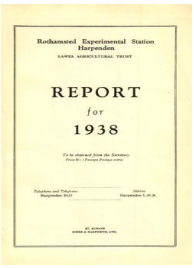
ROTHAMSTED RESEARCH

Rothamsted Report for 1938

Full Table of Content



Continuous Rotation Experiments

Rothamsted Research

Rothamsted Research (1939) *Continuous Rotation Experiments ;* Rothamsted Report For 1938, pp 118 - 139 **- DOI: https://doi.org/10.23637/ERADOC-1-86**

FOUR COURSE ROTATION EXPERIMENT, ROTHAMSTED

RESIDUAL VALUES OF ORGANIC AND PHOSPHATIC FERTILIZERS

(For details, see 1932 Report, p. 127)

MANURES APPLIED, SEASON, 1937-8

Treatment	Organic Fertilisers (cwt. per acre)				Additional Artificial Fertilisers (cwt. per acre)		
	Organic Matter	N	P_2O_5	K_2O	N as S of A	P_2O_5 as Super	K_2O as Mur. of Pot.
1	50 (as F.Y.M.)	1.782	1.344†	4.503†	0.018	0	0
2	50 (as Adco)	1.646	1.520†	1.189	0.154	0	1.811
3	123.75 (as straw)	0.862	0.480	2.652	0.938	0.720	0.348
4	None				0.36	1.2	0.6
5	None				0.36	1.2*	0.6

† Exceeded the prescribed limit, so that no additional artificial fertilizer was required.

* As mineral phosphate.

CULTIVATIONS, etc.

	Barley	Ryegrass	Potatoes	Wheat
Variety—	Plumage Archer	Western Wolths	Ally	Yeoman
Date of sowing ..	Feb. 28	Nov. 3	May 7	Nov. 4
Harvested	Aug. 18	June 18	Oct. 6 and 7	Aug. 11
Previous crop ..	Potatoes	Barley	Wheat	Ryegrass
Manures applied :—				
Lime	Oct. 20			
Dung, Adco, and accompanying artificials ..	Nov. 25	Oct. 4	Nov. 25	Oct. 4
Artificials to straw	Nov. 25, Jan. 18, Feb. 21	Oct 5, 6, 7, Jan. 18, Mar. 10	Nov. 27, Jan. 18, May 5	Oct. 6, Jan. 18, Mar. 10
Treatments 4 & 5	Feb. 21	Nov. 2	May 5	Oct. 18
Cultivations—				
Ploughed ..	Jan. 6-Feb. 4	Oct. 5, 6, 7	Sept. 13, Feb. 4	Oct. 6
Cultivated ..	Feb. 23		Feb. 23	
Harrowed ..	Feb. 25, 28	Oct. 12, Nov. 3	Nov. 25, Mar. 7, May 4, June 4	Sept. 27, Nov. 4, Mar. 18
Rolled	Feb. 25, 28, April 8	Oct. 12, Mar. 19	Feb. 25, Mar. 7, May 4, 18, June 3	Mar. 19
Ridged			Mar. 9, May 5, 24, July 23	
Grubbed ..			July 6, 21	

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PLAN AND YIELDS

Rye grass—AH, plots 1-25
Yields in lb., hay

5 43.6 I	2 27.3 IV	1 35.6 II	3 31.3 V	4 49.4 III
5 31.8 III	1 20.4 V	3 24.1 IV	4 44.3 I	2 33.2 II
3 26.8 III	2 27.3 I	5 31.3 V	4 38.6 II	1 32.0 IV
1 26.2 III	3 53.9 I	4 32.0 IV	5 32.7 II	2 32.2 V
4 20.2 V	1 27.7 I	5 27.2 IV	3 27.8 II	2 28.0 III

N.W. ↑

Wheat—AW, plots 26-50
Yields in lb., grain above, straw below

3 60.4 68.1 III	2 67.0 71.0 IV	5 71.0 82.0 V	4 62.1 73.4 II	1 65.8 90.7 I
4 69.7 80.3 IV	2 60.3 69.2 II	1 57.2 68.8 III	5 64.1 74.4 I	3 59.8 68.7 V
1 61.1 74.9 II	4 63.1 71.4 V	3 91.5 107.5 I	5 68.6 80.4 IV	2 57.3 66.7 III
4 79.4 97.6 I	5 66.6 76.9 III	3 64.7 76.8 II	2 58.6 68.9 V	1 63.4 72.6 IV
2 70.7 89.8 I	4 65.9 74.6 III	3 58.3 63.7 IV	1 54.4 62.6 V	5 63.4 69.6 II

Barley—AB, plots 51-75
Yields in lb., grain above, straw below

3 57.4 50.6 IV	4 84.0 62.0 I	1 41.4 40.6 V	2 54.3 53.7 II	5 76.2 75.8 III
3 59.4 53.1 V	4 76.0 66.0 III	5 56.3 64.7 IV	2 55.6 58.9 I	1 60.3 66.2 II
2 57.1 52.9 IV	4 63.9 60.1 V	3 52.9 53.6 III	1 61.2 56.3 I	5 69.9 77.1 II
5 70.2 62.3 V	1 47.2 42.3 IV	3 53.1 55.9 I	4 71.3 67.2 II	2 51.2 56.8 III
4 77.7 59.8 IV	2 42.4 39.6 V	1 34.6 33.9 III	5 65.1 65.4 I	3 65.1 57.9 II

N.W. ↑

Potatoes—AP, plots 76-100
Yields in lb.

4 142 III	2 116 IV	5 116 II	3 82 V	1 170 I
5 107 V	2 157 I	1 144 III	4 112 II	3 176 IV
2 143 II	1 153 IV	5 89 I	4 75 V	3 139 III
2 124 III	4 280 I	1 114 V	5 67 IV	3 165 II
5 121 III	2 115 V	3 289 I	1 142 II	4 141 IV

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SUMMARY OF RESULTS, 1938

Manure	Year of Cycle	Wheat cwt. per acre Grain	Wheat cwt. per acre Straw	Potatoes tons per acre	Barley cwt. per acre Grain	Barley cwt. per acre Straw	Ryegrass cwt. per acre dry matter
Manure as F.Y.M.	I	24.1	33.2	3.25	22.4	20.6	8.2
	II	22.4	27.5	2.72	22.1	24.3	10.9
	III	21.0	25.2	2.75	12.7	12.4	7.9
	IV	23.2	26.6	2.93	17.3	15.5	9.5
	V	19.9	22.9	2.18	15.2	14.9	6.0
Manure as Adco	I	25.9	32.9	3.00	20.4	21.6	8.1
	II	22.1	25.4	2.73	19.9	19.7	9.9
	III	21.0	24.4	2.37	18.8	20.8	8.5
	IV	24.6	26.0	2.22	20.9	19.4	8.1
	V	21.5	25.3	2.20	15.5	14.5	9.6
Manure as Straw	I	33.5	39.4	5.53	21.3	20.5	15.6
	II	23.7	28.1	3.16	23.9	21.2	8.2
	III	22.1	25.0	2.66	19.4	19.6	8.0
	IV	21.4	23.3	3.37	21.0	18.5	7.2
	V	21.9	25.2	1.57	21.8	19.5	9.6
Super.	I	29.1	35.8	5.35	30.8	22.7	13.2
	II	22.8	26.9	2.14	26.1	24.6	11.4
	III	24.2	27.3	2.72	27.9	24.2	14.5
	IV	25.5	29.4	2.70	28.5	21.9	9.5
	V	23.1	26.2	1.43	23.4	22.0	6.0
Rock Phosphate	I	23.5	27.3	1.70	23.9	24.0	12.8
	II	23.2	25.5	2.22	25.6	28.3	9.7
	III	24.4	28.2	2.31	27.9	27.8	9.5
	IV	25.1	29.5	1.28	20.6	23.7	8.3
	V	26.0	30.1	2.05	25.7	22.8	9.4

