ROTHAMSTED RESEARCH

# Yields of the Field Experiments 1976

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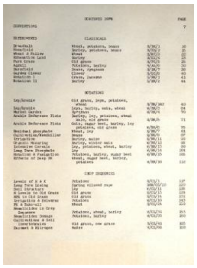

# Rotations

## Rothamsted Research

Rothamsted Research (1977) *Rotations ;* Yields Of The Field Experiments 1976, pp 49 - 116 **- DOI: https://doi.org/10.23637/ERADOC-1-15**

## 76/R/RN/1 and 76/R/RN/2

## LEY/ARABLE

Object: To study the effects of three-year leys on the fertility of the soil as measured by a sequence of three arable test crops. Since 1968, continuous wheat has been grown after the three test crops to study the build-up and decline of take-all (Gaeumannomyces graminis) after the different cropping sequences - Highfield and Fosters.

Sponsors: A.E. Johnston, D.B. Slope.

The 28th year, old grass, leys, potatoes, wheat.

For previous years see 'Details' 1967, 68/B/1(t), 69/R/RN/1&2(t), 70/R/RN/1&2(t), 71/R/RN/1&2(t) and 72-75/R/RN/1&2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (76/R/RN/1)

FOSTERS — A site with little organic matter initially (76/R/RN/2)

ROTATION — Treatments: The experiment originally tested four six-course rotations, with all phases present each year. In recent years these rotations were:-

| | Treatment crops | Test crops |
|---|---|---|
| LUCERNE | LU, LU, LU, | W, P, B |
| CLOGRA | LC, LC, LC, | W, P, B |
| GRASS | LN, LN, LN, | W, P, B |
| ARABLE | H, SB, O, | W, P, B |

LU = lucerne, LC = clover/grass ley, no nitrogen fertiliser, LN = all-grass ley with much nitrogen fertiliser, H = 1-year seeds hay, SB = sugar beet, O = oats, W = wheat, P = potatoes, B = barley.

In 1968 the order of test crops was changed to P, W, B except for those phases that had already started the sequence W, P, B.

In 1975 the barley test crop was changed to wheat.

RESEEDED — On both fields in the first three years other plots were sown with long-term reseeded grass

OLDGRASS — On Highfield plots of the old turf were left initially unploughed, for comparison with the three-year leys

In 1962 and 1963 some of the old and reseeded grass plots were divided for management identical to:-

C — Clover/grass ley
N — All-grass ley



*https://doi.org/10.23637/ERADOC-1-15* 

From 1963 (reseeded) and 1968 (old grass) some grass plots were ploughed and cropped with the same test crops as above, thereafter these plots followed the Arable rotation. In 1973 some of these plots were returned to reseeded grass.

Since 1975 the all-grass half plots of the reseeded grass plots have been used for a new experiment (see 76/R/CS/169).

From 1968 only two phases on each field have continued in the original six-course rotation. All other phases have been sown to wheat every year at the end of the test-crop cycle. In 1976:-

CEREAL 7 Wheat, 8th test crop, 7th cereal (P,W,B,W,W,W,W,W)
CEREAL 8 Wheat, 9th test crop, 8th cereal (P,W,B,W,W,W,W,W,W)
CEREAL 9 Wheat, 11th test crop, 9th cereal (W,P,B,W,W,W,W,W,W,W,W)

Blocks which would have been 12th test crop 1976 were fallowed

Treatments to 8th-11th test crops wheat:-

Sub plots

N 76 Nitrogen fertiliser (kg N) in 1976:-

| | |
|---|---|
| 75 | 75 |
| 126 | 126 |
| 176 | 176 |
| 225 | 225 |

Treatments to 1st test crop potatoes:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:-

| | |
|---|---|
| NONE | None |
| FYM | 30 tonnes on each occasion |

Sub plots

N 76 Nitrogen fertiliser applied to potatoes 1976 (kg N):-

| | |
|---|---|
| 0 | None |
| 80 | 80 |
| 160 | 160 |
| 240 | 240 |

Standard applications:
1st Treatment Crops:
To all: Weedkiller: Glyphosate at 1.7 kg in 220 l. Manures: Chalk at 2.9 t, Highfield only.
All-grass ley: Manures: 75 kg P205, 150 kg K20 as (0:14:28), 75 kg N as 'Nitro-Chalk'.
Clover-grass ley: Manures: 75 kg P205, 150 kg K20 as (0:14:28).
Lucerne: Manures: 75 kg P205, 75 kg K20 as (0:20:20).
Hay: Manures: 75 kg P205, 150 kg K20 as (0:14:28). N at 75 kg as 'Nitro-Chalk'.
1st Test Crop: Potatoes: Manures: 300 kg P205, 300 kg K20 as (0:20:20). Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in 220 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide: Mancozeb at 1.3



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kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 220 l.
8th, 9th and 11th Test Crops: Wheat: Manures: 75 kg P205, 75 kg K20 as (0:20:20), combine drilled. Weedkillers: Paraquat at 0.42 kg ion in 220 l applied in autumn. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l) in spring.
Reseeded Grass and Old Grass: Manures: Chalk at 8.7 t to all-grass half plots, at 2.9 t to clover-grass half plots on Highfield only. 75 kg P205, 150 kg K20 as (0:14:28).
All-grass half plots: (Excluding Reseeded grass): Manures: 75 kg N, 48 kg K20 as (25:0:16) for the first two cuts.
Clover-grass half plots: Manures: 48 kg K20 as muriate of potash for the first two cuts.

Seed: All-grass ley: Timothy S51 at 15 kg, Meadow Fescue at 19 kg. Mixture sown at 34 kg.
Clover-grass ley: Timothy S51 at 15 kg, Meadow Fescue at 19 kg. White Clover S100 at 3 kg. Mixture sown at 37 kg.
Lucerne: Europe, sown at 28 kg.
Hay: Italian RvP ryegrass, sown at 24 kg.
Potatoes: Pentland Crown.
Wheat: Cappelle, sown at 200 kg.

Cultivations, etc.:-
1st-year treatment crops:
To all: Weedkiller applied: 9 Oct, 1975. Chalk applied: 4 Dec.
All-grass ley: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK and N applied: 9 Apr. Power harrowed: 12 Apr. Seed sown: 20 Apr. Topped three times: 17 June, 9 July, 18 Aug.
Clover-grass ley: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK applied: 9 Apr. Power harrowed: 12 Apr. Seed sown: 20 Apr. Topped three times: 17 June, 9 July, 18 Aug.
Lucerne: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK applied: 9 Apr. Power harrowed and seed sown: 20 Apr. Cut twice: 16 Aug, 22 Dec.
Hay: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK and N applied: 9 Apr. Power harrowed and seed sown: 12 Apr. Topped three times: 17 June, 9 July, 18 Aug.
1st Test Crop:
Potatoes: Ploughed: 8 Dec, 1975. Disced twice: 11 Mar, 1976. PK and N applied: 29 Mar. Rotary cultivated and potatoes planted: 30 Mar. Grubbed (Fosters only): 31 Mar. Weedkillers applied: 5 May. Grubbed and rotoridged: 2 June. Insecticide applied: 17 June. Fungicide applied: 28 July. Haulm mechanically destroyed: 23 Sept. Haulm desiccant applied: 28 Sept. Lifted: 12 Oct.



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8th, 9th and 11th Test Crops:
Winter wheat: Autumn weedkiller applied: 7 Oct, 1975. Ploughed: 15 Oct. Heavy spring-tine cultivated: 16 Oct. Rotary harrowed: 20 Oct. Seed sown: 22 Oct. N applied: 2 Apr, 1976. Spring weedkiller applied: 17 Apr. Combine harvested: 29 July.
Reseeded and Old Grass (Excluding all-grass half plots of reseeded grass): Chalk applied, PK applied: 4 Dec, 1975. NK to all-grass half plots and K to clover-grass half plots: 25 Feb, 1976, 24 May. Cut three times: 19 May, 29 June, 10 Nov.
Fallow after 11th test crop 1975: Ploughed: 28 Oct, 1975. Heavy spring-tine cultivated: 14 Apr, 1976. Rotary cultivated: 21 Apr. Deep-tine cultivated: 27 May. Heavy spring-tine cultivated: 16 June. Rotary cultivated: 2 July.

NOTE: There was very little growth on 1st year treatment crops clover-grass ley, all-grass ley and 1-year seeds hay because of drought. Yields were not taken.



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/1 AND 76/R/RN/2

DRY MATTER: TONNES/HECTARE

OLD GRASS

TOTAL OF 3 CUTS

| | C | N |
|---|---|---|
| | HIGHFIELD | |
| 28TH EXPTL YEAR | | |
| BLOCKS 1 & 4 | 1.68 | 5.66 |
| BLOCK 2 | 1.25 | 5.63 |
| MEAN DM% | 26.4 | 23.3 |

LUCERNE

TOTAL OF 2 CUTS

| | HIGHFIELD | FOSTERS |
|---|---|---|
| 1ST YEAR | 2.02 | 1.26 |
| MEAN DM% | 24.7 | 24.4 |

RESEEDED GRASS

TOTAL OF 3 CUTS

| | HIGHFIELD | | FOSTERS | |
|---|---|---|---|---|
| | BLOCKS | RC | BLOCKS | RC |
| 28TH EXPTL YEAR | 1 & 4 | 1.40 | 1 & 3 | 2.33 |
| 28TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973) | 2 & 3 | 3.26 | 2 & 4 | 2.39 |
| MEAN DM% | | 24.8 | | 27.3 |



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76/R/RN/1 HIGHFIELD

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

| N 76 | 0 | 80 | 160 | 240 | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 32.2 | 34.8 | 35.7 | 34.1 | 34.2 |
| FYM | 32.6 | 33.9 | 33.3 | 34.5 | 33.6 |
| MEAN | 32.4 | 34.3 | 34.5 | 34.3 | 33.9 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 33.0 | 35.4 | 37.2 | 31.3 | 34.2 |
| FYM | 31.0 | 35.0 | 37.0 | 31.3 | 33.6 |
| MEAN | 32.0 | 35.2 | 37.1 | 31.3 | 33.9 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| N 76 | | | | | |
| 0 | 31.6 | 34.9 | 36.1 | 26.9 | 32.4 |
| 80 | 31.6 | 36.5 | 37.4 | 31.7 | 34.3 |
| 160 | 32.6 | 34.9 | 37.2 | 33.3 | 34.5 |
| 240 | 32.2 | 34.4 | 37.6 | 33.2 | 34.3 |
| MEAN | 32.0 | 35.2 | 37.1 | 31.3 | 33.9 |

| | ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE |
|---|---|---|---|---|---|
| FYMRES70 | N 76 | | | | |
| NONE | 0 | 33.4 | 36.4 | 35.0 | 23.9 |
| | 80 | 31.7 | 38.3 | 37.7 | 31.4 |
| | 160 | 35.6 | 35.3 | 37.5 | 34.4 |
| | 240 | 31.2 | 31.4 | 38.4 | 35.5 |
| FYM | 0 | 29.9 | 33.4 | 37.2 | 29.9 |
| | 80 | 31.5 | 34.8 | 37.1 | 32.1 |
| | 160 | 29.6 | 34.4 | 36.9 | 32.2 |
| | 240 | 33.1 | 37.4 | 36.7 | 30.9 |



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76/R/RN/1 HIGHFIELD

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

| N 76 FYMRES70 | 0 | 80 | 160 | 240 | MEAN |
|---|---|---|---|---|---|
| NONE | 95.0 | 93.9 | 96.4 | 95.6 | 96.0 |
| FYM | 95.1 | 94.8 | 94.9 | 95.3 | 95.0 |
| MEAN | 95.0 | 94.4 | 96.1 | 95.4 | 96.0 |

| ROTATION FYMRES70 | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| NONE | 93.5 | 95.6 | 96.0 | 94.8 | 95.0 |
| FYM | 94.2 | 95.5 | 95.2 | 95.1 | 95.0 |
| MEAN | 93.9 | 95.5 | 95.6 | 95.0 | 95.0 |

| ROTATION N 76 | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| 0 | 94.3 | 95.0 | 96.0 | 94.7 | 95.0 |
| 80 | 93.3 | 95.3 | 94.8 | 94.1 | 94.4 |
| 160 | 93.5 | 95.9 | 96.0 | 95.1 | 95.1 |
| 240 | 94.4 | 95.8 | 95.6 | 95.9 | 95.4 |
| MEAN | 93.9 | 95.5 | 95.6 | 95.0 | 95.0 |

| FYMRES70 | ROTATION N 76 | LUCERNE | CLOGRA | GRASS | ARABLE |
|---|---|---|---|---|---|
| NONE | 0 | 94.4 | 94.9 | 96.5 | 94.0 |
| | 80 | 92.6 | 94.7 | 94.9 | 93.4 |
| | 160 | 93.1 | 96.5 | 96.7 | 95.2 |
| | 240 | 94.1 | 96.1 | 95.9 | 96.5 |
| FYM | 0 | 94.3 | 95.1 | 95.5 | 95.4 |
| | 80 | 94.0 | 95.9 | 94.7 | 94.7 |
| | 160 | 93.9 | 95.3 | 95.3 | 95.0 |
| | 240 | 94.7 | 95.6 | 95.3 | 95.4 |

PLOT AREA HARVESTED 0.00351



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

| N 76 | 0 | 80 | 160 | 240 | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 29.0 | 31.0 | 33.8 | 32.1 | 31.5 |
| FYM | 31.7 | 31.0 | 31.3 | 35.9 | 32.5 |
| MEAN | 30.3 | 31.0 | 32.5 | 34.0 | 32.0 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 29.3 | 33.8 | 34.1 | 28.7 | 31.5 |
| FYM | 32.1 | 34.6 | 35.1 | 28.1 | 32.5 |
| MEAN | 30.7 | 34.2 | 34.6 | 28.4 | 32.0 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| N 76 | | | | | |
| 0 | 32.3 | 31.6 | 32.6 | 24.8 | 30.3 |
| 80 | 30.4 | 32.7 | 33.7 | 27.3 | 31.0 |
| 160 | 30.7 | 34.2 | 36.1 | 29.2 | 32.5 |
| 240 | 29.5 | 38.3 | 35.8 | 32.4 | 34.0 |
| MEAN | 30.7 | 34.2 | 34.6 | 28.4 | 32.0 |

| | ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE |
|---|---|---|---|---|---|
| FYMRES70 | N 76 | | | | |
| NONE | 0 | 29.7 | 29.0 | 31.9 | 25.3 |
| | 80 | 29.2 | 33.3 | 32.9 | 28.7 |
| | 160 | 31.7 | 34.3 | 38.8 | 30.3 |
| | 240 | 26.6 | 38.7 | 32.7 | 30.4 |
| FYM | 0 | 34.8 | 34.2 | 33.4 | 24.3 |
| | 80 | 31.5 | 32.0 | 34.6 | 25.9 |
| | 160 | 29.6 | 34.1 | 33.3 | 28.1 |
| | 240 | 32.4 | 37.9 | 39.0 | 34.3 |



