ROTHAMSTED RESEARCH

# Yields of the Field Experiments 1984

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## Rotations

### Rothamsted Research

Rothamsted Research (1985) *Rotations ;* Yields Of The Field Experiments 1984, pp 47 - 102 **- DOI: https://doi.org/10.23637/ERADOC-1-32**

## 84/R/RN/1 and 84/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. From 1968, continuous w. wheat was grown on some blocks after the three test crops to study the build-up and decline of take-all (Gaeumannomyces graminis) after the different cropping sequences. From 1977 new crop sequences were introduced on these blocks - Highfield and Fosters.

Sponsors: A.E. Johnston, R. J. Gutteridge.

The 36th year, old grass, leys, oats, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-83/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (84/R/RN/1)

FOSTERS — A site with little organic matter initially (84/R/RN/2)

ROTATION — Treatments: The experiment originally tested four six-course rotations, with all phases present each year. For many 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 fertilizer, LN = all-grass ley with nitrogen fertilizer, H = 1-year seeds hay, SB = sugar beet, O = s. oats, W = w. wheat, P = potatoes, B = s. barley.

From 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.

From 1975 the s. barley test crop was changed to w. 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

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.



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/1 and 84/R/RN/2

From 1968 only two phases on each field continued in the original six-course rotation (the museum blocks). The four other phases (the new sequence blocks) were sown to w. wheat every year at the end of the test-crop cycle. In 1977, 1978, 1979 and 1980 one phase, fallowed in the previous year started new sequences of treatment cropping:

| SEQUENCE | | Treatment crops | Test crops |
|---|---|---|---|
| LUCERNE | (previously LUCERNE) | LU, LU, LU | W, W, W, W |
| CLOGRA | (previously CLOGRA) | LC, LC, LC | W, W, W, W |
| GRASS/G | (previously GRASS) | R, R, R | W, W, W, W |
| ARABLE/A | (previously ARABLE) | O, P, BE | W, W, W, W |
| ARABLE/R | (previously RESEEDED) | B, B, W | W, W, W, W |
| GRASS/OG | (previously OLDGRASS) | R, R, R | W, W, W, W |

R = ryegrass, BE = s. beans. Other symbols as above. All ploughed at the end of the treatment crop cycle except GRASS/OG - direct drilled to 1st and 2nd w. wheats, ploughed thereafter. Treatment crop cycles started after nine previous cereals followed by one fallow. In 1984 yields were taken from 3rd and 4th test crops only.

Additional treatments to 3rd test crop w. wheat in the museum blocks:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1984 (kg N) as 'Nitro-Chalk':

0
50
100
150

Additional treatments to 3rd and 4th test crops w. wheat in the new sequence blocks:

Sub plots

N Nitrogen fertilizer in 1984 (kg N) as 'Nitro-Chalk':

0
50
100
150



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/1 and 84/R/RN/2

Standard applications:

3rd Treatment crops in museum blocks:

Lucerne: Manures: (0:18:36) at 630 kg.

All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg in spring and after each cut except the last.

Clover-grass ley: Manures: (0:18:36) at 420 kg.

Oats: Manures: (20:10:10) at 350 kg. Weedkillers: 3, 6-dichloropicolinic acid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop (as 'CMPP' at 4.2 l) applied with the fungicide in 250 l. Fungicide: Tridemorph at 0.52 kg.

3rd Test crop wheat in museum blocks and 3rd and 4th test crops wheat in new sequence blocks:

W. wheat: Manures: (0:24:24) at 210 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Chlortoluron at 3.5 kg in 250 l. Cyanazine at 0.24 kg and mecoprop at 1.6 kg in 250 l (Highfield), cyanazine at 0.30 kg and mecoprop at 2.0 kg in 250 l (Fosters).

Reseeded grass and old grass: Manures: (0:18:36) at 420 kg. All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.

Seed: S. oats: Trafalgar, sown at 180 kg.
W. wheat: Flanders, sown at 200 kg.

Cultivations, etc.:-

3rd Treatment crops in museum blocks:

Lucerne: PK applied: 21 Nov, 1983. Cut: 11 June, 1984, 18 July. Topped: 10 Sept.

All-grass ley and clover-grass ley: PK applied: 21 Nov, 1983. NK applied to all-grass ley only: 7 Mar, 1984, 4 June. Cut: 30 May, 18 July.

S. oats: Ploughed: 14 Dec, 1983. NPK applied: 16 Mar, 1984. Heavy spring-tine cultivated, rotary harrowed: 20 Mar. Rotary harrowed, seed sown: 21 Mar. Weedkillers and fungicide applied: 23 May. Combine harvested: 30 Aug.

3rd Test crop wheat in museum blocks and 3rd and 4th test crops wheat in new sequence blocks: Glyphosate applied: 20 Sept, 1983. Ploughed: 4 Oct (Fosters), 5 Oct (Highfield). Heavy spring-tine cultivated: 13 Oct (Fosters only). Heavy spring-tine cultivated (Highfield only), PK applied: 17 Oct. Spring-tine cultivated, rotary harrowed, seed sown: 18 Oct. Chlortoluron applied: 20 Oct (Highfield), 21 Oct (Fosters). N applied: 12 Apr, 1984. Cyanazine and mecoprop applied: 14 Apr. Combine harvested: 13 Aug (Fosters), 14 Aug (Highfield).

Re-seeded grass and old grass: PK applied: 21 Nov, 1983. NK applied to all-grass half plots: 7 Mar, 1984, 4 June, 27 July. Cut: 30 May, 18 July, 16 Nov (Highfield), 19 Nov (Fosters).

NOTE: On Highfield 4th test crop wheat three plots were lost because the combine broke down, these plots had treatment combinations

| ARABLE/A | ARABLE/A | ARABLE/A |
|---|---|---|
| 0 | 50 | 150 |

estimated values were used in the analysis.



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/1 AND 84/R/RN/2

MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

| | HIGHFIELD | FOSTERS |
|---|---|---|
| CLOVER-GRASS LEY | | |
| TOTAL OF 2 CUTS | 5.77 | 5.48 |
| MEAN DM% | 21.1 | 25.2 |
| ALL GRASS LEY | | |
| TOTAL OF 2 CUTS | 7.32 | 7.57 |
| MEAN DM% | 25.2 | 24.1 |
| LUCERNE | | |
| TOTAL OF 2 CUTS | 6.73 | 7.69 |
| MEAN DM% | 19.5 | 17.6 |

OLD GRASS

| | HIGHFIELD | |
|---|---|---|
| TOTAL OF 3 CUTS | C | N |
| 36TH EXPTL YEAR | | |
| BLOCKS 1 & 4 | 3.85 | 7.97 |
| BLOCK 2 | 4.39 | 8.13 |
| MEAN DM% | 21.7 | 19.8 |

RESEEDED GRASS

TOTAL OF 3 CUTS

| | HIGHFIELD | | | FOSTERS | | |
|---|---|---|---|---|---|---|
| | BLOCKS | C | N | BLOCKS | C | N |
| 36TH EXPTL YEAR | 1 & 4 | 3.84 | 8.56 | 1 & 3 | 5.00 | 8.44 |
| 36TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973) | 2 & 3 | 4.36 | 8.80 | 2 & 4 | 5.61 | 7.95 |
| MEAN DM% | | 21.3 | 20.7 | | 19.7 | 19.9 |



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84/R/RN/1 HIGHFIELD

W.WHEAT 3RD TEST CROP - MUSEUM BLOCKS

GRAIN TONNES/HECTARE

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

| FYMRES70 | NONE | FYM | MEAN |
|---|---|---|---|
| SEQUENCE | | | |
| LUCERNE | 7.11 | 7.12 | 7.11 |
| CLOGRA | 7.03 | 7.30 | 7.17 |
| GRASS | 7.05 | 6.54 | 6.79 |
| ARABLE | 6.11 | 5.69 | 5.90 |
| MEAN | 6.82 | 6.66 | 6.74 |

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 5.06 | 6.82 | 8.34 | 8.23 | 7.11 |
| CLOGRA | 5.39 | 7.57 | 7.43 | 8.27 | 7.17 |
| GRASS | 5.04 | 6.20 | 7.82 | 8.10 | 6.79 |
| ARABLE | 3.40 | 6.00 | 6.78 | 7.42 | 5.90 |
| MEAN | 4.72 | 6.65 | 7.59 | 8.01 | 6.74 |

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 4.91 | 6.90 | 7.53 | 7.95 | 6.82 |
| FYM | 4.54 | 6.40 | 7.66 | 8.06 | 6.66 |
| MEAN | 4.72 | 6.65 | 7.59 | 8.01 | 6.74 |

| | N | 0 | 50 | 100 | 150 |
|---|---|---|---|---|---|
| FYMRES70 | SEQUENCE | | | | |
| NONE | LUCERNE | 5.73 | 7.30 | 7.91 | 7.50 |
| | CLOGRA | 5.06 | 7.54 | 7.54 | 7.97 |
| | GRASS | 5.30 | 6.75 | 7.67 | 8.46 |
| | ARABLE | 3.54 | 5.99 | 7.00 | 7.89 |
| FYM | LUCERNE | 4.40 | 6.34 | 8.77 | 8.97 |
| | CLOGRA | 5.73 | 7.59 | 7.32 | 8.57 |
| | GRASS | 4.78 | 5.65 | 7.97 | 7.75 |
| | ARABLE | 3.25 | 6.00 | 6.56 | 6.94 |

GRAIN MEAN DM% 83.9

PLOT AREA HARVESTED 0.00675



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/2 FOSTERS

W.WHEAT 3RD TEST CROP - MUSEUM BLOCKS

GRAIN TONNES/HECTARE

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

| FYMRES70 | NONE | FYM | MEAN |
|---|---|---|---|
| SEQUENCE | | | |
| LUCERNE | 6.31 | 6.46 | 6.38 |
| CLOGRA | 6.10 | 6.11 | 6.11 |
| GRASS | 5.15 | 5.74 | 5.44 |
| ARABLE | 5.07 | 4.85 | 4.96 |
| MEAN | 5.66 | 5.79 | 5.72 |

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 4.72 | 6.28 | 6.88 | 7.65 | 6.38 |
| CLOGRA | 4.34 | 6.18 | 6.41 | 7.50 | 6.11 |
| GRASS | 4.25 | 4.45 | 6.42 | 6.65 | 5.44 |
| ARABLE | 2.84 | 4.53 | 5.99 | 6.50 | 4.96 |
| MEAN | 4.04 | 5.36 | 6.42 | 7.08 | 5.72 |