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SIX COURSE ROTATION EXPERIMENT

SEASONAL EFFECTS OF N, P_2O_5 AND K_2O

(For details, see 1932 Report, p. 131)

CULTIVATIONS, Etc.—ROTHAMSTED

	Sugar Beet	Barley	Clover Hay	Wheat	Potatoes	Rye
Variety	Kuhn	Plumage Archer	Montgomery Red	Yeoman	Ally	
Date of sowing	May 9	Feb. 28	April 30, 1937	Nov. 4	April 14	Nov. 4
Harvested	Oct. 26-28	Aug. 2	June 27	Aug. 9	Oct. 1	Aug. 2
Previous crop	Rye	Sugar Beet	Barley	Clover	Wheat	Potatoes
Manures applied	May 9	Feb. 23	Oct, 20 Mar. 14	Oct. 18, Mar. 12	April 12	Nov. 1, Mar. 12
Lime applied		Feb. 25				Oct. 20
Cultivations—						
Ploughed	Aug. 17, Nov. 22	Dec. 7		June 29	Sept. 6, Dec. 16	Oct. 18
Cultivated	Mar. 5			Oct. 16	Mar. 5	
Harrowed	Aug. 18, 24, 30, May 7,9	Feb. 25, 28	April 30, 1937	Oct. 18, 21, Nov. 4, Mar. 18	Mar. 7, June 4	Oct. 18, 21, Nov. 4, Mar. 18
Rolled	Aug. 18, 24, 30, May 4, 7, 9	Feb. 25, April 8	April 30, 1937	Oct. 21, Mar. 19	Mar. 7, May 18, June 3	Oct. 21, Mar. 19
Singled	July 7					
Hoed	June 23, July 16, Aug. 9, 11					
Ridged					Mar. 7, May 24, July 12	
Grubbed					July 5	

CULTIVATIONS, Etc.—WOBURN

	Sugar Beet	Barley	Clover Hay	Wheat	Potatoes	Rye
Variety	Kuhn E	Plumage Archer	Broad Red	Yeoman	Ally	(Home Grown)
Date of sowing	April 12	Mar. 2	May 5, 1937	Nov. 4	April 8	Nov. 4
Harvested	Nov. 3	Aug. 6	July 26, 1937	Aug. 5	Sept. 19-22	Aug. 4
Previous crop	Rye	Sugar beet	Barley	Clover	Wheat	Potatoes
Manures applied	April 12	March 2	Dec. 16, March 18	Nov. 3, March 18	April 7	Nov. 3, March 18
Lime applied		Feb. 21				Oct. 16
Cultivations—						
Ploughed	Aug. 23, March 23	Dec. 30		Sept. 23	Aug. 23, March 22	Sept. 25
Harrowed	Sept. 14, March 31, April 12	March 2, 31	May 5, 1937	Nov. 4, March 16	Oct. 14, March 31, May 20	Nov. 4, March 16
Rolled	Sept. 14, April 12					
Singled	June 14, July 8, 25					
Hoed	July 5			Mar. 28-30	June 22	
Ridged					March 31, July 4	

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ROTHAMSTED, 1938

Potatoes—BP, Plots 1-15
Yields in lb.

1N	3K	3P	2P	0P
340	353	387	360	301
2K	0N	1K	3N	4N
354	268	307	358	401
4K	0K	4P	1P	2N
457	361	398	303	350

N ↑

Barley—BB, Plots 16-30
Yields in lb., grain above, straw below

1P	2K	0K	1K	1N
84.6	96.0	97.7	99.2	82.6
71.4	80.0	83.3	86.8	70.4
3K	0P	4N	3P	2P
95.1	97.7	108.9	95.8	95.2
81.4	81.8	95.1	84.2	79.8
4K	3N	2N	0N	4P
105.6	109.2	99.1	71.2	88.0
89.4	92.3	81.9	55.3	72.0

Clover Hay—BC, Plots 31-45
Yields in lb.

0P	3N	3K	0N	1K
36.4	50.0	45.3	31.3	41.6
1P	4N	2K	2P	3P
25.6	31.2	41.4	40.2	35.5
2N	1N	4K	0K	4P
31.4	33.9	61.7	49.0	36.2

N ↑

Wheat—BW, Plots 46-60
Yields in lb., grain above, straw below

1K	3N	4P	2P	0P
96.9	101.2	103.0	100.4	100.0
107.1	109.8	120.5	114.6	116.5
4N	2N	0N	1P	4K
101.8	103.9	98.5	102.8	96.3
107.2	109.6	110.0	115.7	98.7
0K	3P	1N	3K	2K
99.0	108.6	105.4	108.3	102.0
103.0	119.4	121.1	127.7	119.5

Rye—BR, Plots 61-75
Yields in lb., grain above, straw below

2N	3N	4K	3K	4P
73.6	82.1	70.4	70.8	67.4
101.4	114.9	104.6	101.2	92.6
1P	4N	0N	3P	2P
76.9	81.0	56.9	68.7	73.7
102.1	114.5	81.6	98.8	102.8
0P	1N	2K	0K	1K
74.3	59.0	63.4	70.1	69.9
93.7	78.5	84.6	94.4	93.6

N ↑

Sugar Beet—BS, Plots 76-90
Yields in lb., roots (dirty) above, tops centre, sugar percentage below

2N	3N	1N	3P	3K
311	335	307	352	310
494	536	446	536	412
16.68	16.30	15.92	16.07	16.18
0K	1K	2P	0P	1P
351	403	297	270	259
516	544	466	432	384
16.04	16.39	16.07	16.16	15.55
4N	0N	4P	2K	4K
379	330	323	284	235
627	478	486	400	293
15.32	16.39	15.58	16.33	15.55

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WOBURN, 1938

Rye—CR, Plots 1-15
Yields in lb., grain above, straw below

0K	2P	1P	0P	1N
42.5	61.0	54.2	52.2	46.2
50	74	67	60	56
1K	3P	3N	3K	0N
57.0	55.2	75.3	54.0	44.2
68	64	85	64	52
4P	2N	4N	4K	2K
50.5	54.2	67.0	59.4	41.1
64	61	82	74	56

N.W. ↑

Sugar Beet—CS, Plots 16-30
Yields in lb., roots (dirty) above, tops centre, sugar percentage below

0N	3P	2K	1P	0K
473	542	614	564	488
252	289	376	319	244
17.77	17.89	18.23	18.36	17.83
4P	2P	4K	3N	2N
568	476	564	644	540
308	292	376	400	350
18.26	18.26	18.49	18.26	18.46
1N	0P	3K	1K	4N
483	488	578	563	591
239	319	371	388	428
18.49	17.92	18.75	18.95	18.00

Potatoes—CP, Plots 31-45
Yields in lb.

1K	2P	1P	4N	4K
452	492	466	612	574
3P	0K	3N	3K	0N
511	462	506	552	430
4P	0P	2N	2K	1N
440	340	374	458	448

N.W. ↑

Clover Hay—CC, Plots 46-60
Yields in lb., green weights

4K	3K	1K	3N	3P
89	139	120	120	89
0P	1P	4N	1N	2P
88	108	118	150	136
2K	0K	2N	4P	0N
92	94	122	164	156

Barley—CB, Plots 61-75
Yields in lb., grain above, straw below

4N	3N	0N	2K	1K
91.2	92.0	63.0	95.0	93.5
73	73	52	81	83
2N	0P	3K	4P	3P
93.0	94.2	105.7	102.7	106.0
71	78	85	95	109
1P	1N	4K	2P	0K
88.2	90.7	98.2	93.2	95.0
75	70	83	89	87

N.W. ↑

Wheat—CW, Plots 76-90
Yields in lb., grain above, straw below

3P	4P	2K	3K	4N
77.5	78.7	89.2	94.2	89.2
88	91	105	114	109
0N	2P	1P	3N	2N
70.2	91.0	97.5	92.5	89.7
79	103	117	110	111
1N	4K	0P	0K	1K
70.2	83.7	89.5	76.7	85.0
79	96	101	88	99

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ROTHAMSTED, 1938

1.—Mean yields per acre and increments in yield per cwt. of N, P_2O_5 and K_2O.