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

| N 76 | 0 | 80 | 160 | 240 | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 93.4 | 92.8 | 93.1 | 93.4 | 93.2 |
| FYM | 93.8 | 94.0 | 92.3 | 93.7 | 93.4 |
| MEAN | 93.6 | 93.4 | 92.7 | 93.5 | 93.3 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 91.2 | 93.3 | 93.9 | 94.2 | 93.2 |
| FYM | 92.0 | 94.1 | 94.5 | 93.1 | 93.4 |
| MEAN | 91.6 | 93.7 | 94.2 | 93.6 | 93.3 |

| ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE | MEAN |
|---|---|---|---|---|---|
| N 76 | | | | | |
| 0 | 93.1 | 93.9 | 94.3 | 93.1 | 93.6 |
| 80 | 91.8 | 93.0 | 95.2 | 93.6 | 93.4 |
| 160 | 90.7 | 93.3 | 93.4 | 93.4 | 92.7 |
| 240 | 91.0 | 94.7 | 93.9 | 94.5 | 93.5 |
| MEAN | 91.6 | 93.7 | 94.2 | 93.6 | 93.3 |

| | ROTATION | LUCERNE | CLOGRA | GRASS | ARABLE |
|---|---|---|---|---|---|
| FYMRES70 | N 76 | | | | |
| NONE | 0 | 92.0 | 92.1 | 94.6 | 94.7 |
| | 80 | 91.0 | 92.7 | 93.6 | 93.9 |
| | 160 | 91.4 | 92.8 | 94.8 | 93.4 |
| | 240 | 90.7 | 95.6 | 92.7 | 94.7 |
| FYM | 0 | 94.1 | 95.6 | 93.9 | 91.4 |
| | 80 | 92.7 | 93.2 | 96.8 | 93.2 |
| | 160 | 90.0 | 93.8 | 92.1 | 93.4 |
| | 240 | 91.4 | 93.7 | 95.1 | 94.4 |

PLOT AREA HARVESTED 0.00351



*https://doi.org/10.23637/ERADOC-1-15* *pp 10*

76/R/RN/1 HIGHFIELD

WHEAT 8TH TEST CROP CEREAL 7

GRAIN TONNES/HECTARE

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

| N 76 ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 4.59 | 5.09 | 4.97 | 5.27 | 4.98 |
| CLOGRA | 5.38 | 5.13 | 5.35 | 5.35 | 5.30 |
| GRASS | 4.55 | 4.89 | 4.73 | 4.79 | 4.74 |
| ARABLE | 4.67 | 4.90 | 4.82 | 4.68 | 4.77 |
| RESEEDED | 4.87 | 4.96 | 5.39 | 5.02 | 5.06 |
| OLDGRASS | 5.17 | 5.13 | 5.47 | 5.53 | 5.32 |
| MEAN | 4.87 | 5.02 | 5.12 | 5.11 | 5.03 |

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

| TABLE | BLOCK | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|---|
| SED | 0.095 | 0.165 | 0.088 | 0.250 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| ROTATION | | | | 0.216 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 5 | 0.165 | 3.3 |
| BLOCK.WP.SP | 18 | 0.216 | 4.3 |

GRAIN MEAN DM% 88.3

SUB PLOT AREA HARVESTED 0.00663



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/2 POSTERS

WHEAT 8TH TEST CROP CEREAL 7

GRAIN TONNES/HECTARE

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

| N 76 / ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 3.88 | 4.36 | 4.35 | 4.16 | 4.19 |
| CLOGRA | 3.91 | 3.84 | 4.12 | 4.03 | 3.98 |
| GRASS | 3.96 | 3.76 | 4.03 | 3.76 | 3.88 |
| ARABLE | 3.74 | 4.30 | 4.37 | 4.06 | 4.12 |
| RESEEDED | 4.19 | 4.60 | 4.27 | 4.28 | 4.33 |
| MEAN | 3.93 | 4.17 | 4.23 | 4.06 | 4.10 |

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

| TABLE | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|
| SED | 0.135 | 0.068 | 0.189 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| ROTATION | | | 0.152 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 4 | 0.135 | 3.3 |
| BLOCK.WP.SP | 15 | 0.152 | 3.7 |

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00663



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76/R/RN/1 HIGHFIELD

WHEAT 9TH TEST CROP CEREAL 8

GRAIN TONNES/HECTARE

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

| N 76 / ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 3.80 | 4.55 | 5.13 | 4.44 | 4.48 |
| CLOGRA | 4.25 | 4.37 | 5.01 | 4.63 | 4.56 |
| GRASS | 4.06 | 4.51 | 4.43 | 3.98 | 4.24 |
| ARABLE | 4.14 | 4.40 | 4.72 | 4.77 | 4.51 |
| RESEEDED | 4.50 | 5.31 | 4.94 | 4.80 | 4.89 |
| OLDGRASS | 4.63 | 4.78 | 4.95 | 5.06 | 4.85 |
| MEAN | 4.23 | 4.65 | 4.86 | 4.61 | 4.59 |

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

| TABLE | BLOCK | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|---|
| SED | 0.130 | 0.225 | 0.156 | 0.400 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| ROTATION | | | | 0.382 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 5 | 0.225 | 4.9 |
| BLOCK.WP.SP | 18 | 0.382 | 8.3 |

GRAIN MEAN DM% 87.4

SUB PLOT AREA HARVESTED 0.00663



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/2 FOSTERS

WHEAT 9TH TEST CROP CEREAL 8

GRAIN TONNES/HECTARE

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

| N 76 ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 3.73 | 4.26 | 3.90 | 4.05 | 3.99 |
| CLOGRA | 3.75 | 3.93 | 4.06 | 3.75 | 3.87 |
| GRASS | 3.11 | 3.00 | 3.78 | 3.67 | 3.39 |
| ARABLE | 3.36 | 3.72 | 4.20 | 3.95 | 3.81 |
| RESEEDED | 3.74 | 4.33 | 4.32 | 4.01 | 4.10 |
| MEAN | 3.54 | 3.85 | 4.05 | 3.89 | 3.83 |

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

| TABLE | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|
| SED | 0.345 | 0.123 | 0.419 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| ROTATION | | | 0.275 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 4 | 0.345 | 9.0 |
| BLOCK.WP.SP | 15 | 0.275 | 7.2 |

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00663



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/1 HIGHFIELD

WHEAT 11TH TEST CROP CEREAL 9

GRAIN TONNES/HECTARE

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

| N 76 ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 3.67 | 4.90 | 4.84 | 5.17 | 4.65 |
| CLOGRA | 3.55 | 3.50 | 4.63 | 4.64 | 4.08 |
| GRASS | 3.54 | 4.49 | 4.50 | 4.17 | 4.18 |
| ARABLE | 3.70 | 4.48 | 4.80 | 4.85 | 4.46 |
| RESEEDED | 4.24 | 4.76 | 4.59 | 5.28 | 4.72 |
| OLDGRASS | 4.51 | 4.93 | 5.12 | 5.08 | 4.91 |
| MEAN | 3.87 | 4.51 | 4.75 | 4.86 | 4.50 |

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

| TABLE | BLOCK | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|---|
| SED | 0.281 | 0.486 | 0.142 | 0.571 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| ROTATION | | | | 0.347 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 5 | 0.486 | 10.8 |
| BLOCK.WP.SP | 18 | 0.347 | 7.7 |

GRAIN MEAN DM% 88.3

SUB PLOT AREA HARVESTED 0.00663



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/2 FOSTERS

WHEAT 11TH TEST CROP CEREAL 9

GRAIN TONNES/HECTARE

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

| N 76 ROTATION | 75 | 126 | 176 | 225 | MEAN |
|---|---|---|---|---|---|
| LUCERNE | 3.02 | 3.27 | 3.78 | 3.88 | 3.49 |
| CLOGRA | 3.52 | 3.70 | 4.03 | 3.81 | 3.77 |
| GRASS | 3.58 | 4.03 | 3.89 | 3.98 | 3.87 |
| ARABLE | 3.09 | 4.01 | 4.03 | 3.82 | 3.74 |
| RESEEDED | 3.48 | 3.60 | 3.77 | 3.78 | 3.65 |
| MEAN | 3.34 | 3.72 | 3.90 | 3.85 | 3.70 |

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

| TABLE | ROTATION | N 76 | ROTATION N 76 |
|---|---|---|---|
| SED | 0.157 | 0.086 | 0.229 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| ROTATION | | | 0.193 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 4 | 0.157 | 4.2 |
| BLOCK.WP.SP | 15 | 0.193 | 5.2 |

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00663



*https://doi.org/10.23637/ERADOC-1-15* *pp 16*

76/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without leys - Woburn Stackyard D.

Sponsors: D.A. Boyd, K. Evans, A.E. Johnston, F.G.W. Jones, G.A. Salt.

The 39th year, leys, barley, oats, wheat.

For previous years see 'Details' 1967, 68/B/2(t), 69/W/RN/3(t), 70/W/RN/3(t), 71/W/RN/3(t), 72/W/RN/3(t) and 73-75/W/RN/3.

Design: 5 series of 8 plots, split for treatments other than rotations.

Whole plot dimensions: 8.53 x 40.7.

Treatments: All phases of four five-course rotations were originally present:

ROTATION

| | | |
|---|---|---|
| LEY | Grass/clover ley: | L, L, L, P, W |
| CLO | All legume ley: | SA, SA, SA, P, W until 1971 then CL, CL, CL, P, W |
| A | Arable with roots: | P, R, C, P, W until 1971 then P, B, B, P, W |
| A H | Arable with hay: | P, R, H, P, W until 1971 then P, B, H, P, W |

P = potatoes, R = rye, C = carrots, W = wheat, B = barley, H = hay,
L = grass/clover ley, SA = sainfoin ley, CL = red clover ley

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated (PER)
On four plots in each block arable rotations alternated each five years with ley rotations (ALT)

From 1976 all the rotations have been changed on all phases except for first and second test crops wheat in 1976:

(Previous LEY) LN, LN, LN, W, B
(Previous CLO) LC, LC, LC, W, B
(Previous A H) B, B, O, W, B
(Previous A) F, F, O, W, B

LN = Grass ley with N, LC = Clover/grass ley no N, O = Oats, F = Fallow

Previous alternating rotations have been changed to test eight-year leys:

LN, LN, LN, LN, LN, LN, LN, LN, W, B
LC, LC, LC, LC, LC, LC, LC, LC, W, B



*https://doi.org/10.23637/ERADOC-1-15* *pp 17*

Treatments to first test crop wheat:

ROT CYCL  Combinations of rotations and cycles defined above

LEY PER
CLO PER
A PER
A ALT
A H PER
A H ALT

Treatments to second test crop wheat:

ROTATION  The four rotations defined above

Yields are taken from first and second test crops only.

Additional treatments to first test crop, wheat:-

1/2 plots

1. FYMRES66  Farmyard manure residues, last applied 1966:

| | |
|---|---|
| NONE | None |
| FYM | 38 tonnes on each occasion |

1/8 plots

2. N  Nitrogen fertiliser (kg N):

| | |
|---|---|
| 0 | None |
| 63 | 63 |
| 126 | 126 |
| 189 | 189 |

Additional treatments to second test crop, wheat:-

1/2 plots

1. FYMRES65  Farmyard manure residues, last applied 1965

| | |
|---|---|
| NONE | None |
| FYM | 38 tonnes on each occasion |

1/4 plots

2. FUMRES75  Fumigant residues, applied 1975

| | |
|---|---|
| NONE | None |
| DICHL+AL | Dichloropropene, 220 kg, plus aldicarb, 11 kg |

1/8 plots

3. N  Nitrogen fertiliser (kg N):

| | |
|---|---|
| 0 | None |
| 63 | 63 |
| 126 | 126 |
| 189 | 189 |



*https://doi.org/10.23637/ERADOC-1-15* 

Corrective K dressings (kg K20) as muriate of potash applied to first test crop wheat.

| Continuous rotations | No FYM half plots | FYM half plots |
|---|---|---|
| Ley | 238 | 176 |
| Clover | 0 | 126 |
| Arable with hay | 0 | 75 |
| Arable | 264 | 289 |
| **Alternating rotations (last two rotations in order)** | | |
| Sainfoin/arable | 201 | 151 |
| Ley/arable with hay | 188 | 163 |
| Arable with hay/clover | 213 | 238 |
| Arable/ley | 213 | 226 |

NOTE: For a fuller record of previous treatments see 'Details' 1967 etc.

Standard applications:-
All grass leys: Manures: (0:14:28) at 540 kg. N at 80 kg as 'Nitro-Chalk'. Weedkiller: Paraquat at 0.56 kg ion in 280 l.
All clover/grass leys: Manures: (0:14:28) at 540 kg. Weedkiller: Paraquat at 0.56 kg ion in 280 l.
Barley: Manures: (20:14:14) at 400 kg, combine drilled. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.
Oats: Manures: (20:14:14) at 400 kg combine drilled. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.
Winter wheat: Manures: Magnesian limestone to 2nd test crop only at 5 tonnes. (0:20:20) at 300 kg combine drilled. Weedkiller: Ioxynil at 0.63 kg plus mecoprop 1.9 kg in 280 l. Nematicide: Aldicarb to 1st test crop only at 10 kg.

Varieties: Grass ley: Timothy S51 15 kg, Meadow fescue S215 19 kg, sown at 34 kg.
Clover/grass ley: Timothy S51 20 kg, Meadow fescue S215 16 kg, White clover S100 4 kg, sown at 40 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Oats: Manod, sown at 190 kg.
Winter wheat: Cappelle, sown at 210 kg.

Cultivations, etc.:- Treatment crops:
Grass ley and Clover/grass ley, 1st year: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.



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Grass ley and Clover/grass ley, 2nd year: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.

Grass ley and Clover/grass ley, 3rd year: Ploughed: 3 Nov, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.

Grass ley and Clover/grass ley, 4th year: Rotary cultivated: 14 Oct, 1975. First half corrective K applied: 4 Nov. Rotary cultivated: 21 Nov. Second half corrective K applied: 1 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, grass ley only: 11 Mar. Power harrowed grass ley only: 20 Apr.

All grass leys and Clover/grass leys: PK applied, N applied to grass ley only, spring-tine cultivated with crumbler attached: 21 Apr. Seeds sown: 22 Apr. Topped: 11 June. Weedkiller applied: 20 July. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.

Barley, 1st treatment crop: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Rolled: 23 Mar. Weedkiller applied: 3 May. Combine harvested: 26 July.

Barley, 2nd treatment crop: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Weedkiller applied: 3 May. Combine harvested: 26 July.

Oats, 3rd treatment crop: Ploughed: 3 Nov, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Rolled: 23 Mar. Weedkiller applied: 3 May. Combine harvested: 4 Aug.

Fallow, 1st treatment year: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached: 11 Mar. Spring-tine cultivated: 18 June. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.

Fallow, 2nd treatment year: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Spring-tine cultivated: 18 June. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.

Test crops:

Winter wheat, 1st test crop: Rotary cultivated: 14 Oct, 1975. First half corrective K applied, ploughed: 4 Nov. Spring-tine cultivated with crumbler attached: 5 Nov. Aldicarb applied, rotary cultivated: 7 Nov. Seed sown: 10 Nov. Second half corrective K applied: 1 Mar, 1976. Rolled: 10 Mar. N applied: 15 Apr. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.

Winter wheat, 2nd test crop: Magnesian limestone applied, deep-tine cultivated: 13 Oct, 1975. Spring-tine cultivated: 14 Oct. Seed sown: 15 Oct. Rolled: 10 Mar, 1976. N applied: 14 Apr. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.

NOTE: All grass leys and clover/grass leys failed to establish because of the summer drought.



