O	1·2047
CaO to Ca	0·7146	Ca to CaO	1·3994
MgO to Mg	0·6031	Mg to MgO	1·6581

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