

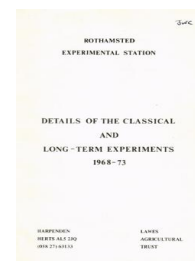
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Details of the Classical and Long-term Experiments 1968-73

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R/BN/7 Barnfield - Beans, Wheat, Barley, Potatoes, Sugar Beet

Rothamsted Research

Rothamsted Research (1977) *R/BN/7 Barnfield - Beans, Wheat, Barley, Potatoes, Sugar Beet* ; Details Of The Classical And Long-Term Experiments 1968-73, pp 25 - 28 - **DOI:**
<https://doi.org/10.23637/ERADOC-1-193>

BARNFIELD

(R/BN/7)

Mangolds were grown on all plots from 1876 to 1959; in addition sugar beet was grown on part of each plot from 1946. In the period 1960-67 the field was fallowed or cropped with mangolds and potatoes, and finally with beans in the year before the introduction of a new cropping scheme in 1968 (*Details 1967*, p 31).

The area known as The Valley, some 30 m deep between Series O and N, had been unmanured until 1967. The following season 18.5 m adjacent to Series O were brought into the manured area of each strip and included in the new scheme. The Series were therefore redesignated Sections and numbered as follows:

Section 1 (Series O), 2 (Valley), 3 (Series N), 4 (Series A)
5 (Series AC), 6 (Series C)

In the period 1968-73 beans were grown continuously on Sections 1 and 2 without fertiliser nitrogen but with the traditional strip manures. On the rest of the field a four-course rotation was followed – potatoes, barley, sugar beet, spring wheat, with only two phases present (on half strips) each year. The rotation and a new test of N at four rates were designed to test cumulative effects of the traditional strip manures and the residual effects of the Series manures, particularly of castor meal, which were discontinued in 1968.

Treatments to Sections

In Sections 1 and 2 plots were split lengthways and in Section 1 also across for a test (unrandomised) of simazine at 0 v. 1.12 kg. Three combinations of treatments have been tested:

	1967	1968	1969	1970	1971	1972	1973
(i)	+	—	—	—	—	+	—
(ii)	+	+	+	—	+	—	+
(iii)	+	+	+	+	—	—	+

On Section 1 treatment (i) was duplicated, Section 2 had treatments (i) and (ii) only. Mechanical cultivation was used to control weeds on sub-plots without simazine.

In Sections 3-6 each plot was split lengthways into two to carry two crops of the four-course rotation, barley and wheat one year, potatoes and sugar beet the following. Each half plot was further split breadthways into two and received two of the four N rates which were applied cumulatively. Each whole plot had the four N rates each year, NO and N2 on one crop, N1 and N3 on the other. In each crop on any one strip Sections 3 and 6 (without and with the castor meal residues respectively) had the same two rates of N, Sections 4 and 5 (without and with castor meal residues) the other two. In each crop on any one section strips 1, 4 and 5 had the same two rates of N, and strips 2, 6, 7 and 8 the other two (see diagram).

Strip 3, which was discarded from the experiment in 1903 as it was very narrow, has carried the same crops as the adjacent half of strip 4 and was manured at the discretion of the Head of Farms. Parts of this strip in Sections 1 and 2 have been used for experiments on the chemical control of soil-borne pathogens of beans (*Yields 70/R/BE/7, 71/R/BE/1, 72 and 73/R/CS/82*).

Plot 9 carried only one phase of the four-course rotation starting with barley in 1968. It was also divided into quarter plots to which the four rates of N are applied to each crop.

NOTE: From 1974 certain changes were made to the strip manures and most of the field (except Sections 1 and 2) was bare fallowed in preparation for a new long-term scheme.

Manuring up to 1973

The seven strip treatments (1, 2, 4, 5, 6, 7 and 8) which have been basically unchanged since 1876 have been continued:

Annual dressings per hectare

(1) *Minerals*

- | | |
|----|--|
| P | Powdered superphosphate (approx. 20% P_2O_5) to supply 34 kg P. |
| K | Sulphate of Potash (approx. 50% K_2O) to supply 224 kg K. |
| Na | Sodium chloride (agricultural salt approx. 39% Na) to supply 90 kg Na. |
| Mg | Sulphate of magnesia (approx. 10% Mg) to supply 22 kg Mg. |

(2) *Organic*

FYM 35 t farmyard manure. Castor meal no longer applied.

(3) *Nitrogen*

N_0 , N_1 , N_2 , N_3 'Nitro-Chalk' to supply 0, 48, 96, 144 kg N applied cumulatively to barley and wheat, 0, 72, 144, 216 kg N to potatoes and sugar beet cumulatively. No N is applied to the beans.

(4) *Application*

P, K, Na, Mg and FYM are applied in autumn before ploughing. N applied just before or soon after sowing cereals, before planting potatoes and before sowing sugar beet (except 1969 shortly after sowing).

Treatment to strips

1	D
2	DPK
4	PKNaMg
5	P
6	PK
7	PNaMg
8	None
Plot 9	KNaMg

Liming

None applied in period 1968-73.

Cropping, varieties and weed control

(1) *Cropping sequences*

Sections 1 and 2	Continuous spring beans	
Sections 3 – 6	Eastern half of each strip and Plot 9	Western half of each strip
1968	B	SW
1969	SB	P
1970	SW	B
1971	P	SB
1972	B	SW
1973	SB	P

B = barley, SB = sugar beet, SW = spring wheat, P = potatoes

(2) *Varieties and treatment of seed*

Spring beans: Maris Bead uninoculated sown at 220 kg (seed was inoculated with *Rhizobium* in 1967)

Barley: 1968 Maris Badger, 1970 and 1972 Julia (dressed with carboxin 1970, ethirimol 1972) sown at 160 kg.

Spring wheat: Kolibri.

Sugar beet: Klein E. sown at 9.0 kg in 1969, 5.6 kg in 1971.

Potatoes: King Edward, once grown chitted paracrinkle free.

(3) *Weedkillers*

Weedkillers were applied in autumn as follows:

Beans 1969:	Diquat	} in previous autumn
Beans 1970:	Strips 1 and 2 only) Paraquat	
Beans 1971, 1972:	Paraquat	
Potatoes 1969, 1971:	Paraquat and linuron	
Spring wheat and Barley 1972:	Dicamba with mecoprop and MCPA	
Sugar beet 1969:	(Strips 1 and 2 only) Phenmedipham	

Other chemicals applied

Beans:	1969-71 and 1973	Demeton-S-methyl
	1968 and 1972	Phorate
Potatoes:	1969, 1971 and 1973	Mancozeb
	1969 and 1973	Demeton-S-methyl
Sugar beet:	1969, 1971	Demeton-S-methyl

Plot size

The original classical plots as used till 1959 ranged from 0.060 to 0.081 ha.

The areas harvested from 1968 were:

Wheat and barley (quarter plots):	0.00781
Beans (half plots): Section 1: 1968, 1969:	0.00147
1970-73:	0.00878
Potatoes (quarter plots):	0.00390
Sugar beet (quarter plots) 1969, 1971:	0.00130
1973:	0.00098

Soil series

Winchester & shallow Batcombe series with small area of Charity Complex (Valley)

References

1. Avery, B.W. et al. (1972)
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2. Nutman, P.S. & Ross, G.J.B. (1970)
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