

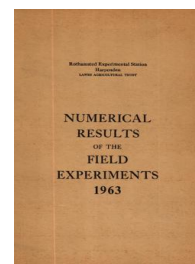
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# Yields of the Field Experiments 1963

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## 63/W/WGM/B/3 Green Manuring

### Rothamsted Research

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63/B/3.1

GREEN MANURING EXPERIMENT

(WGM)

Woburn Stackyard - 1963, the 10th year of the revised scheme.

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

Area of each sub-plot (acres): 0.0195. Area harvested: Sugar beet - 0.0109, barley - 0.0146.

The early potato crop is now replaced by sugar beet. The tops are carted off.

Revised manurial treatments (in cwt N per acre): All plots are split (half-length) to test 2 rates of nitrogen per plot as follows:-

Barley: Either none v 0.6, or 0.3 v 0.9.

Sugar beet: Either none v 1.33, or 0.67 v 2.0.

All nitrogen as 'Nitro-Chalk'.

Basal dressing per acre: 1.5 cwt  $P_{205}$ , 3.0 cwt  $K_{20}$  per acre as compound fertiliser, 1 $\frac{1}{2}$ %  $P_{205}$ , 28%  $K_{20}$ , to sugar beet, none to barley.

Cultivations, etc.:

Green manures after barley 1962 (for sugar beet 1963): Trefoil at 30 lb per acre, ryegrass at 40 lb per acre, undersown: Apr 28, 1962.

Varieties: Trefoil - English, Ryegrass - Italian.

Sugar beet: Straw applied (green manure and 'fallow' plots):

Aug 31, 1962. 'Fallow' plots ploughed: Oct 12. Ryegrass and trefoil plots ploughed: Mar 8, 1963. Basal fertiliser applied: Apr 3. 'Nitro-Chalk' applied: Apr 20. Seed drilled at 5.4 lb per acre: Apr 22. Singled: May 27. Sprayed with demeton-methyl at 6 fluid oz in 40 gallons per acre (against leaf miner and first appearance of aphids): June 5. Lifted: Nov 4. Variety: Klein E.

Green manures after early potatoes 1962 (for barley 1963): Ground chalk applied at 20 cwt per acre: July 20, 1962. Trefoil sown at 30 lb per acre: July 21. Ryegrass sown at 40 lb per acre: July 23.

Varieties: Trefoil - English, Ryegrass - Western Wolths.

Barley: 'Fallow' plots and 'early' green manure plots ploughed:

Nov 8, 1962. 'Late' green manure plots ploughed: Mar 8, 1963.

'Nitro-Chalk' applied: Apr 3. Seed drilled at 2.25 bushels per acre: Apr 8. Trefoil and ryegrass undersown: May 6. Combine harvested: Sept 12. Variety: Proctor.

Note: One sub-plot, which should have received no nitrogen, received 2 cwt N per acre in error. Estimated values were used in the analysis.

63/B/3.2

Standard errors per plot.

Sugar beet. Roots (washed)	Whole plot: 1.236 tons per acre or 10.1% (14 d.f.)
	Sub plot: 1.081 tons per acre or 8.8% (29 d.f.)
Total sugar	Whole plot: 4.64 cwt per acre or 11.1% (14 d.f.)
	Sub plot: 3.98 cwt per acre or 9.5% (29 d.f.)
Tops	Whole plot: 1.546 tons per acre or 13.5% (14 d.f.)
	Sub plot: 1.188 tons per acre or 10.4% (29 d.f.)
Barley. Grain (at 85% dry matter)	Whole plot: 3.68 cwt per acre or 13.0% (16 d.f.)
	Sub plot: 3.27 cwt per acre or 11.5% (26 d.f.)