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| FYMRES70 | | | | | |
| NONE | 3.77 | 5.23 | 6.56 | 7.07 | 5.66 |
| FYM | 4.30 | 5.49 | 6.29 | 7.08 | 5.79 |
| MEAN | 4.04 | 5.36 | 6.42 | 7.08 | 5.72 |

| | N | 0 | 50 | 100 | 150 |
|---|---|---|---|---|---|
| FYMRES70 | SEQUENCE | | | | |
| NONE | LUCERNE | 4.60 | 6.15 | 6.89 | 7.60 |
| | CLOGRA | 4.33 | 6.40 | 6.55 | 7.12 |
| | GRASS | 3.50 | 4.01 | 6.34 | 6.73 |
| | ARABLE | 2.66 | 4.34 | 6.45 | 6.84 |
| FYM | LUCERNE | 4.83 | 6.42 | 6.87 | 7.71 |
| | CLOGRA | 4.35 | 5.96 | 6.27 | 7.87 |
| | GRASS | 4.99 | 4.88 | 6.50 | 6.57 |
| | ARABLE | 3.02 | 4.71 | 5.53 | 6.16 |

GRAIN MEAN DM% 82.4

PLOT AREA HARVESTED 0.00675



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84/R/RN/1 HIGHFIELD

W.WHEAT 3RD TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 5.06 | 6.47 | 8.08 | 8.57 | 7.04 |
| CLOGRA | 6.00 | 6.98 | 8.49 | 8.68 | 7.54 |
| GRASS/G | 5.57 | 6.55 | 8.45 | 8.46 | 7.26 |
| ARABLE/A | 4.91 | 5.30 | 6.74 | 7.88 | 6.20 |
| ARABLE/R | 5.25 | 6.87 | 7.75 | 8.15 | 7.01 |
| GRASS/OG | 6.63 | 7.31 | 7.75 | 9.26 | 7.74 |
| MEAN | 5.57 | 6.58 | 7.88 | 8.50 | 7.13 |

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

| TABLE | SEQUENCE | N | SEQUENCE N |
|---|---|---|---|
| SED | 0.261 | 0.201 | 0.501 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| SEQUENCE | | | 0.493 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 5 | 0.261 | 3.7 |
| BLOCK.WP.SP | 18 | 0.493 | 6.9 |

GRAIN MEAN DM% 83.4

SUB PLOT AREA HARVESTED 0.00322



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84/R/RN/1 HIGHFIELD

W.WHEAT 4TH TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 4.11 | 5.72 | 6.56 | 7.49 | 5.97 |
| CLOGRA | 4.36 | 5.91 | 7.41 | 8.62 | 6.57 |
| GRASS/G | 3.86 | 5.90 | 6.65 | 7.59 | 6.00 |
| ARABLE/A | 3.72 | 4.70 | 6.19 | 6.30 | 5.23 |
| ARABLE/R | 4.68 | 6.09 | 7.56 | 7.98 | 6.58 |
| GRASS/OG | 5.40 | 6.58 | 7.59 | 7.97 | 6.89 |
| MEAN | 4.35 | 5.82 | 6.99 | 7.66 | 6.21 |

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

| TABLE | SEQUENCE | N | SEQUENCE N |
|---|---|---|---|
| SED | 0.385 | 0.189 | 0.557 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| SEQUENCE | | | 0.464 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 5 | 0.385 | 6.2 |
| BLOCK.WP.SP | 15 | 0.464 | 7.5 |

GRAIN MEAN DM% 83.6

SUB PLOT AREA HARVESTED 0.00322



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84/R/RN/2 FOSTERS

W.WHEAT 3RD TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 3.74 | 4.76 | 5.89 | 6.41 | 5.20 |
| CLOGRA | 3.69 | 5.17 | 5.65 | 6.48 | 5.25 |
| GRASS/G | 3.84 | 5.00 | 6.18 | 6.46 | 5.37 |
| ARABLE/A | 2.79 | 3.70 | 4.99 | 5.84 | 4.33 |
| ARABLE/R | 3.71 | 4.71 | 5.97 | 6.58 | 5.24 |
| MEAN | 3.56 | 4.67 | 5.74 | 6.35 | 5.08 |

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

| TABLE | SEQUENCE | N | SEQUENCE N |
|---|---|---|---|
| SED | 0.610 | 0.149 | 0.674 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| SEQUENCE | | | 0.333 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 4 | 0.610 | 12.0 |
| BLOCK.WP.SP | 15 | 0.333 | 6.6 |

GRAIN MEAN DM% 82.6

SUB PLOT AREA HARVESTED 0.00322



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84/R/RN/2 FOSTERS

W.WHEAT 4TH TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

| N | 0 | 50 | 100 | 150 | MEAN |
|---|---|---|---|---|---|
| SEQUENCE | | | | | |
| LUCERNE | 3.36 | 4.37 | 5.20 | 6.56 | 4.87 |
| CLOGRA | 4.08 | 5.08 | 6.44 | 7.21 | 5.70 |
| GRASS/G | 4.02 | 4.67 | 5.56 | 6.34 | 5.15 |
| ARABLE/A | 3.30 | 4.31 | 5.05 | 6.77 | 4.86 |
| ARABLE/R | 4.56 | 5.95 | 6.42 | 6.97 | 5.98 |
| MEAN | 3.86 | 4.87 | 5.74 | 6.77 | 5.31 |

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

| TABLE | SEQUENCE | N | SEQUENCE N |
|---|---|---|---|
| SED | 0.401 | 0.200 | 0.557 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | |
| SEQUENCE | | | 0.446 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 4 | 0.401 | 7.6 |
| BLOCK.WP.SP | 15 | 0.446 | 8.4 |

GRAIN MEAN DM% 82.8

SUB PLOT AREA HARVESTED 0.00322



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84/W/RN/3

LEY/ARABLE

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

Sponsor: A.E. Johnston.

The 47th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-83/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 | Clover/grass 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 = w. rye, C = carrots, W = w. wheat, B = s. barley, H = hay, L = clover/grass ley, SA = sainfoin ley, CL = red clover ley

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated

On four plots in each block arable rotations alternated each five years with ley rotations

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

| | |
|---|---|
| LN 3 | (Previous LEY) LN, LN, LN, W, B |
| LC 3 | (Previous CLO) LC, LC, LC, W, B |
| AF | (Previous A) F, F, BE, W, B |
| AB | (Previous A H) B, B, BE, W, B |

LN = grass ley with N, LC = clover/grass ley no N, BE = s. beans (s. oats until 1980), F = fallow

Plots hitherto in alternating rotations were changed to test eight-year leys:

| | |
|---|---|
| LN 8 | LN, LN, LN, LN, LN, LN, LN, LN, W, B |
| LC 8 | LC, LC, LC, LC, LC, LC, LC, LC, W, B |



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The new scheme started by sowing these new leys in spring 1976 on four phases and in spring 1977 on the fifth phase (2nd test crop in 1976).

Yields are taken only from the leys and the test crops.

Treatments to first test crop w. wheat, all combinations of:

Whole plots

1. ROTATION — Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

2. FYMRES63 — Farmyard manure residues, last applied 1963:

   NONE — None
   FYM — 38 tonnes on each occasion

1/8 plots

3. N — Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

   0
   70
   140
   210

Treatments to second test crop s. barley, all combinations of:

Whole plots

1. ROTATION — Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

2. FYMRES62 — Farmyard manure residues, last applied 1962:

   NONE — None
   FYM — 38 tonnes on each occasion



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84/W/RN/3

1/8 plots

3. N Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

0
60
120
180

Treatments to leys:

| | |
|---|---|
| FYM RES | Farmyard manure residues |
| NONE | None |
| FYM | 38 tonnes on each occasion, last applied 1966 to 1st year leys, 1965 to 2nd year leys, 1964 to 3rd year leys, 1963 to 4th year leys, 1962 to 5th year leys. |

Corrective K dressings (kg $K_2O$) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block:

| Continuous rotations | No FYM half plots | FYM half plots |
|---|---|---|
| LN | 452 | 527 |
| LC | 301 | 364 |
| AF | 665 | 640 |
| AB | 653 | 753 |
| **Ex-alternating rotations** | | |
| LN 8 ploughed for w. wheat | 489 | 326 |
| LN 8 not ploughed | 351 | 289 |
| LC 8 ploughed for w. wheat | 75 | 0 |
| LC 8 not ploughed | 289 | 376 |

Standard applications:-

Grass ley and clover/grass, 1st year: Manures: (0:18:36) at 420 kg. N at 75 kg as 'Nitro-Chalk' to grass ley only. Weedkiller: MCPB at 2.1 kg in 250 l.

Grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:18:36) at 410 kg. (25:0:16) at 300 kg in spring and after the first cut. Weedkillers: MCPA with MCPB (as 'Trifolextra' at 7.0 l) in 250 l to 2nd year only.

Clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:18:36) at 410 kg. $K_2O$ at 48 kg as muriate of potash in spring and after the first cut. Weedkillers: MCPA with MCPB (as 'Trifolex-tra' at 7.0 l) in 250 l to 2nd year only.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkillers: 3, 6-dichloropicolinic acid at 0.07 kg with bromoxynil octanoate at 0.34 kg and mecoprop at 2.1 kg in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

S. beans: 3rd treatment crop: Manures: (0:20:20) at 200 kg.

W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkillers: Glyphosate at 1.8 kg in 280 l. Chlortoluron at 3.5 kg in 250 l. Nematicide: Aldicarb at 10 kg.



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84/W/RN/3

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 310 kg. Weedkillers: 3, 6-dichloropicolinic acid at 0.07 kg bromoxynil octanoate at 0.34 kg and mecoprop at 2.1 kg in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l. Nematicide: Aldicarb at 10 kg.

Seed: Grass ley: Climax timothy at 17 kg, meadow fescue at 17 kg, mixture sown at 34 kg.
Clover/grass ley: Climax timothy at 18 kg, meadow fescue at 15 kg, Huia white clover at 4 kg, mixture sown at 37 kg.
S. barley: Triumph, dressed with triadimenol and fuberidazole, sown at 160 kg.
S. beans: Minden, sown at 270 kg.
W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:- Treatment crops:
Grass ley and clover/grass ley, 1st year: Ploughed: 3 Oct, 1983. Spring-tine cultivated: 21 Mar, 1984. PK applied, N applied to grass ley only: 6 Apr. Rotary harrowed, seeds sown: 10 Apr. Weedkiller applied: 1 Aug. Cut: 24 July, 10 Sept.
Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Weedkiller applied to 2nd year only: 22 Sept, 1983. Magnesian limestone applied to 5th year only: 30 Sept. Corrective K applied to 4th year only: 4 Oct. PK applied: 15 Nov. NK applied to grass ley, K applied to clover/grass ley: 13 Mar, 1984, 20 June. Cut: 11 June, 10 Sept, and 13 Dec (except 3rd and 8th years ploughed before w. wheat).
S. barley, 1st and 2nd treatment crops: Ploughed: 30 Sept, 1983. Spring-tine cultivated, NPK applied, rotary harrowed, seed sown: 21 Mar, 1984. Weedkillers applied: 24 May. Fungicide applied: 15 June. Combine harvested: 15 Aug.
Fallow, 1st and 2nd treatment years: Ploughed: 30 Sept, 1983. Spring-tine cultivated: 21 Mar, 1984. Rotary cultivated: 28 June. Cultivated with thistlebar: 10 Aug.
S. beans, 3rd treatment crop: Ploughed: 30 Sept, 1983. Spring-tine cultivated, PK applied: 21 Mar, 1984. Seed sown: 23 Mar. Combine harvested: 24 Aug.

