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## Rothamsted Report for 1932

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### Other Experiments at Woburn

#### Rothamsted Research

Rothamsted Research (1933) *Other Experiments at Woburn* ; Rothamsted Report For 1932, pp 163 - 168 - DOI: <https://doi.org/10.23637/ERADOC-1-64>

## Replicated Experiments at Woburn SUGAR BEET

Effect of nitrate of soda applied at various times.  
Early and late application of minerals.  
Ordinary and intensive interdrill cultivation.

W S—Butt Close, 1932. Plan and yields in lb.

	Treat-ment.	Roots (un-washed)	Tops	Sugar per cent.		Treat-ment.	Roots (un-washed).	Tops	Sugar per cent.
1	N <sub>2</sub> LB	548	619	17.56		— LA	572	532	18.35
	N <sub>2</sub> EA	588	742	18.24		N <sub>1</sub> EA	595	702	18.47
	N <sub>3</sub> EB	637	754	17.50		N <sub>2</sub> LB	608	808	17.73
	N <sub>1</sub> EA	720*	836*	17.73*		N <sub>3</sub> LB	578	794	17.73
	N <sub>1</sub> EB	674	827	17.44		N <sub>1</sub> LA	687	760	17.96
	N <sub>2</sub> EB	677	784	17.21		N <sub>3</sub> EB	636	828	18.47
	N <sub>3</sub> LB	702	744	17.78		N <sub>2</sub> EB	740	821	17.56
	N <sub>1</sub> LA	686*	878*	18.07*		N <sub>3</sub> EA	730	853	17.61
	—EA	610	575	18.35	W	N <sub>1</sub> EB	664	906	17.90
	—EB	611	564	18.24	↑	N <sub>2</sub> EA	673	922	17.78
	—LB	548	642	18.24		—LB	726	701	17.78
	—LA	593	577	18.18		—EA	673	686	18.30
	N <sub>2</sub> LA	724	708	17.78		—EB	648	628	17.96
	N <sub>1</sub> LB	661	761	17.44		N <sub>2</sub> LA	834	824	17.78
	N <sub>3</sub> LA	736	730	17.90		N <sub>3</sub> LA	758	878	17.33
	N <sub>3</sub> EA	672	775	18.35		N <sub>1</sub> LB	654	888	17.48
	N <sub>3</sub> LB	663	682	18.52		N <sub>1</sub> LB	688	763	17.90
	N <sub>2</sub> EA	602	620	18.24		N <sub>3</sub> EA	688	728	18.30
	—EB	552	552	18.47		N <sub>3</sub> EB	706	735	18.18
	N <sub>3</sub> LA	668	654	18.64		N <sub>1</sub> EB	699	689	18.01
	N <sub>1</sub> EA	630	699	17.78		—LB	646	633	18.13
	N <sub>2</sub> LB	608	758	18.35		N <sub>1</sub> EA	765	715	18.13
	N <sub>1</sub> LA	585	740	18.35		N <sub>3</sub> LB	679	724	18.24
	N <sub>2</sub> EB	693	744	17.90		—EA	640	590	18.81
	—LA	547	582	18.75		N <sub>2</sub> EB	769	708	18.24
	N <sub>2</sub> LA	638	644	18.81		N <sub>1</sub> LA	694	689	18.58
	—EA	570	537	18.47		N <sub>3</sub> LA	762	724	18.01
	—LB	552	568	18.70		—EB	649	570	18.47
	N <sub>3</sub> EA	565	708	18.13		—LA	641	590	18.47
	N <sub>3</sub> EB	625	650	18.52		N <sub>2</sub> LA	748	710	18.52
	N <sub>1</sub> EB	543	722	18.35		N <sub>2</sub> LB	733	696	18.18
32	N <sub>2</sub> LB	530	761	17.90		N <sub>2</sub> EA	569	663	18.07

\* Plots 4 and 8 received an additional  $\frac{1}{2}$ N at singling by mistake. The yields were rejected on analysis.

Plots 33 to 64 are to the East of and contiguous to plots 1 to 32.

SYSTEM OF REPLICATION : 4 randomised blocks of 16 plots each.

AREA OF EACH PLOT : 1/50th acre (180 × 11.1 links).

VARIETY : Kuhn.

TREATMENTS : All combinations of—

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>— No nitrogen.</li> <li>N<sub>1</sub> Nitrogen 3 weeks before sowing.</li> <li>N<sub>2</sub> Nitrogen at sowing.</li> <li>N<sub>3</sub> Nitrogen half at sowing, half at singling.</li> </ul> | <ul style="list-style-type: none"> <li>{ E Basal minerals 3 weeks before sowing.</li> <li>{ L Basal minerals at sowing.</li> <li>{ A Ordinary cultivation.</li> <li>{ B Intensive inter-drill cultivation.</li> </ul> |
|--|---|

Nitrate of soda at the rate of 0.6 cwt. per acre.