*https://doi.org/10.23637/ERADOC-1-15* *pp 20*

76/W/RN/3

WINTER WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

| ROT CYCL / FYMRES66 | LEY PER | CLO PER | A PER | A ALT | A H PER | A H ALT | MEAN |
|---|---|---|---|---|---|---|---|
| NONE | 3.14 | 2.77 | 1.69 | 2.91 | 3.26 | 2.64 | 2.74 |
| FYM | 2.41 | 2.76 | 1.78 | 2.95 | 3.54 | 2.80 | 2.71 |
| N | | | | | | | |
| 0 | 2.40 | 3.17 | 0.43 | 2.65 | 2.48 | 2.80 | 2.32 |
| 63 | 3.01 | 2.71 | 2.24 | 3.21 | 3.64 | 2.66 | 2.91 |
| 126 | 2.61 | 2.57 | 2.24 | 3.12 | 3.72 | 2.69 | 2.83 |
| 189 | 3.07 | 2.61 | 2.04 | 2.74 | 3.76 | 2.73 | 2.83 |
| MEAN | 2.77 | 2.76 | 1.74 | 2.93 | 3.40 | 2.72 | 2.72 |

| FYMRES66 | ROT CYCL N | LEY PER | CLO PER | A PER | A ALT | A H PER | A H ALT |
|---|---|---|---|---|---|---|---|
| NONE | 0 | 3.02 | 2.81 | 0.36 | 2.78 | 1.83 | 2.67 |
| | 63 | 3.24 | 2.89 | 2.65 | 3.11 | 3.02 | 2.71 |
| | 126 | 2.93 | 2.71 | 2.15 | 3.08 | 4.74 | 2.63 |
| | 189 | 3.36 | 2.66 | 1.61 | 2.67 | 3.46 | 2.57 |
| FYM | 0 | 1.79 | 3.53 | 0.49 | 2.53 | 3.14 | 2.93 |
| | 63 | 2.79 | 2.52 | 1.83 | 3.30 | 4.26 | 2.61 |
| | 126 | 2.29 | 2.43 | 2.34 | 3.17 | 2.70 | 2.76 |
| | 189 | 2.79 | 2.57 | 2.47 | 2.80 | 4.06 | 2.90 |

GRAIN MEAN DM% 87.9

STRAW TONNES/HECTARE

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

| ROT CYCL / FYMRES66 | LEY PER | CLO PER | A PER | A ALT | A H PER | A H ALT | MEAN |
|---|---|---|---|---|---|---|---|
| NONE | 2.65 | 3.16 | 1.49 | 2.12 | 2.97 | 2.43 | 2.47 |
| FYM | 2.68 | 3.17 | 1.93 | 2.26 | 4.19 | 2.78 | 2.83 |
| N | | | | | | | |
| 0 | 1.98 | 2.96 | 1.07 | 1.33 | 2.31 | 2.26 | 1.99 |
| 63 | 2.86 | 2.89 | 2.03 | 2.48 | 3.84 | 2.28 | 2.73 |
| 126 | 2.53 | 3.08 | 2.15 | 2.49 | 4.38 | 3.24 | 2.98 |
| 189 | 3.27 | 3.73 | 1.59 | 2.45 | 3.79 | 2.63 | 2.91 |
| MEAN | 2.66 | 3.17 | 1.71 | 2.19 | 3.58 | 2.60 | 2.65 |

| FYMRES66 | ROT CYCL N | LEY PER | CLO PER | A PER | A ALT | A H PER | A H ALT |
|---|---|---|---|---|---|---|---|
| NONE | 0 | 2.21 | 2.68 | 0.76 | 0.86 | 1.72 | 2.35 |
| | 63 | 2.60 | 3.03 | 1.92 | 2.64 | 2.69 | 2.29 |
| | 126 | 2.70 | 3.51 | 1.94 | 2.38 | 4.11 | 2.81 |
| | 189 | 3.08 | 3.43 | 1.35 | 2.59 | 3.36 | 2.26 |
| FYM | 0 | 1.76 | 3.24 | 1.37 | 1.81 | 2.90 | 2.17 |
| | 63 | 3.13 | 2.75 | 2.14 | 2.32 | 4.99 | 2.27 |
| | 126 | 2.36 | 2.65 | 2.37 | 2.61 | 4.66 | 3.68 |
| | 189 | 3.45 | 4.03 | 1.84 | 2.32 | 4.22 | 3.00 |

STRAW MEAN DM% 93.9 SUB PLOT AREA HARVESTED 0.00260



*https://doi.org/10.23637/ERADOC-1-15* *pp 21*

76/W/RN/3

WINTER WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

| ROTATION | LEY | CLO | A | A H | MEAN |
|---|---|---|---|---|---|
| FYMRES65 | | | | | |
| NONE | 2.37 | 2.88 | 2.26 | 2.44 | 2.49 |
| FYM | 2.62 | 2.75 | 2.40 | 2.50 | 2.57 |
| FUMRES75 | | | | | |
| NONE | 2.42 | 2.84 | 2.29 | 2.51 | 2.52 |
| DICHL+AL | 2.57 | 2.79 | 2.37 | 2.44 | 2.54 |
| N | | | | | |
| 0 | 2.92 | 3.53 | 2.11 | 2.52 | 2.77 |
| 63 | 2.62 | 2.88 | 2.75 | 2.52 | 2.69 |
| 126 | 2.40 | 2.65 | 2.10 | 2.45 | 2.40 |
| 189 | 2.04 | 2.20 | 2.36 | 2.41 | 2.25 |
| MEAN | 2.50 | 2.81 | 2.33 | 2.47 | 2.53 |

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

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

| ROTATION | LEY | CLO | A | A H | MEAN |
|---|---|---|---|---|---|
| FYMRES65 | | | | | |
| NONE | 3.95 | 4.85 | 3.08 | 4.73 | 4.15 |
| FYM | 4.52 | 4.75 | 3.42 | 3.71 | 4.10 |
| FUMRES75 | | | | | |
| NONE | 4.14 | 4.40 | 2.41 | 3.92 | 3.72 |
| DICHL+AL | 4.33 | 5.19 | 4.09 | 4.53 | 4.53 |
| N | | | | | |
| 0 | 4.02 | 4.69 | 3.03 | 3.76 | 3.88 |
| 63 | 4.42 | 4.82 | 3.32 | 4.19 | 4.19 |
| 126 | 4.26 | 4.93 | 3.41 | 4.40 | 4.25 |
| 189 | 4.24 | 4.75 | 3.22 | 4.54 | 4.19 |
| MEAN | 4.24 | 4.80 | 3.25 | 4.22 | 4.13 |

STRAW MEAN DM% 92.7

SUB PLOT AREA HARVESTED 0.00260



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## 76/W/RN/4

## MARKET GARDEN

Object: To study the residual effects of fertilisers and organic manures applied in the period 1942-67 - Woburn Lansome I.

Sponsor: A.E. Johnston.

The 35th year, ryegrass.

For previous years see 'Details' 1967, 68/D/4(t), 69/W/RN/4, 70/W/RN/4(t), 71/W/RN/4(t), 72/W/RN/4(t) and 73-75/W/RN/4.

Design: 2 series each of 40 plots divided into 4 blocks of 10 plots. Series B has the plots split into 2.

Whole plot dimensions: 8.53 x 5.18.

NOTE: Yields were not taken and no new treatments were applied.

Basal applications: 80 kg N as 'Nitro-Chalk' in spring and after the first cut.

Seed: RvP Italian Ryegrass at 40 kg, sown 16 Sept, 1974.

Cultivations, etc.:- Both Series
Chain harrowed: 27 Feb, 1976. N applied: 29 Mar, 25 June. Cut once: 8 June.



*https://doi.org/10.23637/ERADOC-1-15* 

76/R/RN/5

## ARABLE REFERENCE PLOTS

Object: To study the long term effects of FYM and N, P and K fertilisers on the yield and mineral content of crops - Great Field IV.

Sponsor: F.V. Widdowson.

The 21st year of the rotation, barley, ley, potatoes, winter wheat, kale. The 17th year of the same rotation on the additional plots. The 20th year of permanent grass.

For previous years see 58/Bc/1(t), 59/Bc/1(t), 60/B/3(t), 61-64/B/2, 65/B/2(t), 66/B/2(t), 67/B/2, 68/B/3(t) and 69-75/R/RN/5.

Design: 1 block of 12 plots for each crop on original plots. 1 block of 7 plots for each crop on additional plots.

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilisers and farmyard manure:

MANURE

Original plots

| | |
|---|---|
| 0 | None |
| N1 | N1 |
| P | P |
| N1P | N1 P |
| K | K |
| N1K | N1 K |
| PK | PK |
| N1PK | N1 PK |
| N2PK | N2 PK |
| D | D |
| N1PKD | N1 PK D |
| N2PKD | N2 PK D |

N1, 2 (kg N): 19, 38 (ley): 56, 112 (barley): 75, 150 (wheat): 125, 250 (potatoes - 75, 150 until 1975): 125, 250 (kale and permanent grass) as 'Nitro-Chalk'

P: 63 kg $P_2O_5$ as superphosphate

K: 250 kg $K_2O$ as muriate of potash

D: 38 tonnes FYM (permanent grass): 50 tonnes (kale and potatoes): none to other crops.

NOTE: Potatoes on these plots all receive a standard dressing of 82 kg MgO as Epsom salts. Before 1976 potatoes tested 0 v 82 kg MgO on sub plots, dressing balanced-up after harvest.



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Additional plots

MANURE

| | |
|---|---|
| 0 | None |
| F | N PK |
| FMGCA | N PK Mg Ca |
| FMGS | N PK Mg S |
| FCAS | N PK Ca S |
| FMGCAS | N PK Mg Ca S |
| FMGCASTE | N PK Mg Ca S TE |

F: N PK
N: N applied as urea. N1 to wheat, N2 to other crops. Rates as above.
P: 126 kg P2O5 as potassium dihydrogen phosphate
K: 251 kg K2O total. As potassium dihydrogen phosphate (83 kg K2O) on all NPK plots. In addition plots without S receive 168 kg K2O as potassium chloride, plots with S receive 92 kg K2O as potassium sulphate plus 76 kg K2O as potassium chloride.
Mg: 126 kg MgO as magnesium chloride
Ca: 126 kg CaO as calcium carbonate
S: 30 kg S supplied by potassium sulphate
TE: Trace element mixture including Mn, Cu, Zn, B, Mo, Ca, Fe. Test varies with crop

Standard applications:
Barley and winter wheat: Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.
Potatoes: Weedkiller: Linuron at 0.93 kg in 280 l. Insecticide: Menazon at 0.28 kg in 280 l on two occasions. Fungicide: Mancozeb at 1.3 kg with the second insecticide spray.
Kale: Insecticide: Menazon at 0.28 kg in 280 l on two occasions.

Seed:
Barley: Maris Mink, sown at 200 kg.
Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover.
Potatoes: Pentland Crown (King Edward on additional plots).
Winter wheat: Maris Fundin, sown at 210 kg.
Kale: Thousand Headed, sown at 7 kg.

Cultivations, etc.:-
Barley: Dug by hand: 29 Oct, 1975. P, K, Mg, Ca and S applied to additional plots: 27 Feb, 1976. P and K applied to remaining plots and seed sown: 2 Mar. N applied: 8 Apr. Weedkillers applied: 7 May. Trace elements applied: 17 May. Fungicide applied: 25 May. Harvested by hand: 19 July.
Grass-clover ley: Seed sown: 11 Aug, 1975. P, K, Ca, Mg and S applied: 12 Nov. N applied: 2 Mar, 1976. Trace elements applied: 14 Apr. Cut twice: 19 May, 12 July.



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Potatoes: FYM applied and dug by hand: 22 Oct, 1975. P, K, Ca, Mg and S applied to additional plots: 27 Feb, 1976. P, K and Mg applied to remaining plots: 2 Mar. N applied, plots rotary cultivated and planted: 8 Apr. Weedkiller applied: 6 May. Second N applied to additional plots: 3 June. Trace elements applied: 7 June. Insecticide applied: 10 June. Insecticide with fungicide applied: 29 June. Plots of the main experiment with neither K nor FYM and no fertiliser plot of additional plots lifted: 16 Aug. Remaining additional plots lifted: 8 Sept. Remaining plots lifted: 13 Sept.

Winter wheat: Balancing Mg applied: 26 Sept, 1975. Dug by hand: 30 Sept. P, K, Ca, Mg and S applied and seed sown: 3 Oct. Weedkillers applied: 5 Mar, 1976. N and trace elements applied: 14 Apr. Fungicide applied: 28 Apr. Harvested by hand: 12 July.

Kale: FYM applied and dug by hand: 21 Oct, 1975. P, K, Ca, Mg and S applied: 27 Feb, 1976. N applied and seed sown: 23 Mar. Second N applied to additional plots: 3 June. Trace elements applied:-7 June. Insecticide applied: 10 June, 17 Sept. Harvested by hand: 3 Nov.

Permanent grass: P and K applied: 12 Nov, 1975. FYM applied: 2 Mar, 1976. N applied: 2 Mar, 19 May, 16 July. Cut three times: 19 May, 16 July, 11 Oct.



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76/R/RN/5

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

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

| | WINTER WHEAT: GRAIN | WINTER WHEAT: STRAW | KALE: FRESH WEIGHT | BARLEY GRAIN | BARLEY STRAW | LEY : DRY MATTER 1ST CUT | LEY : DRY MATTER 2ND CUT | LEY : DRY MATTER TOTAL OF 2 CUTS |
|---|---|---|---|---|---|---|---|---|
| MANURE | | | | | | | | |
| 0 | 3.00 | 3.88 | 7.0 | 1.86 | 1.47 | 1.06 | 0.46 | 1.52 |
| N1 | 2.75 | 4.10 | 5.2 | 2.04 | 1.88 | 2.22 | 0.60 | 2.82 |
| P | 2.81 | 4.14 | 21.8 | 1.80 | 1.49 | 1.36 | 0.55 | 1.91 |
| N1P | 1.64 | 3.09 | 35.7 | 1.24 | 1.39 | 2.51 | 0.68 | 3.19 |
| K | 3.89 | 4.67 | 7.8 | 2.11 | 1.63 | 1.41 | 0.52 | 1.93 |
| N1K | 4.31 | 4.42 | 2.6 | 2.17 | 1.95 | 2.78 | 0.63 | 3.41 |
| PK | 5.15 | 7.03 | 27.0 | 2.85 | 1.94 | 1.78 | 0.75 | 2.53 |
| N1PK | 6.11 | 7.76 | 41.0 | 3.64 | 2.59 | 2.84 | 0.78 | 3.62 |
| N2PK | 5.93 | 8.01 | 54.9 | 3.46 | 2.63 | 4.38 | 0.81 | 5.20 |
| D | 5.81 | 7.28 | 36.6 | 3.37 | 2.54 | 2.63 | 0.75 | 3.39 |
| N1PKD | 6.23 | 8.87 | 59.3 | 4.48 | 3.31 | 4.48 | 0.97 | 5.45 |
| N2PKD | 6.43 | 9.51 | 73.2 | 3.72 | 2.98 | 6.00 | 1.09 | 7.10 |
| MEAN DM% | 84.2 | 74.7 | 84.7 | 77.3 | 28.2 | 46.0 | 37.1 | |

| | POTATOES: TOTAL TUBERS | PERMANENT GRASS: DRY MATTER 1ST CUT | 2ND CUT | 3RD CUT | TOTAL OF 3 CUTS |
|---|---|---|---|---|---|
| MANURE | | | | | |
| 0 | 7.4 | 0.58 | 0.53 | 0.28 | 1.39 |
| N1 | 7.6 | 1.02 | 0.31 | 0.29 | 1.63 |
| P | 12.6 | 0.50 | 0.39 | 0.16 | 1.05 |
| N1P | 7.6 | 2.21 | 0.53 | 0.75 | 3.49 |
| K | 21.5 | 0.90 | 0.43 | 0.37 | 1.70 |
| N1K | 20.8 | 2.24 | 0.55 | 0.73 | 3.51 |
| PK | 26.9 | 0.71 | 0.77 | 0.43 | 1.91 |
| N1PK | 26.9 | 2.68 | 0.73 | 1.00 | 4.41 |
| N2PK | 28.4 | 4.71 | 0.42 | 0.97 | 6.10 |
| D | 26.5 | 2.68 | 1.10 | 0.62 | 4.39 |
| N1PKD | 35.0 | 3.70 | 1.17 | 1.26 | 6.14 |
| N2PKD | 33.0 | 5.65 | 1.12 | 0.74 | 7.50 |
| MEAN DM% | | 27.7 | 65.9 | 21.3 | 38.3 |



