

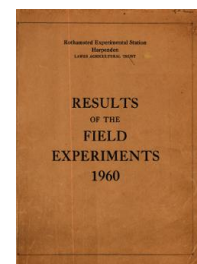
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60/W/B/5 Ley and Arable Rotations

Rothamsted Research

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60/B/5.1

LEY AND ARABLE ROTATIONS

Woburn Stackyard 1960 - the 23rd year.

For history, treatments etc., see "Details of the Classical and Long Term Experiments" 1956.

Note: On the plots of the alternating rotations the hay and carrot crops were accidentally interchanged.

Cultivations, etc.,

Treatment crops

Ley rotations

Ley 1st year. Ploughed twice: Sept 1 and Nov 30, 1959. PK fertilisers and 'Nitro-Chalk' applied: Apr 13, 1960. Seed sown at 40 lb per acre: Apr 15. 'Nitro-Chalk' applied: 2nd dressing - June 29; 3rd dressing - Aug 28. Grazed 7 circuits: June 21 - Oct 29. Seeds mixture: 20 lb S24 Perennial Ryegrass, 11 lb S143 Cocksfoot, 6 lb Late Flowering Red Clover, 3 lb S100 White Clover per acre.

Ley 2nd year. Potash and nitrogen fertiliser applied: Mar 18, June 17 and Sept 5. Grazed 9 circuits: Apr 22 - Oct 21.

Ley 3rd year. Potash and nitrogen fertiliser applied: Mar 18, June 27 and Sept 13. Grazed 6 circuits: May 2 - Oct 12.

Lucerne 1st year. Ploughed twice: Sept 1 and Nov 30, 1959. PK fertiliser applied: Apr 13, 1960. Seed sown at 25 lb per acre: Apr 15. Sprayed with miscible DDT at 3 pints in 40 gallons per acre (against weevil): May 6. Cut twice: July 28, Sept 26. Variety: Du Puits.

Lucerne 2nd year. Muriate of potash applied: Mar 24, 1960. Cut 3 times: June 7, July 28, Sept 26.

Lucerne 3rd year. Muriate of potash applied: Mar 24, 1960. No yields taken. Treated for control of stem eelworm:- Sprayed with diquat at $1\frac{1}{2}$ lb in 80 gallons per acre: July 9. Ploughed: July 19. Plots 37 and 38 split for fumigation with undiluted metham sodium ("Vapam") at 1 pt to 50 sq. ft: Oct 27.

Arable rotations

Potatoes 1st course. Ploughed twice: Sept 1 and Nov 30, 1959. Compound fertiliser applied; potatoes machine planted: Apr 12, 1960. Earthed up: June 14. Sprayed with copper fungicide at 5 lb in 40 gallons per acre: July 15. Haulm destroyed mechanically: Aug 27. Lifted: Sept 30. Variety: Majestic.

Rye 2nd course. Ploughed: Oct 2, 1959. Seed drilled at 3 bushels per acre: Oct 23. 'Nitro-Chalk' applied: Mar 24, 1960. Seeds hay mixture undersown on 4 plots: Apr 7. Combine harvested: Aug 20. Variety: King II.

60/B/5.2

Seeds hay 3rd course. Seeds undersown at 30 lb per acre in rye: Apr 7, 1959. Ground chalk applied at 20 cwt per acre: Sept 1. Potash and nitrogen fertiliser applied: Mar 18, 1960. 'Nitro-Chalk' applied: June 10. Cut twice: June 7 and Aug 30. Seeds mixture: 19 lb S24 Perennial Ryegrass, 9 lb Late Flowering Red Clover, 2 lb Alsike American per acre.

Carrots 3rd course. Ground chalk applied at 20 cwt per acre: Sept 1, 1959. Ploughed twice: Sept 3 and Nov 30. Potash and nitrogen fertilisers applied: Apr 29, 1960. Seed drilled at 5 lb per acre: Apr 30. Sprayed with demeton methyl at 12 fluid oz in 40 gallons per acre: June 1. Crop failed, re-drilled: June 18. Thinned: Aug 18. Sprayed with demeton methyl at 12 fluid oz in 40 gallons per acre: July 18. Lifted: Oct 17. Variety: Scarlet Intermediate.

Test crops

Sugar beet 1st test crop. Dung applied: Dec 2, 1959. Ploughed: Dec 2. Treatment fertilisers and basal compound fertilisers applied: Apr 12, 1960. Seed drilled at 12 lb per acre: Apr 13. Singled: May 26 to June 9. Sprayed with miscible DDT at 3 pints in 40 gallons per acre (against flea beetle): May 6. Sprayed with demeton methyl at 12 fluid oz in 40 gallons per acre: June 1. Lifted: Oct 11. Variety: Klein B.

