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Report for 1934

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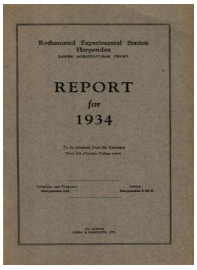

Continuous Rotation Experiments

Rothamsted Research

Rothamsted Research (1935) *Continuous Rotation Experiments ;* Report For 1934, pp 163 - 180 **- DOI: https://doi.org/10.23637/ERADOC-1-66**

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FOUR COURSE ROTATION EXPERIMENT, ROTHAMSTED

RESIDUAL VALUES OF HUMIC AND PHOSPHATIC FERTILISERS

For details, see 1932 Report, p. 127

MANURES APPLIED, SEASON 1933-4

Treatment.	Organic Fertilisers (cwt. per acre)				Additional Artificial Fertilisers (cwt. per acre).		
	Organic Matter.	N.	K_2O	P_2O_5	N. as S. of A.	K_2O as Mur. Pot.	P_2O_5 as Super.
1	50 (as F.Y.M.)	1.364	1.659	0.944	0.436	1.341	0.256
2	50 (as Adco)	1.717	0.687	1.454†	0.083	2.313	None†
3	150.23 (as straw)	0.989	2.637	0.390	0.811	0.363	0.810
4		None			0.36	0.6	1.2
5		None			0.36	0.6	1.2*

* As mineral phosphate.

† The weight of P_2O_5 in the Adco given per acre exceeded the limit of 1.2 cwt., so that no superphosphate had to be added.

CULTIVATIONS, ETC.

	Barley.	Seeds.	Potatoes.	Wheat.
Variety	Plumage Archer	Italian ryegrass and commercial white clover.	Ally	Yeoman
Date of Sowing ..	March 26	April 29	April 17	Oct. 23
Manures applied—				
Dung and Adco	Oct. 30	Oct. 30	Oct. 30	Oct. 16
Artificials to Adco and Dung ..	Oct. 30		Oct. 30	Oct. 16
Straw	Oct. 30	Oct. 30, Dec. 18, April 5	Oct. 30	Oct. 16
Artificials to straw	Oct. 30, Dec. 18, March 15	Oct. 30, Dec. 18, April 5	Oct. 30, Dec. 18, April 17	Oct. 16, Dec. 18, April 6
Treatments 4 and 5	March 15	April 5	April 17	Oct. 24, April 6
Date of harvesting	Aug. 13-16	June 28	Oct. 10	Aug. 8
Previous crop ..	Potatoes	Barley	Wheat	Seeds hay
Cultivations—				
Ploughing ..	Nov. 2-6		Nov. 2-6	June 23-30, Oct. 17 and 18
Harrowing ..	March 26 and 27	April 29	April 13, May 19	Oct. 23 and 24, April 7
Rolling	April 10			April 10
Hoeing			May 17	
Ridging			April 16, June 15, July 10	
Grubbing ..			May 25, June 8, July 2	

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PLAN AND YIELDS

Clover Hay—AH, plots 1-25
Yields in lb., green weights

N.W.

5 56 II	2 42 V	1 41 III	3 21 I	4 53 IV
5 51 IV	1 69 I	3 28 V	4 59 II	2 30 III
3 34 IV	2 25 II	5 32 I	4 51 III	1 31 V
1 26 IV	3 13 II	4 48 V	5 52 III	2 59 I
4 55 I	1 35 II	5 54 V	3 49 III	2 27 IV

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

N.W.

3 59.6 71.4 IV	2 67.3 77.7 V	5 63.7 76.6 I	4 65.1 78.2 III	1 68.4 84.4 II
4 69.5 84.5 V	2 49.9 57.1 III	1 65.6 78.4 IV	5 63.3 76.0 II	3 80.5 97.0 I
1 61.0 72.2 III	4 64.5 78.8 I	3 62.6 79.4 II	5 71.3 87.2 V	2 63.5 72.0 IV
4 79.8 99.4 II	5 72.7 89.8 IV	3 78.3 94.0 III	2 84.8 104.0 I	1 64.9 72.6 V
2 75.5 89.5 II	4 67.7 81.8 IV	3 69.1 81.6 V	1 88.5 110.5 I	5 65.9 76.8 III

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

N.W.

3 71.7 71.0 V	4 74.3 68.0 II	1 86.1 87.9 I	2 63.8 69.7 III	5 64.5 77.5 IV
3 81.8 77.4 I	4 72.0 75.2 IV	5 70.7 82.3 V	2 64.5 73.5 II	1 63.4 75.1 III
2 71.0 71.2 V	4 72.1 71.4 I	3 69.5 74.8 IV	1 69.8 74.2 II	5 54.4 73.1 III
5 59.2 62.8 I	1 59.4 62.6 V	3 70.0 73.5 II	4 69.4 76.6 III	2 56.0 69.2 IV
4 67.8 68.4 V	2 66.0 67.5 I	1 53.1 56.6 IV	5 58.3 60.7 II	3 65.7 68.0 III

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

N.W.

4 211 IV	2 124 V	5 210 III	3 262 I	1 230 II
5 187 I	2 202 II	1 152 IV	4 239 III	3 222 V
2 148 III	1 136 V	5 195 II	4 276 I	3 181 IV
2 162 IV	4 200 II	1 287 I	5 148 V	3 209 III
5 187 IV	2 144 I	3 124 II	1 138 III	4 280 V

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SUMMARY OF RESULTS, 1934

Manure.	Year of Cycle.	Wheat. Cwt. per Acre.		Potatoes, tons per acre.	Barley. Cwt. per Acre.		Seeds Hay. Cwt. per acre dry matter.
		Grain.	Straw.		Grain.	Straw.	
Manure as F.Y.M.	I	32.4	40.5	5.49	31.6	32.2	19.8
	II	25.1	30.9	4.40	25.6	27.2	10.0
	III	22.4	26.5	2.64	23.2	27.5	11.8
	IV	24.0	28.7	2.92	19.5	20.7	7.4
	V	23.8	26.6	2.59	21.8	22.9	8.9
Manure as Adco	I	31.1	38.1	2.75	24.2	24.7	16.9
	II	27.7	32.8	3.85	23.6	26.9	7.2
	III	18.3	20.9	2.84	23.4	25.5	8.6
	IV	23.3	26.4	3.09	20.5	25.4	7.7
	V	24.7	28.5	2.38	26.0	26.1	12.1
Manure as Straw	I	29.5	35.6	5.02	30.0	28.4	6.0
	II	22.9	29.1	2.38	25.7	26.9	3.7
	III	28.7	34.4	4.00	24.1	24.9	14.0
	IV	21.8	26.2	3.46	25.5	27.4	9.7
	V	25.3	29.9	4.24	26.3	26.0	8.0
Super.	I	23.6	28.9	5.27	26.4	26.2	15.8
	II	29.2	36.4	3.82	27.2	24.9	16.9
	III	23.9	28.7	4.57	25.4	28.1	14.6
	IV	24.8	30.0	4.03	26.4	27.6	15.2
	V	25.5	31.0	5.34	24.9	25.1	13.7
Rock Phosphate	I	23.3	28.1	3.58	21.7	23.0	9.2
	II	23.2	27.9	3.73	21.4	22.2	16.1
	III	24.2	28.1	4.01	19.9	26.8	14.9
	IV	26.6	32.9	3.58	23.6	28.4	14.6
	V	26.1	32.0	2.82	25.9	30.2	15.5

The number I denotes application of manure at the beginning of the present season (1933-4) II application in the previous season, etc.