Test crops:
W. wheat, 1st test crop: Glyphosate applied to leys: 22 Sept, 1983. Ploughed: 30 Sept. Corrective K applied: 4 Oct. PK and aldicarb applied, spring-tine cultivated with crumbler attached, seed sown: 5 Oct. Chlortoluron applied: 6 Oct. N applied: 9 Apr, 1984. Combine harvested: 21 Aug.
S. barley, 2nd test crop: Magnesian limestone applied: 30 Sept, 1983. Ploughed: 3 Oct. Spring-tine cultivated, PK and aldicarb applied, seed sown: 21 Mar, 1984. N applied: 23 Mar. Weedkillers applied: 24 May. Fungicide applied: 15 June. Combine harvested: 15 Aug.



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/3

LEYS

1ST CUT (11/6/84, OR 24/7/84 FOR 1ST YEAR LEYS) DRY MATTER TONNES/HECTARE

| FYM RES LEY | NONE | FYM | MEAN |
|---|---|---|---|
| LC1 | 0.38 | 0.36 | 0.37 |
| LC2 | 4.36 | 5.30 | 4.83 |
| LC3 | 4.20 | 4.25 | 4.23 |
| LN1 | 0.66 | 0.89 | 0.78 |
| LN2 | 6.86 | 7.00 | 6.93 |
| LN3 | 3.68 | 4.43 | 4.06 |
| LLC1 | 0.64 | 0.79 | 0.72 |
| LLC2 | 4.63 | 5.14 | 4.88 |
| LLC3 | 4.33 | 4.28 | 4.30 |
| LLC4 | 4.96 | 4.75 | 4.85 |
| LLC5 | 7.10 | 7.05 | 7.08 |
| LLC6 | 5.59 | 5.84 | 5.71 |
| LLC7 | 5.39 | 4.91 | 5.15 |
| LLC8 | 3.96 | 3.39 | 3.67 |
| LLN1 | 0.64 | 0.92 | 0.78 |
| LLN2 | 7.10 | 7.53 | 7.31 |
| LLN3 | 4.81 | 5.27 | 5.04 |
| LLN4 | 5.12 | 4.81 | 4.97 |
| LLN5 | 5.35 | 5.16 | 5.26 |
| LLN6 | 5.97 | 5.93 | 5.95 |
| LLN7 | 6.35 | 6.68 | 6.52 |
| LLN8 | 4.72 | 5.62 | 5.17 |
| MEAN | 4.40 | 4.56 | 4.48 |

1ST CUT MEAN DM% 16.7



*https://doi.org/10.23637/ERADOC-1-32* *pp 16*

84/W/RN/3

LEYS

2ND CUT (10/9/84) DRY MATTER TONNES/HECTARE

| FYM RES LEY | NONE | FYM | MEAN |
|---|---|---|---|
| LC1 | 1.04 | 1.25 | 1.15 |
| LC2 | 0.54 | 0.71 | 0.62 |
| LC3 | 0.52 | 0.65 | 0.58 |
| LN1 | 0.85 | 0.87 | 0.86 |
| LN2 | 2.68 | 2.54 | 2.61 |
| LN3 | 1.31 | 0.85 | 1.08 |
| LLC1 | 1.91 | 1.77 | 1.84 |
| LLC2 | 1.04 | 1.02 | 1.03 |
| LLC3 | 0.56 | 0.55 | 0.55 |
| LLC4 | 0.74 | 1.14 | 0.94 |
| LLC5 | 1.68 | 1.97 | 1.82 |
| LLC6 | 1.87 | 1.85 | 1.86 |
| LLC7 | 0.78 | 0.78 | 0.78 |
| LLC8 | 0.20 | 0.27 | 0.24 |
| LLN1 | 0.64 | 1.17 | 0.90 |
| LLN2 | 2.27 | 2.16 | 2.21 |
| LLN3 | 1.08 | 1.86 | 1.47 |
| LLN4 | 1.24 | 1.15 | 1.19 |
| LLN5 | 2.51 | 2.56 | 2.54 |
| LLN6 | 3.31 | 3.16 | 3.23 |
| LLN7 | 1.97 | 2.02 | 1.99 |
| LLN8 | 0.82 | 1.24 | 1.03 |
| MEAN | 1.34 | 1.43 | 1.39 |

2ND CUT MEAN DM% 22.0



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/3

LEYS

3RD CUT (13/12/84) DRY MATTER TONNES/HECTARE

| FYM RES LEY | NONE | FYM | MEAN |
|---|---|---|---|
| LC1 | 0.20 | 0.32 | 0.26 |
| LC2 | 0.10 | 0.14 | 0.12 |
| LC3 | 0.00 | 0.00 | 0.00 |
| LN1 | 0.22 | 0.23 | 0.23 |
| LN2 | 0.29 | 0.17 | 0.23 |
| LN3 | 0.00 | 0.00 | 0.00 |
| LLC1 | 0.11 | 0.27 | 0.19 |
| LLC2 | 0.14 | 0.14 | 0.14 |
| LLC3 | 0.08 | 0.18 | 0.13 |
| LLC4 | 0.10 | 0.27 | 0.19 |
| LLC5 | 0.03 | 0.04 | 0.03 |
| LLC6 | 0.02 | 0.04 | 0.03 |
| LLC7 | 0.07 | 0.13 | 0.10 |
| LLC8 | 0.00 | 0.00 | 0.00 |
| LLN1 | 0.09 | 0.18 | 0.14 |
| LLN2 | 0.10 | 0.12 | 0.11 |
| LLN3 | 0.05 | 0.04 | 0.05 |
| LLN4 | 0.04 | 0.03 | 0.03 |
| LLN5 | 0.03 | 0.06 | 0.04 |
| LLN6 | 0.03 | 0.03 | 0.03 |
| LLN7 | 0.05 | 0.10 | 0.07 |
| LLN8 | 0.00 | 0.00 | 0.00 |
| MEAN | 0.10 | 0.14 | 0.12 |

3RD CUT MEAN DM% 13.6



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/3

LEYS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

| FYM RES LEY | NONE | FYM | MEAN |
|---|---|---|---|
| LC1 | 1.62 | 1.93 | 1.77 |
| LC2 | 5.00 | 6.15 | 5.57 |
| LC3 | 4.72 | 4.90 | 4.81 |
| LN1 | 1.73 | 1.99 | 1.86 |
| LN2 | 9.83 | 9.71 | 9.77 |
| LN3 | 4.99 | 5.28 | 5.14 |
| LLC1 | 2.65 | 2.83 | 2.74 |
| LLC2 | 5.80 | 6.30 | 6.05 |
| LLC3 | 4.97 | 5.01 | 4.99 |
| LLC4 | 5.80 | 6.15 | 5.98 |
| LLC5 | 8.81 | 9.06 | 8.93 |
| LLC6 | 7.48 | 7.73 | 7.60 |
| LLC7 | 6.24 | 5.82 | 6.03 |
| LLC8 | 4.16 | 3.66 | 3.91 |
| LLN1 | 1.37 | 2.27 | 1.82 |
| LLN2 | 9.47 | 9.80 | 9.64 |
| LLN3 | 5.93 | 7.17 | 6.55 |
| LLN4 | 6.40 | 5.98 | 6.19 |
| LLN5 | 7.89 | 7.78 | 7.84 |
| LLN6 | 9.31 | 9.12 | 9.21 |
| LLN7 | 8.37 | 8.80 | 8.58 |
| LLN8 | 5.53 | 6.86 | 6.19 |
| MEAN | 5.82 | 6.10 | 5.96 |

TOTAL OF 3 CUTS MEAN DM% 24.4

PLOT AREA HARVESTED 0.00183



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/3

BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

| FYMRES62 | NONE | FYM | MEAN |
|---|---|---|---|
| ROTATION | | | |
| LN 8 | 6.65 | 6.68 | 6.67 |
| LN 3 | 6.73 | 6.63 | 6.68 |
| LC 8 | 6.89 | 7.10 | 6.99 |
| LC 3 | 6.61 | 6.82 | 6.72 |
| AF | 5.81 | 6.19 | 6.00 |
| AB | 5.54 | 5.32 | 5.43 |
| MEAN | 6.37 | 6.46 | 6.41 |

| N | 0 | 60 | 120 | 180 | MEAN |
|---|---|---|---|---|---|
| ROTATION | | | | | |
| LN 8 | 6.17 | 7.22 | 6.74 | 6.54 | 6.67 |
| LN 3 | 5.25 | 6.94 | 7.60 | 6.92 | 6.68 |
| LC 8 | 6.28 | 7.56 | 6.83 | 7.30 | 6.99 |
| LC 3 | 5.47 | 7.33 | 7.72 | 6.35 | 6.72 |
| AF | 3.50 | 6.57 | 6.88 | 7.07 | 6.00 |
| AB | 3.62 | 5.27 | 6.58 | 6.23 | 5.43 |
| MEAN | 5.05 | 6.81 | 7.06 | 6.74 | 6.41 |

| N | 0 | 60 | 120 | 180 | MEAN |
|---|---|---|---|---|---|
| FYMRES62 | | | | | |
| NONE | 4.93 | 6.67 | 7.11 | 6.78 | 6.37 |
| FYM | 5.16 | 6.95 | 7.01 | 6.69 | 6.46 |
| MEAN | 5.05 | 6.81 | 7.06 | 6.74 | 6.41 |

| N | | 0 | 60 | 120 | 180 |
|---|---|---|---|---|---|
| ROTATION | FYMRES62 | | | | |
| LN 8 | NONE | 6.18 | 6.73 | 6.73 | 6.98 |
| | FYM | 6.17 | 7.70 | 6.76 | 6.09 |
| LN 3 | NONE | 5.15 | 7.05 | 7.59 | 7.14 |
| | FYM | 5.36 | 6.84 | 7.61 | 6.70 |
| LC 8 | NONE | 6.00 | 7.09 | 7.42 | 7.05 |
| | FYM | 6.55 | 8.03 | 6.24 | 7.56 |
| LC 3 | NONE | 5.18 | 7.18 | 7.70 | 6.40 |
| | FYM | 5.76 | 7.48 | 7.75 | 6.30 |
| AF | NONE | 3.38 | 6.55 | 6.30 | 7.02 |
| | FYM | 3.62 | 6.59 | 7.46 | 7.12 |
| AB | NONE | 3.71 | 5.46 | 6.91 | 6.07 |
| | FYM | 3.53 | 5.08 | 6.25 | 6.40 |