*https://doi.org/10.23637/ERADOC-1-15* *pp 27*

76/R/RN/5

GREAT FIELD IV (R) : ADDITIONAL PLOTS

TONNES/HECTARE

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

| | WINTER WHEAT: GRAIN | WINTER WHEAT: STRAW | KALE: FRESH WEIGHT | BARLEY: GRAIN | BARLEY: STRAW |
|---|---|---|---|---|---|
| MANURE | | | | | |
| 0 | 3.51 | 4.48 | 9.6 | 1.68 | 1.51 |
| F | 5.16 | 8.11 | 64.5 | 3.78 | 3.45 |
| FMGCA | 5.11 | 8.56 | 66.3 | 4.11 | 3.96 |
| FMGS | 5.22 | 8.59 | 68.9 | 3.26 | 3.01 |
| FCAS | 5.13 | 8.47 | 68.0 | 4.18 | 3.82 |
| FMGCAS | 5.27 | 8.98 | 65.4 | 4.43 | 3.94 |
| FMGCASTE | 4.63 | 8.31 | 65.4 | 4.45 | 3.73 |
| MEAN DM% | 86.6 | 80.4 | | 87.8 | 83.4 |

| | LEY : DRY MATTER 1ST CUT | LEY : DRY MATTER 2ND CUT | LEY : DRY MATTER TOTAL OF 2 CUTS | POTATOES: TOTAL TUBERS |
|---|---|---|---|---|
| MANURE | | | | |
| 0 | 1.79 | 0.66 | 2.45 | 10.4 |
| F | 5.16 | 1.18 | 6.35 | 26.1 |
| FMGCA | 5.20 | 0.93 | 6.12 | 28.6 |
| FMGS | 4.45 | 0.96 | 5.41 | 28.6 |
| FCAS | 5.00 | 0.94 | 5.94 | 27.9 |
| FMGCAS | 5.93 | 1.14 | 7.07 | 31.5 |
| FMGCASTE | 5.39 | 0.96 | 6.35 | 25.6 |
| MEAN DM% | 28.4 | 48.7 | 38.6 | |



*https://doi.org/10.23637/ERADOC-1-15* *pp 28*

76/W/RN/6

ARABLE REFERENCE PLOTS

Object: To study the long term effects of FYM and N, P and K fertilisers on the yield and mineral content of crops - Woburn Stackyard C.

Sponsor: F.V. Widdowson.

The 17th year, oats, sugar beet, barley, ley, potatoes, permanent grass.

For previous years see 60/B/3(t), 61-65/B/2, 66/B/2(t), 67/B/2(t), 68/B/3(t), 69/W/RN/6, 70/W/RN/6(t) and 71-75/W/RN/6.

Design: 1 block of 12 plots for each crop.

Whole plot dimensions: 2.74 x 2.13.

Treatments: All combinations of:-

Blocks

| | | |
|---|---|---|
| 1. CROP | Crops:- | |
| | After old grass (1960-73): | |
| POTATO/G | Potatoes | |
| | In arable rotation since 1960: | |
| BARLEY | Barley | |
| LEY | Ley | |
| POTATO/A | Potatoes | |
| SUGRBEET | Sugar beet | |
| OATS | Oats | |
| PERMGRAS | Permanent grass, sown autumn 1973 | |

Plots

| | | |
|---|---|---|
| 2. MANURE | Fertilisers and farmyard manure:- | |
| 0 | None | |
| N1 | N1 | |
| P | P | |
| N1P | N1 P | |
| K | K | |
| N1K | N1 K | |
| PK | PK | |
| N1PK | N1 PK | |
| N2PK | N2 PK | |
| D | D | |
| N1PKD | N1 PK D | |
| N2PKD | N2 PK D | |

N1,2 (kg N): 31.5, 63 (ley): 63, 126 (barley and oats): 126, 252 (sugar beet and potatoes): 188, 376 (permanent grass) as ammonium nitrate.
P: P205 at 63 kg as triple superphosphate.
K: K20 at 252 kg as potassium bicarbonate.
D: Farmyard manure at 25 tonnes (permanent grass): 50 tonnes (sugar beet and potatoes): none to other crops.



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NOTES: (1) The old grass block was dug in autumn 1973 and follows the arable rotation, the crop in 1976 being potatoes. A new block was sown to permanent grass on adjacent land.
(2) Potatoes in the old arable rotation and sugar beet test on sub plots: - v MG (82 kg Mg as Epsom salts). Yields are recorded from potatoes only. Untreated sub plots receive 82 kg MgO after potato and sugar beet harvest.

Standard applications:
Winter oats: Weedkillers: Ioxynil at 0.63 kg and mecoprop at 1.9 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l on two occasions the first with weedkiller.
Sugar beet: Manures: Boron at 0.92 kg $B_2O_3$ as borax in 1120 l. Insecticide: Menazon at 0.28 kg in 280 l on two occasions.
Barley: Weedkillers: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.
Potatoes: After old grass and in rotation: Insecticide: Menazon at 0.28 kg in 280 l on two occasions, the second with fungicide. Fungicide: Mancozeb at 1.3 kg in 280 l.
Permanent grass: Manures: MgO at 82 kg as Epsom salts.

Seed: Winter oats: Peniarth, sown at 200 kg
Sugar beet: Klein E, sown at 5.6 kg
Barley: Julia, dressed with ethirimol, sown at 160 kg
Potatoes: Maris Piper
Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover
Permanent grass: S215 Meadow fescue at 20 kg; S24 perennial ryegrass at 20 kg; crested dogstail at 7 kg; Chewings fescue at 7 kg; smooth stalked meadow grass at 7 kg; alsike clover at 4 kg; wild white clover at 2 kg. Mixture sown at 67 kg.

Cultivations, etc.:-
Winter oats: Balancing Mg applied: 29 Sept, 1975. Plots dug by hand, P and K applied: 2 Oct. Seed sown: 6 Oct. First half N applied: 1 Mar, 1976. Weedkiller with fungicide applied: 5 Apr. Second half N applied: 22 Apr. Fungicide applied: 20 May. Harvested: 9 July.
Sugar beet: FYM applied, plots dug by hand: 21 Sept, 1975. P and K applied: 1 Mar, 1976. First half N applied, Mg applied to half plots, raked in, seed drilled: 22 Mar. Boron applied: 3 May. Second half N applied: 20 May. Singled: 25 May. Insecticide applied: 14 June, 29 June. Lifted: 7 Oct.
Barley: Balancing Mg applied: 8 Nov, 1975. Plots dug by hand: 21 Nov. P and K applied, first half N applied, rotary cultivated, raked level, seed sown, raked in: 1 Mar, 1976. Second half N applied: 22 Apr. Weedkiller applied: 3 May. Fungicide applied: 20 May. Harvested: 13 July.



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Grass-clover ley: Seed undersown in barley stubble: 12 Aug, 1975. P and K applied: 20 Nov. N applied: 9 Mar, 1976. Cut twice: 20 May, 1 July.

Potatoes: Both blocks: FYM applied, plots dug by hand: 20 Nov, 1975. P and K applied: 1 Mar, 1976. First half N applied, rotary cultivated, potatoes planted, Mg applied to half plots, ridged up by hand: 13 Apr. Second half N applied: 20 May. Insecticide applied: 14 June. Insecticide with fungicide applied: 29 June. Lifted plots with neither K nor FYM: 12 Aug. Remaining plots lifted: 6 Sept.

Permanent grass: P, K and basal Mg applied: 20 Nov, 1975. FYM applied: 1 Mar, 1976. First third N applied: 9 Mar. Second third N applied: 20 May. Third third N applied: 1 July. Cut three times: 20 May, 1 July, 5 Nov.

NOTES: (1) Samples were taken for determinations of dry matter for each crop, and the percentage of N, P and K.
(2) The percentages of Mg in sugar beet tops, potato tubers and leaves were determined.
(3) The percentage of K in potato leaves was determined.



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76/W/RN/6

TONNES/HECTARE

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

| | OATS GRAIN | OATS STRAW | ROOTS WASHED | SUGBEET SUGAR % | TOTAL SUGAR | TOPS |
|---|---|---|---|---|---|---|
| MANURE | | | | | | |
| 0 | 3.24 | 3.19 | 8.4 | 13.2 | 1.11 | 7.5 |
| N1 | 2.92 | 3.63 | 10.6 | 13.2 | 1.39 | 12.8 |
| P | 3.28 | 3.34 | 6.8 | 13.2 | 0.90 | 8.5 |
| N1P | 3.35 | 4.00 | 9.2 | 13.7 | 1.26 | 11.1 |
| K | 2.37 | 3.07 | 18.6 | 15.7 | 2.92 | 10.1 |
| N1K | 2.92 | 3.16 | 18.1 | 13.7 | 2.49 | 14.2 |
| PK | 2.22 | 2.60 | 14.2 | 15.1 | 2.14 | 9.9 |
| N1PK | 4.50 | 6.05 | 18.1 | 13.6 | 2.46 | 16.2 |
| N2PK | 3.34 | 6.46 | 22.9 | 13.7 | 3.13 | 19.1 |
| D | 3.94 | 4.90 | 28.7 | 15.8 | 4.55 | 16.7 |
| N1PKD | 3.47 | 6.05 | 28.4 | 14.4 | 4.09 | 20.8 |
| N2PKD | 3.87 | 7.55 | 32.8 | 14.3 | 4.70 | 25.6 |
| MEAN DM% | 87.3 | 77.1 | | | | |

| | BARLEY GRAIN | BARLEY STRAW | - | POTATO/A TOTAL TUBERS MG | MEAN |
|---|---|---|---|---|---|
| MANURE | | | | | |
| 0 | 1.59 | 1.69 | 6.1 | 4.7 | 5.4 |
| N1 | 1.56 | 2.31 | 5.5 | 5.4 | 5.4 |
| P | 1.58 | 1.64 | 4.4 | 6.1 | 5.2 |
| N1P | 1.15 | 2.10 | 4.7 | 5.2 | 5.0 |
| K | 1.79 | 2.06 | 10.8 | 11.1 | 10.9 |
| N1K | 2.81 | 3.47 | 9.4 | 9.0 | 9.2 |
| PK | 1.97 | 1.70 | 11.1 | 12.1 | 11.6 |
| N1PK | 2.83 | 3.50 | 10.7 | 11.8 | 11.2 |
| N2PK | 3.56 | 4.29 | 10.7 | 11.9 | 11.3 |
| D | 2.69 | 2.91 | 13.7 | 13.0 | 13.4 |
| N1PKD | 3.43 | 4.39 | 11.5 | 11.1 | 11.3 |
| N2PKD | 3.67 | 4.97 | 13.6 | 12.4 | 13.0 |
| MEAN DM% | 86.8 | 82.8 | | | |



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76/W/RN/6

TONNES/HECTARE

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

| | POTATO/G | PERMGRAS : DRY MATTER | | | | LEY : DRY MATTER | | |
|---|---|---|---|---|---|---|---|---|
| | TOTAL TUBERS | 1ST CUT | 2ND CUT | 3RD CUT | TOTAL OF 3 CUTS | 1ST CUT | 2ND CUT | TOTAL OF 2 CUTS |
| MANURE | | | | | | | | |
| 0 | 6.4 | 0.90 | 0.25 | 0.36 | 1.51 | 0.90 | 0.26 | 1.16 |
| N1 | 5.9 | 2.26 | 0.37 | 0.39 | 3.02 | 1.74 | 0.42 | 2.17 |
| P | 6.5 | 0.44 | 0.12 | 0.27 | 0.84 | 0.84 | 0.24 | 1.08 |
| N1P | 5.6 | 2.19 | 0.34 | 0.50 | 3.02 | 1.91 | 0.48 | 2.39 |
| K | 10.5 | 1.45 | 0.43 | 0.47 | 2.34 | 0.85 | 0.42 | 1.27 |
| N1K | 10.8 | 2.63 | 0.32 | 0.36 | 3.31 | 2.22 | 0.29 | 2.51 |
| PK | 7.9 | 1.44 | 0.29 | 0.39 | 2.11 | 1.44 | 0.58 | 2.02 |
| N1PK | 10.5 | 2.42 | 0.33 | 0.56 | 3.32 | 2.78 | 0.43 | 3.21 |
| N2PK | 11.5 | 3.96 | 0.59 | 0.45 | 5.00 | 3.39 | 0.48 | 3.87 |
| D | 12.6 | 1.40 | 0.37 | 0.44 | 2.21 | 2.00 | 0.49 | 2.49 |
| N1PKD | 14.2 | 3.30 | 0.51 | 0.51 | 4.31 | 3.38 | 0.57 | 3.95 |
| N2PKD | 13.7 | 3.78 | 0.82 | 0.45 | 5.05 | 4.42 | 0.73 | 5.14 |
| MEAN DM% | | 24.8 | 61.3 | 18.3 | 34.8 | 27.8 | 47.1 | 37.4 |



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## 76/R/RN/7

## RESIDUAL PHOSPHATE

Object: Originally to study the fresh and residual effects of phosphate fertiliser on the yields of three arable crops grown in rotation. Since 1974 the effects on ley and on yield and pathogens of continuous wheat are also studied - Great Field IV and Sawyers I.

Sponsors: G.E.G. Mattingly, D.B. Slope.

The 17th year, ley (Great Field IV): wheat (Sawyers I).

For previous years see 'Details' 1967, 68/R/5(t), 69/R/RN/7, 70/R/RN/7(t) and 71-75/R/RN/7.

Design: Gt. Field IV: 3 series each of 1 randomised block of 12 plots.
Sawyers I: 3 series each of 2 randomised blocks of 12 plots.

Whole plot dimensions:
Gt. Field IV: 4.27 x 18.3
Sawyers I: 4.27 x 20.1

Treatments:

| P205 | Rates and frequency of applying phosphate:- |
|---|---|
| NONE | 0 |
| | **Annual dressings, kg P205:** |
| 29 ANN | 29 |
| 57 ANN | 57 |
| 115 ANN | 115 |
| 172 ANN | 172 |
| | **Triennial dressings, kg P205 (last applied 1975):** |
| 86 TRI | 86 |
| 172 TRI | 172 |
| | **Six-yearly dressings, kg P205 (last applied 1973):** |
| 344 SIX | 344 |
| 688 SIX | 688 |
| 1032 SIX | 1032 |
| | **Single dressing, kg P205 (applied autumn 1959):** |
| 376 G(1) | 376 as Gafsa rock phosphate |
| 376 S(1) | 376 as granular superphosphate |



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NOTES: (1) Since 1974 the original rotation of potatoes, barley, swedes on both fields has been changed. Blocks after barley have been sown to continuous wheat on Sawyers I, to ley on Great Field IV.
(2) Since 1960 all phosphate has been applied as superphosphate.
(3) The six-yearly dressings were applied half in autumn before ploughing, half in spring.
(4) The ley sown in 1974 established poorly. It was ploughed and resown in 1975.