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SIX COURSE ROTATION EXPERIMENT

SEASONAL EFFECTS OF N, P_2O_5, K_2O

(For details see 1932 Report, p. 131)

CULTIVATIONS, ETC.—ROTHAMSTED

	Sugar Beet.	Barley.	Clover Hay.	Wheat.	Potatoes.	Rye
Variety	Kuhn	Plumage Archer	Broad Red	Yeoman	Ally	
Date of Sowing	May 5	March 26	April 27	Oct. 18	April 18	Oct. 16
Manures applied	April 28	March 8	Oct. 28, April 5	Oct. 18, April 6	April 17	Oct. 16, April 6
Date of harvesting	Nov. 27 and 28	Aug. 11	June 28	Aug. 3	Oct. 11	July 27
Previous crop	Forage	Sugar beet	Barley	Clover	Wheat	Potatoes
Cultivations—						
Ploughing	June 22, Sept. 15, Feb. 23	Nov. 27		Oct. 6 and 7	Sept. 14, Feb. 24	Oct. 9,
Harrowing	June 24, Sept. 28 May 2 and 5	Mar. 9 and 26		Oct. 18	Sept. 28, April 13 May 19	Oct. 16, April 14
Rolling	June 24, May 4, 5 and 11	April 10		April 10		
Singling	June 15, 16					
Hoeing	May 28, June 5 July 6 and 20			May 22	May 22, June 9	May 22
Ridging					April 16, June 15, July 10	
Grubbing					May 25, July 3	

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CULTIVATIONS, Etc.—WOBURN

	Sugar Beet.	Barley.	Clover Hay.	Wheat.	Potatoes.	Rye
Variety	Kuhn	Plumage Archer	Broad Red	Yeoman	Ally	
Date of sowing	April 27	March 9	May 12	Oct. 23	April 23	Oct. 23
Manures applied	April 27	March 9	Oct. 23, March 6	Oct. 23, March 7	April 20	Oct. 23, March 7
Date of harvest	Nov. 13	July 24	Crop failed	Aug. 16	Oct. 2	July 25
Previous crop	Forage	Sugar beet	Barley	Clover	Wheat	Potatoes
Cultivations—						
Ploughing	Aug. 1, Oct. 1-3, Oct. 17, Feb. 13	Jan. 30		Aug. 2, Oct. 3 and 4	Aug. 22, Oct. 1-3, Feb. 12	Oct. 3 and 4
Harrowing	Aug. 1 and 23, Oct. 17 and 23, April 12 and 27	March 9, April 23, May 1	May 12	Oct. 17, 23, April 12 and 23, May 2 and 14	Oct. 17 and 23, April 12, May 2, 14 and 23	Oct. 17 and 23, April 12 and 23
Rolling	Aug. 1, April 3 and 23, May 4	Mar. 9, May 2		Aug. 2, March 9, May 4	April 3	March 6
Singling	June 20					
Hoeing	May 14, June 1, 11 and 23, Aug. 18 and19			April 23	May 31, June 11	
Ridging					April 19, May 7, 16, June 29	

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ROTHAMSTED, 1934

Sugar beet—BS, Plots 1-15.
Yields in lb., roots (dirty) above, tops centre, sugar percentage below.

0P 668 390 17.86	2N 725 392 18.00	2K 619 365 18.00	1K 692 365 17.57	4P 618 348 16.85
1N 735 382 18.35	4N 779 454 18.09	0N 690 328 18.81	2P 727 379 18.64	3P 736 406 17.83
3N 738 478 18.00	4K 724 452 18.52	3K 670 332 18.84	0K 635 356 18.32	1P 716 418 18.32

N ↑

Wheat—BW, Plots 16-30.
Yields in lb., grain above, straw below.

0N 67.0 83.5	1P 87.3 119.2	4K 84.4 113.8	0P 87.8 120.0	0K 83.6 117.6
2P 71.4 96.4	4P 83.4 113.6	3K 85.3 114.0	2N 88.3 120.7	1N 77.0 107.8
3P 77.4 105.8	2K 90.3 122.7	1K 78.1 103.4	4N 69.3 91.9	3N 70.7 98.1

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

4P 310	2P 380	2N 384	4N 430	0N 342
0K 172	3P 388	1N 378	1K 365	2K 372
1P 282	0P 287	3N 362	4K 441	3K 392

N ↑

***Rye—BR, Plots 46-60.**
Yields in lb., grain above, straw below.

0P 77.4 119.1	2K 82.0 137.2	3N 87.9 140.1	1N 89.7 139.5	4P 77.8 126.4
3K 80.9 124.6	1K 83.5 141.7	4N 92.0 153.8	0N 83.9 148.9	3P 84.1 138.7
4K 88.1 139.1	2N 87.2 141.8	0K 82.6 140.4	2P 91.2 146.8	1P 82.4 134.6

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

1P 67.6 84.4	2P 83.2 88.6	3N 83.2 91.0	2N 81.1 85.6	3K 76.0 78.0
0K 77.6 88.2	3P 85.5 97.8	4N 76.0 89.8	2K 80.5 89.8	1K 81.6 90.6
4P 79.2 78.6	0P 67.7 76.0	1N 72.9 80.8	4K 79.9 88.1	0N 90.2 89.8

N ↑

Clover Hay—BC, Plots 76-90.
Yields in lb., green weights.

1K 13.5	2K 21.8	0K 20.4	2N 14.1	2P 13.8
4K 13.8	0P 25.9	1N 26.1	4P 14.9	0N 9.7
3K 21.1	4N 21.9	3N 12.8	1P 18.8	3P 11.4

*From 1930 to 1933 a forage mixture was grown and nominally cut green. In fact, this crop was largely rye, which tended to be fairly mature owing to the later maturing properties of the beans and vetches.

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WOBURN, 1934

Barley—CB, Plots 1-15.
Yields in lb., grain above, straw below.

4K 73.5 85.5	1K 74.5 90.5	0K 80.5 97.5	4P 67.0 90.5	0P 79.0 94.5
0N 44.5 52.5	2K 69.0 78.5	2P 84.0 96.5	2N 76.5 84.5	4N 93.0 111.0
3K 64.8 72.5	1P 62.0 63.8	3P 77.0 84.2	3N 76.8 88.8	1N 68.0 72.2

N.W. ↑

Clover Hay—CC, Plots 16-30.
Crop failed.

