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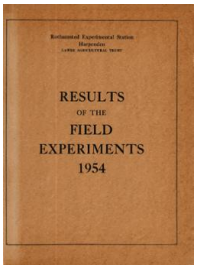
Yields of the Field Experiments 1954

Full Table of Content



54/R/BB/1 Deep Cultivation Rotation

Rothamsted Research

Rothamsted Research (1955) *54/R/BB/1 Deep Cultivation Rotation ;* Yields Of The Field Experiments 1954, pp 26 - 32 **- DOI: https://doi.org/10.23637/ERADOC-1-184**

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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 $2\frac{3}{4}$ 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, $\frac{1}{2}$ 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	38.8	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 83.2 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	+8.6	+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 None	Phosphate Ploughed in	Phosphate In ridges	Potash None	Potash Ploughed in	Potash 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 Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash 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).