		Average 1930-37	1938	Standard errors, 1938			Average 1930-37	1938	Standard errors, 1938
Sugar Beet Roots (washed) tons	Yield	7.55	4.65		**Clover Hay** Dry matter cwt.	Yield	19.7*	11.7	
	N	1.79	1.19			N	12.0*	3.3	±4.9
	P	−0.40	1.76			P	0.3*	1.7	±4.9
	K	0.21	−1.80			K	2.4*	3.4	±2.9
Tops tons	Yield	8.35	8.39		**Wheat** Grain cwt.	Yield	23.6	36.4	
	N	3.60	**4.62**	±1.67		N	3.6†	0.6	±3.1
	P	−1.24	3.10	±1.67		P	0.1	2.9	±3.1
	K	−0.39	**−4.12**	±1.00		K	1.1	0.8	±1.9
Sugar percentage	Mean	17.14	16.04		Straw cwt.	Yield	46.3	40.5	
	N	−0.31	−1.17			N	21.6†	−4.1	
	P	−0.48	−0.43			P	2.7	2.7	
	K	0.47	−0.48			K	2.2	1.7	
Total sugar cwt.	Yield	26.4	14.9		**Potatoes** tons	Yield	6.52	6.22	
	N	5.8	2.6	±4.1		N	1.67	**3.33**	±1.13
	P	−2.2	5.3	±4.1		P	1.01	**3.27**	±1.13
	K	1.6	**−6.2**	±2.5		K	2.43	**1.68**	±0.68
Barley Grain cwt.	Yield	28.0	33.9		**Rye** Grain cwt.	Yield	22.4§	25.2	
	N	6.5	**24.3**	±4.1		N	5.2§	**16.9**	±2.7
	P	3.4	−2.0	±4.1		P	1.5§	−5.2	±2.7
	K	0.4	1.7	±2.4		K	−1.0§	0.2	±1.6
Straw cwt.	Yield	35.6	28.7		Straw cwt.	Yield	43.6§	34.7	
	N	13.7	24.2			N	16.2§	24.4	
	P	5.0	−1.6			P	4.4§	−1.3	
	K	4.5	0.9			K	3.6§	4.0	

* Crop failed in 1933 and 1935. † 1931-37. § 1934-37. Significant results in heavy type. Negative sign means depression.

2.—Average percentage increments in yield for each application of N, P_2O_5 and K_2O.

	N		P		K		Standard errors, 1938
	Average 1930-37	1938	Average 1930-37	1938	Average 1930-37	1938	
Sugar Beet							
Roots (washed)	3.04	3.83	−0.52	5.68	1.08	−9.66	
Tops	6.74	**8.26**	−2.15	5.54	−0.53	**−12.29**	±2.99
Sugar percentage	0.02	−1.10	−0.30	−0.40	0.68	−0.74	
Total sugar	2.75	2.62	−0.96	5.37	1.81	**−10.40**	±4.17
Barley—Grain	3.75	**10.75**	1.85	−0.88	0.50	1.24	±1.80
Straw	5.79	12.65	2.34	−0.84	3.28	0.80	
Clover Hay—Dry matter	8.04*	4.20	−2.23*	2.14	2.04*	7.29	±6.26
Wheat—Grain	3.11†	0.25	0.03	1.18	0.94	0.58	±1.27
Straw	7.71†	−1.51	0.73	1.01	1.02	1.06	
Potatoes	3.82	**8.05**	2.37	**7.88**	9.37	**6.76**	±2.73
Rye—Grain	3.68§	**10.08**	1.10§	−3.10	−1.30§	0.20	±1.63
Straw	6.41§	10.54	1.30§	−0.58	−2.08§	2.91	

* Crop failed in 1933 and 1935. † 1931-1937. § 1934-1937. Significant results in heavy type. Negative sign means depression.

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WOBURN, 1938

1.—Mean yields per acre and increments in yield per cwt. of N, P_2O_5 and K_2O.

		Average 1930-37	1938	Standard errors, 1938			Average 1930-37	1938	Standard errors, 1938
Sugar Beet Roots (washed) tons	Yield	7.44	7.89		**Clover Hay** Dry matter cwt.	Yield	27.7*	17.9	
	N	3.50	2.51			N	−10.0*	−10.6	±7.2
	P	0.45	1.65			P	−4.9*	13.3	±7.2
	K	0.39	2.32			K	4.8*	0.5	±4.3
Tops tons	Yield	6.43	5.89		**Wheat** Grain cwt.	Yield	12.5†	30.4	
	N	2.29	**6.10**	±1.36		N	14.0†	**14.3**	±4.8
	P	0.94	−0.63	±1.36		P	−1.4†	−9.9	±4.8
	K	1.00	1.76	±0.82		K	−0.1†	3.3	±2.9
Sugar percentage	Mean	17.05	18.26		Straw cwt.	Yield	26.0†	35.5	
	N	−1.00	0.15			N	31.2†	21.7	
	P	0.48	0.14			P	−2.5†	−11.7	
	K	0.70	0.45			K	−1.4†	4.4	
Total Sugar cwt.	Yield	25.5	28.8		**Potatoes** tons	Yield	8.12	8.48	
	N	10.5	9.2	±5.9		N	4.46	**5.00**	±2.17
	P	2.3	6.2	±5.9		P	0.66	2.93	±2.17
	K	2.3	**9.1**	±3.5		K	0.73	2.32	±1.30
Barley Grain cwt.	Yield	23.5	33.4		**Rye** Grain cwt.	Yield	20.4§	19.4	
	N	18.6	**13.9**	±5.6		N	13.7§	**17.7**	±5.2
	P	0.9	8.4	±5.6		P	−2.3§	−0.6	±5.2
	K	1.2	2.7	±3.3		K	−1.6§	4.4	±3.1
Straw cwt.	Yield	37.8	28.7		Straw cwt.	Yield	35.2§	23.3	
	N	19.6	10.7			N	30.0§	21.2	
	P	0.8	16.1			P	−3.4§	1.3	
	K	2.9	−0.9			K	−2.3§	6.2	

* 1934, crop failed. † 1931-1937. § 1934-1937. Significant results in heavy type. Negative sign means depression.

2.—Average percentage increments in yield for each application of N, P_2O_5 and K_2O.

	N		P		K		Standard errors, 1938
	Average 1930-37	1938	Average 1930-37	1938	Average 1930-37	1938	
Sugar Beet—							
Roots (washed)	6.36	4.77	0.68	3.13	1.98	7.36	
Tops	5.01	**15.53**	2.33	−1.60	3.41	7.45	±3.47
Sugar percentage	−0.65	0.13	0.40	0.11	1.02	0.61	
Total sugar	5.53	4.79	1.05	3.23	2.87	**7.91**	±3.08
Barley—Grain	12.42	**6.26**	0.48	3.77	1.75	2.04	±2.50
Straw	8.45	5.61	0.58	8.41	1.53	−0.77	
Clover Hay—Dry matter	−7.32*	−8.86	−1.42*	11.09	6.73*	0.67	±6.00
Wheat—Grain	15.80†	**7.08**	−1.96†	−4.91	1.22†	2.70	±2.36
Straw	18.39†	9.16	−1.80†	−4.96	0.98†	3.13	
Potatoes	9.03	**8.85**	1.11	5.19	2.02	6.84	±3.85
Rye—Grain	10.46§	**13.72**	−1.53§	−0.46	−1.99§	5.62	±3.99
Straw	12.96§	13.66	−1.51§	0.86	−1.68§	6.70	

* 1934 crop failed. † 1931-1937. § 1934-1937. Significant results in heavy type. Negative sign means depression.

