

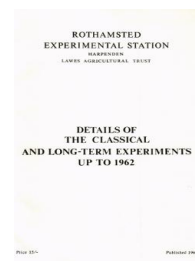
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Six-course Rotation- Rothamsted and Woburn

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SIX-COURSE ROTATION EXPERIMENTS
 ROTHAMSTED, LONG HOOS IV AND WOBURN, STACKYARD,
 SERIES B, 1930-1960

These experiments were begun in 1930 on both farms but were not fully established on their present sites till 1931.

The purpose was to measure the responses of six crops to several levels of each of the main nutrients N, P, K over a period of years, and to obtain information on the response to fertilisers in different seasons.

The crops of the rotation and the varieties are as follows:-

	Rothamsted	Woburn
Sugar Beet	Kuhn P till 1941, then Klein E	Kuhn P till 1942, then Klein E
Barley	Plumage Archer	Plumage Archer till 1955, then Herta
Clover	Red till 1936, then Montgomery Red	Red till 1945, Montgomery Red till 1955, then Crimson Clover
Wheat	Yeoman	Yeoman till 1945, Squareheads Master till 1955, then Yeoman
Potatoes	Ally till 1941, then Majestic	Ally till 1941, then Majestic
Rye*	Not specified till 1948, then King II	Not specified till 1948, then King II

*Till 1933 an autumn sown forage mixture of rye, vetches, and beans was grown and cut green, but rye for grain was substituted in 1934.

In the early years of the experiments catch crop green manures were grown as follows (dates are those of the succeeding root crops):-

Rothamsted 1932-1940, Woburn 1932-1942, mustard for sugar beet

Rothamsted 1932, 1934-1937, Woburn 1932-1942, 1944 and 1945, rye for potatoes.

There are 15 plots in each block divided into three sets of five as follows:-

Level	0	1	2	3	4	
Nitrogen series	0.0	0.15	0.3	0.45	0.6	cwt. N per acre as sulphate of ammonia
Phosphate series	0.0	0.15	0.3	0.45	0.6	cwt. P ₂ O ₅ per acre as superphosphate
Potash series	0.0	0.25	0.5	0.75	1.0	cwt. K ₂ O per acre as muriate of potash

The N series has a basal dressing of P and K at their middle levels, and similarly for the other nutrients. All crops receive the same scale of fertiliser dressing. For spring-sown crops all fertilisers are applied in the seedbed. For autumn-sown crops, P and K are given in the seedbed, N as a spring top dressing. Clover has its P and K in the seedbed or as autumn top dressing and the N in spring.

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The manurial treatments rotate on the plots in such a way that in the course of 15 years every plot has received each of the 15 treatments. Since 1935 ground chalk providing 10 cwt. CaO per acre (23 cwt. ground chalk from 1958 onwards) has been applied before barley and rye. At Woburn no chalk dressing was applied before the barley crops of 1956-1958. In 1956 the rates of nitrogen dressings at Woburn were doubled, except for Crimson clover which remained unchanged at the rate previously used for Late Flowering Red Clover.

In 1959 and 1960 the potato plots at Woburn were split to test 2.6 cwt. magnesium sulphate per acre.

In 1959 the yields of the cereals were measured by one combine cut per plot.

Plot size (acres): Rothamsted, 0.0250; Woburn, 0.0266.

For a description of the design of the experiment see Rep. Rothamst. exp. Sta. for 1932, p.131.

For a summary of results to 1948, see Rep. Rothamst. exp. Sta. for 1948, p.90.

For a summary of results 1931-1955, see Yates, F. and Patterson, H.D. A note on the Six-Course Rotation experiments at Rothamsted and Woburn. J. agric. Sci. (1958) 50, 102-109.

See also:

Glynne, M.D. Eyespot (*Cercospora herpotrichoides*) and other factors influencing yield of wheat in the six-course rotation experiment at Rothamsted (1930-60). Ann. appl. Biol. (1963), 51, 189-214.

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Table 29
SIX-COURSE ROTATION EXPERIMENT
ROTHAMSTED LONG HOOS IV
Means over 30 years 1931-1960

