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## Yields of the Field Experiments 1973

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### 73/R/BN/7 - Barnfield - Beans, Potatoes, Sugar Beet

#### Rothamsted Research

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73/R/BN/7

BARNFIELD

Object: Originally studied the effects of organic and inorganic manures on continuous roots. The experiment has been modified to study effects on a four-course rotation and continuous beans.

The sixth year of the new scheme, beans, potatoes and sugar beet.

For previous years see 'Details' 1967, 68/A/5(t), 69/R/BN/7, 70/R/BN/7(t), 71/R/BN/7(t) and 72/R/BN/7(t).

Plot dimensions and areas harvested:

Beans, Section 1 (half plot): 10.7 x 27.4 (Strips 1 and 8: 7.01 x 27.4).  
Area harvested: 0.00878.

Potatoes and sugar beet (quarter plots): 4.27 x 28.5 (Strip 1: 2.74 x 28.5). Area harvested: Potatoes: 0.00390, sugar beet: 0.00098.

Treatments to sugar beet and potatoes (following the rotation potatoes, barley, sugar beet, spring wheat): All combinations of:-

Whole plots: 1. Fertilisers and organic manures:

	MANURE
D	D
D P K	DPK
P K Na Mg	PKNaMg
P	P
P K	PK
P Na Mg	PNaMg
None	None
K Na Mg (to sugar beet only)	KNaMg

P: Superphosphate to supply 34 kg P

K: Sulphate of potash to supply 224 kg K

Na: Agricultural salt (sodium chloride) to supply 90 kg Na

Mg: Sulphate of magnesia to supply 22 kg Mg

D: Farmyard manure at 35 tonnes

Sub plots: 2. Nitrogen fertiliser (kg N) as 'Nitro-Chalk':

	N
None	0
72	72
144	144
216	216

73/R/BN/7

and partial combinations (excluding treatment K Na Mg) with previous treatments:- 3. Forms of N: RESIDUAL

Nitrate of soda to supply 96 kg N	NS
Sulphate of ammonia to supply 96 kg N	SA
Sulphate of ammonia and castor meal each to supply 96 kg N	SA/C
Castor meal to supply 96 kg N	C

Castor meal last applied 1961, others until 1959.

Treatments to beans (grown continuously since 1967): All combinations of:

Whole plots: 1. Fertilisers and organic manures as for sugar beet and potatoes but excluding K Na Mg: MANURE

Sub plots: 2. Year of applying simazine: SIMAZINE

1.12 kg in 1972, none in 1973 (mechanically weeded)	1972
Mechanically weeded in 1972, 1.12 kg in 1973	1973

NOTE: For a fuller record of treatments see 'Details' etc.

Standard applications:

Spring beans: Insecticide: Demeton-s-methyl at 0.25 kg in 370 l.  
 Potatoes: Fungicide: Mancozeb at 1.3 kg in 370 l on two occasions.  
 Insecticide: Demeton-s-methyl at 0.25 kg in 370 l applied with the mancozeb on the first occasion.  
 Sugar beet: Insecticide: Demeton-s-methyl at 0.25 kg in 370 l.

Seed: Beans: Maris Bead, sown at 220 kg.  
 Potatoes: King Edward, Rothamsted, once grown, chitted seed.  
 Sugar beet: Klein E, sown at 7.8 kg.

Cultivations, etc.: Autumn fertilisers applied: 31 Oct, 1972. FYM applied: 6 Nov. Ploughed: 6-8 Nov.  
 Spring beans: Seed sown: 13 Mar, 1973. Weedkiller applied: 16 Mar.  
 Insecticide applied: 8 June.  
 Potatoes: N applied: 20 Mar, 1973. Plots rotary cultivated, potatoes machine planted: 2 Apr. Grubbed: 25 May. Strips 1 & 2 rotary ridged. Strips 1 & 2 grubbed: 7 June. Strips 1 & 2 rotary ridged: 8 June. Strips 4, 5, 6, 7 and 8 rotary ridged: 2 July. Fungicide and insecticide applied: 3 July. Fungicide applied: 24 July. Sprayed with undiluted BOV at 220 l: 20 Sept. Lifted: 15 Oct.  
 Sugar beet: N applied: 20 Mar, 1973. Seed sown: 22 Mar. Singled: 1-5 June. Insecticide applied: 11 June. Lifted: 13 Nov.

NOTE: At lifting many tubers were found to be affected by pink rot (*Phytophthora erythroseptica*) and these were not harvested. A more detailed examination on the P K Na Mg strip showed up to 27%, by weight, of diseased tubers.