4N —	2N —	1P —	0N —	4K —
3N —	1N —	3P —	2K —	1K —
0K —	4P —	2P —	0P —	3K —

Sugar Beet—CS, Plots 31-45.
Yields in lb., roots (dirty) above, tops centre, sugar percentage below.

0N 470 227 16.94	1K 568 274 16.99	0K 596 304 16.19	3P 720 388 16.30	3N 818 434 17.02
2K 730 343 16.94	4K 722 344 17.71	2P 891 409 16.85	2N 828 421 17.14	4N 938 515 17.19
3K 648 398 17.54	4P 508 402 17.05	1P 661 463 16.73	1N 662 498 16.82	0P 747 558 16.40

N.W. ↑

Potatoes—CP, Plots 46-60.
Yields in lb.

3P 462	2P 486	0P 479	2K 519	2N 466
4P 476	0N 409	3K 532	0K 490	1N 459
1P 457	4K 544	1K 562	3N 547	4N 482

Wheat—CW, Plots 61-75.
Yields in lb., grain above, straw below.

3P 2.8 8.0	2P 2.5 5.2	4N 3.0 9.0	1N 4.5 9.0	0N 8.0 14.0
1P 5.5 11.5	4P 6.0 10.5	2N 7.0 11.0	3K 19.5 32.5	2K 34.5 47.0
0K 15.8 26.0	0P 9.8 15.5	3N 16.5 52.2	1K 26.8 37.8	4K 32.8 51.5

N.W. ↑

***Rye—CR, Plots 76-90.**
Yields in lb., grain above, straw below.

2N 65.5 106.5	3N 68.5 107.0	1P 70.5 110.5	2P 72.5 113.0	3K 73.5 116.0
4N 61.5 95.0	1N 63.5 98.0	0N 62.5 90.0	2K 61.5 101.0	1K 69.0 109.2
0K 62.0 100.0	3P 59.0 90.5	4P 56.0 85.2	4K 57.8 90.5	0P 65.0 91.5

*From 1930 to 1933 a forage mixture was grown and nominally cut green. In fact, this crop was largely rye, which tended to be fairly mature owing to the later maturing properties of the beans and vetches.

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ROTHAMSTED, 1934

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

		Average, 1930-33	1934	Standard error, 1934			Average, 1930-33	1934	Standard error, 1934
Sugar Beet Roots (washed) tons	Yield	5.63	11.08		**Clover Hay** Dry matter cwt.	Yield	24.7*	4.0	
	N	0.54	1.91	±1.35		N	20.5*	1.8	±2.8
	P	0.51	−0.84	±1.35		P	0.9*	−4.5	±2.8
	K	0.08	1.00	±0.81		K	1.8*	−0.5	±1.7
Tops tons	Yield	9.14	6.96		**Wheat** Grain cwt.	Yield	23.6	28.6	
	N	2.78	**4.15**	±1.26		N	3.7†	−0.3	±5.7
	P	−0.10	−1.14	±1.26		P	1.6	−4.5	±5.7
	K	−0.88	1.13	±0.75		K	1.2	1.2	±3.4
Sugar percentage	Mean	16.48	18.13		Straw cwt.	Yield	50.2	38.8	
	N	0.01	−1.19	±1.00		N	26.2†	1.7	±9.3
	P	−0.44	−1.67	±1.00		P	3.8	−6.3	±9.3
	K	0.32	0.67	±0.60		K	2.0	0.4	±5.6
Total sugar cwt.	Yield	19.0	40.2		**Potatoes** tons	Yield	6.52	6.29	
	N	1.9	4.4			N	1.87	1.88	±1.78
	P	1.4	−6.5			P	0.78	1.82	±1.78
	K	0.7	5.2			K	3.06	**4.02**	±1.07
Barley Grain cwt.	Yield	26.3	28.1		**Rye** Grain cwt.	Yield	35.5**	30.2	
	N	6.1	−4.3	±4.3		N	21.0**	3.5	±3.2
	P	2.0	**9.7**	±4.3		P	−1.0**	0.6	±3.2
	K	1.0	−0.2	±2.6		K	−2.6**	1.2	±1.9
Straw cwt.	Yield	31.4	30.9		Straw cwt.	Yield		49.3	
	N	11.8	2.5	±5.1		N		2.4	±6.8
	P	8.7	4.5	±5.1		P		4.4	±6.8
	K	4.6	−1.8	±3.0		K		−2.8	±4.1

*1930-32. †1931-33. ** Forage crop—total dry matter. See note on previous page. 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 error 1934
	Average 1930-33	1934	Average 1930-33	1934	Average 1930-33	1934	
Sugar Beet—Roots (washed)	1.04	2.59	1.30	−1.14	1.46	2.25	±1.83
Tops	4.76	**8.94**	−0.14	−2.46	−1.72	4.07	±2.71
Sugar percentage	0.58	−0.99	−0.17	−1.38	0.49	0.92	±0.83
Total sugar	0.95	1.64	0.84	−2.41	2.04	3.21	
Barley—Grain	3.94	−2.31	1.43	**5.19**	0.90	−0.14	±2.28
Straw	6.02	1.23	4.24	2.20	3.64	−1.46	±2.46
Clover—dry matter	10.99*	6.70	0.42*	−16.89	2.05*	−2.98	±10.33
Wheat—Grain	3.96†	−0.17	1.06	−2.38	0.97	1.05	±3.01
Straw	9.61†	0.64	0.98	−2.42	0.58	0.26	±3.58
Potatoes	4.36	4.48	2.06	4.34	11.43	**15.99**	±4.25
Rye—Grain	9.11**	1.72	−0.25**	0.33	−2.11**	1.02	±1.61
Straw		0.73		1.34		−1.40	±2.06

*1930-32. †1931-33. **Forage crop—total dry matter. See note on previous page. Significant results in heavy type. Negative sign means depression.

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WOBURN, 1934

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

		Average 1930-33	1934	Standard error 1934			Average 1930-33	1934	Standard error 1934
Sugar Beet Roots (washed) tons	Yield	6.47	9.73		**Clover Hay** Dry matter cwt.	Yield	24.6*		
	N	1.61	**10.11**	±2.81		N	−9.2*	‡	
	P	−0.58	−3.89	±2.81		P	−8.4*		
	K	0.91	1.84	±1.68		K	7.5*		
Tops tons	Yield	6.60	7.12		**Wheat** Grain cwt.	Yield	10.7*	4.6	
	N	1.54	**6.11**	±2.36		N	15.9*	0.5	±4.5
	P	0.79	−4.60	±2.36		P	−0.9*	−2.4	±4.5
	K	2.14	1.46	±1.42		K	−2.6*	3.8	±2.7
Sugar percentage	Mean	17.09	16.92		**Straw** cwt.	Yield	28.8*	8.1	
	N	−1.58	0.47	±0.49		N	34.7*	7.9	±9.9
	P	−0.10	0.58	±0.49		P	−1.9*	−3.2	±9.9
	K	0.63	**1.44**	±0.30		K	−7.9*	6.5	±5.9
Total Sugar cwt.	Yield	22.2	32.9		**Potatoes** tons	Yield	9.29	8.77	
	N	3.3	35.3			N	5.22	**2.79**	±1.08
	P	−2.2	−12.1			P	0.85	−0.01	±1.08
	K	3.8	9.0			K	0.86	0.55	±0.65
Barley Grain cwt.	Yield	21.7	25.9		**Rye** Grain cwt.	Yield	38.6†*	23.1	
	N	17.1	**25.1**	±5.9		N	27.5†*	0.8	±4.4
	P	2.1	−2.1	±5.9		P	−0.7†*	−7.0	±4.4
	K	4.6	−3.5	±3.5		K	0.6†*	−0.6	±2.6
Straw cwt.	Yield	42.6	30.1		Straw cwt.	Yield		35.8	
	N	23.8	**31.7**	±7.8		N		4.5	±8.3
	P	−1.8	2.9	±7.8		P		−7.9	±8.3
	K	7.6	−6.0	±4.7		K		−1.8	±5.0