(Excluding plots fallow under old scheme)

Estimates of produce (roots and tops) of green manure crops: cwt per acre

	Green manures	Ploughed in	Dry matter	Nitrogen
<u>For sugar beet</u>	Trefoil		17.5	0.504
	Ryegrass		15.4	0.221
<u>For barley</u>	Trefoil	Early	35.0	0.932
	Ryegrass	Early	39.3	0.762
	Trefoil	Late	6.2	0.184
	Ryegrass	Late	15.5	0.390

Summary of Results

Sugar beet. Roots (washed): tons per acre

	Straw: tons per acre		N: cwt. per acre		Dung to cabbages 1953: tons per acre		Mean
	None	1.5	None	0.67	None	10	
				1.33	2.00		

Excluding plots fallow under old scheme

Undersown green manures for sugar beet								
None	(±0.437)	11.67	6.66	(1) and (2) 11.62	13.84	14.18	(±0.437)	(±0.309) 11.58
Trefoil	(±0.618)	13.25	11.51	(3) and (4) 14.31	14.40	14.39	(±0.618)	(±0.437) 13.65
Ryegrass		12.83	8.86	13.36	15.04	14.77		13.01
Straw: tons per acre				(5) and (6)			(±0.437)	(±0.309)
None			8.36	12.76	14.08	14.22		12.35
1.5			8.49	12.70	14.47	14.53		12.55
N: cwt per acre							(5) and (6)	(7) and (8)
None							8.22	8.42
0.67							12.23	12.73
1.33							13.73	14.28
2.00							14.17	14.38
Mean (±0.309)							12.09	12.45
(1) (±0.382)	(2) (±0.540)		(3) (±0.514)	(4) (±0.727)			(5) (±0.382)	(6) (±0.514)
(7) (±0.270)	(8) (±0.363)							

63/B/3.3

Sugar beet. Roots (washed): tons per acre

	N: cwt per acre		Dung to cabbages 1953: tons per acre		Mean
	None	0.67	1.33	2.00	
<u>Plots fallow under old scheme</u>					
Straw: tons per acre	(1) and (2)				(±0.618)
None	6.09	11.17	13.54	14.82	11.40
1.5	6.13	11.03	13.83	14.59	11.39
N: cwt per acre	(1) and (2)				(±0.540)
None			(1) and (2)		6.11
0.67			5.69		11.10
1.33			11.63		13.68
2.00			14.23		14.71
Mean (±0.618)			14.69		11.40

Undersown green manures for sugar beet

Old scheme	None Fallow	None		Mean
		Trefoil	Ryegrass Excluding fallow	
(1) (±0.764)	11.40 (±0.618)	13.65	13.01 (±0.437)	12.24
(2) (±1.027)				

(1) (±0.764) (2) (±1.027)

Note: On all summary sheets - Standard errors 1, 3, 5 and 7 are for use in comparisons within the same whole plot treatment. 2, 4, 6 and 8 are for use in comparisons involving different whole plot treatments, (all except N, None v 1.33 or 0.67 v 2.00).

63/B/3.4

Sugar beet. Sugar percentage

	Straw: tons per acre		N: cwt per acre		Dung to cabbages 1953: tons per acre		Mean		
	None	1.5	None	0.67	1.33	2.00		None	10
<u>Excluding plots fallow under old scheme</u>									
Undersown green manures for sugar beet									
None	17.0	17.1	17.4	17.7	17.1	16.2	17.0	17.2	17.1
Trefoil	16.9	17.1	17.9	17.5	16.7	16.0	16.9	17.2	17.0
Ryegrass	17.4	17.3	18.0	17.9	17.0	16.4	17.2	17.5	17.3
Straw: tons per acre									
None			17.7	17.6	16.9	16.2	17.0	17.2	17.1
1.5			17.5	17.7	17.1	16.3	17.1	17.3	17.2
N: cwt per acre									
None							17.5	17.7	17.6
0.67							17.6	17.7	17.7
1.33							16.8	17.1	17.0
2.00							16.1	16.3	16.2
Mean							17.0	17.2	17.1

63/B/3.5

Sugar beet. Sugar percentage

N: cwt per acre		Dung to cabbages 1953: tons per acre	Mean
None	1.33		
None	0.67	10	

