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## Yields of the Field Experiments 1979

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### 79/S/RN/1 Rotation I - Grass, Grass/CLOVER, Beans, Wheat, W. Barley

#### Rothamsted Research

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79/S/RN/1

ROTATION I

Object: To compare nutrient cycles, uptakes of nutrients and responses to fresh P and K. To obtain an estimate of the rate of release of nutrients, particularly K, from Saxmundham soil - Saxmundham.

Sponsor: A.E. Johnston.

The 81st year, grass, grass/clover, winter beans, winter wheat, winter barley.

For previous years see 'Details' 1967 & 1973, and 74-78/S/RN/1.

Whole plot dimensions (new treatments): 5.49 x 17.1.

Treatments: From 1899 to 1969 the experiment followed a four-course rotation of wheat, roots, barley, legumes. Each phase of the rotation was present each year on a separate block. From 1966 each plot was divided, a small area at the south end being continued under the original treatment (OLDTREAT), modified treatments (NEWTREAT) being applied on the larger sub-plots (see below).

In 1970 the rotation was stopped and each pair of blocks was divided for lucerne and grass. In 1978 lucerne was replaced by a grass/clover mixture (the OLDTREAT sub-plots form a part of the Grass area).

TREATMENT	OLDTREAT	NEWTREAT	NEWTREAT
1899-1965	Grass	Grass/Clover	Grass
	MANURE	MANURE	MANURE
D	(D)	(D)	(D)N
B	B	B	BN
N	N	(N)P2	(N)P2N
P	P	(P)P1	(P)P1N
K	K	(K)P2K	(K)P2KN
-	-	(-)P2	(-)P2N
PK	PK	(PK)P1K	(PK)P1KN
NK	NK	(NK)P2K	(NK)P2KN
NP	NP	(NP)P1	(NP)P1N
NPK	NPK	(NPK)P1K	(NPK)P1KN

D: Farmyard manure at 15 tonnes

(D): Farmyard manure at 30 tonnes (1966-1969 15 tonnes on OLDTREAT), 60 tonnes in autumn 1969, none since

B: Bone meal at 0.5 tonnes

N: 1899-1965 - 38 kg N as nitrate of soda. Since 1970 - 100 kg N (38 kg N on OLDTREAT) per cut as 'Nitro-Chalk'

P: 1899-1965 40 kg P205 as single superphosphate. Since 1966 50 kg P205 as triple superphosphate

P1,P2: 50, 100 kg P205 as triple superphosphate

K: 1899-1965 63 kg K20 as muriate of potash. Since 1966 - 126 kg K20 (75 kg K20 on OLDTREAT)

NOTES: (1) For a fuller record of treatments see 'Details' etc.

(2) On OLDTREAT grass, clover appeared naturally on some plots in 1975. To unify the plots white clover was sown on all at 33 kg.

(3) Yields were not taken from OLDTREAT grass. NEWTREAT grass/clover was ploughed on 24 May, 1979, yields were not taken.

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In 1977 lucerne was ploughed on one pair of blocks and the area divided into three for three phases of the arable four-course rotation barley, potatoes, winter beans, wheat. Whole plot treatments are continued on the ploughed area as for NEWTREAT grass/clover except all crops, except beans, are given N and plots previously given farmyard manure now receive phosphate fertiliser. Plots on this area are randomly subdivided for each crop for a test of potash fertiliser. All combinations of the following are present:

1. MANURE

Winter beans	Winter wheat and winter barley
(D)P2	(D)P2N
B	BN
(N)P2	(N)P2N
(P)P1	(P)P1N
(K)P2K	(K)P2KN
(-)P2	(-)P2N
(PK)P1K	(PK)P1KN
(NK)P2K	(NK)P2KN
(NP)P1	(NP)P1N
(NPK)P1K	(NPK)P1KN

Symbols as above except N = 148 kg - 50 kg in autumn 98 kg in spring.

2. POTASH Additional potash fertiliser, as muriate of potash (kg K2O):

0  
63

NOTE: Bone meal to arable crops was omitted in 1978. Two dressings were applied for 1979 crops.

Standard applications:

Wheat: Weedkillers: Autumn: Isoproturon at 3.1 kg in 220 l. Spring: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l applied with tridemorph and chlormequat. Fungicide: Tridemorph at 0.53 kg. Growth regulator: Chlormequat at 1.7 kg.

Barley: Weedkillers: Autumn: Isoproturon at 3.1 kg in 220 l. Spring: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l applied with the fungicides. Fungicides: Carbendazim (as 'Bavistin' at 0.51 kg), and tridemorph at 0.53 kg.

Beans: Weedkillers: Simazine at 1.1 kg in 220 l. Fungicide: Benomyl at 0.28 kg in 280 l.

Seed: Wheat: Maris Huntsman, sown at 210 kg.

Barley: Sonja, sown at 160 kg.

Beans: Throws MS, sown at 250 kg.

Grass/Clover: Blanca white clover and S23 PRG sown at 40 kg.

Cultivations, etc.:

Wheat and Barley: PK and bone meal applied: 19 Sept, 1978. N applied, seed sown: 4 Oct. Isoproturon applied: 5 Oct. Bone meal and N applied: 10 Apr, 1979.

Wheat: Ploughed: 3 Oct, 1978. Spring weedkiller, fungicide and growth regulator applied: 15 May, 1979. Combine harvested: 21 Aug.

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Barley: Spring weedkiller and fungicides applied: 15 May, 1979. Combine harvested: 8 Aug.