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THREE COURSE ROTATION EXPERIMENT, ROTHAMSTED, 1938

EFFECT OF PLOUGHING IN STRAW
(For details, see 1933 Report, p. 118)

CULTIVATIONS, Etc.

	Barley	Sugar Beet	Potatoes
Variety	Plumage Archer	Kuhn	Ally
Date of Sowing ..	Feb. 28	May 10	April 14
Harvested	Aug. 5	Oct. 25	Oct. 10
Previous crop ..	Potatoes	Barley	Sugar Beet
Manures applied—			
Artificials ..	Dec. 15	Dec. 15, May 9	Dec. 15, April 13
Adco and straw	Dec. 15	Dec. 15	Dec. 15
Cultivations—			
Ploughed ..	Dec. 15-28	Dec. 15-28	Dec. 15-28
Cultivated ..	Feb. 24	Sept. 16, 30, Feb. 24	Feb. 24
Harrowed ..	Feb. 28	Oct. 5, May 9, 10	Mar. 7, June 4
Rolled	Feb. 28, April 8	May 4, 9, 10	Mar. 7, May 18
Singled		July 8	
Hoed		June 23, July 16, Aug. 8, 10	
Ridged ..			Mar. 8, May 26, July 11
Grubbed ..			July 4

The comparisons of winter green-manure crops of vetches and rye, made in previous years of the experiment, have been discontinued.

PLAN AND YIELDS

Barley—DB, Plots 49-72. Yields in lb., grain above, straw below.

St *1* I	**Ad I**	**Ad II**	**Ad I**	**Ad II**	**St *1* I**
81.5	85.4	82.8	83.3	64.0	57.8
73.5	76.1	68.2	68.7	66.0	58.7
St *1* I	**St *2* II**	**St *1* II**	**St *2* I**	**St *2* I**	**St *2* I**
92.7	98.5	95.7	95.6	79.9	71.0
76.3	87.0	83.3	79.9	71.1	64.0
Ar I	**Ar II**	**Ar I**	**Ad I**	**St *1* II**	**Ar II**
89.4	98.7	89.6	85.3	88.7	91.6
74.1	81.3	70.4	68.7	78.3	76.9
St *1* II	**Ad II**	**St *2* II**	**St *2* II**	**Ar I**	**Ar II**
90.6	79.1	91.0	93.2	84.0	85.8
81.4	67.9	78.5	79.3	72.0	76.7

https://doi.org/10.23637/ERADOC-1-86

Sugar Beet—DS, Plots 25-48. Yields in lb., roots (dirty) above, tops centre, sugar percentage below.

St *1* II	Ad I	Ad II	Ar II	Ar I	St *2* I
399	345	307	342	256	342
466	410	398	475	359	446
16.79	17.34	17.05	16.91	17.02	17.66
St *2* II	Ad II	St *2* I	St *2* I	St *1* II	Ar I
380	352	331	362	372	322
450	418	406	442	504	382
17.66	17.66	17.28	16.76	16.39	17.89
Ar II	Ad II	St *2* II	St *1* I	St *1* I	Ad I
282	317	363	353	328	293
420	428	509	430	400	342
16.04	15.95	16.65	17.19	17.10	16.99
Ad I	Ar I	St *1* I	Ar II	St *2* II	St *1* II
250	279	333	269	337	382
356	358	402	408	416	484
15.69	15.92	16.21	15.64	16.82	16.53

Potatoes—DP. Plots 1-24. Yields in lb.

St *1* II	St *2* I	Ar I	St *2* II	Ar II	Ad I
459	355	339	436	418	418
St *1* I	St *2* II	St *1* II	Ar II	Ad II	St *2* I
358	445	460	417	344	382
Ar II	St *2* II	Ar I	St *1* I	Ad I	St *1* II
444	456	289	339	305	438
Ad II	Ar I	Ad I	St *2* I	St *1* I	Ad II
403	301	293	359	338	287

SUMMARY OF RESULTS

	Manured 1937-8					Manured 1936-7				
	Artificials	Adco	Straw St 1	Straw St 2	*Mean*	Artificials	Adco	Straw St 1	Straw St 2	*Mean*
Barley—										
Grain cwt. p.a. ..	41.1	33.6	40.9	42.1	*39.4*	39.1	37.8	34.5	36.7	*37.0*
Straw cwt. p.a. ..	34.9	30.1	36.2	36.4	*34.4*	32.2	31.8	31.0	32.0	*31.8*
Sugar Beet—										
Roots (washed) tons p.a.	5.62	5.95	7.12	6.77	*6.36*	5.27	5.56	6.36	6.36	*5.89*
Tops tons p.a. ..	9.69	9.25	10.82	10.23	*10.00*	8.18	8.24	9.17	9.63	*8.80*
Sugar percentage ..	16.20	16.89	16.57	17.04	*16.68*	16.94	16.67	16.83	17.23	*16.92*
Total sugar cwt. p.a.	18.3	20.1	23.6	23.1	*21.3*	17.9	18.6	21.4	22.0	*20.0*
Potatoes—										
Tons p.a.	9.52	7.69	10.10	9.96	*9.32*	6.91	7.56	7.71	8.15	*7.58*

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LONG PERIOD CULTIVATION EXPERIMENT, 1937

Long Hoos V
(For details, see 1934 Report, p. 175)

CULTIVATIONS, Etc.

	Wheat	Mangolds	Barley
Variety	Victor	Yellow Globe	Plumage Archer
Date of sowing	Nov. 17	May 27	Mar. 9
Harvested	Aug. 11	Nov. 2-4	Aug. 18
Previous crop	Barley	Wheat	Mangolds
Manures applied—			
Cyanamide	Mar. 17	May 21	Mar. 2
Nitro-chalk	Mar. 15	May 21, July 27	Mar. 2
Super. & mur. pot. ..		May 21	
Cultivations—			
Ploughed	Sept. 10	Feb. 2	Feb. 2-4
Cultivated	Sept. 23	Sept. 15, 30, Feb. 14	Feb. 5-14
Simared*	Nov. 11	May 19	Feb. 22
Harrowed	Nov. 11, 17, Mar. 18	Oct. 5, 18, May 23, 27	Mar. 7, 9
Hoed		June 29, July 18, Aug. 9, 10	
Rolled	Mar. 19	May 18, 19, 23	May 19
Singled		July 8	

* Simared or rotary cultivated.

PLAN AND YIELDS IN LB.