Standard applications:
Leys (Gt. Field IV only): Manures: K20 at 250 kg as muriate of potash Chalk at 3.1 t (1st year ley only).
Wheat (Sawyers I only): Manures: K20 at 90 kg as muriate of potash. 'Nitro-Chalk' at 500 kg. Chalk at 3.1 t (2nd cereal only). Weedkillers: Paraquat at 0.56 kg ion in 220 l. (2nd and 3rd cereal only). Glyphosate at 1.7 kg in 220 l (4th cereal only). Ioxynil at 0.53 kg with mecoprop at 1.6 kg (both as the potassium salt) in 450 l in spring.

Seed: Ley mixture: Meadow fescue, S215 at 9.3 kg, Contessa meadow fescue at 5.9 kg, S48 Timothy at 5.9 kg, N.Z Huia white clover at 2.1 kg, Wild white clover at 0.38 kg. Sown at 24 kg.
Wheat: Cappelle, sown at 190 kg.

Cultivations, etc.:-
Leys: First-year only: Chalk applied: 30 Sept, 1975. Ploughed: 26 Oct. Disced: 26 Feb, 1976. Treatment P applied: 27 Feb. Standard K applied: 9 Apr. Power harrowed and sown: 21 Apr. Topped: 14 and 29 June, 13 July, 18 Aug.
Second and third-year Leys: Standard K applied: 30 Dec, 1975. Treatment P applied: 27 Feb, 1976. Cut three times: 20 May, 28 June and 5 Nov.
Wheat: Glyphosate applied: 24 Sept, 1975. Chalk applied: 29 Sept. Paraquat applied: 7 Oct. Ploughed: 19 Oct. Spring-tine cultivated, standard K and treatment P applied: 29 Oct. Power harrowed and sown: 30 Oct. N applied: 31 Mar, 1976. Spring-weedkiller applied: 28 Apr. Combine harvested: 30 July.

NOTE: Incidence of take-all in wheat was measured in April and July.



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76/R/RN/7 GREAT FIELD IV

SERIES II LEY

DRY MATTER TONNES/HECTARE

| P205 | CUT 1 (20/5/76) | CUT 2 (28/6/76) | CUT 3(5/11/76) | TOTAL OF 3 CUTS |
|---|---|---|---|---|
| NONE | 2.46 | 0.88 | 1.49 | 4.83 |
| 29 ANN | 2.73 | 1.07 | 1.80 | 5.60 |
| 57 ANN | 2.94 | 1.48 | 2.14 | 6.56 |
| 115 ANN | 2.92 | 1.56 | 1.88 | 6.37 |
| 172 ANN | 1.87 | 1.38 | 1.96 | 5.22 |
| 86 TRI | 2.81 | 1.46 | 1.63 | 5.90 |
| 172 TRI | 2.11 | 1.15 | 1.96 | 5.22 |
| 344 SIX | 3.05 | 1.77 | 2.11 | 6.93 |
| 688 SIX | 2.21 | 1.16 | 1.97 | 5.34 |
| 1032 SIX | 2.12 | 1.34 | 1.51 | 4.97 |
| 376 G(1) | 2.64 | 1.23 | 1.93 | 5.80 |
| 376 S(1) | 2.03 | 1.57 | 1.48 | 5.08 |
| MEAN | 2.49 | 1.34 | 1.82 | 5.65 |
| MEAN DM% | 20.4 | 32.9 | 13.5 | 22.3 |

PLOT AREA HARVESTED 0.00186

SERIES III LEY

DRY MATTER TONNES/HECTARE

| P205 | CUT 1 (20/5/76) | CUT 2 (28/6/76) | CUT 3(5/11/76) | TOTAL OF 3 CUTS |
|---|---|---|---|---|
| NONE | 2.31 | 0.95 | 1.21 | 4.46 |
| 29 ANN | 1.65 | 0.89 | 1.37 | 3.90 |
| 57 ANN | 2.23 | 1.04 | 1.98 | 5.25 |
| 115 ANN | 2.36 | 0.96 | 2.04 | 5.35 |
| 172 ANN | 3.06 | 0.71 | 1.57 | 5.34 |
| 86 TRI | 2.34 | 1.07 | 1.83 | 5.23 |
| 172 TRI | 1.78 | 0.85 | 1.15 | 3.77 |
| 344 SIX | 1.94 | 1.01 | 1.68 | 4.63 |
| 688 SIX | 2.20 | 0.88 | 1.67 | 4.75 |
| 1032 SIX | 2.66 | 1.01 | 1.50 | 5.17 |
| 376 G(1) | 2.37 | 1.12 | 1.79 | 5.29 |
| 376 S(1) | 1.84 | 0.66 | 1.52 | 4.02 |
| MEAN | 2.23 | 0.93 | 1.61 | 4.76 |
| MEAN DM% | 21.5 | 36.1 | 13.5 | 23.7 |

PLOT AREA HARVESTED 0.00186



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76/R/RN/7 SAWYERS I

SERIES I 2ND CEREAL WHEAT

GRAIN TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 4.31 |
| 29 ANN | 4.86 |
| 57 ANN | 4.27 |
| 115 ANN | 4.16 |
| 172 ANN | 4.35 |
| 86 TRI | 4.25 |
| 172 TRI | 4.21 |
| 344 SIX | 4.24 |
| 688 SIX | 4.47 |
| 1032 SIX | 4.57 |
| 376 G(1) | 3.90 |
| 376 S(1) | 3.94 |
| MEAN | 4.29 |

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

| TABLE | P205 |
|---|---|
| SED | 0.324 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 11 | 0.324 | 7.5 |

GRAIN MEAN DM% 88.1

STRAW TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 3.70 |
| 29 ANN | 4.41 |
| 57 ANN | 4.73 |
| 115 ANN | 4.43 |
| 172 ANN | 4.60 |
| 86 TRI | 4.21 |
| 172 TRI | 4.30 |
| 344 SIX | 4.10 |
| 688 SIX | 4.35 |
| 1032 SIX | 4.13 |
| 376 G(1) | 3.92 |
| 376 S(1) | 3.83 |
| MEAN | 4.23 |

STRAW MEAN DM% 90.4

PLOT AREA HARVESTED 0.00569



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76/R/RN/7 SAWYERS I

SERIES II 3RD CEREAL WHEAT

GRAIN TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 2.71 |
| 29 ANN | 3.34 |
| 57 ANN | 3.96 |
| 115 ANN | 3.79 |
| 172 ANN | 4.04 |
| 86 TRI | 3.92 |
| 172 TRI | 3.65 |
| 344 SIX | 3.64 |
| 688 SIX | 4.00 |
| 1032 SIX | 4.27 |
| 376 G(1) | 3.07 |
| 376 S(1) | 3.50 |
| MEAN | 3.66 |

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

| TABLE | P205 |
|---|---|
| SED | 0.431 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 11 | 0.431 | 11.8 |

GRAIN MEAN DM% 88.1

STRAW TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 2.56 |
| 29 ANN | 3.40 |
| 57 ANN | 3.44 |
| 115 ANN | 3.77 |
| 172 ANN | 3.53 |
| 86 TRI | 3.14 |
| 172 TRI | 3.47 |
| 344 SIX | 3.36 |
| 688 SIX | 3.62 |
| 1032 SIX | 3.78 |
| 376 G(1) | 2.68 |
| 376 S(1) | 2.86 |
| MEAN | 3.30 |

STRAW MEAN DM% 89.7

PLOT AREA HARVESTED 0.00569



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76/R/RN/7 SAWYERS I

SERIES III 4TH CEREAL WHEAT

GRAIN TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 2.53 |
| 29 ANN | 2.99 |
| 57 ANN | 3.16 |
| 115 ANN | 3.21 |
| 172 ANN | 3.39 |
| 86 TRI | 2.50 |
| 172 TRI | 3.47 |
| 344 SIX | 2.75 |
| 688 SIX | 3.26 |
| 1032 SIX | 3.11 |
| 376 G(1) | 2.29 |
| 376 S(1) | 2.30 |
| MEAN | 2.91 |

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

| TABLE | P205 |
|---|---|
| SED | 0.549 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 11 | 0.549 | 18.9 |

GRAIN MEAN DM% 88.0

STRAW TONNES/HECTARE

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

| P205 | |
|---|---|
| NONE | 2.28 |
| 29 ANN | 2.79 |
| 57 ANN | 2.85 |
| 115 ANN | 2.63 |
| 172 ANN | 2.70 |
| 86 TRI | 2.22 |
| 172 TRI | 2.66 |
| 344 SIX | 2.62 |
| 688 SIX | 2.64 |
| 1032 SIX | 3.33 |
| 376 G(1) | 2.00 |
| 376 S(1) | 1.55 |
| MEAN | 2.52 |

STRAW MEAN DM% 91.0

PLOT AREA HARVESTED 0.00569



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76/R/RN/8

## CULTIVATION WEEDKILLER

Object: To study the long-term effects of weedkillers and different methods of primary cultivation on a rotation of crops - Great Harpenden I.

Sponsors: R. Moffitt, G.V. Dyke, J.A. Currie.

The 16th year, spring beans.

For previous years see 'Details' 1967, 68/B/6(t), 69/R/RN/8(t), 70/R/RN/8, 71/R/RN/8(t) and 72-75/R/RN/8.

Design: 2 randomised blocks of 12 plots split into 2.

Whole plot dimensions: 12.8 x 15.2.

Treatments: All combinations of:-

Whole plots

1. CULTIVTN Primary cultivations annually:

| | |
|---|---|
| PLOUGH | Ploughed: 12 Nov, 1975 |
| ROTAVATE | Rotary cultivated: 13 Nov, 1975 |
| DEEPTINE | Deep-tine cultivated twice: 12 Nov, 1975 |

2. WEEDCNTL(76) Weed control to beans 1976:

| | |
|---|---|
| MECHANCL | Mechanical |
| SIMAZINE | Simazine at 1.1 kg in 220 l (duplicated) |

Sub plots

3. WEEDKLLR(751) Hormone weedkiller to barley 1975:

| | |
|---|---|
| NONE | None |
| DI+ME+MC | Dicamba + mecoprop + MCPA ('Tetralex Plus' at 7.0 l in 220 l). |

4. WEEDKLLR(752) Paraquat weedkiller to barley stubble autumn 1975:

| | |
|---|---|
| NONE | None |
| PARAQUAT | Paraquat at 0.42 kg ion in 220 l |

EXTRA plus three extra treatments

| | |
|---|---|
| SPIKE | Spike rotary cultivated: 4 Mar, 1976. Given simazine to beans 1976, with sub plot treatments 3 and 4 above. |
| (SH)PLGH | Shallow ploughed: 17 Nov, 1975. Given simazine to beans 1976 and paraquat to barley stubble autumn 1975, with sub plot treatment 3 above. Barley straw spread: 2 Sept, 1975. Straw burned: 10 Sept. |
| STANDARD | Standard cultivations as considered best for each crop. Ploughed: 12 Nov, 1975. Given simazine to beans 1976, with sub plot treatments 3 and 4 above. |



*https://doi.org/10.23637/ERADOC-1-15* *pp 40*

NOTES: (1) Simazine applied: 9 Mar, 1976
(2) Paraquat applied: 6 Oct, 1975.
(3) MECHANCL plots: Mechanically weeded: 29 April, 25 May, 1976.
(4) All plots, except SPIKE plots, heavy spring-tine cultivated: 3 Mar, 1976.
(5) All plots mechanically weeded: 28 May.

Basal applications: Manures: (0:14:28) at 400 kg.

Seed: Maris Bead, sown at 220 kg.

Cultivations, etc.:- Fertiliser applied: 3 Mar, 1976. Seed sown: 4 Mar.
Harvested: 20 July.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

| | EXTRA | SPIKE (SH) | PLGH | STANDARD |
|---|---|---|---|---|
| WEEDKLLR(751) | | | | |
| NONE | 0.31 | | 0.95 | 0.75 |
| DI+ME+MC | 0.29 | | 0.70 | 0.62 |
| WEEDKLLR(752) | | | | |
| NONE | 0.26 | | | 0.67 |
| PARAQUAT | 0.35 | | 0.82 | 0.71 |
| MEAN | 0.30 | | 0.82 | 0.69 |

GRAIN MEAN DM% 74.8

SUB PLOT AREA HARVESTED 0.00488



*https://doi.org/10.23637/ERADOC-1-15* *pp 41*

76/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

| CULTIVTN | PLOUGH | ROTAVATE | DEEPTINE | MEAN |
|---|---|---|---|---|
| WEEDCNTL(76) | | | | |
| MECHANCL | 0.79 | 0.42 | 0.34 | 0.52 |
| SIMAZINE | 0.72 | 0.61 | 0.41 | 0.58 |
| WEEDKLLR(751) | | | | |
| NONE | 0.68 | 0.53 | 0.28 | 0.50 |
| DI+ME+MC | 0.81 | 0.57 | 0.49 | 0.62 |
| WEEDKLLR(752) | | | | |
| NONE | 0.68 | 0.48 | 0.36 | 0.51 |
| PARAQUAT | 0.81 | 0.62 | 0.41 | 0.61 |
| MEAN | 0.75 | 0.55 | 0.38 | 0.56 |

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

| TABLE | WEEDCNTL(76) | WEEDKLLR(751) | WEEDKLLR(752) | CULTIVTN |
|---|---|---|---|---|
| | 0.093 | 0.056 | 0.056 | 0.108 |

| TABLE | CULTIVTN WEEDCNTL(76) | CULTIVTN WEEDKLLR(751) | CULTIVTN WEEDKLLR(S752) | |
|---|---|---|---|---|
| SED | 0.187 | | | MIN-REP |
| | 0.162 | 0.128 | 0.128 | MAX-MIN |
| | 0.132 | | | MAX-REP |

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:

| | | | |
|---|---|---|---|
| CULTIVTN | 0.098 | 0.098 | |

| | WEEDCNTL(76) |
|---|---|
| MIN-REP | WEEDCNTL(76) MECHANCL |
| MAX-MIN | MECHANCL SIMAZINE |
| MAX-REP | SIMAZINE |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 10 | 0.187 | 33.4 |
| BLOCK.WP.SP | 9 | 0.169 | 30.2 |

GRAIN MEAN DM% 76.7



*https://doi.org/10.23637/ERADOC-1-15* 

# IRRIGATION

Object: To study the effects of irrigation on a rotation of crops. Other agronomic factors are also included - Great Field I and II.

Sponsors: B.J. Legg, B.K. French.

The twelfth year, barley (Great Field I); forage maize (Great Field II).

For previous years see 64/C/15(t), 65/C/14(t), 66/C/9(t), 67/C/7(t), 68/C/6(t), 69/R/11(t), 70/R/RN/11(t), 71/R/RN/11(t), 72/R/RN/11(t), and 73-75/R/RN/11.

Design: 4 randomised blocks of 4 plots split into half and quarter plots (Great Field I).
4 randomised blocks of 2 plots split into quarter plots (Great Field II).

Whole plot dimensions: Barley - 15.2 x 32.0, forage maize - 15.2 x 15.2.