GRAIN MEAN DM% 84.4

PLOT AREA HARVESTED 0.00251



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/3

WINTER WHEAT

GRAIN TONNES/HECTARE

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

| FYMRES63 | NONE | FYM | MEAN |
|---|---|---|---|
| ROTATION | | | |
| LN 8 | 8.66 | 8.18 | 8.42 |
| LN 3 | 8.92 | 7.41 | 8.17 |
| LC 8 | 9.26 | 9.52 | 9.39 |
| LC 3 | 10.19 | 9.13 | 9.66 |
| AF | 8.35 | 7.50 | 7.92 |
| AB | 7.02 | 6.66 | 6.84 |
| MEAN | 8.73 | 8.07 | 8.40 |

| N | 0 | 70 | 140 | 210 | MEAN |
|---|---|---|---|---|---|
| ROTATION | | | | | |
| LN 8 | 5.46 | 8.68 | 9.20 | 10.33 | 8.42 |
| LN 3 | 4.92 | 7.66 | 9.75 | 10.35 | 8.17 |
| LC 8 | 7.51 | 9.66 | 11.04 | 9.36 | 9.39 |
| LC 3 | 7.18 | 11.06 | 10.52 | 9.88 | 9.66 |
| AF | 4.28 | 8.94 | 9.12 | 9.35 | 7.92 |
| AB | 3.66 | 6.56 | 7.74 | 9.41 | 6.84 |
| MEAN | 5.50 | 8.76 | 9.56 | 9.78 | 8.40 |

| N | 0 | 70 | 140 | 210 | MEAN |
|---|---|---|---|---|---|
| FYMRES63 | | | | | |
| NONE | 5.69 | 8.98 | 9.91 | 10.35 | 8.73 |
| FYM | 5.31 | 8.54 | 9.21 | 9.21 | 8.07 |
| MEAN | 5.50 | 8.76 | 9.56 | 9.78 | 8.40 |

| N | | 0 | 70 | 140 | 210 |
|---|---|---|---|---|---|
| ROTATION | FYMRES63 | | | | |
| LN 8 | NONE | 5.61 | 8.55 | 9.67 | 10.80 |
| | FYM | 5.32 | 8.81 | 8.72 | 9.87 |
| LN 3 | NONE | 5.16 | 7.56 | 11.10 | 11.87 |
| | FYM | 4.67 | 7.76 | 8.39 | 8.83 |
| LC 8 | NONE | 7.13 | 9.34 | 10.67 | 9.92 |
| | FYM | 7.89 | 9.97 | 11.41 | 8.81 |
| LC 3 | NONE | 8.37 | 11.87 | 10.28 | 10.22 |
| | FYM | 6.00 | 10.24 | 10.75 | 9.54 |
| AF | NONE | 4.02 | 10.14 | 9.58 | 9.67 |
| | FYM | 4.54 | 7.74 | 8.66 | 9.04 |
| AB | NONE | 3.85 | 6.41 | 8.18 | 9.63 |
| | FYM | 3.46 | 6.70 | 7.30 | 9.18 |

GRAIN MEAN DM% 89.1

PLOT AREA HARVESTED 0.00251



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4

MARKET GARDEN

Object: The experiment compared the effects of fertilizers and organic manures applied annually in the period 1942 to 1967. Residual effects of the organic manures were studied in arable crops from 1968 to 1973. From 1974 until 1982 the site was maintained in grass without yields. A new sequence of arable cropping started in 1983 to study further the residual effects of the organic manures, particularly the availability of metals from sewage sludge - Woburn Lansome I.

Sponsor: S.P. McGrath.

The 43rd year, red beet, carrots, clover.

For previous years see 'Details' 1967 & 1973, 74-80/W/RN/4 and 83/W/RN/4.

Design: 2 series each of 4 blocks of 10 plots. On one series the plots are split, systematically, for red beet and carrots.

Whole plot dimensions: 8.15 x 5.18.

Treatments:

To Series A, red beet and carrots, all combinations of:-

1. OM RESID — Residues of organic manures:

| | |
|---|---|
| FYM | Farmyard manure until 1967 |
| SEWAGE | Sewage sludge until 1962 |
| SEW COM | Sewage sludge, composted with straw, until 1962 |
| VEG COM | Vegetable compost until 1962, then farmyard manure until 1967 |

2. OM RATE — Rates of organic manures (t per crop):

25
50

EXTRA — plus one extra treatment (duplicated):

NONE — No organic manures

To Series B, white clover, all combinations of:-

1. OM RESID — Residues of organic manures:

| | |
|---|---|
| FYM | Farmyard manure to whole plot until 1964, to half plots until 1967. Untreated half plots received a balancing dressing in 1974 |
| SEWAGE | Sewage sludge until 1962 |
| SEW COM | Sewage sludge, composted with straw, until 1962 |
| VEG COM | Vegetable compost until 1962, then farmyard manure until 1965 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4

2. OM RATE — Rates of organic manures (t per crop):

25
50

EXTRA — plus one extra treatment (duplicated):

PEAT — Peat at 31 t per crop to half plots 1965 to 1967. Untreated half plots received a balancing dressing in 1974.

NOTE: On series A red beet in 1984 followed carrots in 1983 and vice versa.

Basal applications:
Series A: Red beet: Manures: (0:20:20) at 750 kg, N at 200 kg as 'Nitro-Chalk'. Insecticide: Demeton-S-methyl at 0.24 kg in 250 l.
Carrots: Manures: (0:20:20) at 750 kg, N at 70 kg as 'Nitro-Chalk'. Insecticides: Carbofuran (as 'Yaltox' granules at 94 kg). Demeton-S-methyl at 0.24 kg in 250 l.
Series B: Clover: Manures: (0:18:36) at 380 kg. Weedkiller: Paraquat at 0.4 kg ion in 250 l.

Seed: Red beet: Detroit Crimson Globe, sown by precision drill.
Carrots: Chantenay Red-cored Supreme, sown by precision drill.
Clover: Blanca white clover, sown at 8 kg and resown at 17 kg.

Cultivations, etc.:-
Series A: Red beet: Ploughed: 15 Feb, 1984. Spring-tine cultivated with crumbler attached, PK and N applied, power harrowed twice: 16 Apr. Seed sown: 18 Apr. Seed resown: 25 May. Hand hoed: 18-19 June. Insecticide applied: 27 June. Singled: 3-6 July. Hand hoed: 6 July. Hand harvested: 20 Aug.
Carrots: Ploughed: 15 Feb, 1984. Spring-tine cultivated with crumbler attached, PK and N applied: 16 Apr. Carbofuran applied, power harrowed twice, seed sown: 18 Apr. Seed resown: 25 May. Hand hoed: 21-22 June, 6-9 July. Demeton-S-methyl applied: 27 June. Hand harvested: 21 Aug.
Series B: Clover: PK applied: 19 Sept, 1983. Ploughed: 20 Sept. Spring-tine cultivated with crumbler attached, seed sown: 11 Oct. Weedkiller applied: 17 Apr, 1984. Power harrowed: 18 Apr. Seed resown: 19 Apr. Cut: 24 July, 1 Nov.

NOTES: (1) All crops failed at the first sowing and had to be resown.
(2) Crop samples were taken at maturity and soil samples after harvest for chemical analyses.
(3) One plot of Series B clover was contaminated with soil from adjacent plots with high metal content and it has been treated as missing, it had treatment combination VEG COM, 50. An estimated value was used in the analyses.



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4 RED BEET

ROOTS FRESH WEIGHT TONNES/HECTARE

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

| OM RESID / OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 23.2 | 23.7 | 25.8 | 20.4 | 23.3 |
| 50 | 28.0 | 19.4 | 21.8 | 25.7 | 23.7 |
| MEAN | 25.6 | 21.5 | 23.8 | 23.1 | 23.5 |

NONE 21.9

GRAND MEAN 23.2

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

| TABLE | OM RESID | OM RATE | OM RESID OM RATE |
|---|---|---|---|
| SED | 2.24 | 1.59 | 3.17 |

SED FOR COMPARING NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 2.75

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 28 | 4.48 | 19.4 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4 RED BEET

TOPS FRESH WEIGHT TONNES/HECTARE

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

| OM RESID<br>OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 12.7 | 11.1 | 11.6 | 11.1 | 11.6 |
| 50 | 12.5 | 10.2 | 9.2 | 12.4 | 11.1 |
| MEAN | 12.6 | 10.7 | 10.4 | 11.7 | 11.3 |

NONE 11.4

GRAND MEAN 11.4

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

| TABLE | OM RESID | OM RATE | OM RESID<br>OM RATE |
|---|---|---|---|
| SED | 0.77 | 0.54 | 1.09 |

SED FOR COMPARING NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.94

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 28 | 1.54 | 13.6 |

PLOT AREA HARVESTED 0.00022



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4 CARROTS

ROOTS FRESH WEIGHT TONNES/HECTARE

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

| OM RESID<br>OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 28.5 | 26.2 | 26.0 | 29.8 | 27.6 |
| 50 | 33.7 | 23.5 | 31.6 | 36.0 | 31.2 |
| MEAN | 31.1 | 24.8 | 28.8 | 32.9 | 29.4 |

NONE 34.2

GRAND MEAN 30.4

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

| TABLE | OM RESID | OM RATE | OM RESID<br>OM RATE |
|---|---|---|---|
| SED | 2.47 | 1.75 | 3.50 |

SED FOR COMPARING NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 3.03

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 28 | 4.95 | 16.3 |



*https://doi.org/10.23637/ERADOC-1-32* *pp 26*

84/W/RN/4 CARROTS

TOPS FRESH WEIGHT TONNES/HECTARE

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

| OM RESID<br>OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 11.6 | 10.6 | 10.8 | 11.6 | 11.2 |
| 50 | 12.1 | 8.6 | 11.8 | 12.9 | 11.3 |
| MEAN | 11.8 | 9.6 | 11.3 | 12.2 | 11.2 |