Plots fallow under old scheme

Straw: tons per acre	None	17.7	18.0	17.3	17.2	17.5	17.6	17.5	17.5
	1.5	17.4	17.8	17.1	16.6	17.3	17.0	17.3	17.2
N: cwt per acre	None					17.8	17.3	17.5	
	0.67					17.9	17.9	17.9	
	1.33					17.4	17.0	17.2	
	2.00					16.6	17.1	16.9	
Mean					17.4	17.3	17.4	17.3	17.4

Undersown green manures for sugar beet

Old scheme	None	None	Trefoil	Ryegrass	Mean
	Fallow	Excluding fallow			
	17.4	17.1	17.0	17.3	17.2

63/B/3.6

Sugar beet. Total sugar: cwt per acre

	Straw: tons per acre		N: cwt per acre		Dung to cabbages 1953: tons per acre		Mean
	None	1.5	None	0.67	None	10	
				1.33	2.00		

Excluding plots fallow under old scheme

Undersown green manures for sugar beet	Straw: tons per acre		N: cwt per acre		Dung to cabbages 1953: tons per acre		Mean
	(±1.64)	(1) and (2)	(1) and (2)	(3) and (4)	(±1.64)	(±1.16)	
None	39.5	39.2	23.0	41.0	47.2	46.0	39.3
Trefoil	44.7	47.9	41.1	50.0	48.1	46.1	46.3
Ryegrass	44.4	45.2	31.9	47.9	51.0	48.5	44.8
Straw: tons per acre				(5) and (6)			(±1.16)
None			29.7	44.9	47.5	46.0	42.0
1.5			29.8	45.0	49.3	47.3	42.9
N: cwt per acre				(5) and (6)			(±1.16)
None							42.0
0.67							42.9
1.33							
2.00							
Mean (±1.16)							42.5

63 /B/3.7

(1) (±1.41) (2) (±1.99) (3) (±1.92) (4) (±2.71) (5) (±1.41) (6) (±1.92)  
 (7) (±0.99) (8) (±1.36)



Sugar beet. Total sugar: cwt per acre

	N: cwt per acre		Dmg to cabages 1953: tons per acre	Mean
	None	0.67 1.33 2.00		
Straw: tons per acre	<u>Plots fallow under old scheme</u>			
	(1) and (2)			(±3.28)
None	21.6	40.2	46.9	50.8
1.5	21.2	39.2	47.2	48.3
N: cwt per acre	(1) and (2) (3) and (4)			(±2.32)
None			20.2	21.4
0.67			41.7	39.7
1.33			49.4	47.0
2.00			48.7	49.5
Mean (±2.32)			40.0	38.8

Undersown green manures for sugar beet

Old scheme	None		Ryegrass		Mean
	Fallow	Excluding fallow	Trefoil	Excluding fallow	
(1) (±2.81)	39.4	46.3			41.9
(2) (±3.83)	(±2.32)	(±1.16)			
(3) (±1.99)		(±1.64)			
(4) (±2.71)					

63/B/3.8

Sugar beet. Tops: tons per acre

	Straw: tons per acre		N: cwt per acre		Dmg to cabbages 1953: tons per acre		Mean
	None	1.5	None	0.67	1.33	2.00	
<u>Excluding plots fallow under old scheme</u>							
Undersown green manures for sugar beet							
None	10.65 (±0.547)	10.14	4.38	(1) and (2) 8.14	13.16	15.90	(±0.387) 10.40
Trefoil	14.04 (±0.773)	15.10	8.34	(3) and (4) 12.94	17.67	19.35	(±0.547) 14.57
Ryegrass	12.01	12.38	5.46	9.39	15.11	18.83	12.20
Straw: tons per acre							
None			5.41	(5) and (6) 9.61	15.00	17.33	(±0.387) 11.84
1.5			5.87	9.70	14.55	17.66	11.94
N: cwt per acre							
None							(7) and (8) 5.64
0.67							9.65
1.33							14.77
2.00							17.49
Mean (±0.387)							11.89
(1) (±0.420)	(2) (±0.594)	(3) (±0.622)	(4) (±0.880)	(5) (±0.420)	(6) (±0.622)		
(7) (±0.297)	(8) (±0.440)						