BASAL MINERALS : Super. at the rate of 0.5 cwt. P<sub>2</sub>O<sub>5</sub> per acre and 30 per cent. potash manure salt at the rate of 1.0 cwt. K<sub>2</sub>O per acre.

BEEF SOWN : May 6th-12th. BEET LIFTED : Nov. 7th-12th. PREVIOUS CROP : Brussel Sprouts.

CULTIVATIONS :

Ordinary. Sufficient hand or horse hoeing to keep down weeds. Actual cultivations : June 6th-7th, 17th, July 4th, 15th, August 18th, horse hoe. Intensive inter-drill cultivation. Ordinary cultivation, plus an intensive cultivation with horse or motor implements as nearly as possible at ten-day intervals from singling. Actual additional cultivations : July 21st, 29th, August 5th, 18th.

### SUMMARY OF RESULTS

		No Nitrogen	Nitrogen 3 weeks before sowing	Nitrogen at sowing	$\frac{1}{2}$ N at sowing $\frac{1}{2}$ N at singling	Mean of Nitrogens	Mean
<b>ROOTS (washed)</b>							
<b>Tons per acre</b>							
Ordinary cultivation	Early basal ..	11.37	12.04*	11.08	12.11	11.75	11.65
	Late basal ..	10.72	11.89*	13.42	13.33	12.88	12.34
	Mean .. ..	11.04	11.97	12.25	12.72	12.31	11.99
Intensive inter-drill cultivation	Early basal ..	11.22	11.76	13.12	11.87	12.25	11.99
	Late basal ..	11.26	11.55	11.38	11.95	11.62	11.53
	Mean .. ..	11.24	11.66	12.25	11.91	11.94	11.76
<i>Mean of both cultivations</i> .. ..		11.14	11.81	12.25	12.31	12.12	11.88
<b>Per cent.</b>							
Ordinary cultivation	Early basal ..	95.6	101.3*	93.3	101.9	98.8	98.0
	Late basal ..	90.3	100.1*	113.0	112.2	108.4	103.9
	Mean .. ..	93.0	100.7	103.1	107.0	103.6	101.0
Intensive inter-drill cultivation	Early basal ..	94.4	99.0	110.5	99.9	103.1	100.9
	Late basal ..	94.8	97.2	95.8	100.6	97.9	97.1
	Mean .. ..	94.6	98.1	103.1	100.3	100.5	99.0
<i>Mean of both cultivations</i> .. ..		93.8	99.4	103.1	103.6	102.0	100.0
<b>TOPS</b>							
<b>Tons per acre</b>							
Ordinary cultivation	Early basal ..	13.32	15.70*	16.44	17.10	16.41	15.64
	Late basal ..	12.73	16.24*	16.10	16.66	16.33	15.43
	Mean .. ..	13.03	15.97	16.28	16.88	16.38	15.54
Intensive inter-drill cultivation	Early basal ..	12.91	17.54	17.06	16.56	17.05	16.02
	Late basal ..	14.20	17.71	16.08	16.43	16.74	16.10
	Mean .. ..	13.55	17.62	16.57	16.49	16.89	16.06
<i>Mean of both cultivations</i> .. ..		13.29	16.80	16.42	16.69	16.64	15.80
<b>Per cent.</b>							
Ordinary cultivation	Early basal ..	84.3	99.4*	104.1	108.2	103.9	99.0
	Late basal ..	80.6	102.8*	101.9	105.5	103.4	97.7
	Mean .. ..	82.4	101.1	103.0	106.8	103.6	98.3
Intensive inter-drill cultivation	Early basal ..	81.7	111.0	108.0	104.8	107.9	101.4
	Late basal ..	89.8	112.1	101.8	104.0	106.0	101.9
	Mean .. ..	85.8	111.6	104.9	104.4	107.0	101.6
<i>Mean of both cultivations</i> .. ..		84.1	106.3	103.9	105.6	105.3	100.0

\* The yield of one plot of each of these treatments was estimated.

Standard Errors of single entries—Roots : 0.415 tons, or 3.49 per cent.  
Tops : 0.519 tons, or 3.29 per cent.