	Level ^x				
	0	1	2	3	4
	<u>Barley, grain: cwt per acre</u>				
N	24.5	27.8	30.1	31.5	31.8
P	29.3	29.2	29.6	30.0	29.2
K	29.4	29.9	29.8	29.0	29.6
	<u>*Clover, hay, dry matter : cwt per acre</u>				
N	27.5	28.9	29.2	29.9	30.3
P	28.5	30.1	31.1	28.9	29.1
K	29.9	29.8	29.9	29.5	30.8
	<u>Wheat, grain: cwt per acre</u>				
N	25.5	28.0	27.9	29.2	29.7
P	29.1	29.3	28.4	28.8	28.7
K	28.4	28.7	28.3	28.5	29.0
	<u>Potatoes, total tubers: tons per acre</u>				
N	6.73	7.29	8.10	8.29	8.69
P	7.64	7.87	8.09	8.25	8.27
K	6.79	7.95	8.19	8.56	8.68
	<u>**Rye, grain: cwt per acre</u>				
N	20.8	24.6	28.0	29.9	29.8
P	26.8	26.6	27.2	26.4	26.5
K	27.3	25.9	25.9	26.9	26.0
	<u>Sugar beet, total sugar: cwt per acre</u>				
N	31.1	33.3	34.6	35.5	36.5
P	34.8	34.6	34.6	34.8	33.6
K	34.2	34.8	34.6	35.2	35.1

*Clover crop failed in 1933, 1935, 1954, Means over 27 years only

**Rye no yields for 1931, 1932, 1933. Means over 27 years only

^x See text for details

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Table 30
SIX-COURSE ROTATION EXPERIMENT
WOBURN STACKYARD FIELD
Means over 25 years 1931-1955

	Level ^x				
	0	1	2	3	4
	<u>Barley, grain: cwt per acre</u>				
N	15.0	20.3	23.5	25.1	26.4
P	22.4	24.1	24.0	24.1	23.0
K	22.6	22.6	23.8	23.5	23.0
	<u>Clover, hay, dry matter: cwt per acre</u>				
N	32.8	31.7	30.3	28.0	30.8
P	31.2	30.2	30.6	30.2	32.4
K	29.1	32.0	33.3	31.7	32.4
	<u>Wheat, grain: cwt per acre</u>				
N	10.2	11.3	14.4	16.7	17.7
P	13.8	14.4	13.5	13.3	13.8
K	14.1	13.8	14.1	13.9	13.9
	<u>Potatoes, total tubers: tons per acre</u>				
N	6.24	6.94	7.78	8.45	9.02
P	7.27	7.46	7.88	7.74	7.69
K	7.79	7.57	8.07	7.91	7.78
	<u>Rye, grain: cwt per acre</u>				
N	14.3	17.1	19.6	22.6	24.5
P	20.5	19.5	19.7	19.6	19.6
K	19.7	19.5	19.4	19.8	19.7
	<u>Sugar beet, total sugar: cwt per acre</u>				
N	24.1	27.3	29.3	31.0	32.3
P	30.2	29.8	30.1	30.5	29.3
K	28.1	29.5	30.4	31.2	30.1

^x See text for details

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Table 31
SIX-COURSE ROTATION EXPERIMENT
WOBURN STACKYARD FIELD
Means over 5 years 1956-60

	Level ^x				
	0	1	2	3	4
<u>Barley, grain: cwt per acre</u>					
N	17.3	27.6	28.6	30.6	34.5
P	30.7	32.3	30.8	31.3	32.0
K	30.3	27.6	31.4	30.3	27.1
<u>+Clover, hay, dry matter: cwt per acre</u>					
N	11.0	14.5	12.9	13.5	16.5
P	14.2	17.4	17.4	18.0	18.8
K	9.7	14.1	12.1	12.2	12.6
<u>Wheat, grain: cwt per acre</u>					
N	6.7	12.8	17.7	23.2	24.9
P	20.3	21.2	20.4	19.4	18.7
K	18.8	17.8	18.6	20.6	20.1
<u>Potatoes, total tubers: tons per acre</u>					
N	5.73	8.33	8.82	10.49	11.17
P	9.75	9.58	9.30	9.81	8.89
K	8.96	9.37	11.13	10.40	9.34
<u>Rye, grain: cwt per acre</u>					
N	14.6	19.8	29.7	33.9	33.0
P	27.9	27.0	27.0	28.2	28.4
K	29.0	28.7	28.2	28.3	27.1
<u>Sugar beet, total sugar: cwt per acre</u>					
N	27.6	36.6	39.5	41.2	41.4
P	38.6	37.7	38.1	40.1	42.9
K	42.0	37.9	36.2	44.3	44.5

^x See text for details

+Clover. Mean over 3 years only. Crop discarded in 1959 and 1960

Table 32
SIX-COURSE ROTATION EXPERIMENT
WOBURN STACKYARD FIELD
Potatoes, total tubers: tons per acre
Mean over 2 years 1959-1960

Plots not receiving Mg.	Level ^x				
	0	1	2	3	4
N	4.74	7.81	8.68	11.06	10.46
P	9.65	9.06	7.98	9.62	7.70
K	7.96	9.22	10.03	9.20	8.13
<u>Plots receiving Mg.</u>					
N	4.36	8.49	10.39	10.74	10.93
P	9.58	9.44	8.14	8.96	8.54
K	9.38	9.60	9.31	10.00	10.56

^x See text for details