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Rothamsted- the Classical Experiments

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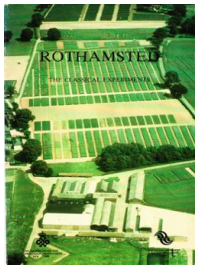

Hoosfield Spring Barley

Rothamsted Research

Rothamsted Research (1984) *Hoosfield Spring Barley ;* Rothamsted- The Classical Experiments, pp 18 - 20 **- DOI: https://doi.org/10.23637/ERADOC-1-190**

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HOOSFIELD SPRING BARLEY

Spring barley has been grown continuously here since 1852. The experiment offers interesting contrasts to that on Broadbalk, being spring-sown, having been fallowed only four times to control weeds and testing not only nitrogen, minerals and FYM but also silicate of soda.

In 1968 a crop rotation of potatoes, beans and barley on small areas of some plots and a four-level N test on all plots were introduced. The effects of the two-year break on the yield of barley were small and the whole experiment has again grown continuous barley since 1979.

The design of the experiment is of a factorial nature with east-west strips (see plan) having the four combinations of:

(1) 0 *vs* P and
(2) 0 *vs* KMg

and north-south strips, which cross these, originally testing forms of nitrogen, all applied at the same rate of N:

(3) 0 *vs* sulphate of ammonia *vs* nitrate of soda *vs* rape cake (later castor meal)

The nitrate of soda strip is divided for a test of 0 *vs* silicate of soda.

Additional plots at the south side test FYM, since the experiment started, and residues of FYM applied 1852–71.

Hoosfield (see plan on opposite page)

Cropping

Continuous barley

Nitrogen dressing in spring

N1, 2, 3 — 'Nitro-Chalk' supplying 48, 96, 144 kg N ha^{-1} (about 0·4, 0·8, 1·2 cwt N $acre^{-1}$)

The rates of N shown on the diagram are those applied to barley in 1984; they change cyclically, every year in order N3 following N– following N1 following N2.

Organic (applied before ploughing in autumn)

FYM — 35 t ha^{-1} farmyard manure (14 tons $acre^{-1}$)

Minerals (applied before ploughing in autumn)

P — 35 kg P ha^{-1} as granular superphosphate (19% P_2O_5) (0·6 cwt P_2O_5 $acre^{-1}$) discontinued to Series C since 1980

K — 90 kg K ha^{-1} as sulphate of potash (50% K_2O) (0·9 cwt K_20 $acre^{-1}$) discontinued to Series C since 1980

S — 450 kg ha^{-1} silicate of soda since 1980, (S) each year until 1979

Applied every 3rd year (1983, 1986 etc.)

Mg — 35 kg Mg ha^{-1} as kieserite (15% Mg)

Residuals

Na — 15 kg Na ha^{-1} as sodium sulphate discontinued in 1974 (applied with K and Mg)

Series treatments (discontinued 1968)

O — None
A — 48 kg N ha^{-1} as sulphate of ammonia (0·4 cwt N $acre^{-1}$)
AA & AAS — 48 kg N ha^{-1} as nitrate of soda
C — 48 kg N ha^{-1} as castor bean meal