Beans: P, K and bone meal applied, seed sown: 13 Oct, 1978. Weedkiller applied: 14 Oct. Bone meal applied: 10 Apr, 1979. Fungicide applied: 16 May. Combine harvested: 22 Aug.

OLDTREAT Grass: N, P and K applied: 6 Mar, 1979. Bone meal applied: 10 Apr.

NEWTREAT Grass: P and K applied: 6 Mar, 1979. Bone meal applied: 10 Apr. N applied twice: 18 Apr, 9 July. Cut twice: 12 June and 11 Sept.

NEWTREAT Grass/Clover (after lucerne 1978): Ploughed: 23 June, 1978. Seed sown: 15 Aug. P and K applied: 6 Mar, 1979. Bone meal applied: 10 Apr.

79/S/RN/1 GRASS NEW TREAT

DRY MATTER TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

	1ST CUT(12/6/79)	2ND CUT(11/9/79)	TOTAL OF 2 CUTS
MANURE			
(D)N	5.91	1.87	7.78
BN	5.11	1.71	6.82
(N)P2N	5.40	1.51	6.90
(P)P1N	5.71	1.61	7.32
(K)P2KN	6.24	1.98	8.22
(-)P2N	5.60	1.59	7.19
(PK)P1KN	6.11	1.76	7.87
(NK)P2KN	6.18	1.94	8.12
(NP)P1N	5.65	1.59	7.23
(NPK)P1KN	5.72	1.75	7.47
MEAN	5.76	1.73	7.49
MEAN DM%	21.9	35.4	28.7
1ST CUT PLOT AREA HARVESTED	0.00089		
2ND CUT PLOT AREA HARVESTED	0.00084		

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WINTER BEANS

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

POTASH MANURE	0	63	MEAN
(D)P2	3.31	4.02	3.67
B	2.33	3.26	2.79
(N)P2	1.33	3.00	2.16
(P)P1	2.87	2.67	2.77
(K)P2K	4.34	4.27	4.31
(-)P2	3.03	3.88	3.45
(PK)P1K	4.31	4.00	4.15
(NK)P2K	3.96	4.24	4.10
(NP)P1	2.26	3.29	2.78
(NPK)P1K	3.50	3.65	3.57
MEAN	3.12	3.63	3.38

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	POTASH	MANURE* POTASH
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SED	0.070	0.222

\* WITHIN SAME LEVEL OF MANURE ONLY

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.251	7.4
BLOCK.WP.SP	10	0.222	6.6

SUB PLOT AREA HARVESTED 0.00075

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WINTER WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

POTASH MANURE	0	63	MEAN
(D)P2N	8.63	8.52	8.57
BN	7.83	7.99	7.91
(N)P2N	7.96	8.51	8.24
(P)P1N	7.95	8.36	8.16
(K)P2KN	8.44	8.53	8.49
(-)P2N	8.60	8.08	8.34
(PK)P1KN	8.39	8.23	8.31
(NK)P2KN	8.21	8.20	8.20
(NP)P1N	7.84	8.00	7.92
(NPK)P1KN	7.87	7.98	7.92
MEAN	8.17	8.24	8.21

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	POTASH	MANURE* POTASH
SED	0.117	0.371

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.283	3.4
BLOCK.WP.SP	10	0.371	4.5

GRAIN MEAN DM% 81.0

STRAW TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

POTASH MANURE	0	63	MEAN
(D)P2N	4.95	5.33	5.14
BN	4.78	4.78	4.78
(N)P2N	4.61	4.98	4.79
(P)P1N	4.89	5.14	5.02
(K)P2KN	5.06	5.23	5.14
(-)P2N	4.95	4.84	4.90
(PK)P1KN	5.29	5.00	5.14
(NK)P2KN	4.73	5.18	4.96
(NP)P1N	4.42	4.72	4.57
(NPK)P1KN	5.12	4.94	5.03
MEAN	4.88	5.01	4.95

STRAW MEAN DM% 84.5

SUB PLOT AREA HARVESTED 0.00075

79/S/RN/1

WINTER BARLEY

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

POTASH MANURE	0	63	MEAN
(D)P2N	7.84	7.27	7.55
BN	7.00	6.92	6.96
(N)P2N	7.06	6.62	6.84
(P)P1N	7.05	6.83	6.94
(K)P2KN	6.95	6.91	6.93
(-)P2N	5.74	7.11	6.42
(PK)P1KN	7.17	5.64	6.40
(NK)P2KN	6.79	7.24	7.02
(NP)P1N	6.25	6.93	6.59
(NPK)P1KN	6.43	7.26	6.84
MEAN	6.83	6.87	6.85

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	POTASH	MANURE* POTASH
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SED	0.278	0.879

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.392	5.7
BLOCK.WP.SP	10	0.879	12.8

GRAIN MEAN DM% 81.8

STRAW TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

POTASH MANURE	0	63	MEAN
(D)P2N	4.59	3.72	4.16
BN	3.22	3.83	3.53
(N)P2N	3.52	3.43	3.48
(P)P1N	3.70	3.23	3.46
(K)P2KN	3.58	3.86	3.72
(-)P2N	3.32	3.76	3.54
(PK)P1KN	4.16	3.04	3.60
(NK)P2KN	4.12	3.39	3.76
(NP)P1N	2.60	3.47	3.04
(NPK)P1KN	3.59	4.45	4.02
MEAN	3.64	3.62	3.63

STRAW MEAN DM% 88.3

SUB PLOT AREA HARVESTED 0.00075