NONE 13.0

GRAND MEAN 11.6

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

| TABLE | OM RESID | OM RATE | OM RESID<br>OM RATE |
|---|---|---|---|
| SED | 1.05 | 0.74 | 1.49 |

SED FOR COMPARING NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 1.29

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 28 | 2.10 | 18.1 |

PLOT AREA HARVESTED 0.00022



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4 WHITE CLOVER

1ST CUT (24/7/84) DRY MATTER TONNES/HECTARE

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

| OM RESID<br>OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 0.69 | 0.43 | 0.35 | 0.88 | 0.59 |
| 50 | 1.19 | 0.21 | 0.38 | 0.71 | 0.62 |
| MEAN | 0.94 | 0.32 | 0.37 | 0.80 | 0.61 |

PEAT 0.50

GRAND MEAN 0.58

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

| TABLE | OM RESID | OM RATE | OM RESID<br>OM RATE |
|---|---|---|---|
| SED | 0.113 | 0.080 | 0.160 |

SED FOR COMPARING PEAT WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.139

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 27 | 0.227 | 38.8 |

1ST CUT MEAN DM% 27.4



*https://doi.org/10.23637/ERADOC-1-32* *pp 28*

84/W/RN/4 WHITE CLOVER

2ND CUT (1/11/84) DRY MATTER TONNES/HECTARE

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

| OM RESID / OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 1.60 | 1.28 | 1.29 | 1.46 | 1.41 |
| 50 | 1.52 | 1.36 | 1.42 | 1.56 | 1.47 |
| MEAN | 1.56 | 1.32 | 1.35 | 1.51 | 1.44 |

PEAT 1.44

GRAND MEAN 1.44

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

| TABLE | OM RESID | OM RATE | OM RESID OM RATE |
|---|---|---|---|
| SED | 0.063 | 0.045 | 0.089 |

SED FOR COMPARING PEAT WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.077

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 27 | 0.126 | 8.8 |

2ND CUT MEAN DM% 13.0



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/4 WHITE CLOVER

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

| OM RESID / OM RATE | FYM | SEWAGE | SEW COM | VEG COM | MEAN |
|---|---|---|---|---|---|
| 25 | 2.28 | 1.71 | 1.64 | 2.34 | 2.00 |
| 50 | 2.71 | 1.58 | 1.80 | 2.28 | 2.09 |
| MEAN | 2.50 | 1.65 | 1.72 | 2.31 | 2.04 |

PEAT 1.94

GRAND MEAN 2.02

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

| TABLE | OM RESID | OM RATE | OM RESID OM RATE |
|---|---|---|---|
| SED | 0.126 | 0.089 | 0.178 |

SED FOR COMPARING PEAT WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.155

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 27 | 0.252 | 12.5 |

TOTAL OF 2 CUTS MEAN DM% 20.3

PLOT AREA HARVESTED 0.00075



*https://doi.org/10.23637/ERADOC-1-32* *pp 30*

84/R/RN/5

## ARABLE REFERENCE PLOTS

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

Sponsor: F.V. Widdowson.

The 29th year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980, w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 24th year of a rotation on the additional plots (as the initial above rotation for 20 years; w. barley, ley, potatoes, w. wheat, w. oats since 1980). The 28th 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 69-83/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: Fertilizers and farmyard manure:

MANURE

Original plots

0
N1
P
N1P
K
N1K
PK
N1PK
N2PK
D
N1PKD
N2PKD

N1,2 (kg N): 20, 40 (ley): 100, 200 (w. wheat, w. barley and w. oats): 125, 250 (potatoes, 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): 100 tonnes (to potatoes only - 50 tonnes to potatoes and kale until 1980): none to other crops

NOTES: (1) All w. wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts.
(2) Cereals receive 20 kg of N1 and 40 kg of N2 in March, remainder in April.



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/5

Additional plots

| MANURE | Fertilizers from 1980 to 1984 and in previous years: |
|---|---|
| 1980-84 | Until 1979 |
| 0 | 0 |
| N2PK | N2 PK |
| N2PKMG | N2 PK MG CA |
| N2PKS | N2 PK CA S |
| N2PKMGS | N2 PK MG S |
| N1PKMGS | N2 PK CA MG S |
| N3PKMGS | N2 PK CA MG S TE |

N: In 1984: N1: 20 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 200 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). Until 1979 N2 = larger rate on original plots in these years. As urea in all years. Cereals receive 40 kg N in March, remainder in April.
P: 126 kg $P_2O_5$ as potassium dihydrogen phosphate.
K: 251 kg $K_2O$ total. As potassium dihydrogen phosphate (83 kg $K_2O$) on all PK plots. In addition plots without S receive 168 kg $K_2O$ as potassium chloride, plots with S receive 92 kg $K_2O$ as potassium sulphate plus 76 kg $K_2O$ as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg $K_2O$ for potatoes, applied in autumn as potassium chloride.
MG: 126 kg MgO as magnesium chloride.
CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given CA received calcium carbonate at 7.5 t, except 0 which was given 5 t.
S: 30 kg S supplied by the potassium sulphate.
TE: Trace element mixture which included Mn, Cu, Zn, B, Mo, Ca and Fe.

Standard applications:
Original and additional plots:

All cereals: Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with (except for oats) chlortoluron at 3.5 kg, applied with the permethrin in 220 l. Fungicides: Prochloraz at 0.40 kg with tridemorph at 0.52 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg with captafol at 1.1 kg applied with the pirimicarb in 220 l. Insecticides: Permethrin at 0.05 kg; pirimicarb at 0.14 kg.

W. wheat and w. oats: Fungicides: Propiconazole at 0.13 kg and captafol at 1.1 kg in 220 l. Growth regulator: Chlormequat at 1.9 kg in 220 l.

W. barley: Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg in 220 l. Growth regulator: Mepiquat chloride and ethephon (as 'Terpal' at 2.8 l) in 220 l.

Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat: Norman, sown at 210 kg.
W. barley: Panda, sown at 200 kg.
W. oats: Peniarth, sown at 210 kg.
Potatoes: Desiree.
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.



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Cultivations, etc.:-

W. wheat: Dug by hand: 19 Sept, 1983 (original plots), 20 Sept (additional plots). P, K and Mg applied to original plots; P, K, Mg and S applied to additional plots: 22 Sept. All plots lightly rotary cultivated, raked level, seed sown and raked in: 23 Sept. 'Brittox', chlortoluron and permethrin applied: 25 Oct. First N applied, prochloraz and tridemorph applied: 1 Mar, 1984. Second N applied: 9 Apr. Chlormequat applied: 25 Apr. Propiconazole and captafol applied: 24 May. Carbendazim, maneb, tridemorph, captafol and pirimicarb applied: 27 June. Harvested by hand: 7 Aug.

W. barley: Rotary cultivated, Mg applied to additional plots: 5 Sept, 1983. P and K applied to original plots; P, K and S to additional plots: 7 Sept. Lightly rotary cultivated, raked level, seed sown, raked in: 20 Sept. 'Brittox', chlortoluron and permethrin applied: 25 Oct. First N applied, prochloraz and tridemorph applied: 1 Mar, 1984. Second N applied: 2 Apr. Growth regulator applied: 25 Apr. Carbendazim, maneb and tridemorph applied: 9 May. Carbendazim, maneb, tridemorph, captafol and pirimicarb applied: 27 June. Harvested by hand: 23 July.

W. oats: Rotary cultivated, Mg applied to additional plots: 5 Sept, 1983. P and K applied to original plots; P, K and S to additional plots: 7 Sept. Lightly rotary cultivated, raked level, seed sown, raked in: 26 Sept. 'Brittox' and permethrin applied: 25 Oct. First N, prochloraz and tridemorph applied: 1 Mar, 1984. Second N applied: 9 Apr. Growth regulator applied: 25 Apr. Propiconazole and captafol applied: 24 May. Carbendazim, maneb, tridemorph, captafol and pirimicarb applied: 27 June. Harvested by hand: 6 Aug.

Potatoes: FYM applied to original plots: 7 Dec, 1983. Dug by hand: 9 Dec. P and K applied to original plots; P, K, Mg and S to additional plots: 19 Dec. N applied, deep rotary cultivated twice, potatoes planted and ridged by hand: 24 Apr, 1984. Weedkillers applied: 9 May. Fungicide and insecticide applied: 2 July. Plots given neither FYM nor K harvested by hand: 24 July. Remaining plots harvested by hand: 12 Sept.

Grass-clover ley: Lightly rotary cultivated, raked level, seed sown and raked in: 22 Aug, 1983. P and K applied to original plots; P, K, Mg and S applied to additional plots: 21 Nov. N applied: 1 Mar, 1984. Cut: 30 May, 19 July, 2 Oct.

Permanent grass: P and K applied: 21 Nov, 1983. FYM and first N applied: 1 Mar, 1984. Second N applied: 24 May. Final N applied: 19 July. Cut: 30 May, 19 July, 2 Oct.



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84/R/RN/5

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

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

| | WINTER WHEAT: | | BARLEY: | | LEY : DRY MATTER 1ST CUT | 2ND CUT | 3RD CUT | TOTAL OF 3 CUTS |
|---|---|---|---|---|---|---|---|---|
| | GRAIN | STRAW | GRAIN | STRAW | | | | |
| MANURE | | | | | | | | |
| 0 | 5.81 | 5.50 | 2.35 | 2.07 | 3.18 | 1.18 | 0.77 | 5.13 |
| N1 | 6.49 | 5.59 | 2.88 | 2.78 | 3.94 | 1.62 | 0.81 | 6.37 |
| P | 4.98 | 4.85 | 3.34 | 2.44 | 2.80 | 1.22 | 0.35 | 4.37 |
| N1P | 3.25 | 4.77 | 1.68 | 3.39 | 3.83 | 1.53 | 0.45 | 5.82 |
| K | 5.44 | 7.32 | 3.27 | 2.88 | 2.49 | 1.54 | 0.92 | 4.95 |
| N1K | 6.91 | 7.82 | 5.13 | 5.12 | 3.39 | 1.77 | 0.90 | 6.05 |
| PK | 6.82 | 7.33 | 3.32 | 2.58 | 3.49 | 2.07 | 3.15 | 8.71 |
| N1PK | 11.03 | 11.22 | 6.96 | 6.29 | 5.62 | 2.25 | 1.52 | 9.39 |
| N2PK | 12.11 | 13.31 | 9.08 | 7.69 | 6.85 | 2.33 | 0.98 | 10.15 |
| D | 8.71 | 10.50 | 4.75 | 3.99 | 4.83 | 2.12 | 1.34 | 8.28 |
| N1PKD | 12.24 | 15.53 | 8.30 | 6.95 | 6.11 | 2.85 | 2.50 | 11.46 |
| N2PKD | 10.83 | 13.95 | 9.47 | 8.57 | 7.37 | 2.90 | 0.84 | 11.11 |
| MEAN DM% | 76.6 | 59.0 | 85.8 | 66.2 | 27.0 | 31.7 | 21.4 | 26.7 |