73/R/BN/7

TABLES OF MEANS

BEANS

SIMAZINE

	1972	1973	Mean
GRAIN: TONNES/HECTARE			
MANURE			
D	2.26	2.71	2.49
DPK	2.98	3.10	3.04
PKNaMg	2.35	0.81	1.58
P	2.26	0.79	1.53
PK	2.06	0.53	1.29
PNaMg	2.22	0.76	1.49
None	1.64	0.47	1.05
Mean	2.25	1.31	1.78

STRAW: TONNES/HECTARE

MANURE			
D	4.58	2.05	3.32
DPK	4.60	1.93	3.26
PKNaMg	1.12	0.26	0.69
P	0.83	0.23	0.53
PK	0.92	0.14	0.53
PNaMg	0.97	0.28	0.62
None	0.57	0.34	0.46
Mean	1.94	0.75	1.34

Mean D.M. % Grain 83.1  
 Straw 92.6

73/R/BN/7

POTATOES

TOTAL TUBERS: TONNES/HECTARE

MANURE	N	RESIDUAL			
		NS	SA	SA/C	C
D	0	-	30.5	22.4	-
	72	34.0	-	-	51.9
	144	-	53.0	44.5	-
	216	47.8	-	-	33.4
DPK	0	36.4	-	-	24.8
	72	-	52.7	46.5	-
	144	53.3	-	-	44.1
	216	-	50.3	47.4	-
PKNaMg	0	-	9.8	11.7	-
	72	26.4	-	-	23.9
	144	-	21.2	20.4	-
	216	44.0	-	-	44.3
P	0	-	9.0	10.4	-
	72	21.3	-	-	21.1
	144	-	21.0	19.8	-
	216	28.9	-	-	29.8
PK	0	11.6	-	-	11.9
	72	-	17.0	20.2	-
	144	32.7	-	-	36.7
	216	-	31.4	29.7	-
PNaMg	0	12.3	-	-	16.6
	72	-	18.3	20.2	-
	144	31.8	-	-	32.3
	216	-	24.1	32.4	-
None	0	10.2	-	-	11.4
	72	-	10.5	10.0	-
	144	12.4	-	-	13.1
	216	-	10.9	13.5	-

73/R/BN/7

POTATOES

PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE

MANURE	N	RESIDUAL		
		NS	SA	SA/C
D	0	-	91.7	89.7
	72	94.4	-	-
	144	-	95.7	92.7
	216	94.7	-	-
DPK	0	92.7	-	-
	72	-	96.7	93.7
	144	95.4	-	-
	216	-	94.2	93.1
PKNaMg	0	-	77.5	80.3
	72	85.2	-	-
	144	-	89.9	89.7
	216	93.7	-	-
P	0	-	83.8	81.7
	72	91.7	-	-
	144	-	89.6	85.3
	216	93.7	-	-
PK	0	85.8	-	-
	72	-	88.2	89.1
	144	94.8	-	-
	216	-	93.2	92.4
PNaMg	0	83.3	-	-
	72	-	85.4	83.7
	144	92.6	-	-
	216	-	85.9	91.8
None	0	81.7	-	-
	72	-	84.3	70.2
	144	84.5	-	-
	216	-	78.7	79.2

NOTE: At lifting many tubers were found to be infested with (Phytophthora & other rot) and these were discarded. A more detailed examination of the P K Na Mg treatments up to 2 1/2% by weight, of disease and tuber yield.

73/R/BN/7

SUGAR BEET

ROOTS WASHED: TONNES/HECTARE

MANURE	N	RESIDUAL			
		NS	SA	SA/C	C
D	0	29.1	-	-	32.0
	72	-	47.5	46.8	-
	144	51.1	-	-	46.6
	216	-	51.9	53.7	-
DPK	0	-	32.2	39.5	-
	72	50.9	-	-	44.8
	144	-	53.2	53.7	-
	216	52.0	-	-	53.7
PKNaMg	0	10.7	-	-	11.2
	72	-	22.3	24.7	-
	144	40.9	-	-	39.7
	216	-	50.7	52.0	-
P	0	12.9	-	-	12.9
	72	-	24.4	25.8	-
	144	37.6	-	-	38.3
	216	-	35.4	37.1	-
PK	0	-	8.7	12.3	-
	72	26.0	-	-	26.8
	144	-	40.2	45.9	-
	216	47.6	-	-	46.4
FNaMg	0	-	8.8	13.8	-
	72	24.8	-	-	27.8
	144	-	39.2	46.0	-
	216	47.2	-	-	43.7
None	0	-	7.2	13.9	-
	72	15.7	-	-	25.3
	144	-	30.4	32.2	-
	216	32.1	-	-	34.2
KNaMg	0		11.8		
	72		25.8		
	144		32.7		
	216		38.6		