Barley
Grain Left, Straw Right

1	P Sh Cy	16.7	25.8		C Sh N	15.6	22.9	73
	P D Cy	19.8	23.7		S Sh N	28.1	30.4	
	S Sh N	31.6	28.9		S D Cy	24.2	26.8	
	C D N	33.6	30.9		P Sh Cy	14.9	25.6	
	S D Cy	30.9	26.1		S D N	23.1	26.4	
B	C Sh N	36.4	31.6		P Sh N	19.1	26.9	A
	S Sh Cy	28.0	25.5		P D N	18.5	27.0	
	C D Cy	33.1	27.9		S Sh Cy	27.5	31.5	
	C Sh Cy	35.8	31.7		C Sh Cy	22.4	28.1	
	S D N	37.3	32.7		C D N	26.0	31.5	
	P D N	30.3	29.3	N	C D Cy	19.8	29.7	
	P Sh N	37.3	27.2	↑	P D Cy	19.0	27.0	
	C Sh N	35.8	27.2		C D Cy	22.6	29.4	
	S Sh Cy	32.7	26.8		P Sh Cy	22.1	29.4	
	P D Cy	33.4	30.6		S D Cy	32.6	32.4	
	C D Cy	35.7	28.8		P D Cy	25.1	31.9	
	C Sh Cy	37.1	31.4		S Sh N	30.4	27.1	
C	P Sh Cy	37.3	31.7		C Sh Cy	25.7	30.8	C
	S Sh N	36.7	30.8		S D N	28.2	28.8	
	C D N	33.5	29.0		C D N	19.7	22.3	
	S D N	33.1	26.4		P Sh N	29.4	32.1	
	P Sh N	37.8	30.2		P D N	25.2	28.8	
	S D Cy	34.2	28.3		S Sh Cy	28.2	27.3	
	P D N	20.9	19.1		C Sh N	20.8	23.7	

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Mangolds

Roots Left, Tops Right

	S Sh N	232	99	S Sh N	236	106	
	C Sh N	230	106	S D Cy	254	86	
	C Sh Cy	228	105	P Sh Cy	275	107	
	P D N	280	127	P Sh N	262	130	
	C D N	233	100	P D Cy	310	130	
C	P Sh Cy	246	100	C D Cy	262	100	C
	C D Cy	238	102	S D N	288	106	
	S D Cy	238	90	P D N	280	138	
	P Sh N	246	112	S Sh Cy	204	79	
	S Sh Cy	224	81	C Sh N	235	114	
	S D N	278	100	C D N	218	112	
	P D Cy	262	121	C Sh Cy	205	100	
	S D Cy	225	90	S D N	242	107	
	P Sh N	228	118	S Sh N	215	108	
	P Sh Cy	232	118	P D Cy	209	107	
	P D Cy	252	124	C D N	210	113	
	C Sh Cy	228	120	P D N	227	134	
A	S Sh Cy	247	102	P Sh Cy	197	100	B
	C Sh N	215	110	S Sh Cy	204	98	
	C D Cy	265	112	C Sh N	238	120	
	P D N	208	114	C D Cy	210	98	
	C D N	208	105	C Sh Cy	182	94	
	S Sh N	231	107	S D Cy	222	95	
	S D N	260	106	P Sh N	214	116	

Wheat

Grain Left, Straw Right

	C Sh N	10.6	14.4	C D Cy	11.7	14.8	
	S Sh N	14.8	19.7	C Sh Cy	17.3	21.7	
	P Sh Cy	26.9	30.1	C D N	27.3	33.2	
	C D Cy	23.6	26.4	P Sh N	30.1	32.4	
	C Sh Cy	20.5	25.5	C Sh N	19.7	23.3	
C	C D N	24.7	29.8	S D Cy	19.5	23.5	A
	S Sh Cy	14.4	19.1	S Sh N	17.0	25.0	
	S D Cy	17.9	23.6	P D Cy	27.6	31.4	
	P D Cy	23.3	27.7	S Sh Cy	14.5	21.0	
	P Sh N	31.2	35.8	P Sh Cy	25.1	27.9	
	P D N	29.5	33.5	P D N	30.0	32.0	
	S D N	18.0	25.0	S D N	17.2	24.3	
	S D Cy	18.8	22.2	S D Cy	13.8	20.2	
	C Sh Cy	20.9	25.6	C D Cy	18.5	22.5	
	C D Cy	18.0	22.0	C Sh Cy	17.2	18.8	
	P D Cy	35.1	36.4	P Sh N	26.2	30.8	
	C D N	23.4	28.1	C D N	17.8	25.2	
B	S D N	17.7	21.3	S Sh N	13.4	20.1	C
	C Sh N	19.0	22.5	S D N	10.8	18.2	
	P Sh Cy	25.1	24.9	S Sh Cy	12.7	17.3	
	S Sh N	14.1	18.9	P D Cy	23.0	27.5	
	P Sh N	29.5	33.0	P D N	23.5	28.0	
	S Sh Cy	11.1	15.9	C Sh N	19.8	24.7	
72	P D N	31.8	34.7	P Sh Cy	27.9	29.6	144

https://doi.org/10.23637/ERADOC-1-86

Summary of Results

Last year / This year	Continuous P P	Continuous S S	Continuous C C	Mean	Cycle A C P	Cycle A P S	Cycle A S C	Cycle B S P	Cycle B C S	Cycle B P C	Mean
Wheat				GRAIN : cwt. per acre							
N D ..	15.4	8.4	12.3	*12.0*	17.4	10.0	15.8	18.5	10.3	13.6	*14.3*
N Sh ..	16.7	8.2	8.8	*11.2*	17.5	9.9	11.4	17.1	8.2	11.0	*12.5*
Cy D ..	13.4	9.2	12.2	*11.6*	16.0	11.3	6.8	20.4	10.9	10.4	*12.6*
Cy Sh ..	15.9	7.9	10.9	*11.6*	14.6	8.4	10.0	14.6	6.4	12.1	*11.0*
St. Errors		±1.32		*±0.759*							
				STRAW : cwt. per acre							
N D ..	17.8	12.5	16.0	*15.4*	18.6	14.1	19.3	20.1	12.4	16.3	*16.8*
N Sh ..	19.3	11.5	11.3	*14.0*	18.8	14.5	13.5	19.2	11.0	13.1	*15.0*
Cy D ..	16.0	12.7	14.2	*14.3*	18.2	13.6	8.6	21.1	12.9	12.8	*14.5*
Cy Sh ..	17.3	10.6	12.9	*13.6*	16.2	12.2	12.6	14.5	9.2	14.9	*13.3*
Mangolds				ROOTS : tons per acre							
N D ..	16.25	16.42	13.09	*15.25*	12.07	15.09	12.07	13.17	14.04	12.19	*13.11*
N Sh ..	14.74	13.58	13.49	*13.94*	13.23	13.41	12.48	12.42	12.48	13.81	*12.97*
Cy D ..	16.60	14.28	14.51	*15.13*	14.62	13.06	15.38	12.13	12.88	12.19	*13.38*
Cy Sh ..	15.12	12.42	12.56	*13.37*	13.46	14.33	13.23	11.43	11.84	10.56	*12.48*
St. Errors		±0.605		*±0.349*							
				TOPS : tons per acre							
N D ..	7.69	5.98	6.15	*6.61*	6.62	6.15	6.09	7.78	6.21	6.56	*6.57*
N Sh ..	7.02	5.95	6.38	*6.45*	6.85	6.21	6.38	6.73	6.27	6.96	*6.57*
Cy D ..	7.28	5.11	5.86	*6.08*	7.20	5.22	6.50	6.21	5.51	5.69	*6.06*
Cy Sh ..	6.01	4.64	5.95	*5.53*	6.85	5.92	6.96	5.80	5.69	5.46	*6.11*
Barley				GRAIN : cwt. per acre							
N D ..	13.4	17.8	15.4	*15.5*	10.7	13.4	15.1	17.6	21.6	19.5	*16.3*
N Sh ..	19.5	19.5	16.4	*18.5*	11.1	16.3	9.1	21.6	18.3	21.1	*16.2*
Cy D ..	17.0	19.4	16.9	*17.8*	11.0	14.0	11.5	11.5	17.9	19.2	*14.2*
Cy Sh ..	17.2	17.7	18.2	*17.7*	8.6	16.0	13.0	9.7	16.2	20.8	*14.0*
St. Errors		±1.73		*±0.999*							
				STRAW : cwt. per acre							
N D ..	13.9	16.0	14.9	*14.9*	15.7	15.3	18.3	16.9	19.0	17.9	*17.2*
N Sh ..	18.1	16.8	14.8	*16.6*	15.6	17.6	13.3	15.8	16.8	18.3	*16.2*
Cy D ..	18.1	17.6	16.9	*17.5*	15.7	15.6	17.2	13.8	15.1	16.2	*15.6*
Cy Sh ..	17.7	15.7	18.0	*17.1*	14.9	18.3	16.3	15.0	14.8	18.4	*16.3*