63/B/3.9

Sugar beet. Tops: tons per acre

	N: cwt per acre		Dung to cabbages 1953: tons per acre		Mean
	None	0.67	1.33	2.00	
Straw: tons per acre					
None					(±0.773)
1.5	4.34	7.65	12.84	16.52	10.33
N: cwt per acre	4.28	6.75	11.00	14.73	9.19
None					(1) and (2)
0.67					4.03
1.33					7.12
2.00					12.61
					16.55
Mean (±0.773)					10.08

Plots fallow under old scheme

	(1) and (2)		(3) and (4)		Mean
	Straw: tons per acre				
None					(±1.093)
1.5	4.34	7.65	12.84	16.52	10.33
N: cwt per acre	4.28	6.75	11.00	14.73	9.19
None					(1) and (2)
0.67					4.03
1.33					7.12
2.00					12.61
					16.55
Mean (±0.773)					10.08

Undersown green manures for sugar beet

Old scheme	None		Trefoil		Ryegrass		Mean
	Fallow	Excluding fallow	Excluding fallow	Excluding fallow	Excluding fallow	Excluding fallow	
(1) (±0.840)	9.76 (±0.773)	10.40 (±0.387)	14.57 (±0.547)	12.20			11.46
(2) (±1.244)							
(3) (±0.594)							
(4) (±0.880)							

63/B/3.10

Barley, Grain (at 85% dry matter): cwt per acre

	Green manures In barley		N: cwt per acre		Dung to cabbages 1952: tons per acre		Mean				
	Under- sown	After potatoes for barley	None	0.3	0.6	10					
	None	Trefoil	Rye- grass	None	0.3	0.6	0.9				
<u>Excluding plots fallow under old scheme</u>											
<u>Green manures ploughed in</u>	(±1.30)	(±1.30)		(1) and (2)			(±0.92)				
<u>Early</u>	27.4	28.9	29.2	27.1	20.1	29.2	31.4	31.8	27.5	28.7	28.1
<u>Late</u>	27.0	29.9	29.0	27.8	20.9	29.4	31.7	31.7	27.2	29.6	28.4
<u>Green manures in barley</u>											
None				27.1	19.9	27.8	30.3	30.8	25.6	28.7	27.2
Undersown				31.1	21.1	30.8	32.7	32.8	29.1	29.6	29.4
<u>Green manures after potatoes for barley</u>											
<u>Trefoil</u>					22.0	30.9	32.3	31.1	28.4	29.8	29.1
<u>Ryegrass</u>					19.0	27.7	30.7	32.4	26.4	28.5	27.4
<u>N: cwt per acre</u>									(1) and (2)		(±0.82)
None									20.3	20.7	20.5
0.3									27.7	30.9	29.3
0.6									30.8	32.2	31.5
0.9									30.7	32.8	31.8
<u>Mean (±0.92)</u>									27.4	29.2	28.3

63/B/3.11

(1) (±1.16) For use in comparisons within the same whole plot treatment.  
 (2) (±1.54) For use in comparisons involving different whole plot treatments.

63/B/3.12

Barley, Grain (at 85% dry matter): cwt per acre

Old scheme	Green manures after potatoes for barley		Plots fallow under old scheme	
	None Fallow	Trefoil Excluding fallow	Ryegrass fallow	Mean
	16.9	29.1	27.4	26.0
			N: cwt per acre	
			Dung to cabbages 1952: tons per acre	
			None	10
			4.4	4.7
			14.0	16.0
			21.5	22.3
			24.7	27.4
			Mean	16.1
				17.6
				Mean
				16.9

Mean dry matter % as harvested: 75.4