*1931-33 only. †Forage crop—total dry matter. See note on previous page. ‡ Crop failed. 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 error 1934
	Average 1930-33	1934	Average 1930-33	1934	Average 1930-33	1934	
Sugar Beet—Roots (washed)	3.57	**15.59**	−1.48	−6.00	4.51	4.74	±4.33
Tops	3.36	**12.87**	1.62	−9.70	7.38	5.12	±4.98
Sugar percentage	−0.94	0.41	−0.08	0.51	0.90	**2.12**	±0.44
Total sugar	2.29	16.09	−1.54	−5.49	5.20	6.80	
Barley—Grain	12.88	**14.53**	1.13	−1.23	5.54	−3.35	±3.39
Straw	8.34	**15.79**	−0.60	1.43	4.88	−4.99	±3.89
Clover Hay—Dry matter	−5.58*		−4.94*		7.39*		
Wheat—Grain	19.90*	1.51	−0.56*	−7.90	−5.63*	20.64	±14.71
Straw	17.70*	14.63	−0.83*	−5.95	−6.81*	20.12	±18.25
Potatoes	9.40	**4.78**	0.59	−0.01	1.93	1.57	±1.84
Rye—Grain	11.45*†	0.52	−0.60*†	−4.55	0.08*†	−0.61	±2.85
Straw		1.90		−3.30		−1.23	±3.46

*1931-33 only. †Forage crop—total dry matter. See note on previous page. Significant results in heavy type. Negative sign means depression.

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THREE COURSE ROTATION EXPERIMENT ROTHAMSTED, 1934

EFFECT OF PLOUGHING IN STRAW AND OF WINTER GREEN-MANURE CROPS

For details see 1933 Report, p. 118.

CULTIVATIONS, ETC.

	Barley	Sugar Beet	Potatoes
Variety	Plumage Archer	Kuhn	Ally
Date of sowing	March 26	May 5	April 18
Manures applied			
Artificials ..	October 4, March 9	September 18, May 3	October 21, April 18
Adco and straw	October 4	September 18	October 21
Date of Harvesting	August 11	October 26-30	October 10
Previous crop ..	Potatoes	Barley	Sugar Beet
Cultivations—			
Ploughing ..	October 5-6, February 26-27	September 19, April 18-19	October 21-23, April 11
Harrowing ..	October 6, March 9 & 26	September 20, May 4 & 5	October 23, April 13
Rolling ..	April 11	May 4, 5 & 11	
Singling ..		June 18-21	
Hoeing ..		May 22-28, June 11 &28 July 4, 20, 23 & 24	
Ridging ..			April 17, June 16, July 10
Grubbing ..			May 26, June 8

PLAN AND YIELDS

Potatoes—DP, Plots 49-72. Yields in lb.

N

St 1 R I 309	Ad R I 294	Ad V II 260	Ad V I 258	Ad R II 233	St 1 V I 247
St 1 O I 302	St 2 V II 359	St 1 V II 390	St 2 V I 226	St 2 R I 248	St 2 O I 266
Ar R I 248	Ar R II 357	Ar O I 237	Ad O I 254	St 1 O II 352	Ar V II 338
St 1 R II 351	Ad O II 258	St 2 R II 247	St 2 O II 351	Ar V I 262	Ar O II 340

Barley—DB, Plots 25-48. Yields in lb., grain above, straw below.

N

St 1 O II 56.7 68.8	Ad O I 57.4 65.6	Ad R II 39.0 43.5	Ar V II 61.5 68.0	Ar R I 52.8 59.2	St 2 O I 60.9 65.6
St 2 O II 60.7 79.8	Ad V II 66.3 76.7	St 2 R I 49.8 60.0	St 2 V I 64.7 69.6	St 1 R II 57.8 67.2	Ar O I 66.7 70.3
Ar R II 54.3 69.7	Ad O II 68.1 79.9	St 2 R II 58.6 70.6	St 1 V I 67.0 73.5	St 1 R I 53.7 58.3	Ad V I 59.9 63.6
Ad R I 26.1 46.4	Ar V I 51.9 63.1	St 1 O I 58.8 66.7	Ar O II 60.9 71.1	St 2 V II 63.1 69.4	St 1 V II 50.4 61.1

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Sugar Beet—DS, Plots 1-24. Yields in lb., roots (dirty) above, tops centre, sugar percentage below.

N

St 1 R II 624 448 19.81	**St 2 R I** 665 215 20.22	**Ar R I** 500 284 19.38	**St 2 O II** 626 403 19.21	**Ar O II** 684 519 18.09	**Ad O I** 627 550 18.14
St 1 O I 650 447 19.21	**St 2 R II** 640 416 19.70	**St 1 O II** 636 470 19.67	**Ar V II** 638 506 18.95	**Ad O II** 662 413 19.67	**St 2 O I** 590 430 19.27
Ar R II 622 438 19.56	**St 2 V II** 628 546 18.60	**Ar V I** 613 460 18.86	**St 1 R I** 667 400 19.27	**Ad R I** 455 170 19.87	**St 1 V II** 565 435 19.38
Ad V II 687 556 18.40	**Ar O I** 621 478 18.35	**Ad V I** 572 404 18.98	**St 2 V I** 600 408 19.38	**St 1 V I** 555 358 19.53	**Ad R II** 439 271 19.32

GREEN MANURE CROPS—GREEN WEIGHTS—TONS PER ACRE

		Manured 1932-3					Manured 1933-4				
		Art'ls.	Adco	St. 1	St. 2	*Mean*	Art'ls.	Adco	St. 1	St. 2	*Mean*
Barley	Vetches	0.46	0.23	0.30	0.32	*0.33*	0.40	0.27	0.35	0.39	*0.35*
	Rye ..	2.23	2.92	2.37	2.82	*2.58*	2.19	2.78	2.37	2.80	*2.54*
S. Beet	Vetches	0.55	0.48	0.45	0.61	*0.52*	0.55	0.62	0.65	0.87	*0.67*
	Rye ..	3.41	3.78	4.69	4.62	*4.12*	7.04	4.52	5.48	6.57	*5.90*
Potatoes	Vetches	0.29	0.43	0.29	0.34	*0.34*	0.49	0.33	0.41	0.43	*0.42*
	Rye ..	4.13	3.63	3.90	4.44	*4.02*	2.72	3.33	2.58	4.23	*3.22*

PERCENTAGE DRY MATTER

		Sample 1	Sample 2
Barley ..	Vetches	11.47	9.34
	Rye	12.28	13.99
Sugar Beet ..	Vetches	15.45	15.98
	Rye	17.26	17.98
Potatoes ..	Vetches	9.90	10.93
	Rye	9.35	7.98

For each break of the rotation, two large samples each of rye and vetches were taken for dry matter determination. These were weighed fresh, dried at 100°C, cleaned from soil as far as possible and weighed again. The dry matter percentages thus include a dirt tare correction.