Barley 2nd test crop. Ground chalk applied at 18 cwt per acre: Nov 27, 1959. Ploughed: Nov 28. Muriate of potash applied to sub plots to equalise treatment dressings to 1959 sugar beet test crop: Mar 10, 1960. Seed drilled at 2½ bushels per acre: Mar 18. Combine harvested: Aug 15. Variety: Herta.

Standard errors per plot. Test crops.

Sugar beet.	Total sugar.	Whole plot:	6.05 cwt per acre	or 11.4%
				(4 d.f.)
		½ plot:	4.07 cwt per acre	or 7.6%
				(4 d.f.)
		⅓ plot:	4.76 cwt per acre	or 8.9%
				(24 d.f.)
Tops.		Whole plot:	1.875 tons per acre	or 12.0%
				(4 d.f.)
		½ plot:	0.709 tons per acre	or 4.5%
				(4 d.f.)
		⅓ plot:	1.223 tons per acre	or 7.8%
				(24 d.f.)
Barley.	Grain (at 85% dry matter).	Whole plot:	4.95 cwt per acre	or 16.0%
				(4 d.f.)
		½ plot:	0.64 cwt per acre	or 2.1%
				(4 d.f.)

60/B/5.3

Summary of Results

Treatment crops

Ley, sheep days of grazing per acre

1st year	2nd year	3rd year
1458	2253	1397

Lucerne, dry matter: cwt per acre

	1st cut	2nd cut	3rd cut	Total
<u>1st year</u>				
Dung in 1958: tons per acre				
None	14.0	15.1		29.1
15	20.1	21.3		41.4
Difference	+6.1	+6.2		+12.3
Previous rotation				
Lucerne	15.6	17.0		32.6
Arable with hay	18.4	19.4		37.8
Mean	17.0	18.2		35.2
<u>2nd year</u>				
Dung in 1957: tons per acre				
None	25.5	20.5	18.3	64.3
15	28.5	24.8	20.4	73.7
Difference	+3.0	+4.3	+2.1	+9.4
Previous rotation				
Lucerne	27.3	22.1	18.7	68.1
Arable with roots	26.7	23.2	20.0	69.9
Mean	27.0	22.6	19.4	69.0

60/B/5.4

Treatment crops

	Potatoes		Rye	
	Total tubers: tons per acre	Percentage ware ($1\frac{5}{8}$ " riddle)	Grain: (at 85% D.M.) cwt per acre	Straw: cwt per acre
Dung: tons per acre				
None*	12.86	94.2	39.4	45.6
15	13.76	92.6	39.4	46.0
Difference	+0.90	-1.6	0.0	+0.4
Previous rotation				
Ley	15.36	94.4	39.8	47.7
Lucerne	14.85	96.6	39.8	45.2
Arable with hay	12.44	91.4	40.7	46.9
Arable with roots	10.60	91.1	37.2	43.4
Mean	13.31	93.4	39.4	45.8

Hay

Yield, dry matter: cwt per acre

	1st cut	2nd cut
Dung in 1956: tons per acre		
None	34.4	12.4
15	39.7	15.6
Difference	+5.3	+3.2
Previous rotation		
Ley	37.6	17.0
Arable with hay ⁺	36.4	11.1
Mean	37.0	14.0

Carrots

	Roots washed: tons per acre	Tops tons per acre
Dung in 1956: tons per acre		
None	6.39	3.71
15	8.58	6.14
Difference	2.19	2.43
Previous rotation		
Lucerne	7.10	4.72
Arable with roots ⁺	7.86	5.12
Mean	7.48	4.92

*Dung applied: Potatoes for test crop sugar beet in 1958.
Rye for test crop sugar beet in 1957.

⁺See note on page 60/B/5.1

Mean dry matter % as harvested: Rye, Grain: 78.4
Straw: 82.6

60/B/5.5

1st Test crop					
Sugar beet					
Previous rotation					
	Ley	Lucerne	Arable with hay	Arable with roots	Mean
<u>Roots (washed): tons per acre</u>					
Mean	17.30	16.51	14.62	16.63	16.26
Dung: tons per acre					
None	15.37	14.64	13.12	13.55	14.17
15	19.22	18.38	16.13	19.71	18.36
Difference	+3.85	+3.74	+3.01	+6.16	+4.19
Response to additional 0.72 cwt N per acre					
No dung	+0.28	+1.47	-0.75	+3.03	+1.00
Dung 15 tons per acre	-1.03	-1.67	-0.12	+1.68	-0.28
Response to additional 0.9 cwt K ₂ O per acre					
No dung	+0.32	-1.33	+0.32	-0.67	-0.34
Dung 15 tons per acre	+1.67	+0.07	+0.04	+0.67	+0.61
<u>Sugar Percentage</u>					
Mean	16.3	16.4	16.4	16.5	16.4
Dung: tons per acre					
None	16.4	16.3	16.6	16.6	16.5
15	16.2	16.5	16.2	16.3	16.3
Difference	-0.2	+0.2	-0.4	-0.3	-0.2
Response to additional 0.72 cwt N per acre					
No dung	-0.6	-0.5	-0.5	-0.3	-0.5
Dung 15 tons per acre	-0.9	-0.5	-0.5	-0.6	-0.7
Response to additional 0.9 cwt K ₂ O per acre					
No dung	0.0	+0.3	+0.1	-0.1	+0.1
Dung 15 tons per acre	-0.3	+0.5	-0.3	+0.4	+0.1