**SUGAR PERCENTAGE**

		No Nitrogen	Nitrogen 3 weeks before sowing	Nitrogen at sowing	$\frac{1}{2}$ N at sowing $\frac{1}{2}$ N at singling	Mean of Nitrogens	Mean
Ordinary cultivation	Early basal ..	18.48	18.05*	18.08	18.10	18.08	18.18
	Late basal ..	18.44	18.22*	18.22	17.97	18.14	18.21
	Mean .. ..	18.46	18.14	18.15	18.04	18.11	18.20
Intensive inter-drill cultivation	Early basal ..	18.28	17.92	17.73	18.17	17.94	18.02
	Late basal ..	18.21	17.68	17.96	18.07	17.90	17.98
	Mean .. ..	18.24	17.80	17.84	18.12	17.92	18.00
<i>Mean of both cultivations</i> .. ..		18.35	17.97	18.00	18.08	18.02	18.10
<b>Per cent.</b>							
Ordinary cultivation	Early basal ..	102.1	99.7*	99.9	100.0	99.9	100.4
	Late basal ..	101.9	100.7*	100.7	99.3	100.2	100.6
	Mean .. ..	102.0	100.2	100.3	99.6	100.0	100.5
Intensive inter-drill cultivation	Early basal ..	101.0	99.0	97.9	100.4	99.1	99.6
	Late basal ..	100.6	97.7	99.2	99.8	98.9	99.3
	Mean .. ..	100.8	98.4	98.6	100.1	99.0	99.4
<i>Mean of both cultivations</i> .. ..		101.4	99.3	99.4	99.9	99.5	100.0

\* The yield of one plot of each of these treatments was estimated.

Standard Error of single entry : 0.138, or 0.765 per cent.

**CONCLUSIONS**

Both the roots and tops show a significant response to nitrate of soda, set off by a significant reduction in sugar percentage, but there are no significant differences between the different times of application. The response of the roots (to 0.6 cwt. N. per acre) is at the rate of 1.63 tons or 13.7 per cent. per cwt. N., the corresponding reduction in sugar percentage being 0.55 or 3.2 per cent.

The higher yield of tops in the case of the inter-drill cultivation is not quite significant, and there is a non-significant reduction of 0.23 tons or 2.0 per cent. in the roots and a significant reduction of 0.20 or 1.1 per cent. in the sugar percentage by intensive cultivation.

There are no significant average differences between early and late applications of basal manures, but with the roots the intensive inter-drill cultivation does significantly better in conjunction with early application of basal manures than with the late application, though in view of the wide discrepancies between the corresponding differences for the separate nitrogenous treatments the reality of the effect seems doubtful.

## KALE

### EFFECT OF AMMONIUM HUMATE, SULPHATE OF AMMONIA AND HUMIC ACID.

WK—Butt Close, 1932.

Plan and yields in lb., green weights.

65							69	
4 574	1 608	5 634	3 714	2 585				
2 992	3 910	4 851	1 791	5 647				
3 992	4 982	2 949	5 933	1 970				
5 886	2 893	1 815	4 897	3 858				
1 754	5 682	3 748	2 785	4 737				
85							89	

S  
↑

SYSTEM OF REPLICATION : 5 × 5 Latin square.

AREA OF EACH PLOT : 1/50th acre (16 yds. 5 ins. × 6 yds.). Kale drilled in rows 22 inches apart, not thinned.

VARIETY : Garton's Thousand head.

TREATMENTS :

1=No nitrogen.

2=Sulphate of ammonia at the rate of 0.145 cwt. N per acre.

3=Sulphate of ammonia } At the rate

4=Ammonium humate } 0.4 cwt. N

5=Humic Acid } per acre.

BASAL MANURING : Superphosphate at the rate of 0.5 cwt. P<sub>2</sub>O<sub>5</sub> per acre and potash manure salt at the rate of 1.0 cwt. K<sub>2</sub>O per acre.

MANURES APPLIED : June 6th.

SEED SOWN : June 4th.

KALE CUT : December 20th-January 31st.

PREVIOUS CROP : Brussel sprouts.

### SUMMARY OF RESULTS

	No Nitrogen	S/Amm. 0.145 cwt. N.	S/Amm. 0.4 cwt. N.	Amm. humate 0.4 cwt. N.	Humic acid 0.4 cwt. N.	Mean	Standard Error
<i>Green Material—</i>							
Tons per acre ..	18.31	19.55	19.63	18.79	17.59	18.78	0.649
Per cent .. ..	97.5	104.1	104.6	100.1	93.7	100.0	3.46
<i>Percentage dry matter in fresh—</i>							
Leaves .. ..	14.2	14.1	14.0	14.3	14.1	14.1	—
Stems .. ..	19.7	19.4	18.8	19.0	19.8	19.3	—
<i>Ratio Leaf/Stem (green) .. ..</i>	1.157	1.122	1.046	1.088	1.177	1.118	—

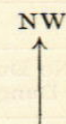
### CONCLUSIONS

The differences between the treatments are not significant.