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SUMMARY OF RESULTS

		Manured 1932-3					Manured 1933-4				
		Artificials.	Adco.	Straw. St. 1	Straw. St. 2	*Mean.*	Artificials.	Adco.†	Straw. St. 1	Straw. St. 2	*Mean.*
Barley Grain cwt. p.a.	None	29.8	25.6	26.2	27.2	*27.2*	27.2	30.4	25.3	27.1	*27.5*
	Vetches	23.2	26.7	29.9	28.9	*27.2*	27.5	29.6	22.5	28.2	*27.0*
	Rye*	23.6	11.7	24.0	22.2	*20.4*	24.2	17.4	25.8	26.2	*23.4*
	Mean	*25.5*	*21.3*	*26.7*	*26.1*	*24.9*	*26.3*	*25.8*	*24.5*	*27.2*	*26.0*
Straw cwt. p.a.	None	31.4	29.3	29.8	29.3	*30.0*	31.7	35.7	30.7	35.6	*33.4*
	Vetches	28.2	28.4	32.8	31.1	*30.1*	30.4	34.2	27.3	31.0	*30.7*
	Rye*	26.4	20.7	26.0	26.8	*25.0*	31.1	19.4	30.0	31.5	*28.0*
	Mean	*28.7*	*26.1*	*29.5*	*29.1*	*28.4*	*31.1*	*29.8*	*29.3*	*32.7*	*30.7*
Sugar Beet Roots (Washed) Tons p.a.	None	12.59	12.72	13.17	11.99	*12.62*	13.88	13.42	12.90	12.70	*13.22*
	Vetches	12.43	11.58	11.25	12.17	*11.86*	12.95	13.93	11.47	12.72	*12.77*
	Rye*	10.13	9.22	13.53	13.48	*11.59*	12.61	8.91	12.66	12.97	*11.79*
	Mean	*11.72*	*11.17*	*12.65*	*12.55*	*12.02*	*13.15*	*12.09*	*12.34*	*12.80*	*12.60*
Tops Tons p.a.	None	10.67	12.28	9.98	9.60	*10.63*	11.58	9.22	10.49	9.00	*10.07*
	Vetches	10.27	9.02	7.99	9.11	*9.10*	11.29	12.41	9.71	12.19	*11.40*
	Rye*	6.34	3.79	8.93	4.80	*5.96*	9.78	6.05	10.00	9.29	*8.78*
	Mean	*9.09*	*8.36*	*8.97*	*7.84*	*8.56*	*10.88*	*9.23*	*10.07*	*10.16*	*10.08*
Sugar percentage	None	18.35	18.14	19.21	19.27	*18.74*	18.09	19.67	19.67	19.21	*19.16*
	Vetches	18.86	18.98	19.53	19.38	*19.19*	18.95	18.40	19.38	18.60	*18.83*
	Rye*	19.38	19.87	19.27	20.22	*19.68*	19.56	19.32	19.81	19.70	*19.60*
	Mean	*18.86*	*19.00*	*19.34*	*19.62*	*19.20*	*18.87*	*19.13*	*19.62*	*19.17*	*19.20*
Total sugar cwt. p.a.	None	46.2	46.1	50.6	46.2	*47.3*	50.2	52.8	50.7	48.8	*50.6*
	Vetches	46.9	44.0	43.9	47.2	*45.5*	49.1	51.3	44.4	47.3	*48.0*
	Rye*	39.3	36.6	52.1	54.5	*45.6*	49.3	34.4	50.2	51.1	*46.2*
	Mean	*44.1*	*42.2*	*48.9*	*49.3*	*46.1*	*49.5*	*46.2*	*48.4*	*49.1*	*48.3*
Potatoes Tons p.a.	None	5.29	5.67	6.74	5.94	*5.91*	7.60	5.76	7.87	7.83	*7.26*
	Vetches	5.86	5.76	5.51	5.04	*5.54*	7.56	5.81	8.72	8.01	*7.52*
	Rye*	5.54	6.57	6.90	5.55	*6.14*	7.97	5.20	7.83	5.51	*6.63*
	Mean	*5.56*	*6.00*	*6.38*	*5.51*	*5.86*	*7.71*	*5.59*	*8.14*	*7.12*	*7.14*

*Rye, not ryegrass as stated in last year's Report, was the green manure crop grown in 1932-3.
†All plots receiving Adco in the season 1933-4 were given 0.5 cwt. K_2O per acre in excess of the proper dressing.

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LONG PERIOD CULTIVATION EXPERIMENT

Long Hoos V

Begun Autumn, 1933

Objects.

(*a*) To compare the effects of continued ploughing, rotary cultivation with the Simar implement ("simaring") and stirring the soil with a cultivator ("cultivating") on crop yield and weed-infestation.

(*b*) To investigate the value of cyanamide as a weed-killer.

Crop rotation. The following three crops are grown in rotation : wheat, mangolds, barley.

Treatments and arrangement (see plan).

All combinations of—

$$\left\{\begin{array}{ll}\text{Ploughing} & \text{(P)}\\ \text{Simaring} & \text{(S)}\\ \text{Cultivating} & \text{(C)}\end{array}\right\} \times \left\{\begin{array}{ll}\text{Deep cultivation (8 ins.)} & \text{(D)}\\ \text{Shallow cultivation (4 ins.)} & \text{(Sh)}\end{array}\right\} \times \left\{\begin{array}{l}\text{Cyanamide (Cy)}\\ \text{Nitro-chalk (N)}\end{array}\right\}$$

For each crop there are four blocks carrying these twelve treatments.

On two of the four blocks (labelled C on the plan) under each crop, the treatments are continued on the same plots in successive years. On the remaining two (labelled A and B on the plan) a cycle of cultivations and manuring is adopted. The object of this arrangement is to provide a standard of "direct" cultivation effects, for comparing cumulative effects of the "continuous" cultivations.