| | OATS: | | POTATOES: TOTAL TUBERS | PERMANENT GRASS : DRY MATTER 1ST CUT | 2ND CUT | 3RD CUT | TOTAL OF 3 CUTS |
|---|---|---|---|---|---|---|---|
| | GRAIN | STRAW | | | | | |
| MANURE | | | | | | | |
| 0 | 3.79 | 3.39 | 8.8 | 0.61 | 0.68 | 0.18 | 1.46 |
| N1 | 6.99 | 6.61 | 11.0 | 0.94 | 1.47 | 0.68 | 3.08 |
| P | 4.47 | 3.79 | 15.4 | 0.53 | 0.89 | 0.23 | 1.65 |
| N1P | 5.57 | 5.68 | 10.6 | 1.68 | 1.87 | 0.70 | 4.25 |
| K | 3.74 | 3.90 | 22.1 | 1.06 | 1.02 | 0.34 | 2.42 |
| N1K | 7.54 | 8.99 | 25.8 | 1.81 | 2.36 | 0.99 | 5.17 |
| PK | 3.84 | 3.55 | 26.5 | 0.63 | 0.83 | 0.29 | 1.75 |
| N1PK | 8.74 | 9.07 | 43.8 | 2.34 | 2.76 | 0.94 | 6.03 |
| N2PK | 8.22 | 11.10 | 49.6 | 3.85 | 3.56 | 1.78 | 9.19 |
| D | 6.02 | 6.10 | 40.8 | 3.68 | 2.06 | 0.61 | 6.36 |
| N1PKD | 9.71 | 11.60 | 59.8 | 4.84 | 3.17 | 1.23 | 9.24 |
| N2PKD | 9.03 | 13.34 | 60.5 | 5.87 | 4.40 | 1.95 | 12.22 |
| MEAN DM% | 83.0 | 43.7 | 24.2 | 27.4 | 32.7 | 26.6 | 28.9 |



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84/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

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

| | WINTER WHEAT: GRAIN | WINTER WHEAT: STRAW | BARLEY: GRAIN | BARLEY: STRAW | OATS: GRAIN | OATS: STRAW | POTATOES: TOTAL TUBERS |
|---|---|---|---|---|---|---|---|
| MANURES | | | | | | | |
| 0 | 6.91 | 6.63 | 2.87 | 2.33 | 4.28 | 3.67 | 9.4 |
| N2PK | 11.06 | 13.90 | 9.70 | 7.62 | 9.02 | 10.66 | 48.8 |
| N2PKMG | 12.48 | 14.46 | 8.57 | 7.39 | 9.20 | 11.14 | 53.8 |
| N2PKS | 11.42 | 14.31 | 8.24 | 7.17 | 9.31 | 12.28 | 51.9 |
| N2PKMGS | 11.47 | 12.18 | 8.58 | 8.35 | 9.53 | 12.25 | 50.4 |
| N1PKMGS | 11.80 | 12.67 | 7.40 | 6.25 | 9.22 | 9.52 | 50.0 |
| N3PKMGS | 11.33 | 15.65 | 9.26 | 7.69 | 8.90 | 12.33 | 55.4 |
| MEAN DM% | 77.1 | 58.4 | 85.2 | 65.5 | 83.4 | 49.8 | 24.4 |

| | LEY : DRY MATTER 1ST CUT | 2ND CUT | 3RD CUT | TOTAL OF 3 CUTS |
|---|---|---|---|---|
| MANURES | | | | |
| 0 | 3.89 | 1.41 | 0.58 | 5.88 |
| N2PK | 5.55 | 2.21 | 0.67 | 8.44 |
| N2PKMG | 6.34 | 2.23 | 0.91 | 9.48 |
| N2PKS | 6.25 | 2.19 | 1.30 | 9.74 |
| N2PKMGS | 6.44 | 2.38 | 0.88 | 9.70 |
| N1PKMGS | 5.79 | 2.15 | 1.09 | 9.04 |
| N3PKMGS | 6.94 | 2.24 | 0.60 | 9.78 |
| MEAN DM% | 26.1 | 32.1 | 21.5 | 26.6 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/8

CULTIVATION/WEEDKILLER

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

Sponsors: R. Moffitt, J.A. Currie.

The 24th year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-83/R/RN/8.

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

Whole plot dimensions: 12.8 x 12.2.

Treatments: All combinations of:-

Whole plots

| | | |
|---|---|---|
| 1. CULTIVTN | | Primary cultivations annually: |
| | PLOUGH | Ploughed: 13 Sept, 1983 |
| | ROTA DIG | Cultivated by rotary digger: 14 Sept |
| | DEEPTINE | Deep-tine cultivated: 5 Sept |
| 2. SUBSOIL(82) | | Subsoiling in September 1982: |
| | NONE | None |
| | CNVNTIAL | Conventional vertical tine |
| | PARAPLOW | 'Paraplow' |

Sub plots

| | | |
|---|---|---|
| 3. WEEDKLLR(75) | | Hormone weedkiller to cereals in the previous rotation, last applied to s. barley 1975 (basal hormone weedkiller to s. wheat 1977, s. barley 1978 to 1980 and w. barley 1981 to 1984): |
| | NONE | |
| | HORMONE | |
| 4. WEEDKLLR(80) | | Paraquat weedkiller to preceding cereal stubbles last applied for w. barley in autumn 1980: |
| | NONE | |
| | PARAQUAT | |

NOTE: The combinations of 3 and 4 are tested on half plots: WEEDKLLR(75) NONE, WEEDKLLR(80) NONE and WEEDKLLR(75) HORMONE, WEEDKLLR(80) PARAQUAT on one block, remaining combinations on the other.



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| | |
|---|---|
| EXTRA (DD) | plus three extra whole plot treatments all with sub plot test 3 above; all given paraquat to preceding cereal stubble, direct drilled 1981, 1982, 1983 and 1984 but differing in subsoiling in September 1982: |
| NONE | None |
| CNVNTIAL | Conventional vertical tine |
| PARAPLOW | 'Paraplow' |

NOTES: (1) The conventional vertical tine sub soiler had tines 76 cm apart and worked at a depth of about 50 cm.
(2) The 'Paraplow' had rigid tines set at a 45° angle. The tip of each tine was in line with the attachment of an adjacent tine. The tines were 51 cm apart and worked at a depth of about 38 cm.

Basal applications: Manures: (5:14:30) at 340 kg. 'Nitro-Chalk' at 630 kg. Weedkillers: Paraquat at 0.6 kg ion in 250 l. Methabenzthiazuron at 2.4 kg in 250 l. Mecoprop at 2.0 l and cyanazine at 0.30 l in 250 l applied with the fungicides. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg.

Seed: Igri, sown at 160 kg.

Cultivations, etc.:- Disced direct drilled plots: 15 Sept, 1983. NPK applied: 28 Sept. Paraquat applied: 29 Sept. Seed sown: 30 Sept. Methabenzthiazuron applied: 1 Oct. N applied: 22 Mar, 1984. Mecoprop and cyanazine applied with the fungicides: 12 Apr. Combine harvested: 25 July.

GRAIN TONNES/HECTARE

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

| SUBSOIL(82) CULTIVTN | NONE | CNVNTIAL | PARAPLOW | MEAN |
|---|---|---|---|---|
| PLOUGH | 8.91 | 8.18 | 8.28 | 8.46 |
| ROTA DIG | 8.61 | 8.62 | 8.77 | 8.67 |
| DEEPTINE | 8.99 | 8.68 | 8.77 | 8.81 |
| MEAN | 8.84 | 8.49 | 8.61 | 8.64 |

| WEEDKLLR(75) CULTIVTN | NONE | HORMONE | MEAN |
|---|---|---|---|
| PLOUGH | 8.50 | 8.41 | 8.46 |
| ROTA DIG | 8.72 | 8.62 | 8.67 |
| DEEPTINE | 8.88 | 8.74 | 8.81 |
| MEAN | 8.70 | 8.59 | 8.64 |

| WEEDKLLR(75) SUBSOIL(82) | NONE | HORMONE | MEAN |
|---|---|---|---|
| NONE | 9.10 | 8.57 | 8.84 |
| CNVNTIAL | 8.59 | 8.39 | 8.49 |
| PARAPLOW | 8.41 | 8.81 | 8.61 |
| MEAN | 8.70 | 8.59 | 8.64 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/8

GRAIN TONNES/HECTARE

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

| WEEDKLLR(80) | NONE | PARAQUAT | MEAN |
|---|---|---|---|
| CULTIVTN | | | |
| PLOUGH | 8.50 | 8.42 | 8.46 |
| ROTA DIG | 8.54 | 8.80 | 8.67 |
| DEEPTINE | 8.75 | 8.88 | 8.81 |
| MEAN | 8.59 | 8.70 | 8.64 |

| WEEDKLLR(80) | NONE | PARAQUAT | MEAN |
|---|---|---|---|
| SUBSOIL(82) | | | |
| NONE | 8.52 | 9.15 | 8.84 |
| CNVNTIAL | 8.62 | 8.36 | 8.49 |
| PARAPLOW | 8.64 | 8.57 | 8.61 |
| MEAN | 8.59 | 8.70 | 8.64 |

| WEEDKLLR(80) | NONE | PARAQUAT | MEAN |
|---|---|---|---|
| WEEDKLLR(75) | | | |
| NONE | 8.67 | 8.73 | 8.70 |
| HORMONE | 8.52 | 8.66 | 8.59 |
| MEAN | 8.59 | 8.70 | 8.64 |

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

| TABLE | CULTIVTN | SUBSOIL(82) | WEEDKLLR(75) | WEEDKLLR(80) |
|---|---|---|---|---|
| SED | 0.185 | 0.185 | 0.128 | 0.128 |

| TABLE | CULTIVTN SUBSOIL(82) | CULTIVTN WEEDKLLR(75) | SUBSOIL(82) WEEDKLLR(75) | CULTIVTN WEEDKLLR(80) |
|---|---|---|---|---|
| SED | 0.321 | 0.243 | 0.243 | 0.243 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | | | | |
| CULTIVTN | | 0.222 | | 0.222 |
| SUBSOIL(82) | | | 0.222 | |

| TABLE | SUBSOIL(82) WEEDKLLR(80) |
|---|---|
| SED | 0.243 |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: | |
| SUBSOIL(82) | 0.222 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 8 | 0.321 | 3.7 |
| BLOCK.WP.SP | 8 | 0.385 | 4.5 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/8

GRAIN TONNES/HECTARE

EXTRA PLOTS

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

| WEEDKLLR(75) EXTRA DD | NONE | HORMONE | MEAN |
|---|---|---|---|
| NONE | 8.42 | 8.58 | 8.50 |
| CNVNTIAL | 9.23 | 8.50 | 8.86 |
| PARAPLOW | 8.95 | 8.35 | 8.65 |
| MEAN | 8.87 | 8.47 | 8.67 |

GRAIN MEAN DM% 85.3

SUB PLOT AREA HARVESTED 0.00347



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/12

## ORGANIC MANURING

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

Sponsor: A.E. Johnston.