Treatments to barley: All combinations of:-

Whole plots

1. IRRIGTN — Irrigation (by oscillating spray line), cumulative to previous years:

| | |
|---|---|
| NONE | None |
| EARLY | Early |
| LATE | Late |
| FULL | Full |

Half plots

2. FUNGCIDE — Fungicides:

| | |
|---|---|
| NONE | None |
| E+T+B | Ethirimol seed dressing, tridemorph spray on 28 May and 7 July, benodanil spray on 7 July |

Quarter plots

3. ALDICARB(75) — Residuals of aldicarb applied to beans 1975:

| | |
|---|---|
| (0) | None |
| (14) | 14 kg |

4. N TIME — Time of applying nitrogen fertiliser (total dressing 50 kg N):

| | |
|---|---|
| SEEDBED | All to seedbed, dressing divided before (6 Mar) and after (23 Mar) sowing |
| SB+TD | Half to seedbed (6 Mar), half top dressed (28 June) |



*https://doi.org/10.23637/ERADOC-1-15* *pp 43*

NOTE: Tridemorph at 0.53 kg in 220 l for first spray; with benodanil at 1.12 kg in 450 l for second spray.

Treatments to forage maize: All combinations of:-

Whole plots

1. IRRIGTN Irrigation:

| | |
|---|---|
| NONE | None |
| FULL | Full |

Quarter plots

2. N Nitrogen fertiliser (kg N):

| | |
|---|---|
| 50 | 50 to seedbed |
| 100 | 100 to seedbed |
| 150 | 150 to seedbed |
| 100+50 | 100 to seedbed, 50 top dressed five weeks after establishment |

NOTE: Seedbed N applied on 5 May, top dressed on 28 June.

Standard applications: Barley: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Forage maize: Manures: (0:20:20) at 450 kg. Weedkillers: Atrazine at 1.7 kg in 220 l. Paraquat at 0.42 kg ion in 220 l. Insecticide: Dimethoate at 0.07 kg in 450 l.

Seed: Barley: Julia, sown at 160 kg.
Forage maize: Cargill Primeur 170, sown at 100,000 seeds per hectare.

Cultivations, etc.:- Barley: Ploughed: 20 Nov, 1975. Spring-tine cultivated: 3 Mar, 1976, 6 Mar. Seed sown: 8 Mar. Weedkiller applied: 7 May. Combine harvested: 26 July.
Forage maize: Paraquat applied: 27 Oct, 1975. Ploughed: 17 Oct. Spring-tine cultivated: 3 Mar, 1976. PK applied: 5 May. Atrazine applied and harrowed in: 7 May. Power harrowed: 10 May. Seed sown: 11 May. Insecticide applied: 8 June. Harvested by hand: 7 Oct.

NOTES: (1) Mildew on the barley was assessed on two occasions.
(2) Soil moisture measurements were made during the season.



*https://doi.org/10.23637/ERADOC-1-15* *pp 44*

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RAINFALL AND IRRIGATION: MM

| Week ending | Rainfall | IRRIGATION BARLEY EARLY | BARLEY LATE | BARLEY FULL | MAIZE FULL |
|---|---|---|---|---|---|
| May 1 | 0.4 | | | | |
| May 8 | 0.8 | | | | |
| May 15 | 7.2 | | | | |
| May 22 | 4.9 | 30 | | 30 | |
| May 29 | 5.2 | 25 | | 25 | |
| June 5 | 1.8 | | | | |
| June 12 | Trace | 25 | | 25 | 20 |
| June 19 | 16.5 | | | | |
| June 26 | Trace | | 25 | 25 | |
| July 3 | 0.1 | | 25 | 20 | 25 |
| July 10 | 0.4 | | 30 | | 30 |
| July 17 | 39.0 | | | | |
| July 24 | 2.1 | | | | |
| July 31 | Trace | | | | 25 |
| Aug 7 | Trace | | | | 25 |
| Aug 14 | Trace | | | | 25 |
| Aug 21 | 0 | | | | |
| Aug 28 | 2.8 | | | | 30 |
| Sept 4 | 9.0 | | | | |
| Sept 11 | 30.6 | | | | |
| Sept 18 | 5.9 | | | | |
| Sept 25 | 36.7 | | | | |
| Oct 2 | 44.6 | | | | |
| Total | 208.0 | 80 | 80 | 125 | 180 |

NOTES: (1) BARLEY IRRIGTN FULL plots started to lodge at the beginning of July and irrigation was stopped to prevent further lodging.
(2) Analysis of two blocks given ALDICARB(75) showed the residual effect to be negligible, therefore all four blocks were analysed together ignoring this factor.
(3) There was a systematic difference between the yields recorded from even and odd sub plots in the order of harvesting. An adjustment has been made for this in the yields presented. An explanation is being sought.



*https://doi.org/10.23637/ERADOC-1-15* *pp 45*

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BARLEY

GRAIN TONNES/HECTARE

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

| FUNGCIDE<br>IRRIGTN | NONE | E+T+B | MEAN |
|---|---|---|---|
| NONE | 4.04 | 4.87 | 4.45 |
| EARLY | 4.89 | 5.61 | 5.25 |
| LATE | 5.04 | 5.09 | 5.07 |
| FULL | 4.81 | 5.95 | 5.38 |
| MEAN | 4.69 | 5.38 | 5.04 |

| N TIME<br>IRRIGTN | SEEDBED | SB+TD | MEAN |
|---|---|---|---|
| NONE | 4.45 | 4.45 | 4.45 |
| EARLY | 5.26 | 5.23 | 5.25 |
| LATE | 4.98 | 5.16 | 5.07 |
| FULL | 5.42 | 5.35 | 5.38 |
| MEAN | 5.03 | 5.05 | 5.04 |

| N TIME<br>FUNGCIDE | SEEDBED | SB+TD | MEAN |
|---|---|---|---|
| NONE | 4.74 | 4.65 | 4.69 |
| E+T+B | 5.32 | 5.44 | 5.38 |
| MEAN | 5.03 | 5.05 | 5.04 |

| FUNGCIDE | NONE | | E+T+B | |
|---|---|---|---|---|
| N TIME<br>IRRIGTN | SEEDBED | SB+TD | SEEDBED | SB+TD |
| NONE | 4.08 | 3.99 | 4.83 | 4.90 |
| EARLY | 5.01 | 4.77 | 5.51 | 5.70 |
| LATE | 4.85 | 5.24 | 5.11 | 5.08 |
| FULL | 5.02 | 4.60 | 5.82 | 6.09 |

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

| TABLE | IRRIGTN | FUNGCIDE | N TIME | IRRIGTN<br>FUNGCIDE |
|---|---|---|---|---|
| SED | 0.205 | 0.079 | 0.074 | 0.233 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| IRRIGTN | | | | 0.157 |

| TABLE | IRRIGTN<br>N TIME | FUNGCIDE<br>N TIME | IRRIGTN<br>FUNGCIDE<br>N TIME |
|---|---|---|---|
| SED | 0.235 | 0.110 | 0.281 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| IRRIGTN | 0.151 | | 0.219 |
| FUNGCIDE | | 0.107 | |
| IRRIGTN.FUNGCIDE | | | 0.212 |
| IRRIGTN.N TIME | | | 0.219 |



*https://doi.org/10.23637/ERADOC-1-15* *pp 46*

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BARLEY

GRAIN TONNES/HECTARE

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 9 | 0.290 | 5.8 |
| BLOCK.WP.HP | 12 | 0.222 | 4.4 |
| BLOCK.WP.HP.SP | 23 | 0.295 | 5.9 |

GRAIN MEAN DM% 87.5

STRAW TONNES/HECTARE

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

| FUNGCIDE / IRRIGTN | NONE | E+T+B | MEAN |
|---|---|---|---|
| NONE | 3.04 | 3.44 | 3.24 |
| EARLY | 4.22 | 4.59 | 4.41 |
| LATE | 3.11 | 3.33 | 3.22 |
| FULL | 4.05 | 4.50 | 4.28 |
| MEAN | 3.61 | 3.96 | 3.78 |

| N TIME / IRRIGTN | SEEDBED | SB+TD | MEAN |
|---|---|---|---|
| NONE | 3.28 | 3.20 | 3.24 |
| EARLY | 4.61 | 4.20 | 4.41 |
| LATE | 3.30 | 3.13 | 3.22 |
| FULL | 4.38 | 4.18 | 4.28 |
| MEAN | 3.89 | 3.68 | 3.78 |

| N TIME / FUNGCIDE | SEEDBED | SB+TD | MEAN |
|---|---|---|---|
| NONE | 3.75 | 3.46 | 3.61 |
| E+T+B | 4.03 | 3.90 | 3.96 |
| MEAN | 3.89 | 3.68 | 3.78 |

| FUNGCIDE | NONE | | E+T+B | |
|---|---|---|---|---|
| N TIME / IRRIGTN | SEEDBED | SB+TD | SEEDBED | SB+TD |
| NONE | 3.13 | 2.94 | 3.42 | 3.46 |
| EARLY | 4.51 | 3.93 | 4.70 | 4.47 |
| LATE | 3.22 | 3.00 | 3.39 | 3.27 |
| FULL | 4.15 | 3.96 | 4.60 | 4.40 |

STRAW MEAN DM% 90.4

SUB PLOT AREA HARVESTED 0.00347



*https://doi.org/10.23637/ERADOC-1-15* *pp 47*

76/R/RN/11

FORAGE MAIZE DRY MATTER TONNES/HECTARE

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

| N / IRRIGTN | 50 | 100 | 150 | 100+50 | MEAN |
|---|---|---|---|---|---|
| NONE | 9.45 | 10.00 | 10.33 | 9.61 | 9.85 |
| FULL | 11.79 | 13.08 | 13.34 | 13.42 | 12.91 |
| MEAN | 10.62 | 11.54 | 11.84 | 11.51 | 11.38 |

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

| TABLE | N | IRRIGTN* N |
|---|---|---|
| SED | 0.556 | 0.786 |

* WITHIN THE SAME LEVEL OF IRRIGTN ONLY

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 18 | 1.111 | 9.8 |

MEAN DM% 40.8

SUB PLOT AREA HARVESTED 0.00156



*https://doi.org/10.23637/ERADOC-1-15* *pp 48*

76/W/RN/12

## ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the cumulative effects of a range of types of organic matter - Woburn, Stackyard B.

Sponsor: G.E.G. Mattingly.

The 12th year, winter oats, barley.

For previous years see 66/C/31(t), 67/C/24(t), 68/C/18(t), 69/W/RN/12(t), 70/W/RN/12(t), 71/W/RN/12(t), 72/W/RN/12(t) and 73-75/W/RN/12.

Design for each crop: 2 blocks of 8 plots split into 8.

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. A rotation of potatoes, wheat, sugar beet and barley was started on two blocks in 1972 and the remaining two blocks in 1973. Organic manures were last applied in 1971, the leys were ploughed in autumn 1971 and 1972 before starting the rotation. The experiment now tests all combinations of:-

Whole plots

1. MANURE Organic manures and fertilisers in the preliminary period:

| | |
|---|---|
| FYM | Farmyard manure |
| STRAW | Straw |
| PEAT | Peat |
| GREENMNR | Green manures |
| FERT-FYM | Fertilisers equivalent to FYM |
| FERT-STR | Fertilisers equivalent to straw |
| CLOVRLEY | Grass/clover ley, no N |
| GRASSLEY | Grass ley with N for each cut |

Sub plots

2. N 75 N 76 Fertiliser nitrogen (kg N) (residues of treatments to barley 1975 on winter oats, fresh dressings 1976 to barley):

| W. OATS | BARLEY | Winter oats | Barley |
|---|---|---|---|
| (0) | 0 | (0) | 0 |
| (25) | 25 | (25) | 25 |
| (50) | 50 | (50) | 50 |
| (75) | 75 | (75) | 75 |
| (100) | 100 | (100) | 100 |
| (125) | 125 | (125) | 125 |
| (150) | 150 | (150) | 150 |
| (175) | 175 | (175) | 175 |

No fresh nitrogen was applied to winter oats 1976. The crop was cut green on 30 June.



*https://doi.org/10.23637/ERADOC-1-15* *pp 49*

Standard applications:
Winter oats: Manures: (0:20:20) at 300 kg, combine drilled. Weedkillers: Glyphosate at 1.7 kg in 340 l. Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.
Barley: Manures: (0:20:20) at 290 kg combine drilled. Weedkiller: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 280 l.

Seed: Winter oats: Peniarth, sown at 200 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-
Winter oats: Glyphosate applied: 5 Oct, 1975. Ploughed: 24 Oct. Spring-tine cultivated with crumbler attached: 25 Oct. Seed sown: 27 Oct. Ioxynil plus mecoprop applied: 20 Apr, 1976. Harvested green: 30 June.
Barley: Ploughed in sugar beet tops: 24 Nov, 1975. Spring-tine cultivated: 2 Mar, 1976. N applied: 4 Mar. Seed sewn: 8 Mar. Weedkiller applied: 28 Apr. Combine harvested: 27 July.

NOTE: Soil samples were taken from the blocks in barley for chemical analyses and physical measurements.

WINTER OATS

GREEN CROP DRY MATTER TONNES/HECTARE

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

| N 75 MANURE | (0) | (25) | (50) | (75) | (100) | (125) | (150) | (175) | MEAN |
|---|---|---|---|---|---|---|---|---|---|
| FYM | 2.10 | 2.06 | 1.80 | 2.21 | 2.29 | 3.06 | 2.56 | 3.29 | 2.42 |
| STRAW | 1.93 | 2.12 | 2.50 | 2.39 | 2.31 | 2.39 | 2.79 | 2.48 | 2.36 |
| PEAT | 1.58 | 1.56 | 1.78 | 1.67 | 2.16 | 2.36 | 2.42 | 1.97 | 1.94 |
| GREENMNR | 1.93 | 1.47 | 2.09 | 1.88 | 2.34 | 2.16 | 1.86 | 2.34 | 2.01 |
| FERT FYM | 1.67 | 1.41 | 1.30 | 1.38 | 1.81 | 1.69 | 1.63 | 2.23 | 1.64 |
| FERT STR | 1.18 | 1.51 | 1.72 | 1.98 | 1.85 | 1.55 | 1.79 | 2.00 | 1.70 |
| CLOVRLEY | 2.56 | 2.51 | 2.38 | 2.57 | 2.90 | 3.00 | 2.97 | 4.23 | 2.89 |
| GRASSLEY | 3.14 | 2.15 | 2.62 | 2.97 | 2.89 | 4.96 | 5.45 | 4.27 | 3.55 |
| MEAN | 2.01 | 1.85 | 2.02 | 2.13 | 2.32 | 2.65 | 2.68 | 2.85 | 2.31 |

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

| TABLE | MANURE | N 75 | MANURE N 75 |
|---|---|---|---|
| SED | 0.524 | 0.166 | 0.684 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| MANURE | | | 0.470 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 7 | 0.524 | 22.7 |
| BLOCK.WP.SP | 56 | 0.470 | 20.3 |