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Mean of Nitro-Chalk and Cyanamide

Last year / This year	Continuous P P	Continuous S S	Continuous C C	Mean	Cycle A C P	Cycle A P S	Cycle A S C	Cycle B S P	Cycle B C S	Cycle B P C	Mean
Wheat				GRAIN : cwt. per acre							
D	14.4[1]	8.8[1]	12.2[1]	*11.8*[3]	16.7	10.6	11.3	19.4	10.6	12.0	*13.4*
Sh	16.3[1]	8.0[1]	9.8[1]	*11.4*[3]	16.0	9.2	10.7	15.8	7.3	11.6	*11.7*
Mean ..	*15.4*[2]	*8.4*[2]	*11.0*[2]	*11.6*	*16.4*	*9.9*	*11.0*	*17.6*	*9.0*	*11.8*	*12.6*
	St. Errors (1) ±0.930, (2) ±0.658, (3) ±0.537.										
				STRAW : cwt. per acre							
D	16.9	12.6	15.1	*14.9*	18.4	13.8	14.0	20.6	12.6	14.6	*15.7*
Sh	18.3	11.0	12.1	*13.8*	17.5	13.4	13.0	16.8	10.1	14.0	*14.1*
Mean ..	*17.6*	*11.8*	*13.6*	*14.3*	*18.0*	*13.6*	*13.5*	*18.7*	*11.4*	*14.3*	*14.9*
Mangolds				ROOTS : tons per acre							
D	16.42[1]	15.35[1]	13.80[1]	*15.19*[3]	13.34	14.08	13.72	12.65	13.46	12.19	*13.24*
Sh	14.93[1]	13.00[1]	13.02[1]	*13.65*[3]	13.34	13.87	12.86	11.92	12.16	12.18	*12.72*
Mean ..	*15.68*[2]	*14.18*[2]	*13.41*[2]	*14.42*	*13.34*	*13.98*	*13.29*	*12.28*	*12.81*	*12.19*	*12.98*
	St. Errors (1) ±0.428, (2) ±0.303, (3) ±0.247.										
				TOPS : tons per acre							
D	7.48	5.54	6.00	*6.34*	6.91	5.68	6.30	7.00	5.86	6.12	*6.31*
Sh	6.52	5.30	6.16	*5.99*	6.85	6.06	6.67	6.26	5.98	6.21	*6.34*
Mean ..	*7.00*	*5.42*	*6.08*	*6.17*	*6.88*	*5.87*	*6.48*	*6.63*	*5.92*	*6.16*	*6.32*
Barley				GRAIN : cwt. per acre							
D	15.2[1]	18.6[1]	16.2[1]	*16.7*[3]	10.8	13.7	13.3	14.6	19.8	19.4	*15.3*
Sh	18.4[1]	18.6[1]	17.3[1]	*18.1*[3]	9.8	16.2	11.0	15.6	17.2	21.0	*15.1*
Mean ..	*16.8*[2]	*18.6*[2]	*16.8*[2]	*17.4*	*10.3*	*15.0*	*12.2*	*15.1*	*18.5*	*20.2*	*15.2*
	St. Errors (1) ±1.22, (2) ±0.863, (3) ±0.704.										
				STRAW : cwt. per acre							
D	16.0	16.8	15.9	*16.2*	15.7	15.4	17.8	15.4	17.0	17.0	*16.4*
Sh	17.9	16.2	16.4	*16.8*	15.2	18.0	14.8	15.4	15.8	18.4	*16.3*
Mean ..	*17.0*	*16.5*	*16.2*	*16.6*	*15.4*	*16.7*	*16.3*	*15.4*	*16.4*	*17.7*	*16.3*

https://doi.org/10.23637/ERADOC-1-86

Conclusions

For wheat grain the mean yields of the plots ploughed, simared and cultivated every year were respectively 15.4, 8.4 and 11.0 cwt. per acre, all differences being significant. The results were similar with the rotating cultivations.

For barley grain there were no significant differences between the effects of the continuous cultivations. On the blocks with rotating cultivations the yields varied irregularly, the plots ploughed this year giving the lowest yields in each case.

For mangold roots the plots ploughed every year gave a significantly higher yield than the plots simared every year, the latter being slightly but not significantly above the plots cultivated every year. With the rotating cultivations the differences between ploughing, simaring and cultivating this year were small.

For mangold roots the deep cultivations gave a significantly higher yield than the shallow cultivations on the continuous part of the experiment. The results with the rotating cultivations were in the same direction though the difference was small. For wheat grain there was little difference between deep and shallow cultivations on the continuous plots, but deep cultivation gave significantly higher yields on the rotating cycles. There were no significant differences between the effects of deep and shallow cultivation on barley grain.

There was no apparent difference between nitro-chalk and cyanamide.

https://doi.org/10.23637/ERADOC-1-86

NEW GREEN MANURING EXPERIMENT

STACKYARD, WOBURN

(For details see 1936 Report, p. 203)

Cultivations, etc.

UPPER HALF: Ploughed: Sept. 27-29. Harrowed, mustard and tares drilled: Oct. 21. Ploughed: March 18. Harrowed, mustard and tares redrilled: March 28. Clover and ryegrass cut: June 17. Dung applied: June 24. Straw applied: July 1. Ploughed: 1-4. Rolled, harrowed, kale drilled and sulphate of ammonia applied to all plots: July 7 and 8. Mineral manures applied to all plots and harrowed: July 9. Kale redrilled: Aug. 11 and 12. Hoed: Aug. 30, Sept. 5, 14 and 20. Harvested: Feb. 13 and 20. Variety: Thousand head. Previous crop: Barley.

LOWER HALF: Ploughed: Feb. 2-4. Harrowed and barley drilled: March 3. Harrowed and Broad Red Clover and Italian Ryegrass drilled: March 31. Harvested: Aug. 11 and 12. Variety: Plumage Archer. Previous crop: Kale.

SPECIAL NOTE: The green manuring crops on the upper half sown in the winter (Oct. 21) were a failure.

W—STACKYARD, 1938

Upper half—Kale. Plan and yields in lb.

20	C	—	—	N	84	T	D	S	2N	144	40
	M	—	—	N	73	R	—	—	N	11	
	F	—	S	2N	171	F	—	—	2N	43	
	M	—	S	2N	174	M	D	S	N	82	
	T	D	S	N	239	F	D	—	2N	166	
	T	—	—	N	212	C	D	—	2N	171	
	C	D	S	2N	301	T	—	S	N	40	
	R	D	—	2N	378	F	D	S	N	89	
	C	—	S	N	335	C	—	S	2N	174	
	R	—	S	2N	230	F	—	—	N	49	
	F	D	—	N	318	R	D	S	N	179	
	M	—	—	2N	295	F	D	S	2N	297	
	C	D	—	N	303	T	D	—	N	212	
	F	—	S	N	270	R	—	S	N	20	
	C	—	—	2N	325	M	—	S	N	40	
	R	D	S	2N	298	M	D	—	N	143	
	T	—	S	2N	288	M	D	S	2N	179	
	C	D	S	N	313	T	—	—	2N	139	
	R	—	—	2N	224	R	D	—	N	158	
1	M	D	—	2N	268	T	D	—	2N	322	21

Lower half—Barley. Plan and yields of grain in lb.