The cultivation cycles are :

(A) Ploughing, simaring, cultivating.
(B) Ploughing, cultivating, simaring.
Deep and shallow cultivations alternate in successive years.
Cyanamide and nitro-chalk alternate in two-yearly periods.
Area of each plot : 1/65 acre (139.8 lks. x 11 lks.)
There are 4 rows of mangolds per plot spaced 22 inches apart.

Times of Cultivation.

Wheat. All cultivations in autumn.
Barley. Ploughed and cultivated in autumn and again in spring. Simared in spring.
Mangolds. All cultivations in spring.

Subsidiary non-experimental cultivations.

The land is harrowed after applying fertilisers (except after top-dressing wheat where harrowing is optional), and after drilling the seed.

In 1933, half of each simared plot of the wheat break was rolled after sowing.

Application of fertilisers.

Wheat. N (as cyanamide or nitro-chalk) applied at the rate of 0.3 cwt. per acre as a spring top-dressing.

Barley. N (as cyanamide or nitro-chalk) applied at the rate of 0.2 cwt. per acre, at least one week before sowing.

Mangolds. N (as cyanamide or nitro-chalk) applied at the rate of 0.6 cwt. per acre. A basal dressing of P_2O_5 (as superphosphate) at the rate of 0.75 cwt. per acre, and K_2O (as muriate of potash) at the rate of 1.0 cwt. per acre is given to all plots. Cyanamide, superphosphate and muriate of potash are applied, at least one week before sowing. Nitro-chalk is applied half one week before sowing and half at singling.

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CULTIVATIONS, ETC.

	Wheat	Mangolds	Barley
Variety	Victor	Yellow Globe	Plumage Archer
Date of sowing	Oct. 20	May 3	Mar. 29
Manures applied—			
Cyanamide	Apr. 6-7	Apr. 21	Mar. 22
Nitro-chalk	Apr. 6-7	Apr. 21, June 29	Mar. 22
Super. & mur. pot.	—	Apr. 23	—
Date of harvesting	Aug. 4	Oct. 22-27	Aug. 13
Previous crop	Beans	Beans	Beans
Cultivations—			
Ploughing	Oct. 17	Apr. 12	Nov. 27, Mar. 9
Simaring	Oct. 17	Apr. 12	Mar. 9
Cultivating	Oct. 17	Apr. 12	Nov. 27, Mar. 9
Harrowing	Oct. 20, Apr. 6-7	Apr. 21, 24, 28, May 3	Mar. 28-29
Hoeing	May 22	May 28, 31, June 9, July 17 and 19	May 22
Rolling	Oct. 20, Apr. 10	May 3	—
Singling	—	June 21-22	—

PLAN AND YIELDS IN LB.

Mangolds

Roots left, tops right.

	1	S Sh Cy	543	133		S Sh N	639	134	73
		S D Cy	547	122		P Sh N	652	122	
		C Sh N	594	128		P D Cy	644	92	
		P D N	675	138		C Sh Cy	634	125	
		C D Cy	574	106		P D N	637	128	
	B	P Sh N	667	129		C Sh N	577	126	A
		C Sh Cy	636	134		C D N	704	138	
		P D Cy	620	128		P Sh Cy	608	119	
		P Sh Cy	637	134		S Sh Cy	607	124	
		C D N	730	130		S D N	640	124	
		S D N	560	108		S D Cy	586	107	
		S Sh N	602	148		C D Cy	665	124	
		C Sh N	644	154		C D Cy	619	108	
		S Sh Cy	620	143		P Sh Cy	715	126	
		P D Cy	666	144		S D Cy	713	137	
		C D Cy	704	148		P D Cy	803	138	
		C Sh Cy	648	138		S Sh N	640	150	
N	C	P Sh Cy	630	136		C Sh Cy	650	138	C
		S Sh N	592	126		S D N	616	129	
		C D N	560	106		C D N	629	130	
		S D N	544	116		P Sh N	621	120	
		P Sh N	552	119		P D N	632	114	
		S D Cy	514	114		S Sh Cy	515	121	
		P D N	542	117		C Sh N	656	124	

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Wheat

Grain left, straw right

	S Sh N	29.1	38.1	S Sh N	26.8	44.0	
	C Sh N	35.1	42.1	S D Cy	33.3	42.9	
	C Sh Cy	35.8	42.4	P Sh Cy	42.3	55.5	
	P D N	43.1	53.7	P Sh N	46.8	58.4	
	C D N	38.5	46.5	P D Cy	45.6	56.4	
C	P Sh Cy	42.0	47.5	C D Cy	37.8	45.4	C
	C D Cy	43.7	50.3	S D N	44.3	57.2	
	S D Cy	36.1	44.7	P D N	45.2	55.3	
	P Sh N	45.9	49.9	S Sh Cy	39.6	46.6	
	S Sh Cy	38.2	45.0	C Sh N	40.8	49.0	
	S D N	42.4	48.1	C D N	47.5	59.5	
	P D Cy	44.8	52.7	C Sh Cy	41.6	49.4	
	P D Cy	40.5	46.0	C D N	45.0	55.0	
	C Sh N	41.0	47.0	C Sh N	43.2	52.0	
	C Sh Cy	39.5	43.5	S D Cy	43.5	51.3	
	C D Cy	38.0	43.5	P D N	40.5	49.7	
	S Sh Cy	32.7	38.3	S D N	35.6	43.9	
A	P Sh Cy	39.3	42.2	S Sh Cy	38.0	44.2	B
	S Sh N	32.2	37.0	C Sh Cy	40.5	47.7	
	S D Cy	36.2	40.8	P Sh N	41.0	48.5	
	C D N	49.4	54.8	P D Cy	48.3	55.9	
	S D N	39.2	45.0	P Sh Cy	41.3	48.2	
	P Sh N	45.3	54.7	C D Cy	46.1	53.9	
	P D N	38.5	47.3	S Sh N	36.2	45.3	

Barley

Grain left, straw right

	C Sh N	46.0	43.8	S D Cy	47.0	43.5	
	S Sh N	48.9	47.6	S Sh Cy	44.5	43.0	
	P Sh Cy	50.3	47.2	S D N	46.8	45.4	
	C D Cy	49.3	47.4	C Sh N	41.9	43.1	
	C Sh Cy	44.5	45.0	S Sh N	41.8	38.0	
C	C D N	44.4	43.6	P D Cy	41.2	41.6	A
	S Sh Cy	40.7	40.6	P Sh N	47.0	45.8	
	S D Cy	48.7	46.3	C D Cy	43.0	41.5	
	P D Cy	46.1	48.2	P Sh Cy	43.9	42.1	
	P Sh N	48.3	48.4	C Sh Cy	41.4	38.8	
	P D N	46.3	45.7	C D N	42.9	41.1	
	S D N	52.3	49.2	P D N	42.4	40.4	
	C D Cy	48.8	46.0	S D Cy	49.6	45.2	
	P Sh Cy	47.8	47.0	C D Cy	45.9	43.6	
	P D Cy	53.5	51.8	C Sh Cy	45.1	43.6	
	S D Cy	49.8	47.2	P Sh N	43.7	43.8	
	P D N	47.8	46.4	C D N	45.0	44.0	
B	C D N	50.0	49.0	S Sh N	39.3	38.0	C
	P Sh N	46.5	44.5	S D N	40.0	39.8	
	S Sh Cy	45.0	40.8	S Sh Cy	35.8	35.7	
	C Sh N	48.5	48.2	P D Cy	42.0	40.8	
	S Sh N	43.0	39.0	P D N	41.6	41.9	
	C Sh Cy	49.3	48.4	C Sh N	43.4	42.8	
72	S D N	49.3	47.7	P Sh Cy	40.6	44.6	144