GREENCROP MEAN DM% 47.6

SUB PLOT AREA HARVESTED 0.00056



*https://doi.org/10.23637/ERADOC-1-15* *pp 50*

76/W/RN/12

BARLEY

GRAIN TONNES/HECTARE

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

| N 76 / MANURE | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | MEAN |
|---|---|---|---|---|---|---|---|---|---|
| FYM | 2.79 | 3.51 | 3.06 | 3.78 | 3.46 | 3.14 | 2.99 | 3.19 | 3.24 |
| STRAW | 2.65 | 3.82 | 4.29 | 3.79 | 3.89 | 3.67 | 4.22 | 3.82 | 3.77 |
| PEAT | 2.35 | 3.03 | 3.58 | 3.58 | 3.78 | 3.04 | 2.81 | 3.14 | 3.17 |
| GREENMNR | 2.06 | 3.19 | 2.72 | 2.42 | 2.65 | 3.33 | 2.75 | 3.69 | 2.85 |
| FERT FYM | 1.56 | 2.24 | 2.34 | 2.61 | 3.06 | 1.83 | 2.44 | 2.71 | 2.35 |
| FERT STR | 2.44 | 3.35 | 3.16 | 3.88 | 3.79 | 3.83 | 3.42 | 3.22 | 3.39 |
| CLOVRLEY | 3.12 | 4.22 | 4.19 | 4.29 | 3.61 | 4.01 | 3.78 | 3.54 | 3.85 |
| GRASSLEY | 3.15 | 3.65 | 3.07 | 3.39 | 4.23 | 3.42 | 2.98 | 3.39 | 3.41 |
| MEAN | 2.52 | 3.38 | 3.30 | 3.47 | 3.56 | 3.28 | 3.17 | 3.34 | 3.25 |

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

| TABLE | MANURE | N 76 | MANURE N 76 |
|---|---|---|---|
| SED | 0.652 | 0.107 | 0.711 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| MANURE | | | 0.302 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 7 | 0.652 | 20.1 |
| BLOCK.WP.SP | 56 | 0.302 | 9.3 |

GRAIN MEAN DM% 88.1

STRAW TONNES/HECTARE

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

| N 76 / MANURE | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | MEAN |
|---|---|---|---|---|---|---|---|---|---|
| FYM | 1.68 | 2.27 | 2.81 | 2.85 | 2.45 | 2.53 | 2.61 | 2.43 | 2.45 |
| STRAW | 1.61 | 2.17 | 2.90 | 2.53 | 2.68 | 2.78 | 2.99 | 2.89 | 2.57 |
| PEAT | 1.25 | 1.82 | 1.74 | 2.52 | 2.74 | 2.14 | 2.07 | 1.93 | 2.03 |
| GREENMNR | 1.37 | 2.18 | 1.30 | 1.98 | 2.52 | 2.41 | 2.32 | 2.58 | 2.08 |
| FERT FYM | 0.91 | 1.39 | 1.93 | 1.84 | 2.26 | 1.75 | 2.30 | 2.06 | 1.81 |
| FERT STR | 1.34 | 1.98 | 2.21 | 2.41 | 2.88 | 2.57 | 2.17 | 2.33 | 2.24 |
| CLOVRLEY | 1.85 | 2.66 | 2.60 | 2.90 | 2.77 | 2.90 | 2.92 | 2.84 | 2.68 |
| GRASSLEY | 1.93 | 2.62 | 2.37 | 3.29 | 3.08 | 2.69 | 2.82 | 2.63 | 2.68 |
| MEAN | 1.49 | 2.14 | 2.23 | 2.54 | 2.67 | 2.47 | 2.52 | 2.46 | 2.32 |

STRAW MEAN DM% 92.0

SUB PLOT AREA HARVESTED 0.00173



*https://doi.org/10.23637/ERADOC-1-15* 

76/W/RN/13

## INTENSIVE CEREALS

Object: To study the effects of intensive cereal cropping on yield, incidence of soil-borne diseases and organic matter in the soil -- Woburn Stackyard I.

Sponsor: D.B. Slope.

The 11th year, ley, potatoes, winter wheat, barley.

For previous years see 66/B/9(t), 67/B/9, 68/B/7(t), 69/W/RN/13(t), 70/W/RN/13(t), 71/W/RN/13(t) and 72-75/W/RN/13.

Design: For each experiment: 2 randomised blocks of 6 plots, split into 4.

Whole plot dimensions: 8.53 x 20.4.

Treatments:-
One experiment on winter wheat on part of the site of the classical wheat experiment 1877-1954
One experiment on barley on part of the site of the classical barley experiment 1877-1954
Factors tested on both experiments are the same but crop and nitrogen rates differ. All combinations of:-

Whole plots

1. PREVCROP Previous crops:

| | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|
| C/C/L/P | L | P | C | C | C | L | P |
| C/L/P/C | P | C | C | C | L | P | C |
| L/P/C/C | C | C | C | L | P | C | C |
| P/C/C/C | C | C | L | P | C | C | C |
| C/C/C/L | C | L | P | C | C | C | L |
| C/C/C/C | C | C | C | C | C | C | C |

Ley = 1 year ley P = Potatoes C = Cereal: wheat or barley.

Sub plots

2. N Nitrogen fertiliser (kg N):

| Wheat | Barley | To wheat | To barley |
|---|---|---|---|
| 63 | 50 | 63 | 50 |
| 126 | 100 | 126 | 100 |
| 189 | 150 | 189 | 150 |
| 252 | 200 | 252 | 200 |

NOTE: Ley and potatoes receive standard N only, residues of dressings to cereals are tested (NRESID).



*https://doi.org/10.23637/ERADOC-1-15* *pp 52*

Basal applications: All crops: P205 at 130 kg, K20 at 260 kg as (0:14:28), half ploughed in, half applied to the plough furrow.

Standard applications:
Leys: N at 60 kg as 'Nitro-Chalk' in the seedbed, repeated after sowing. Weedkiller: Glyphosate at 1.7 kg in 340 l to wheat stubble only.
Potatoes: N at 150 kg as 'Nitro-Chalk'. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.
Wheat: Weedkillers: Glyphosate at 1.7 kg in 340 l. Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.
Barley: Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.

Seed: Ley: Italian ryegrass, sown at 40 kg
Potatoes: Pentland Crown
Wheat: Cappelle sown at 210 kg
Barley: Julia, dressed with ethirimol, sown at 160 kg

Cultivations, etc.:- All plots: Half PK applied, ploughed: 24 Oct, 1975. Remaining PK applied: 27 Oct.

Leys: Weedkiller applied to wheat stubble only: 5 Oct, 1975. Spring-tine cultivated wheat blocks only: 27 Oct. Deep-tine cultivated barley blocks only: 29 Dec. Spring-tine cultivated barley blocks: 2 Mar, 1976, wheat blocks: 9 Mar. N applied: 20 Apr. Seed sown: 27 Apr. N applied: 9 June. Cut once: 20 Oct.
Potatoes: Rotary cultivated: 14 Oct, 1975. Spring-tine cultivated barley blocks: 2 Mar, 1976, wheat blocks: 9 Mar. N applied: 30 Mar. Rotary cultivated, potatoes planted: 6 Apr. Weedkiller applied: 7 May. Rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm mechanically destroyed: 15 Sept. Haulm desiccant applied: 6 Oct. Lifted: 19 Oct.
Wheat: Glyphosate applied: 5 Oct, 1975. Spring-tine cultivated, seed sown: 27 Oct. N applied: 1 Apr, 1976. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.
Barley: Deep-tine cultivated: 29 Dec, 1975. Spring-tine cultivated: 2 Mar, 1976. Seed sown: 8 Mar. N applied: 9 Mar. Weedkiller applied: 28 Apr. Combine harvested: 26 July.

NOTES: (1) Five plots of wheat N 63 were damaged by birds shortly before harvest. No yields are presented for N 63 on wheat.
(2) Four other plots of wheat were also affected by bird damage:

| PREVCROP | N |
|---|---|
| C/C/L/P | 189 |
| C/L/P/C | 126 |
| C/L/P/C | 189 |
| L/P/C/C | 126 |

Estimated values were used in the analysis.



*https://doi.org/10.23637/ERADOC-1-15* *pp 53*

76/W/RN/13

LEY WHEAT SITE

1ST AND ONLY CUT (20/10/76) DRY MATTER TONNES/HECTARE

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

| NRESID | 63 | 126 | 189 | 252 | MEAN |
|---|---|---|---|---|---|
| | 0.68 | 0.64 | 0.66 | 0.51 | 0.62 |

1ST CUT MEAN DM% 15.9 PLOT AREA HARVESTED 0.00089

LEY BARLEY SITE

1ST AND ONLY CUT (20/10/76) DRY MATTER TONNES/HECTARE

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

| NRESID | 50 | 100 | 150 | 200 | MEAN |
|---|---|---|---|---|---|
| | 0.95 | 0.85 | 0.98 | 1.07 | 0.96 |

1ST CUT MEAN DM% 14.0 PLOT AREA HARVESTED 0.00089

POTATOES WHEAT SITE

TOTAL TUBERS TONNES/HECTARE

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

| NRESID | 63 | 126 | 189 | 252 | MEAN |
|---|---|---|---|---|---|
| | 22.6 | 24.3 | 22.4 | 24.7 | 23.5 |

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

| NRESID | 63 | 126 | 189 | 252 | MEAN |
|---|---|---|---|---|---|
| | 93.6 | 93.7 | 93.3 | 93.3 | 93.5 |

PLOT AREA HARVESTED 0.00139

POTATOES BARLEY SITE

TOTAL TUBERS TONNES/HECTARE

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

| NRESID | 50 | 100 | 150 | 200 | MEAN |
|---|---|---|---|---|---|
| | 30.4 | 33.4 | 32.8 | 31.9 | 32.1 |

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

| NRESID | 50 | 100 | 150 | 200 | MEAN |
|---|---|---|---|---|---|
| | 95.3 | 95.7 | 96.0 | 95.8 | 95.7 |

PLOT AREA HARVESTED 0.00139



*https://doi.org/10.23637/ERADOC-1-15* *pp 54*

76/W/RN/13

WINTER WHEAT

GRAIN TONNES/HECTARE

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

| N | 126 | 189 | 252 | MEAN |
|---|---|---|---|---|
| PREVCROP | | | | |
| C/C/L/P | 2.41 | 1.97 | 1.92 | 2.10 |
| C/L/P/C | 2.22 | 1.92 | 1.74 | 1.96 |
| L/P/C/C | 1.59 | 2.05 | 1.74 | 1.79 |
| C/C/C/C | 1.63 | 1.94 | 1.91 | 1.83 |
| MEAN | 1.96 | 1.97 | 1.83 | 1.92 |

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

| TABLE | N | PREVCROP* N |
|---|---|---|
| | 0.090 | 0.179 |

* WITHIN THE SAME LEVEL OF PREVCROP ONLY

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 4 | 0.179 | 9.3 |

GRAIN MEAN DM% 88.0

STRAW TONNES/HECTARE

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

| N | 126 | 189 | 252 | MEAN |
|---|---|---|---|---|
| PREVCROP | | | | |
| C/C/L/P | 3.02 | 2.80 | 2.56 | 2.79 |
| C/L/P/C | 2.39 | 2.64 | 2.75 | 2.59 |
| L/P/C/C | 1.71 | 2.60 | 2.43 | 2.24 |
| C/C/C/C | 2.14 | 2.55 | 2.13 | 2.27 |
| MEAN | 2.31 | 2.65 | 2.47 | 2.48 |

STRAW MEAN DM% 87.5

SUB PLOT AREA HARVESTED 0.00273



*https://doi.org/10.23637/ERADOC-1-15* *pp 55*

76/W/RN/13

BARLEY

GRAIN TONNES/HECTARE

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

| PREVCROP \ N | 50 | 100 | 150 | 200 | MEAN |
|---|---|---|---|---|---|
| C/C/L/P | 3.31 | 3.18 | 3.54 | 3.75 | 3.44 |
| C/L/P/C | 3.16 | 3.61 | 3.36 | 3.29 | 3.36 |
| L/P/C/C | 2.73 | 3.48 | 3.83 | 3.43 | 3.37 |
| C/C/C/C | 2.34 | 2.76 | 2.38 | 2.93 | 2.60 |
| MEAN | 2.88 | 3.26 | 3.28 | 3.35 | 3.19 |

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

| TABLE | N | PREVCROP* N |
|---|---|---|
| SED | 0.163 | 0.326 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 12 | 0.326 | 10.2 |

GRAIN MEAN DM% 87.5

STRAW TONNES/HECTARE

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

| PREVCROP \ N | 50 | 100 | 150 | 200 | MEAN |
|---|---|---|---|---|---|
| C/C/L/P | 1.83 | 2.11 | 2.52 | 2.62 | 2.27 |
| C/L/P/C | 1.55 | 1.74 | 2.21 | 2.05 | 1.89 |
| L/P/C/C | 1.36 | 1.91 | 2.48 | 2.27 | 2.00 |
| C/C/C/C | 1.00 | 1.54 | 1.48 | 1.59 | 1.40 |
| MEAN | 1.44 | 1.83 | 2.17 | 2.13 | 1.89 |

STRAW MEAN DM% 88.6

SUB PLOT AREA HARVESTED 0.00273



*https://doi.org/10.23637/ERADOC-1-15* 

76/W/RN/14

## LONG TERM PHOSPHATE

Object: To study the residual effects of superphosphate on a clover/grass ley- Woburn Stackyard III.

Sponsor: G.E.G. Mattingly.

The ninth year, clover/grass ley.

For previous years see 68/B/8(t), 69/W/RN/14, 70/W/RN/14(t), 71/W/RN/14(t), 72/W/RN/14(t) and 73-75/W/RN/14.

Design: 6 blocks of 6 plots, split into 2.

Whole plot dimensions: 8.53 x 15.8.

Treatments: All combinations of:-

Whole plots

1. P2O5RES(73) Residues of superphosphate applied autumn 1967 and spring 1973 (kg P2O5):

| | 1967 | 1973 | Total | |
|---|---|---|---|---|
| 0 | None | None | None | (Duplicate plots) |
| 360 | 188 | 172 | 360 | |
| 720 | 376 | 344 | 720 | |
| 1440 | 753 | 687 | 1440 | |
| 2160 | 1130 | 1030 | 2160 | |

Sub plots

2. P2O5RES(72) Residues of superphosphate applied in three equal dressings 1970-72 (kg P2O5, total):

| | |
|---|---|
| 0 | 0 |
| 376 | 376 |

Basal applications: Manures: $K_2O$ at 110 kg as muriate of potash. MgO at 30 kg as Epsom salts. $K_2O$ at 50 kg as muriate of potash.

Cultivations, etc.:- Mg applied: 15 Dec, 1975. Chain harrowed: 27 Feb, 1976. First K applied: 19 Mar. Cut once: 11 June. Second K applied: 25 June.



*https://doi.org/10.23637/ERADOC-1-15* *pp 57*

76/W/RN/14

1ST AND ONLY CUT (10/6/76) DRY MATTER TONNES/HECTARE

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

| P205RES(73) / P205RES(72) | 0 | 360 | 720 | 1440 | 2160 | MEAN |
|---|---|---|---|---|---|---|
| 0 | 1.31 | 1.77 | 2.04 | 1.85 | 1.59 | 1.64 |
| 376 | 1.78 | 1.67 | 2.08 | 1.83 | 1.71 | 1.81 |
| MEAN | 1.54 | 1.72 | 2.06 | 1.84 | 1.65 | 1.73 |

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

| TABLE | P205RES(72) | P205RES(73) | P205RES(72) P205RES(73) | |
|---|---|---|---|---|
| SED | | 0.215 | 0.232 | MIN REP |
| | 0.051 | 0.186 | 0.201 | MAX-MIN |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| P205RES(73) | | | 0.124 | MIN REP |
| | | | 0.108 | MAX-MIN |
| | | | 0.088 | MAX REP |

| | P205RES(73) |
|---|---|
| MAX REP | 0 |
| MAX-MIN | 0 V ANY OF REMAINDER |
| MIN REP | ANY OF REMAINDER |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 26 | 0.372 | 21.6 |
| BLOCK.WP.SP | 31 | 0.215 | 12.5 |

MEAN DM% 40.3

SUB PLOT AREA HARVESTED 0.00145



*https://doi.org/10.23637/ERADOC-1-15* 

76/W/RN/15

## ROTATION AND FUMIGATION

Object: To study different ways of using nematicides in a three-course rotation and to determine the effects on crop yield and incidence of pathogenic nematodes - Woburn Butt Close.