20	C	D	S	N	110	R	—	S	2N	94	40
	M	D	—	2N	106	M	—	S	N	118	
	F	D	—	2N	104	F	—	—	N	94	
	T	—	S	N	83	R	D	—	N	95	
	T	D	—	2N	95	T	D	S	2N	102	
	F	D	S	N	119	F	—	S	2N	94	
	F	D	S	2N	105	R	D	S	N	99	
	T	—	S	2N	95	F	—	—	2N	86	
	R	—	S	N	69	C	D	—	2N	101	
	T	D	—	N	98	R	—	—	2N	80	
	M	—	—	N	78	T	—	—	2N	84	
	F	—	S	N	73	M	—	S	2N	75	
	C	—	S	2N	99	F	D	—	N	81	
	R	—	—	N	99	C	D	S	2N	87	
	R	D	S	2N	106	M	D	S	N	91	
	T	—	—	N	91	C	—	S	N	94	
	M	D	—	N	104	R	D	—	2N	99	
	M	—	—	2N	106	C	—	—	2N	85	
	T	D	S	N	121	M	D	S	2N	84	
1	C	D	—	N	106	C	—	—	N	79	21

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Upper half : Leys and Green Manures : dry matter and nitrogen per cent.

	Fallow	Tares	Mustard	Clover	Ryegrass
	Winter crop : buried			Dry matter : carted off	
Dry matter, cwt. ..	0.2	1.1	0.3	13.8	6.4
Nitrogen per cent. ..	3.64	2.88	3.27	4.12	1.18
	Spring crop : buried			Stubble : buried	
Dry matter, cwt. ..	2.2	23.3	13.4	44.9	44.6
Nitrogen per cent. ..	3.12	1.99	1.16	2.15	0.51

Note.—The dry matter yields for the individual plots are also available. The fallow figures are the weights and nitrogen percentages of the weeds on the plots.

Lower half : barley grain, cwt. per acre

Residual effects of green manures and fertilizers applied to kale in 1937

Leys and green manures prior to kale crop of 1937. Ley sown 1938 under barley.	None None	Tares None	Clover Ryegrass	Mustard None	Ryegrass Clover	*Mean* (±*0.789*)	*Increase* (±*1.11*)
No dung	21.1	21.4	21.7	22.9	20.8	*21.6*	
Dung	24.9	25.3	24.6	23.4	24.3	*24.5*	*+2.9*
No straw	22.2	22.4	22.6	24.0	22.8	*22.8*	
Straw	23.7	24.3	23.7	22.4	22.4	*23.3*	*+0.5*
2 cwt. sulphate of amm.	22.3	23.8	23.6	23.8	22.0	*23.1*	
4 cwt. sulphate of amm.	23.6	22.9	22.6	22.6	23.1	*23.0*	*−0.1*
Mean (±*1.25*)	*23.0*	*23.3*	*23.1*	*23.2*	*22.6*	*23.0*	

Interactions of fertilizers

Grain, cwt. per acre (±1.58)

	2 cwt. sulphate of amm.		4 cwt. sulphate of amm.	
	No dung	Dung	No dung	Dung
No straw ..	21.5	23.6	21.5	24.6
Straw ..	21.2	26.3	22.2	23.5

Conclusions

Upper half :—

The kale crop was a failure, the mean yield being just over 2 tons per acre and for that reason no summary tables are given. There were no significant effects of the green manures or leys. Dung produced a significant increase of 0.83 tons per acre and sulphate of ammonia a significant increase of 0.86 tons per acre.

Lower half :—

There were no effects on the yield of barley grain of the green manures grown before the preceding kale crop, or of the undersowing of clover or ryegrass.

Dung applied to the kale increased the yield of barley grain significantly by 2.9 cwt. per acre. The residual effects of sulphate of ammonia and straw were negligible.

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EXPERIMENT TO COMPARE LEY AND ARABLE ROTATIONS, WOBURN

Stackyard, Series D

The purpose of the experiment is to test the value of a three year ley, three years of lucerne and an arable rotation with a one year ley, as means of building up soil fertility in comparison with a rotation without leys. The effects of these crop sequences are measured by the yields of two following crops of potatoes and barley, which may be termed the indicator crops. Each rotation therefore has five courses.

Rotations

The rotations compared are :—

(1) Three year ley,
(2) Three years of lucerne,
(3) Potatoes, wheat, one year ley,
(4) Potatoes, wheat, kale,

} **potatoes, barley.**

Arrangement

The plan of the experiment is shown on p.138 and the cropping sequence on p.137.

There are five blocks, one for each phase of the five year cycle, so that all the courses of every rotation are represented every year. The rotations begin on block 3 in 1938, and then in successive years on blocks 5, 4, 2, and 1. Each block has eight main plots, two for each rotation. On half the plots the same rotation will continue throughout the experiment. This may cause wide fertility differences if the repeated arable cropping should lead to organic matter shortage. On the remaining plots the ley and arable rotations will alternate so as to provide comparisons at a steadier fertility level. This alternation of rotations can be made in two ways, namely, 1, 3, 2, 4 etc. and 1, 4, 2, 3 etc. The following sequences were chosen :

Cycle	Blocks 1, 3, 4 Sequence of Rotations				Blocks 2, 5 Sequence of Rotations			
1	1	2	3	4	1	2	3	4
2	3	4	1	2	4	3	2	1
3	2	1	4	3	2	1	4	3
4	4	3	2	1	3	4	1	2

Thus, in blocks 1, 3 and 4 the plots carrying rotation 1 in the first cycle will carry rotation 3 in the second cycle, and so on.

With this scheme it will be seen that if rotation 1 follows rotation 3 in any cycle, it follows rotation 4 in the cycle commencing a year later. In the early years of the experiment, the rotations will be duplicated in each block, but after the completion of one full rotation the two plots for any one rotation will have differed in their previous cropping.

The three year ley will be grazed by sheep throughout the three years. The lucerne and the one year ley will be cut for hay. To avoid affecting the barley yields by undersowing and by the inclusion of ryegrass and clover in the straw of some plots but not others, the leys will be sown after the barley crop is harvested.

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Manuring

Each main plot is divided into two sub-plots, one of which will receive dung at the rate of 15 tons per acre applied to the indicator crops of potatoes. The same sub-plots will receive dung throughout the experiment.

All plots will be liberally manured with inorganic fertilizers. The different rotations will receive the same amount of phosphate and potash, but not of nitrogen.

Rates of Application, cwt. per acre

Year of rotation		Sulphate of ammonia	Super-phosphate	Sulphate of potash
1	Potatoes	3	3	1½
	Ley	1	3	1½
	Lucerne	–	3	1½
2	Wheat	1	–	–
	Ley	–	–	–
	Lucerne	–	–	–
3	One year ley	1	–	–
	Kale	3	–	–
	Ley	–	–	–
	Lucerne	–	–	–
4	Potatoes	3	3	1½
5	Barley	1	–	–

Preliminary years

Special arrangements are made for the preliminary years in blocks 5, 4, 2 and 1, and these are shown in the table on p. 137. As far as possible the normal sequence of cropping is followed in the preliminary years. The potato crops on block 4 in 1938, on block 2 in 1939 and on block 1 in 1940, receive the same application of dung applied to sub-plots, as the indicator potato crops in the normal rotation.

Varieties

Lucerne—Provence.
Wheat—Red Standard.
Potatoes—Majestic.
Barley—Plumage Archer.
Kale—Thousand Head.

Grass Ley—
- 14 lbs. Perennial Ryegrass per acre.
- 8 lbs. Cocksfoot per acre.
- 4 lbs. Late Flowering Red Clover per acre.
- 2 lbs. Wild White Clover per acre.

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LEY EXPERIMENT, STACKYARD, WOBURN.