The 20th year, sugar beet, w. oats, ley.

For previous years see 'Details' 1973 and 74-83/W/RN/12.

Design for sugar beet and w. oats: 2 blocks of 4 plots
3rd, 4th, 5th and 6th year leys: 2 blocks of 2 plots.

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. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. In addition to leys the first pair included w. oats in 1984 and the second pair sugar beet.

Sugar beet and w. oats tested:

| | |
|---|---|
| MANURE | Organic manures and fertilizers in 1984, cumulative to 1983 and 1982 (both crops) and to 1981 (w. oats only) and to those applied in the preliminary period: |
| FYM | Farmyard manure at 50 tonnes |
| STRAW | Straw at 7.5 tonnes plus $P_2O_5$ at 140 kg, $K_2O$ at 140 kg, MgO at 50 kg |
| FERT-FYM | $P_2O_5$ at 280 kg, $K_2O$ at 560 kg, MgO at 100 kg |
| FERT-STR | $P_2O_5$ at 140 kg, $K_2O$ at 280 kg, MgO at 50 kg |

All leys are clover/grass (LC) without N. 3rd and 4th year leys tested:

| | |
|---|---|
| PREV LEY | Previous ley: |
| LC(LC) | Clover/grass ley in preliminary period |
| LC(LN) | Grass ley with N in preliminary period |

5th and 6th year leys tested:

| | |
|---|---|
| PREV MAN | Previous manure: |
| LC(GM) | Green manures in preliminary period |
| LC(PT) | Peat in preliminary period |



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Standard applications:
W. oats: Manures: N at 90 kg as 'Nitro-Chalk'. Weedkiller: Methabenzthiazuron at 2.4 kg in 250 l.
Sugar beet: Manures: Ground chalk at 5.0 t, N at 150 kg as 'Nitro-Chalk'. Insecticide: Demeton-S-methyl at 0.24 kg in 250 l.
Leys, 3rd, 4th, 5th and 6th years: Manures: $P_2O_5$ at 140 kg, $K_2O$ at 280 kg as (0:18:36), MgO at 50 kg as kieserite.

Seed: W. oats: Panema, sown at 200 kg.
Sugar beet: Monoire, sown by precision drill.

Cultivations, etc.:-
W. oats: Half PK and Mg applied to FERT-FYM plots, treatment FYM and straw applied, sugar beet tops spread over arable plots, ploughed: 19 Oct, 1983. Half PK and Mg applied to FERT-FYM, all PK and Mg applied to FERT-STR and STRAW plots only, spring-tine cultivated with crumbler attached, seed sown: 20 Oct. Weedkiller applied: 21 Oct. N applied: 3 Apr, 1984. Combine harvested: 3 Aug.
Sugar beet: Ground chalk applied: 30 Sept, 1983. Half PK and Mg applied to FERT-FYM plots, treatment FYM and straw applied: 20 Oct. Ploughed: 21 Oct. PK applied to STRAW plots: 11 Nov. Half PK and Mg applied to FERT-FYM plots, all PK and Mg applied to FERT-STR plots and all Mg applied to STRAW plots: 15 Nov. Heavy spring-tine cultivated: 14 Dec. N applied and spring-tine cultivated: 3 Apr, 1984. Spring-tine cultivated with crumbler attached, seed sown: 4 Apr. Singled: 16-18 May. Tractor hoed: 31 May, 11 June. Hand hoed: 11-12 June, 29 June-4 July. Insecticide applied: 29 June. Lifted: 26 Oct.
3rd, 4th, 5th and 6th year leys: PK and Mg applied to 4th and 6th years: 20 Oct, 1983. 3rd and 5th years: 15 Nov. Cut: 12 June, 1984, 10 Sept.



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84/W/RN/12

SUGAR BEET

CLEAN BEET TONNES/HECTARE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 51.8 | 48.0 | 37.6 | 45.5 | 45.7 |

SUGAR PERCENTAGE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 18.2 | 18.3 | 17.9 | 18.2 | 18.2 |

TOTAL SUGAR TONNES/HECTARE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 9.44 | 8.77 | 6.83 | 8.32 | 8.34 |

TOPS TONNES/HECTARE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 24.1 | 18.7 | 19.2 | 19.7 | 20.4 |

PLOT AREA HARVESTED 0.00098



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/12

W.OATS

GRAIN TONNES/HECTARE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 5.10 | 5.14 | 4.94 | 4.44 | 4.90 |

GRAIN MEAN DM% 87.0

STRAW TONNES/HECTARE

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

| MANURE | FYM | STRAW | FERT-FYM | FERT-STR | MEAN |
|---|---|---|---|---|---|
| | 5.19 | 4.90 | 4.06 | 3.70 | 4.46 |

STRAW MEAN DM% 84.3

PLOT AREA HARVESTED 0.00796

3RD YEAR LEY

DRY MATTER TONNES/HECTARE

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

| | 1ST CUT (12/6/84) | 2ND CUT (10/9/84) | TOTAL OF 2 CUTS |
|---|---|---|---|
| PREV LEY | | | |
| LC(LC) | 3.54 | 0.41 | 3.95 |
| LC(LN) | 3.88 | 0.59 | 4.47 |
| MEAN | 3.71 | 0.50 | 4.21 |
| MEAN DM% | 24.4 | 31.9 | 28.2 |

4TH YEAR LEY

DRY MATTER TONNES/HECTARE

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

| | 1ST CUT (12/6/84) | 2ND CUT (10/9/84) | TOTAL OF 2 CUTS |
|---|---|---|---|
| PREV LEY | | | |
| LC(LC) | 4.28 | 0.97 | 5.25 |
| LC(LN) | 4.46 | 0.76 | 5.22 |
| MEAN | 4.37 | 0.86 | 5.24 |
| MEAN DM% | 19.8 | 31.6 | 25.7 |



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84/W/RN/12

5TH YEAR LEY

DRY MATTER TONNES/HECTARE

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

| | 1ST CUT (12/6/84) | 2ND CUT (10/9/84) | TOTAL OF 2 CUTS |
|---|---|---|---|
| PREV MAN | | | |
| LC(GM) | 2.59 | 0.69 | 3.28 |
| LC(PT) | 3.32 | 0.62 | 3.94 |
| MEAN | 2.96 | 0.65 | 3.61 |
| MEAN DM% | 21.6 | 32.5 | 27.1 |

6TH YEAR LEY

DRY MATTER TONNES/HECTARE

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

| | 1ST CUT (12/6/84) | 2ND CUT (10/9/84) | TOTAL OF 2 CUTS |
|---|---|---|---|
| PREV MAN | | | |
| LC(GM) | 4.52 | 0.77 | 5.30 |
| LC(PT) | 3.50 | 0.42 | 3.92 |
| MEAN | 4.01 | 0.60 | 4.61 |
| MEAN DM% | 20.2 | 35.9 | 28.1 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/13

## INTENSIVE CEREALS

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

Sponsors: A.E. Johnston, J. McEwen.

The 19th year, w. wheat, ley.

For previous years see 'Details' 1973 and 74-83/W/RN/13.

Treatments:-

Until 1977 the experiment tested all phases of the five-course rotation ley, potatoes, cereal, cereal, cereal and continuous cereal. From 1977 to 1980 all phases were cropped with cereal. The experiment was in two halves, one in which the cereal was w. wheat, sown on part of the site of the classical wheat experiment 1877-1954 and one in which the cereal was s. barley, sown on part of the site of the classical barley experiment 1877-1954. From 1981 the experiment is being used to establish leys of different durations for test on w. wheat in 1987. Plots not in ley are sown to w. wheat on both halves of the experiment.

The following crop sequences are being followed:

| 1981 | 82 | 83 | 84 | 85 | 86 | 87 |
|---|---|---|---|---|---|---|
| W(5) | W | W | W | W | L | W |
| W(5) | W | W | W | L | L | W |
| W(6) | W | W | L | L | L | W |
| W(7) | W | L | L | L | L | W |
| W(8) | L | L | L | L | L | W |
| L | L | L | L | L | L | W |

L = clover/grass ley W = w. wheat (5)etc = number of years continuous cereal

NOTE: Yields are not taken in the period 1981-86.

Standard applications:
W. wheat: Manures: (5:14:30) at 340 kg, N at 140 kg as 'Nitro-Chalk'.
Weedkiller: Chlortoluron at 3.5 kg in 250 l.
Ley, 1st year: Manures: (5:14:30) at 340 kg, N at 50 kg as 'Nitro-Chalk'.
Ley, 2nd, 3rd and 4th years: Manures: (0:18:36) at 380 kg.

Seed: W. wheat: Avalon, sown at 200 kg.
Ley: S 23 perennial ryegrass at 27 kg, Blanca white clover at 7 kg, mixture sown at 34 kg.



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Cultivations, etc.:-

W. wheat: Ploughed: 13 Sept, 1983. NPK applied, rotary cultivated, seed sown: 28 Sept. Weedkiller applied: 29 Sept. N applied: 4 Apr, 1984. Combine harvested: 21 Aug.

Ley, 1st year: Ploughed: 13 Sept, 1983. NPK applied, rotary cultivated: 28 Sept. Seeds sown: 29 Sept. N applied: 27 Mar, 1984. Cut: 17 June, 11 Sept.

Ley, 2nd, 3rd and 4th years: PK applied: 31 Jan, 1984. Cut: 17 June, 11 Sept.



*https://doi.org/10.23637/ERADOC-1-32* 

84/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 and nutrient uptakes of s. barley - Woburn Butt Furlong.

Sponsors: J. McEwen, A.E. Johnston.

The tenth year, s. barley and s. oats.

For previous years see 74-83/W/RN/16.

Design: 4 series (for crops) each of 3 randomised blocks of 4 plots.

Whole plot dimensions: 4.27 x 2.59.

Treatments:

| PK SUB | Extra PK and subsoil treatment (applied autumn 1973): | |
|---|---|---|
| | Extra PK | Subsoil (25-50 cm) treatment |
| - - - | None | None |
| - - S | None | Subsoiled |
| P K T | To topsoil (0-25 cm) | None |
| P K S | 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.
(4) One series was fallow in 1984.