73/R/BN/7

SUGAR BEET

SUGAR PERCENTAGE

MANURE	N	RESIDUAL			
		NS	SA	SA/C	C
D	0	17.1	-	-	17.3
	72	-	17.0	17.7	-
	144	17.1	-	-	17.6
	216	-	16.9	16.8	-
DPK	0	-	17.5	17.1	-
	72	17.8	-	-	17.3
	144	-	17.1	17.6	-
	216	16.5	-	-	17.2
PKNaMg	0	17.4	-	-	17.8
	72	-	18.2	17.7	-
	144	18.0	-	-	18.3
	216	-	18.4	18.1	-
P	0	17.3	-	-	17.4
	72	-	17.8	17.8	-
	144	17.3	-	-	17.6
	216	-	17.2	17.2	-
PK	0	-	17.9	17.6	-
	72	17.7	-	-	17.8
	144	-	18.5	18.3	-
	216	17.4	-	-	18.0
PNaMg	0	-	17.8	17.7	-
	72	17.5	-	-	17.4
	144	-	18.1	17.7	-
	216	17.2	-	-	16.9
None	0	-	17.5	17.5	-
	72	17.5	-	-	16.8
	144	-	18.0	17.6	-
	216	16.7	-	-	16.8
KNaMg	0		18.1		
	72		18.3		
	144		18.5		
	216		18.3		



73/R/EN/7

SUGAR BEET

TOTAL SUGAR: TONNES/HECTARE

MANURE	N	RESIDUAL			
		NS	SA	SA/C	C
D	0	4.98	-	-	5.53
	72	-	8.07	8.29	-
	144	8.70	-	-	8.20
	216	-	8.76	9.04	-
DPK	0	-	5.63	6.77	-
	72	9.08	-	-	7.74
	144	-	9.08	9.48	-
	216	8.58	-	-	9.23
PKNaMg	0	1.86	-	-	2.00
	72	-	4.07	4.38	-
	144	7.34	-	-	7.29
	216	-	9.32	9.41	-
P	0	2.23	-	-	2.25
	72	-	4.34	4.59	-
	144	6.49	-	-	6.76
	216	-	6.08	6.36	-
PK	0	-	1.56	2.18	-
	72	4.61	-	-	4.76
	144	-	7.45	8.42	-
	216	8.27	-	-	8.36
PNaMg	0	-	1.56	2.43	-
	72	4.34	-	-	4.82
	144	-	7.07	8.15	-
	216	8.13	-	-	7.36
None	0	-	1.26	2.44	-
	72	2.76	-	-	4.25
	144	-	5.47	5.67	-
	216	5.36	-	-	5.75
KNaMg	0		2.13		
	72		4.72		
	144		6.06		
	216		7.09		

73/R/BN/7

SUGAR BEET

TOPS: TONNES/HECTARE

MANURE	N	RESIDUAL			
		NS	SA	SA/C <sup>1</sup>	C
D	0	9.3	-	-	9.3
	72	-	19.5	12.1	-
	144	20.5	-	-	23.2
	216	-	18.6	21.4	-
DPK	0	-	7.7	11.2	-
	72	14.9	-	-	12.1
	144	-	17.7	12.1	-
	216	23.2	-	-	17.7
PKNaMg	0	2.4	-	-	3.6
	72	-	5.0	4.5	-
	144	10.2	-	-	7.4
	216	-	12.1	10.2	-
P	0	4.2	-	-	3.7
	72	-	6.8	7.0	-
	144	13.0	-	-	14.9
	216	-	14.9	24.2	-
PK	0	-	3.6	4.8	-
	72	6.5	-	-	5.6
	144	-	12.1	12.1	-
	216	19.5	-	-	13.0
PNaMg	0	-	3.2	4.4	-
	72	5.6	-	-	8.4
	144	-	11.2	17.7	-
	216	25.1	-	-	19.5
None	0	-	3.6	4.4	-
	72	5.6	-	-	10.6
	144	-	13.0	14.9	-
	216	26.0	-	-	18.6
KNaMg	0			6.8	
	72			12.1	
	144			8.9	
	216			9.3	