Sequence of cropping

P = Potatoes, B = Barley, W = Wheat, K = Kale, H = one year ley for hay, L = Ley
A = Lucerne (alfalfa)

Block	3	5	4	2	1
Sub-plot Nos.	No dung 43 34 45 40 41 37 47 36 * Dung 44 33 46 39 42 38 48 35	No dung 65 79 68 74 78 69 71 76 * Dung 66 80 67 73 77 70 72 75	No dung 58 60 53 64 55 61 50 51 * Dung 57 59 54 63 56 62 49 52	No dung 31 29 17 19 23 26 22 27 * Dung 32 30 18 20 24 25 21 28	No dung 14 3 2 6 7 12 9 15 * Dung 13 4 1 5 8 11 10 16
1938	L A P P L A P P	Barley	Potatoes	Barley	Barley
1939	L A W W L A W W	L A P P L A P P	Barley	Potatoes	H K H K K H K H
1940	L A H K L A H K	L A W W L A W W	L A P P L A P P	Barley	Potatoes
1941	Potatoes	L A H K L A H K	L A W W L A W W	L A P P L A P P	Barley
1942	Barley	Potatoes	L A H K L A H K	L A W W L A W W	L A P P L A P P
1943	L A P P P P L A	Barley	Potatoes	L A H K L A H K	L A W W L A W W
1944	L A W W W W L A	L A P P P P A L	Barley	Potatoes	L A H K L A H K
1945	L A H K H K L A	L A W W W W A L	L A P P P P L A	Barley	Potatoes
1946	Potatoes	L A H K K H A L	L A W W W W L A	L A P P P P A L	Barley
1947	Barley	Potatoes	L A H K H K L A	L A W W W W A L	L A P P P P L A
1948	L A P P A L P P	Barley	Potatoes	L A H K K H A L	L A W W W W L A
1949	L A W W A L W W	L A P P A L P P	Barley	Potatoes	L A H K H K L A
1950	L A H K A L K H	L A W W A L W W	L A P P A L P P	Barley	Potatoes
1951	Potatoes	L A H K A L K H	L A W W A L W W	L A P P A L P P	Barley
1952	Barley	Potatoes	L A H K A L K H	L A W W A L W W	L A P P A L P P
1953	L A P P P P A L	Barley	Potatoes	L A H K A L K H	L A W W A L W W
1954	L A W W W W A L	L A P P P P L A	Barley	Potatoes	L A H K A L K H
1955	L A H K K H A L	L A W W W W L A	L A P P P P A L	Barley	Potatoes
1956	Potatoes	L A H K H K L A	L A W W W W A L	L A P P P P L A	Barley
1957	Barley	Potatoes	L A H K K H A L	L A W W W W L A	L A P P P P A L
1958	L A P P L A P P	Barley	Potatoes	L A H K H K L A	L A W W W W A L
1959	L A W W L A W W	L A P P L A P P	Barley	Potatoes	L A H K K H A L
1960	L A H K L A H K	L A W W L A W W	L A P P L A P P	Barley	Potatoes

* The second line of subplots receive dung when the whole block carries potatoes.

The above arrangement of blocks and subplots is given to facilitate the understanding of the sequence and the progress of the experiment. The blocks are given in the order 3, 5, 4, 2, 1, since the rotations begin on block 3 in 1938 and on blocks 5, 4, 2 and 1 in 1939 to 1942 respectively. The plots (or pairs of subplots) appearing in the first four columns of each block carry the continuous rotations 1, 2, 3, 4 in this order. The plots appearing in the last four columns carry the sequences of rotations.

PLAN AND YIELDS, 1938

Yields in lb. per plot : Barley : grain left, straw right. Potatoes : total produce left, percentage ware right. Lucerne : green weight

Block										
	1	26.4 * 25.5	3	36.0 36.0	2	3	29.0 33.7	2	31.6 * 34.8	4
	5	31.7 * 32.0	4	39.0 38.0	6	7	43.0 44.0	1	47.3 * 50.0	8
I	9	38.8 39.0	3	47.5 * 43.0	10	11	41.8 * 45.0	2	46.5 45.0	12
	13	34.5 * 37.0	1	38.0 39.0	14	15	47.5 51.0	4	26.0 * 42.0	16
	17	38.8 39.0	3	38.3 * 36.0	18	19	36.7 41.0	4	34.2 * 42.0	20
	21	44.5 * 41.0	3	44.7 41.0	22	23	36.0 41.0	1	27.3 * 38.0	24
II	25	41.0 * 42.0	2	42.2 47.0	26	27	31.7 41.0	4	17.2 * 32.0	28
	29	27.7 38.5	2	25.5 * 32.3	30	31	25.2 34.8	1	13.3 * 33.5	32
	33	212 *	2A	212	34	35	1062 * 91.1	4P	1178 92.4	36
	37	203	2A	241 *	38	39	1028 * 92.9	4P	1188 92.8	40
III	41		1L	*	42	43		1L	*	44
	45	1136 89.7	3P	1150 * 91.9	46	47	1213 92.4	3P	1268 * 94.7	48
	49	1372 *	3	1076	50	51	961	4	1315 *	52
	53	1106	3	1426 *	54	55	1078	1	1312 *	56
IV	57	1510 *	1	1114	58	59	1471 *	2	1043	60
	61	962	2	1374 *	62	63	1395 *	4	903	64
	65	26.2 43.0	1	31.2 * 45.0	66	67	24.5 * 46.0	3	22.0 47.0	68
	69	25.7 37.0	2	38.5 * 54.0	70	71	36.2 56.0	3	26.5 * 44.0	72
V	73	33.7 * 60.0	4	50.2 71.0	74	75	40.8 * 59.0	4	32.8 61.0	76
	77	44.7 * 64.0	1	54.0 77.0	78	79	40.2 72.0	2	26.2 * 74.0	80

Barley

Barley

Potatoes

Barley

Potatoes (P)
Ley (L)
Lucerne (A)

Area of each Sub-plot : 0.0390 acre.

* These sub-plots receive dung when the whole block carries potatoes (block IV in 1938).
1, 2, 3, 4 refer to the rotations, see p. 135.
The centre pathway serves as a road for bringing on sheep when the ley plots are to be grazed.

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BLOCK I. Ploughed : Sept. 11, 20, March 7 and 8. Harrowed and barley drilled : March 9. Manures applied : March 10. Cut : Aug. 25 and 27. Variety : Plumage Archer.

BLOCK II. Ploughed : Sept. 11, 20 and March 8. Harrowed and barley drilled : March 9. Manures applied : March 10. Cut : Aug. 27. Variety : Plumage Archer.

BLOCK III. Ploughed : Sept. 11, 20, March 17 and 18. Harrowed : April 21 and 22. Rolled and bouted up for potatoes : April 22. Artificials applied and potatoes planted : April 23. Ley and lucerne plots rolled and harrowed : May 19. Seeds sown, harrowed, rolled and lucerne sown : May 20. Manures applied on ley and lucerne plots : May 21. Potato plots hoed : June 22. Lucerne plots hoed : July 1-5. Potato plots rebouted : July 7. Seeds plots grazed by sheep : Aug. 2-9 and Sept. 6-14. Lucerne cut : Sept. 14. Potatoes lifted : Sept. 22-28. Varieties : Potatoes : Majestic. Lucerne : Garton's Provence.

BLOCK IV. Ploughed : Sept. 11-20. Dung applied : March 14. Ploughed and harrowed : March 31. Rolled and bouted up for potatoes : April 21. Artificials applied and potatoes planted : April 22. Hoed and bouts broken down : June 22. Bouts built up : July 5. Potatoes lifted : Sept. 30, Nov. 16 and 18. Variety : Majestic.

BLOCK V. Ploughed : Sept. 11, 20 and March 7. Harrowed, rolled and barley drilled : March 9. Manures applied : March 10. Rolled : May 20. Cut : Aug. 25. Variety : Plumage Archer.

SPECIAL NOTE. Potatoes in Block III passed over a $1\frac{5}{8}$ inch riddle to determine percentage ware.

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