**KALE**  
**AVAILABILITY OF NITROGEN IN DUNG.**  
**WK—Lansome, 1932**

Plan and yields in lb.—Green weights.

	1							8
	<b>D2</b> 230	<b>O3</b> 258	<b>O2</b> 242	<b>D0</b> 194	<b>O0</b> 145	<b>D1</b> 268	<b>D3</b> 285	<b>O1</b> 185
	<b>D0</b> 167	<b>D1</b> 176	<b>D3</b> 314	<b>O2</b> 196	<b>D2</b> 230	<b>O1</b> 198	<b>O3</b> 231	<b>O0</b> 136
	<b>O3</b> 240	<b>O2</b> 189	<b>D2</b> 280	<b>O0</b> 127	<b>D1</b> 240	<b>D0</b> 212	<b>O1</b> 148	<b>D3</b> 298
	<b>D1</b> 155	<b>D0</b> 142	<b>O1</b> 194	<b>D2</b> 222	<b>O3</b> 255	<b>D3</b> 318	<b>O0</b> 118	<b>O2</b> 208
	<b>O2</b> 180	<b>D2</b> 212	<b>D0</b> 204	<b>D3</b> 285	<b>O1</b> 171	<b>O0</b> 152	<b>D1</b> 258	<b>O3</b> 251
	<b>O0</b> 124	<b>O1</b> 176	<b>O3</b> 247	<b>D1</b> 155	<b>D3</b> 283	<b>O2</b> 170	<b>D2</b> 254	<b>D0</b> 208
	<b>O1</b> 177	<b>D3</b> 306	<b>O0</b> 146	<b>O3</b> 249	<b>D0</b> 203	<b>D2</b> 260	<b>O2</b> 184	<b>D1</b> 206
	<b>D3</b> 275	<b>O0</b> 145	<b>D1</b> 289	<b>O1</b> 213	<b>O2</b> 248	<b>O3</b> 274	<b>D0</b> 249	<b>D2</b> 258
	57							64



SYSTEM OF REPLICATION : 8 × 8 Latin square.

AREA OF EACH PLOT : 0.004591 acre (20 × 10 ft.). 100 plants per plot, spaced 2 × 1 ft. Plants weighed individually at harvest. No paths or guard rows.

VARIETY : Marrow stem.

TREATMENTS : Sulphate of ammonia at the rate of 0 (0), 0.2 (1), 0.4 (2), and 0.8 cwt. (3) N per acre, with and without dung (D and O) at the rate of 15 tons per acre. Basal (plots receiving no dung) : superphosphate at the rate of 0.5 cwt. P<sub>2</sub>O<sub>5</sub> per acre, and 30 per cent. potash manure salt at the rate of 1.0 cwt. K<sub>2</sub>O per acre.

MANURES APPLIED : May 17th. Dung, March 27th and 28th.

SEED SOWN IN GLASS HOUSE on March 7th ; transplanted on May 17th-18th.

KALE CUT : October 4th, 5th, 19th ; November 1st and 18th.

PREVIOUS CROP : Wheat.

## SUMMARY OF RESULTS.

### FRESH MATERIAL

(See diagram on p. 29.)

	No S/Amm.	S/Amm. 0.2 cwt. N.	S/Amm. 0.4 cwt. N.	S/Amm. 0.8 cwt. N.	Mean
<b>Tons per acre</b>					
No Dung .. ..	13.29	17.76	19.67	24.36	18.77
Dung .. ..	19.19	21.24	23.67	28.74	23.21
Mean .. ..	16.24	19.50	21.67	26.55	20.99
<b>Per cent.</b>					
No Dung .. ..	63.3	84.6	93.7	116.0	89.4
Dung .. ..	91.4	101.2	112.8	136.9	110.6
Mean .. ..	77.4	92.9	103.2	126.5	100.0

Standard Error of single entry : 0.713 tons, or 3.40 per cent.

### CONCLUSIONS

The effects of dung and sulphate of ammonia are both significant. There is no significant departure from proportionality in the response to increasing dressings of sulphate of ammonia, though the low value of the yield of plots without sulphate of ammonia or dung is suggestive, nor is there any significant difference in the response to sulphate of ammonia in the presence and absence of dung. The results indicate that the dung supplied produced the same increase in yield as 0.34 cwt. N. per acre as sulphate of ammonia ; if it is assumed that the whole effect of the dung was due to the additional available nitrogen supplied then 22 per cent. of the nitrogen in the dung appears to be in available form.