M

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SUMMARY OF RESULTS

	Continuous				Cycle A			Cycle B			
Last year* / This year	P	S	C	*Mean*	C / P	P / S	S / C	S / P	P / C	C / S	*Mean*
Wheat					GRAIN : cwt. per acre						
N D	25.6	25.2	25.0	*25.3*	22.3	22.8	28.7	23.5	26.1	20.7	*24.0*
N Sh	26.9	16.2	22.0	*21.7*	26.3	18.7	23.8	23.8	25.1	21.0	*23.1*
Cy D	26.2	20.1	23.6	*23.3*	23.5	21.0	22.1	28.0	26.8	25.2	*24.4*
Cy Sh	24.5	22.6	22.5	*23.2*	22.8	19.0	22.9	24.0	23.5	22.1	*22.4*
St. error		±1.41		*±0.816*				±2.00			*±0.816*
					STRAW : cwt. per acre						
N D	31.6	30.6	30.8	*31.0*	27.5	26.1	31.8	28.8	31.9	25.5	*28.6*
N Sh	31.4	23.8	26.4	*27.2*	31.7	21.5	27.3	28.1	30.2	26.3	*27.5*
Cy D	31.7	25.4	27.8	*28.3*	26.7	23.7	25.2	32.4	31.3	30.0	*28.2*
Cy Sh	29.9	26.6	26.6	*27.7*	24.5	22.2	25.2	28.0	27.7	25.7	*25.6*
St. error		±1.51		*±0.873*				±2.14			*±0.873*
Mangolds					ROOTS : tons per acre						
N D	33.74	33.34	34.17	*33.75*	36.61	36.78	40.46	38.80	41.96	32.19	*37.80*
N Sh	33.71	35.40	37.36	*35.49*	37.47	36.73	33.16	38.34	34.14	34.60	*35.74*
Cy D	42.22	35.26	38.02	*38.50*	37.01	33.68	38.22	35.63	32.99	31.44	*34.83*
Cy Sh	38.65	32.62	37.30	*36.19*	34.95	34.89	36.44	36.61	36.55	31.21	*35.11*
St. error		±2.21		*±1.28*				±3.13			*±1.28*
					TOPS : tons per acre						
N D	6.64	7.04	6.78	*6.82*	7.36	7.13	7.93	7.93	7.47	6.21	*7.34*
N Sh	6.87	7.93	7.99	*7.60*	7.01	7.70	7.24	7.41	7.36	8.51	*7.54*
Cy D	8.10	7.21	7.36	*7.56*	5.29	6.15	7.13	7.36	6.09	7.01	*6.50*
Cy Sh	7.53	7.59	7.93	*7.68*	6.84	7.13	7.18	7.70	7.70	7.64	*7.36*
St. error		±0.532		*±0.307*				±0.752			*±0.307*
Barley					GRAIN : cwt. per acre						
N D	25.8	26.8	25.9	*26.2*	24.6	27.2	24.9	27.7	29.0	28.6	*27.0*
N Sh	26.7	25.6	25.9	*26.1*	27.3	24.3	24.3	27.0	28.1	25.0	*26.0*
Cy D	25.6	28.5	27.6	*27.2*	23.9	27.3	25.0	31.0	28.3	28.9	*27.4*
Cy Sh	26.4	22.2	26.0	*24.9*	25.5	25.8	24.0	27.7	28.6	26.1	*26.3*
St. error		±1.08		*±0.624*				±1.53			*±0.624*
					STRAW : cwt. per acre						
N D	25.4	25.8	25.4	*25.5*	23.4	26.3	23.9	26.9	28.4	27.7	*26.1*
N Sh	26.8	24.8	25.1	*25.6*	26.6	22.1	25.0	25.8	28.0	22.6	*25.0*
Cy D	25.8	26.6	26.4	*26.3*	24.1	25.2	24.1	30.1	26.7	27.4	*26.3*
Cy Sh	26.6	22.1	25.7	*24.8*	24.4	25.0	22.5	27.3	28.1	23.7	*25.2*
St. error		±1.01		*±0.581*				±1.42			*±0.581*

*These cultivations were not carried out, this being the first year of the experiment.

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Mean of Nitro-Chalk and Cyanamide

