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## Yields of the Field Experiments 1978

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### 78/S/RN/1 Rotation I - Grass, Lucerne, Potatoes, Beans, Wheat

#### Rothamsted Research

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78/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 80th year, grass, lucerne, potatoes, beans and wheat.

For previous years see 'Details' 1967 & 1973, and 74-77/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  
(the OLDTREAT sub-plots form a part of the Grass area).

| TREATMENT<br>1899-1965 | OLDTREAT<br>Grass | NEWTREAT<br>Lucerne | NEWTREAT<br>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 P2O5 as single superphosphate. Since 1966 50 kg P2O5 as triple superphosphate  
P1,P2: 50, 100 kg P2O5 as triple superphosphate (single superphosphate until 1965)  
K: 1899-1965 63 kg K2O as muriate of potash. Since 1966 - 126 kg K2O (75 kg K2O 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) Lucerne was resown in 1976.

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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 lucerne 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

| Beans    | Potatoes and wheat |
|----------|--------------------|
| (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 = 250 kg (potatoes); 144 kg (wheat) - 50 kg in autumn, 94 kg in spring.

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

| Beans and wheat | Potatoes |
|-----------------|----------|
| 0               | 0        |
| 63              | 224      |

NOTE: Remaining lucerne was ploughed in June 1978 after the first cut. The area was then sown to a grass/clover mixture, all plots given (15:15:15) at 167 kg.

## Standard applications:

Wheat: Weedkillers: Isoproturon at 3.1 kg in 220 l. Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l applied with the tridemorph. Fungicide: Tridemorph at 0.53 kg. Benodanil at 1.1 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l. Growth Regulator: Chlormequat at 1.7 kg in 280 l.

Potatoes: Weedkillers: Linuron at 0.93 kg in 280 l. Fungicide: Mancozeb at 1.3 kg in 280 l on three occasions with insecticide. Insecticide: Pirimicarb at 0.14 kg.

Beans: Weedkillers: Simazine at 1.1 kg in 340 l. Fungicide: Benomyl at 0.28 kg in 280 l.

Seed: Wheat: Maris Huntsman, sown at 200 kg.

Potatoes: Pentland Crown.

Beans: Throws MS, sown at 260 kg.

Grass/Clover: (To remaining 'NEWTREAT' lucerne area): Clover, Blanca and perennial ryegrass S.23, mixture sown at 39 kg.