Sponsors: F.G.W. Jones, A.G. Whitehead, T.D. Williams.

The eighth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-75/W/RN/15.

Design: 3 series each of 2 blocks of 3 plots split into 7.

Whole plot dimensions: 5.33 x 31.1.

Treatments:
All phases of the rotation potatoes, barley, sugar beet are present. Each crop tests all combinations of:-

Whole plots

1. N Nitrogen fertiliser (kg N), applied cumulatively:

| POTATOES & S.BEET | BARLEY | To potatoes and sugar beet | To barley |
|---|---|---|---|
| 75 | 38 | 75 | 38 |
| 150 | 75 | 150 | 75 |
| 225 | 113 | 225 | 113 |

Sub plots

2. CHEMICAL Chemicals:

| | |
|---|---|
| 0 | None |
| A (P) | Aldicarb at 6 kg before potatoes |
| A (SB) | Aldicarb at 6 kg before sugar beet |
| A (B) | Aldicarb at 6 kg before barley |
| A (ALL) | Aldicarb at 6 kg before all crops |
| DAZ(ALL) | Dazomet at 224 kg before all crops since 1970 only |
| BEN(ALL) | Benomyl at 22 kg before all crops since 1974 only |

NOTE: Aldicarb first used in 1976. From 1969-75 dichloropropane/dichloropropene ('D-D') was applied at 448 kg to these treatments (before appropriate crops as above).

Standard applications:
Potatoes: Manures: (0:14:28) at 1080 kg. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.



*https://doi.org/10.23637/ERADOC-1-15* *pp 59*

Barley: Manures: (0:20:20) at 310 kg combine drilled. Weedkiller: Ioxynil at 0.52 kg with mecoprop at 1.6 kg in 280 l.
Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28) at 1080 kg. Boron at 7.4 kg B203 (as 'Solubor') applied with insecticide. Insecticide: Demeton-s-methyl at 0.25 kg in 390 l.

Seed: Potatoes: Pentland Crown.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Sugar beet: Klein E, sown at 6 kg.

Cultivations, etc.:-
All Series: Dazomet applied and these plots only rotary cultivated and all plots spring-tine cultivated: 11 Nov, 1975.
Potatoes: Ploughed: 4 Nov, 1975. Spring-tine cultivated with crumbler: 5 Nov. Ploughed: 15 Jan, 1976. Spring-tine cultivated: 3 Mar. PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated: 24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated, potatoes planted: 1 Apr. Weedkiller applied: 5 May. Grubbed: 2 June. Rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm mechanically destroyed: 15 Sept. Lifted: 28 Sept.
Barley: Ploughed, spring-tine cultivated with crumbler: 5 Nov, 1975. Ploughed: 15 Jan, 1976. Aldicarb and benomyl applied, all plots rotary cultivated: 2 Mar. N applied, spring-tine cultivated, seed sown: 3 Mar. Weedkiller applied: 29 Apr. Combine harvested: 28 July.
Sugar beet: Subsoiled: Tines 140 cm apart and 56 cm deep: 1 Sept, 1975. Magnesian limestone applied: 5 Sept. Spring-tine cultivated: 18 Sept. Ploughed twice: 16 Oct and 15 Jan, 1976. Spring-tine cultivated: 3 Mar. PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated: 24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated: 1 Apr. Spring-tine cultivated with crumbler, seed sown: 5 Apr. Tractor hoed: 13 May. Singled: 20 May. Boron and insecticide applied: 28 May. Hoed by hand: 18 June, Lifted: 18 Nov.

NOTES: (1) Soil samples were taken after harvest for eelworm counts.
(2) Sugar beet: Because of rabbit damage the yields on three plots with the following treatment combinations were not taken

| N | CHEMICAL |
|---|---|
| 75 | A(B) |
| 225 | 0 |
| 225 | BEN(ALL) |

Estimated values were used in the analysis.



*https://doi.org/10.23637/ERADOC-1-15* *pp 60*

76/W/RN/15

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

| N / CHEMICAL | 75 | 150 | 225 | MEAN |
|---|---|---|---|---|
| 0 | 11.4 | 11.7 | 10.5 | 11.2 |
| A(P) | 28.6 | 27.2 | 20.4 | 25.4 |
| A(SB) | 23.9 | 23.8 | 20.8 | 22.8 |
| A(B) | 18.1 | 19.1 | 12.0 | 16.4 |
| A(ALL) | 31.3 | 30.5 | 27.5 | 29.8 |
| DAZ(ALL) | 28.4 | 26.3 | 26.3 | 27.0 |
| BEN(ALL) | 23.3 | 12.9 | 11.7 | 15.9 |
| MEAN | 23.6 | 21.6 | 18.4 | 21.2 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|---|---|---|
| SED | 2.81 | 4.87 |

* WITHIN THE SAME LEVEL OF N ONLY

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 18 | 4.87 | 23.0 |

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

| N / CHEMICAL | 75 | 150 | 225 | MEAN |
|---|---|---|---|---|
| 0 | 74.6 | 78.3 | 77.5 | 76.8 |
| A(P) | 91.7 | 87.1 | 84.0 | 87.6 |
| A(SB) | 91.0 | 89.1 | 89.1 | 89.7 |
| A(B) | 83.1 | 82.7 | 79.0 | 81.6 |
| A(ALL) | 90.8 | 87.6 | 88.6 | 89.0 |
| DAZ(ALL) | 90.5 | 89.1 | 89.7 | 89.8 |
| BEN(ALL) | 85.1 | 83.0 | 74.8 | 81.0 |
| MEAN | 86.7 | 85.3 | 83.2 | 85.1 |

PLOT AREA HARVESTED 0.00052



*https://doi.org/10.23637/ERADOC-1-15* 

76/W/RN/15

BARLEY

GRAIN TONNES/HECTARE

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

| N<br>CHEMICAL | 38 | 75 | 113 | MEAN |
|---|---|---|---|---|
| 0 | 2.02 | 1.91 | 2.35 | 2.09 |
| A(P) | 1.90 | 2.58 | 2.24 | 2.24 |
| A(SB) | 2.12 | 2.70 | 3.03 | 2.62 |
| A(B) | 2.24 | 2.69 | 3.25 | 2.72 |
| A(ALL) | 1.68 | 2.24 | 3.36 | 2.43 |
| DAZ(ALL) | 2.24 | 1.68 | 1.56 | 1.83 |
| BEN(ALL) | 2.13 | 2.13 | 2.57 | 2.28 |
| MEAN | 2.05 | 2.27 | 2.62 | 2.31 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|---|---|---|
| SED | 0.348 | 0.603 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 18 | 0.603 | 26.1 |

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

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

| N<br>CHEMICAL | 38 | 75 | 113 | MEAN |
|---|---|---|---|---|
| 0 | 1.67 | 1.40 | 2.06 | 1.71 |
| A(P) | 1.59 | 2.16 | 1.57 | 1.77 |
| A(SB) | 1.87 | 2.05 | 2.25 | 2.06 |
| A(B) | 1.78 | 2.06 | 2.43 | 2.09 |
| A(ALL) | 1.58 | 1.89 | 2.27 | 1.91 |
| DAZ(ALL) | 1.95 | 2.19 | 1.50 | 1.88 |
| BEN(ALL) | 1.97 | 1.97 | 1.96 | 1.97 |
| MEAN | 1.77 | 1.96 | 2.01 | 1.91 |

STRAW MEAN DM% 91.3

PLOT AREA HARVESTED 0.00052



*https://doi.org/10.23637/ERADOC-1-15* *pp 62*

76/W/RN/15

SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

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

| N | 75 | 150 | 225 | MEAN |
|---|---|---|---|---|
| CHEMICAL | | | | |
| 0 | 29.8 | 32.4 | 29.7 | 30.6 |
| A(P) | 27.7 | 30.9 | 29.8 | 29.5 |
| A(SB) | 31.8 | 36.5 | 37.6 | 35.3 |
| A(B) | 29.3 | 29.8 | 32.4 | 30.5 |
| A(ALL) | 33.9 | 37.1 | 36.4 | 35.8 |
| DAZ(ALL) | 33.3 | 28.0 | 32.4 | 31.3 |
| BEN(ALL) | 26.6 | 25.6 | 32.7 | 28.3 |
| MEAN | 30.3 | 31.5 | 33.0 | 31.6 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|---|---|---|
| SED | 1.45 | 2.52 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 15 | 2.52 | 8.0 |

SUGAR PERCENTAGE

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

| N | 75 | 150 | 225 | MEAN |
|---|---|---|---|---|
| CHEMICAL | | | | |
| 0 | 15.2 | 14.7 | 14.0 | 14.7 |
| A(P) | 14.6 | 14.8 | 14.3 | 14.6 |
| A(SB) | 15.0 | 14.9 | 14.8 | 14.9 |
| A(B) | 15.0 | 14.3 | 14.5 | 14.6 |
| A(ALL) | 14.8 | 14.8 | 14.8 | 14.8 |
| DAZ(ALL) | 15.0 | 14.3 | 14.5 | 14.6 |
| BEN(ALL) | 15.0 | 14.7 | 14.4 | 14.7 |
| MEAN | 14.9 | 14.7 | 14.5 | 14.7 |



*https://doi.org/10.23637/ERADOC-1-15* *pp 63*

76/W/RN/15

SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

| N / CHEMICAL | 75 | 150 | 225 | MEAN |
|---|---|---|---|---|
| 0 | 4.54 | 4.78 | 4.15 | 4.49 |
| A(P) | 4.04 | 4.58 | 4.26 | 4.29 |
| A(SB) | 4.77 | 5.43 | 5.58 | 5.26 |
| A(B) | 4.45 | 4.28 | 4.69 | 4.47 |
| A(ALL) | 5.00 | 5.47 | 5.38 | 5.29 |
| DAZ(ALL) | 5.00 | 4.00 | 4.70 | 4.57 |
| BEN(ALL) | 3.98 | 3.78 | 4.82 | 4.19 |
| MEAN | 4.54 | 4.62 | 4.80 | 4.65 |

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

| TABLE | CHEMICAL | CHEMICAL N* |
|---|---|---|
| SED | 0.231 | 0.400 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP.SP | 15 | 0.400 | 8.6 |

PLOT AREA HARVESTED 0.00130



*https://doi.org/10.23637/ERADOC-1-15* 

76/W/RN/16

EFFECTS OF DEEP PK

Object: To study the residual effects of subsoiling, and of incorporating a large dressing of PK in either the subsoil or topsoil, on yields of a rotation of crops - Woburn Butt Furlong.

Sponsor: J. McEwen.

The third year, winter wheat, sugar beet, spring barley, potatoes.

For previous year see 74-75/W/RN/16.

Design: 4 series of 3 randomised blocks of 4 plots.

Whole plot dimensions: 4.27 x 2.59.

Treatments: Extra PK and subsoil treatment (applied autumn 1973):

| PK SUB | Extra PK | Subsoil (25-50 cm) treatment |
|---|---|---|
| - - | None | None |
| - SUB | None | Subsoiled |
| PKTOP - | To topsoil (0-25 cm) | None |
| - PKSUB | To subsoil | Subsoiled |

NOTES: (1) The rates of P and K were 1930 kg $P_2O_5$, as superphosphate and 460 kg $K_2O$ as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and subsoil.
(2) Subsoiling was done by spade, after removing the topsoil which was then replaced. PK to subsoil was worked in by forking.
(3) PK to topsoil was applied half before ploughing in autumn half soon after on the plough furrow.

Standard applications:
Series III: Winter wheat: Manures: (0:20:20) at 290 kg, combine drilled. N at 75 kg as 'Nitro-Chalk'. Weedkiller: Ioxynil at 0.6 kg plus mecoprop at 1.8 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Series IV: Sugar beet: Manures: Magnesian limestone at 5 tonnes. (0:14:28) at 750 kg. N at 140 kg as 'Nitro-Chalk'. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Series I: Barley: Manures: (20:14:14) at 380 kg, combined drilled. Weedkiller: Ioxynil at 0.6 kg plus mecoprop at 1.8 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Series II: Potatoes: Manures: (13:13:20) at 1860 kg. Weedkiller: Linuron at 0.9 kg in 430 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: Winter wheat: Cappelle, sown at 210 kg.
Sugar beet: Klein E, sown at 5.6 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.



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Cultivations, etc.:-

Series III: Winter wheat: Spring-tine cultivated with crumbler, seed sown: 23 Oct, 1975. N applied: 13 Apr, 1976. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand harvested: 19 July.

Series IV: Sugar beet: Magnesian limestone applied: 5 Sept, 1975. Ploughed: 28 Oct. N and PK applied: 30 Mar, 1976. Spring-tine cultivated with crumbler twice, seed sown: 5 Apr. Singled by hand 22 May. Insecticide applied: 25 June. Hand lifted: 17 Nov.

Series I: Barley: Ploughed: 24 Nov, 1975. Spring-tine cultivated with crumbler: 8 Mar, 1976. Seed sown: 9 Mar. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand harvested: 20 July.

Series II: Potatoes: Ploughed: 28 Oct, 1975. NPK applied: 23 Mar, 1976. Rotary harrowed, potatoes planted: 31 Mar. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand lifted: 19 Oct.

NOTE: Samples of wheat and barley grain, potato tubers and sugar beet roots and tops were taken for analysis of N,P,K,Na,Ca and Mg.



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WINTER WHEAT

GRAIN TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 3.48 | 4.06 | 3.18 | 4.17 | 3.72 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.281 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.344 | 9.2 |

GRAIN MEAN DM% 89.2

STRAW TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 4.90 | 5.64 | 4.33 | 6.34 | 5.30 |

STRAW MEAN DM% 90.3

PLOT AREA HARVESTED 0.00033

SUGAR BEET

ROOTS WASHED TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 35.3 | 36.9 | 33.0 | 39.3 | 36.1 |

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

| TABLE | PK SUB |
|---|---|
| SED | 1.62 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 1.98 | 5.5 |



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SUGAR BEET

SUGAR PERCENTAGE TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 14.9 | 15.0 | 14.8 | 14.9 | 14.9 |

TOTAL SUGAR TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 5.25 | 5.54 | 4.88 | 5.86 | 5.38 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.241 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.295 | 5.5 |

TOPS TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 28.3 | 24.9 | 24.7 | 25.6 | 25.9 |

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

| TABLE | PK SUB |
|---|---|
| SED | 1.32 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 1.62 | 6.3 |
| PLOT AREA HARVESTED | 0.00049 | | |



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BARLEY

GRAIN TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 3.43 | 4.46 | 3.77 | 4.51 | 4.04 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.261 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.319 | 7.9 |

GRAIN MEAN DM% 89.2

STRAW TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 3.16 | 4.14 | 3.41 | 4.44 | 3.79 |

STRAW MEAN DM% 92.2

PLOT AREA HARVESTED 0.00033

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

| PK SUB | - - | - SUB | PKTOP - | - PKSUB | MEAN |
|---|---|---|---|---|---|
| | 41.3 | 39.7 | 43.0 | 47.1 | 42.8 |

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

| TABLE | PK SUB |
|---|---|
| SED | 2.34 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 2.87 | 6.7 |

PLOT AREA HARVESTED 0.00043



*https://doi.org/10.23637/ERADOC-1-15* 