	Continuous				Cycle A			Cycle B			
Last year* / This year	P	S	C	*Mean*	C / P	P / S	S / C	S / P	P / C	C / S	*Mean*
Wheat	GRAIN : cwt. per acre (±1.00)				GRAIN : cwt. per acre (±1.41)						
D ..	25.9	22.6	24.3	*24.3*[2]	22.9	22.4	25.4	25.8	26.4	23.0	*24.3*[2]
Sh ..	25.7	19.4	22.2	*22.4*[2]	24.6	18.8	23.4	23.9	24.3	21.6	*22.8*[2]
Mean ..	*25.8*[1]	*21.0*[1]	*23.2*[1]	*23.4*	*23.8*[3]	*20.6*[3]	*24.4*[3]	*24.8*[3]	*25.4*[3]	*22.3*[3]	*23.6*
St. errors (1) ±0.707. (2) ±0.577. (3) ±1.00.											
	STRAW : cwt. per acre (±1.07)				STRAW : cwt. per acre (±1.51)						
D ..	31.6	28.0	29.3	*29.6*[2]	27.1	24.9	28.5	30.6	31.6	27.8	*28.4*[2]
Sh ..	30.6	25.2	26.5	*27.4*[2]	28.1	21.8	26.2	28.0	29.0	26.0	*26.5*[2]
Mean ..	*31.1*[1]	*26.6*[1]	*27.9*[1]	*28.5*	*27.6*[3]	*23.4*[3]	*27.4*[3]	*29.3*[3]	*30.3*[3]	*26.9*[3]	*27.5*
St. errors (1) ±0.755. (2) ±0.617. (3) ±1.07.											
Mangolds	ROOTS : tons per acre (±1.56)				ROOTS : tons per acre (±2.21)						
D ..	37.98	34.30	36.10	*36.13*[2]	36.81	35.23	39.34	37.22	37.48	31.82	*36.32*[2]
Sh ..	36.18	34.01	37.33	*35.84*[2]	36.21	35.81	34.80	37.48	35.34	32.90	*35.42*[2]
Mean ..	*37.08*[1]	*34.16*[1]	*36.72*[1]	*35.98*	*36.51*[3]	*35.52*[3]	*37.07*[3]	*37.35*[3]	*36.41*[3]	*32.36*[3]	*35.87*
St. errors (1) ±1.11. (2) ±0.902. (3) ±1.56.											
	TOPS : tons per acre (±0.376)				TOPS : tons per acre (±0.532)						
D ..	7.37	7.12	7.07	*7.19*[2]	6.32	6.64	7.53	7.64	6.78	6.61	*6.92*[2]
Sh ..	7.20	7.76	7.96	*7.64*[2]	6.92	7.42	7.21	7.56	7.53	8.08	*7.45*[2]
Mean ..	*7.28*[1]	*7.44*[1]	*7.52*[1]	*7.41*	*6.62*[3]	*7.03*[3]	*7.37*[3]	*7.60*[3]	*7.16*[3]	*7.34*[3]	*7.18*
St. errors (1) ±0.266, (2) ±0.217, (3) ±0.376.											
Barley	GRAIN : cwt. per acre (±0.764)				GRAIN : cwt. per acre (±1.08)						
D ..	25.7	27.7	26.8	*26.7*[2]	24.2	27.2	25.0	29.4	28.6	28.8	*27.2*[2]
Sh ..	26.6	23.9	26.0	*25.5*[2]	26.4	25.0	24.2	27.4	28.4	25.6	*26.2*[2]
Mean ..	*26.2*[1]	*25.8*[1]	*26.4*[1]	*26.1*	*25.3*[3]	*26.1*[3]	*24.6*[3]	*28.4*[3]	*28.5*[3]	*27.2*[3]	*26.7*
St. errors (1) ±0.540, (2) ±0.441, (3) ±0.764.											
	STRAW : cwt. per acre (. ±0.714)				STRAW : cwt. per acre (±1.01)						
D ..	25.6	26.2	25.9	*25.9*[2]	23.8	25.8	24.0	28.5	27.6	27.6	*26.2*[2]
Sh ..	26.7	23.5	25.4	*25.2*[2]	25.5	23.6	23.8	26.6	28.0	23.2	*25.1*[2]
Mean ..	*26.2*[1]	*24.8*[1]	*25.6*[1]	*25.5*	*24.6*[3]	*24.7*[3]	*23.9*[3]	*27.6*[3]	*27.8*[3]	*25.4*[3]	*25.6*
St. errors (1) ±0.505, (2) ±0.412, (3) ±0.714.											

*These cultivations were not carried out, this being the first year of the experiment.

The above tables give the form in which the results will be presented in the succeeding years of the experiment. In the present year, there is no difference between the sets of treatments in the four blocks, and the summary tables below are based on means of all four blocks.

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Mean of nitro-chalk and cyanamide

	P	S	C	*Mean*	P	S	C	*Mean*
Wheat	GRAIN : cwt. per acre (±0.707)				STRAW : cwt. per acre (±0.755)			
D ..	25.1	22.5	25.1	*24.2*[2]	30.3	27.1	29.7	*29.0*[4]
Sh ..	24.9	19.8	23.0	*22.6*[2]	29.4	24.6	27.1	*27.0*[4]
Mean ..	*25.0*[1]	*21.2*[1]	*24.0*[1]	*23.4*	*29.8*[3]	*25.8*[3]	*28.4*[3]	*28.0*
St. errors : (1) ±0.500, (2) ±0.408, (3) ±0.534, (4) ±0.436.								
Mangolds	ROOTS : tons per acre (±1.11)				TOPS : tons per acre (±0.266)			
D ..	37.50	33.91	37.25	*36.22*[2]	7.18	6.88	7.11	*7.06*[4]
Sh	36.51	34.18	36.20	*35.63*[2]	7.22	7.75	7.67	*7.55*[4]
Mean ..	*37.00*[1]	*34.04*[1]	*36.72*[1]	*35.92*	*7.20*[3]	*7.32*[3]	*7.39*[3]	*7.30*
St. errors : (1) ±0.784, (2) ±0.641, (3) ±0.188, (4) ± 0.154.								
Barley	GRAIN : cwt. per acre (±0.540)				STRAW : cwt. per acre (±0.505)			
D	26.2	27.8	26.8	*26.9*[2]	25.9	26.4	25.8	*26.0*[4]
Sh	26.7	24.6	26.1	*25.8*[2]	26.4	23.4	25.7	25.2[4]
Mean ..	*26.4*[1]	*26.2*[1]	*26.4*[1]	*26.4*	*26.2*[3]	*24.9*[3]	*25.8*[3]	*25.6*
St. errors : (1) ±0.382, (2) ±0.312, (3) ±0.356, (4) ±0.291.								

Mean of deep and shallow cultivation

	P	S	C	*Mean*	P	S	C	*Mean*
Wheat	GRAIN : cwt. per acre (±0.707)				STRAW : cwt. per acre (±0.755)			
N	25.1	20.7	24.7	*23.5*[1]	30.3	26.0	29.4	*28.6*[2]
Cy	25.0	21.6	23.4	*23.3*[1]	29.3	25.7	27.3	*27.4*[2]
Mangolds	ROOTS : tons per acre (±1.11)				TOPS : tons per acre (±0.266)			
N	35.76	34.72	36.60	*35.69*[3]	7.09	7.44	7.44	*7.32*[4]
Cy	38.24	33.37	36.86	*36.16*[3]	7.31	7.19	7.34	*7.28*[4]
Barley ..	GRAIN : cwt. per acre (±0.540)				STRAW : cwt. per acre (±0.505)			
N	26.4	26.2	26.3	*26.2*[5]	25.9	25.0	25.8	*25.6*[6]
Cy	26.5	26.2	26.6	*26.4*[5]	26.4	24.8	25.7	*25.6*[6]

Standard errors : (1) ±0.408, (2) ±0.436, (3) ±0.641, (4) ±0.154, (5) ±0.312, (6) ±0.291.

Conclusions

For wheat and barley, the yields of grain and straw were significantly higher with deep cultivation than with shallow, the increases in cwt. per acre being wheat grain 1.6, straw 2.0, barley grain 1.1, straw 0.8. For mangolds there was little difference in the roots, but shallow cultivation gave a significantly higher yield of tops.

In the case of wheat, both grain and straw, and mangolds, roots only, simaring gave significantly lower yields than ploughing and cultivating. Ploughing gave somewhat higher yields than cultivating in the case of wheat, the difference being almost significant for the wheat straw. There was little difference between ploughing and cultivating in the case of mangold roots or of any of the three methods of cultivation in the tops. In the case of barley the results were similar to those for wheat as far as the shallow cultivations are concerned, but with deep cultivations simaring has actually yielded higher (significantly so in the case of the grain) than ploughing or cultivating.

There was no indication of any difference in the effects of nitro-chalk and cyanamide, except in the case of wheat straw, in which the nitro-chalk gave a slight, though not significant, increase.

In the case of wheat grain, the second order interaction was significant.