60/B/5.6

		1st Test Crop				
		Sugar beet				
		Previous rotation				
		Ley	Lucerne	Arable with hay	Arable with roots	Mean
<u>Total sugar: cwt per acre</u>						
Mean	(±4.28)	56.5	54.3	47.9	54.6	53.3
Dung: tons per acre						
None	(±4.74)*	50.4	47.8	43.4	45.0	46.6
15		62.7	60.7	52.4	64.2	60.0
Difference	(±4.07)	+12.3	+12.9	+9.0	+19.2	+13.4
Response to additional 0.72 cwt N per acre						(±2.03)
						(±3.37)
No dung		-0.7	+3.4	-4.0	+9.1	+1.9
Dung 15 tons per acre		-7.1	-7.1	-2.2	+2.9	-3.4
Response to additional 0.9 cwt K ₂ O per acre						(±1.68)
						(±3.37)
No dung		+0.8	-3.2	+1.3	-2.7	-0.9
Dung 15 tons per acre		+3.8	+1.9	-0.9	+3.5	+2.0
<u>Tops: tons per acre</u>						
Mean	(±1.326)	18.60	13.51	16.19	14.21	15.63
Dung: tons per acre						
None	(±1.372)*	16.72	10.87	14.24	12.51	13.58
15		20.48	16.15	18.14	15.90	17.67
Difference	(±0.709)	+3.76	+5.28	+3.90	+3.39	+4.09
Response to additional 0.72 cwt N per acre						(±0.354)
						(±0.865)
No dung		+3.71	+6.02	+3.79	+6.27	+4.95
Dung 15 tons per acre		+2.72	+3.32	+3.77	+3.75	+3.39
Response to additional 0.9 cwt K ₂ O per acre						(±0.432)
						(±0.865)
No dung		+0.91	-0.25	+1.19	+0.47	+0.58
Dung 15 tons per acre		+0.97	+0.11	-0.93	-0.33	-0.05

*For use in horizontal and diagonal comparisons only.

60/B/5.7

1st Test Crop

Sugar beet

Plots receiving no additional N or K

Previous rotation

Dung: tons per acre	Ley	Lucerne	Arable with hay	Arable with roots	Mean
<u>Roots (washed): tons per acre</u>					
Mean	16.90	17.22	14.58	16.30	16.25
None	15.11	14.83	13.22	13.53	14.17
15	18.68	19.61	15.94	19.07	18.33
Difference	+3.57	+4.78	+2.72	+5.54	+4.16
<u>Sugar percentage</u>					
Mean	16.7	16.3	16.6	16.7	16.5
None	16.7	16.1	16.7	16.8	16.6
15	16.8	16.4	16.4	16.5	16.5
Difference	+0.1	+0.3	-0.3	-0.3	-0.1
<u>Total sugar: cwt per acre</u>					
Mean (±3.93)	56.8	56.1	48.2	54.3	53.8
None (±5.25)*	50.5	47.8	44.1	45.6	47.0
15	63.1	64.3	52.3	63.0	60.7
Difference (±5.79)	+12.6	+16.5	+8.2	+17.4	+13.7
<u>Tops: tons per acre</u>					
Mean (±1.105)	16.81	11.63	14.47	11.93	13.71
None (±1.474)*	14.36	8.01	11.99	9.63	10.99
15	19.26	15.25	16.96	14.23	16.42
Difference (±1.274)	+4.90	+7.24	+4.97	+4.60	+5.43

*For use in horizontal and diagonal comparisons only.

60/B/5.8

2nd Test Crop

Barley

Previous rotation

Dung in 1959: tons per acre		Previous rotation				Mean
		Ley	Lucerne	Arable with hay	Arable with roots	
<u>Grain (at 85% dry matter): cwt per acre</u>						
None 15	(± 3.51) [*]	33.5	32.9	26.7	29.6	30.6
		32.4	33.7	27.8	31.6	31.4
Mean	(± 3.50)	32.9	33.3	27.3	30.6	30.9
Difference	(± 0.64)	-1.1	+0.8	+1.1	+2.0	+0.8 (± 0.32)

Straw (at 85% dry matter): cwt per acre

None 15	26.2	22.7	21.3	22.4	23.1
	26.4	26.3	23.0	24.9	25.1
Mean	26.3	24.5	22.1	23.6	24.1
Difference	+0.2	+3.6	+1.7	+2.5	+2.0

*For use in horizontal and diagonal comparisons only.

Mean dry matter % as harvested: Grain 80.1
Straw 77.4