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HOOSFIELD

Spring Barley since 1852

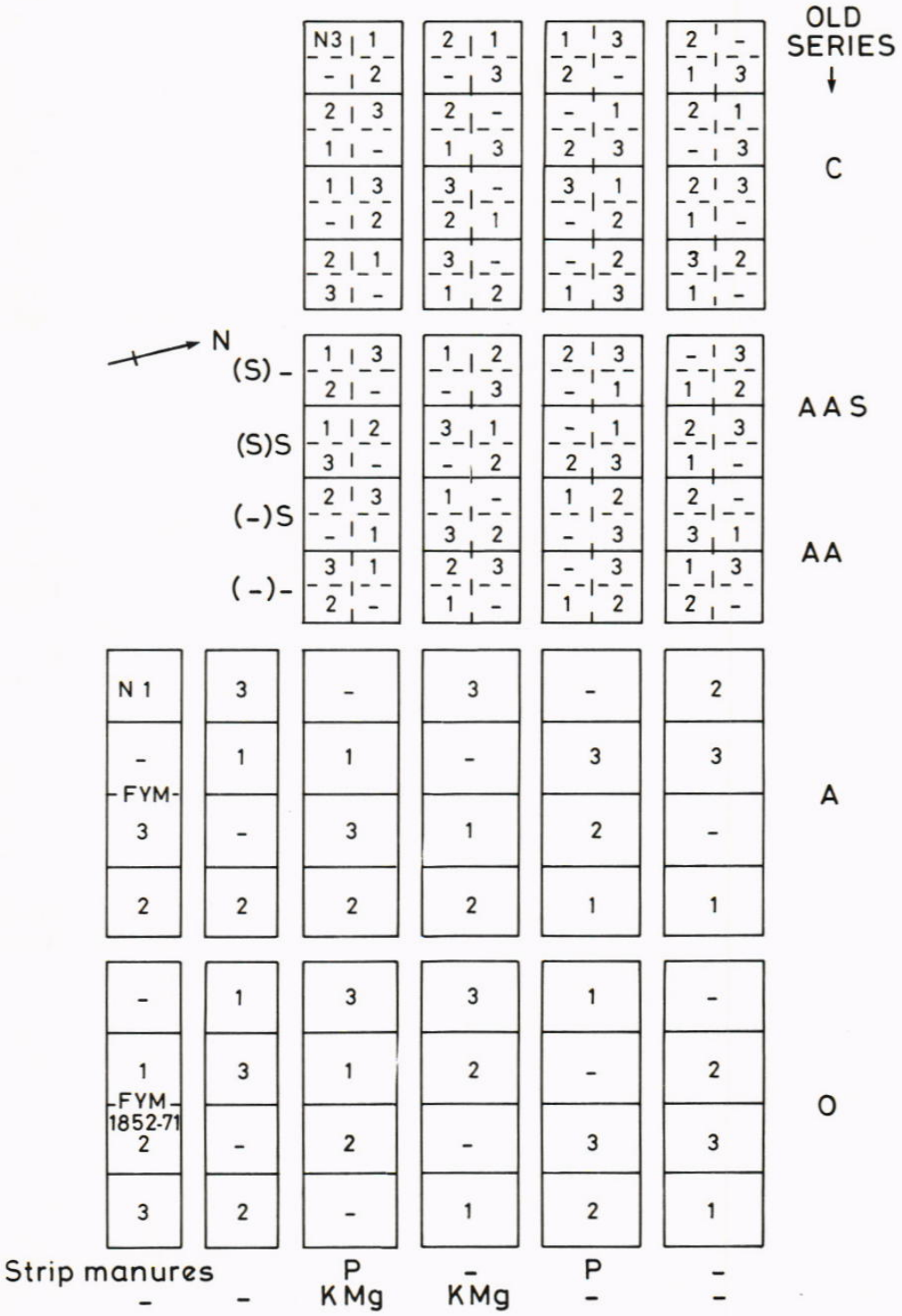

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TABLE 4

Mean yield (4 years, 1980–83) of Georgie spring barley grain t ha^{-1}

	Continuous barley since fallow in 1967			
	N0	N1	N2	N3
–	0·8	1·2	1·5	1·6
P	1·9	3·0	3·0	2·5
K	1·0	1·6	2·0	2·1
PK	1·7	3·6	4·5	5·1
FYM	5·0	5·6	5·3	5·8

	After continuous barley 1968–79		After barley in rotation 1968–79	
	–	(S)–	(–)S	(S)S
N3–	1·5	3·2	3·3	3·8
N3P	3·6	4·5	5·2	5·3
N3K	2·3	4·3	4·0	4·6
N3PK	5·3	6·0	5·6	5·6

Forms of nitrogen have not been tested since 1967, PKMg applications on the old rape cake series were discontinued after 1979 and the silicate of soda test was modified in 1980 to include the four combinations of:

(1) 0 *vs* silicate from 1980
(2) 0 *vs* silicate 1862–1979

Recent yields (Table 4) continue to show the great importance of P to spring-sown barley as well as large positive interactions between N, P and K. Although the yields from complete fertilizers match the yields from FYM alone, the largest yields, as on Broadbalk, come from the combination of FYM and nitrogen fertilizer. The residual effect of silicate of soda applied until 1979 more than doubled the yield of plots given nitrogen alone and even when P is supplied the effect is considerable. Fresh or continued dressings of silicate since 1979 appear also to be beneficial but at present these effects are uncertain because of differences in the continuity of barley cropping.

EXHAUSTION LAND SPRING BARLEY

This area was cropped with wheat without manure from 1850 to 1855 when it was divided into four strips for a fertilizer test with continuous wheat given treatments similar to some of those on Broadbalk. This continued until 1875; potatoes were then grown from 1876 to 1901 with an additional strip added and all five strips halved to test ten manurial treatments repeated on the plots each year. Three of these treatments were the same as those applied to the same plots under wheat.

Table 5 shows the number of annual dressings given to these plots between 1856 and 1901 and estimates of the total amounts of P and K applied in FYM and fertilizers.

The potato experiment ended in 1901 and with few exceptions cereals have been grown each year since then. From 1902 to 1939 no manures were given; yields of grain and straw recorded in some of the earlier years measured the residual values of the manures applied to the potatoes. From 1940 fertilizer

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