Basal applications:
All series: Weedkiller: Glyphosate at 1.4 kg in 250 l.
Series II and IV: S. barley: Manures: (20:10:10) at 750 kg.
Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Fungicide: Tridemorph at 0.52 kg in 250 l.
Series III: S. oats: Manures: (20:10:10) at 750 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l.

Seed: S. barley: Triumph, dressed with triadimenol and fuberidazole, sown at 160 kg.
S. oats: Trafalgar, sown at 200 kg.

Cultivations, etc.:-
Series I: Fallow: Glyphosate applied: 7 Sept, 1983. Ploughed: 20 Oct. Spring-tine cultivated: 14 Mar, 1984. Spring-tine cultivated with crumbler attached: 16 Mar, 16 May. Rotary cultivated: 25 July.
Series II and IV: S. barley: Glyphosate applied: 7 Sept, 1983. Ploughed: 20 Oct. NPK applied: 14 Mar, 1984. Spring-tine cultivated, spring-tine cultivated with crumbler attached, seed



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sown: 16 Mar. 'Brittox' applied: 16 May. Fungicide applied: 15 June. Harvested by hand: 13 Aug.

Series III: S. oats after s. barley: Glyphosate applied: 7 Sept, 1983. Ploughed: 20 Oct. NPK applied: 14 Mar, 1984. Spring-tine cultivated, spring-tine cultivated with crumbler attached, seed sown: 16 Mar. 'Brittox' applied: 16 May. Harvested by hand: 13 Aug.

SERIES II BARLEY AFTER FALLOW

GRAIN TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 4.32 | 4.47 | 4.35 | 4.62 | 4.44 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.131 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.161 | 3.6 |

GRAIN MEAN DM% 84.7

STRAW TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 3.45 | 3.61 | 3.48 | 3.46 | 3.50 |

STRAW MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00071



*https://doi.org/10.23637/ERADOC-1-32* 

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SERIES IV BARLEY AFTER BARLEY

GRAIN TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 4.60 | 4.48 | 4.37 | 4.62 | 4.52 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.288 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.353 | 7.8 |

GRAIN MEAN DM% 84.1

STRAW TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 4.16 | 4.05 | 4.01 | 4.09 | 4.08 |

STRAW MEAN DM% 85.1

SUB PLOT AREA HARVESTED 0.00071



*https://doi.org/10.23637/ERADOC-1-32* 

84/W/RN/16

SERIES III OATS

GRAIN TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 3.22 | 3.08 | 3.44 | 3.24 | 3.25 |

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

| TABLE | PK SUB |
|---|---|
| SED | 0.278 |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| BLOCK.WP | 6 | 0.340 | 10.5 |

GRAIN MEAN DM% 83.4

STRAW TONNES/HECTARE

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

| PK SUB | - - - | - - S | P K T | P K S | MEAN |
|---|---|---|---|---|---|
| | 3.03 | 3.04 | 2.57 | 3.18 | 2.96 |

STRAW MEAN DM% 79.2

SUB PLOT AREA HARVESTED 0.00071



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

## RATES OF P AND K TO THE SUBSOIL

Object: To study the effects of a range of rates and frequencies of application of P and K to the subsoil, singly and together, on the yields and nutrient uptakes of a rotation of crops - Meadow.

Sponsors: J. McEwen, A.E. Johnston.

The fourth year, potatoes, s. barley, s. beans, w. wheat.

For previous years see 81-83/R/RN/17.

Design: 4 series (for crops) each of 40 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments to each series:

TREATMNT — Extra P and K and primary cultivation tool in autumn 1980 only except on R plots, treatments repeated each autumn:

| | $P_2O_5$(kg) | $K_2O$(kg) | Tool | |
|---|---|---|---|---|
| - - - | 0 | 0 | Plough | (duplicated) |
| P6 K6 T | 1000 | 500 to topsoil | " | ( " ) |
| - - S | 0 | 0 " " | Wye double-digger | (four plots) |
| - - SR | 0 | 0 " " | " " " | (duplicated) |
| P2 - SR | 63 | 0 to subsoil | " " " | |
| P3 - S | 125 | 0 " " | " " " | |
| P4 - S | 250 | 0 " " | " " " | |
| P5 - S | 500 | 0 " " | " " " | (duplicated) |
| P6 - S | 1000 | 0 " " | " " " | |
| - K2 SR | 0 | 31 " " | " " " | |
| - K3 S | 0 | 63 " " | " " " | |
| - K4 S | 0 | 125 " " | " " " | |
| - K5 S | 0 | 250 " " | " " " | (duplicated) |
| - K6 S | 0 | 350 " " | " " " | |
| P1 K1 SR | 31 | 16 " " | " " " | |
| P1 K3 SR | 31 | 63 " " | " " " | |
| P2 K2 SR | 63 | 31 " " | " " " | |
| P3 K1 SR | 125 | 16 " " | " " " | |
| P3 K3 SR | 125 | 63 " " | " " " | |
| P3 K4 S | 125 | 125 " " | " " " | |
| P4 K3 S | 250 | 63 " " | " " " | |
| P4 K4 S | 250 | 125 " " | " " " | |
| P4 K5 S | 250 | 250 " " | " " " | (duplicated) |
| P4 K6 S | 250 | 350 " " | " " " | |
| P5 K4 S | 500 | 125 " " | " " " | (duplicated) |
| P5 K5 S | 500 | 250 " " | " " " | |
| P5 K6 S | 500 | 350 " " | " " " | |
| P6 K4 S | 1000 | 125 " " | " " " | |
| P6 K5 S | 1000 | 250 " " | " " " | |
| P6 K6 S | 1000 | 350 " " | " " " | |



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

NOTES: (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(2) The topsoil PK dressing was equally divided before and after ploughing.
(3) All plots other than R were conventionally ploughed in autumn 1981, 1982 and 1983.
(4) The rate of 350 kg $K_2O$ applied was in error for 500 kg $K_2O$.

Standard applications:
Potatoes: Manures: (10:10:15 + 4.5 Mg) at 1960 kg. Weedkillers: Paraquat at 0.50 kg ion with linuron at 1.3 kg in 500 l. Glyphosate at 1.4 kg in 250 l. Fungicides: Fentin hydroxide at 0.28 kg in 200 l on seven occasions, with the insecticide on the first, third, fourth and sixth occasions. Insecticide: Pirimicarb at 0.14 kg on four occasions. Haulm desiccant: Diquat at 0.56 kg ion in 200 l.
S. barley: Manures: (20:10:10) at 630 kg. Weedkillers: 3, 6-dichloropicolinic acid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop (as 'CMPP' at 4.2 l) applied with the fungicide in 250 l. Fungicide: Tridemorph at 0.52 kg.
S. beans: Weedkillers: Glyphosate at 1.4 kg in 250 l. Simazine at 1.2 l in 250 l. Insecticide: Phorate at 5.6 kg.
W. wheat: Manures: (0:18:36) at 350 kg. 'Nitro-Chalk' at 750 kg. Weedkillers: Mecoprop at 2.0 kg, ioxynil at 0.25 kg and bromoxynil at 0.25 kg in 200 l. Fungicide: Propiconazole at 0.25 kg in 500 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Potatoes: Pentland Crown.
S. barley: Triumph, dressed with triadimenol and fuberidazole, sown at 160 kg.
S. beans: Minden, sown at 240 kg.
W. wheat: Avalon, sown at 190 kg.

Cultivations, etc.:-
All crops: Treatments applied by double digger: 7-10 Nov, 1983. Ploughed: 11 Nov.
Potatoes: Glyphosate applied: 6 Oct, 1983. Heavy spring-tine cultivated twice: 16 Jan, 1984 and a third time: 14 Feb. NPK Mg applied: 3 Apr. Spiked rotary cultivated, potatoes planted: 4 Apr. Rotary ridged: 6 Apr. Linuron and paraquat applied: 3 May. Fentin hydroxide with the insecticide applied: 19 June, 17 July, 30 July, 28 Aug. Fentin hydroxide applied: 3 July, 13 Aug, 11 Sept. Haulm mechanically destroyed: 3 Oct. Desiccant applied: 4 Oct. Lifted: 24 Oct.
S. barley: Spring-tine cultivated: 14 Nov, 1983. Heavy spring-tine cultivated: 14 Feb, 1984. NPK applied: 7 Mar. Spring-tine cultivated, rotary harrowed, seed sown: 8 Mar. Weedkillers and fungicide applied: 23 May. Combine harvested: 17 Aug.
S. beans: Glyphosate applied: 6 Oct, 1983. Heavy spring-tine cultivated twice: 16 Jan, 1984, and a third time: 14 Feb. Insecticide applied, heavy spring-tine cultivated, rotary harrowed, seed sown: 20 Mar. Simazine applied: 22 Mar. Combine harvested: 31 Aug.
W. wheat: Glyphosate applied: 6 Oct, 1983. Spring-tine cultivated, PK applied, spring-tine cultivated, rotary harrowed, seed sown: 14 Nov. N applied: 9 Apr, 1984. Weedkillers applied: 19 Apr. Fungicide applied: 14 June. Insecticide applied: 26 June. Combine harvested: 22 Aug.



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SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

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

| TREATMNT | |
|---|---|
| - - - | 57.7 |
| P6 K6 T | 66.1 |
| - - S | 61.3 |
| - - SR | 56.8 |
| P2 - SR | 53.1 |
| P3 - S | 52.3 |
| P4 - S | 59.0 |
| P5 - S | 63.0 |
| P6 - S | 57.7 |
| - K2 SR | 60.1 |
| - K3 S | 62.4 |
| - K4 S | 61.3 |
| - K5 S | 64.1 |
| - K6 S | 58.1 |
| P1 K1 SR | 52.4 |
| P1 K3 SR | 62.3 |
| P2 K2 SR | 55.7 |
| P3 K1 SR | 61.5 |
| P3 K3 SR | 60.8 |
| P3 K4 S | 58.3 |
| P4 K3 S | 58.9 |
| P4 K4 S | 59.3 |
| P4 K5 S | 65.1 |
| P4 K6 S | 61.8 |
| P5 K4 S | 63.1 |
| P5 K5 S | 65.6 |
| P5 K6 S | 64.2 |
| P6 K4 S | 62.0 |
| P6 K5 S | 60.9 |
| P6 K6 S | 65.6 |
| MEAN | 60.8 |

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

| TABLE | TREATMNT* |
|---|---|
| SED | 2.91 MIN REP |
| | 2.30 MAX-MIN |

* SED APPLIES ONLY TO - - -, P6 K6 T, - - S, - - SR, P5 - S, - K5 S, P4 K5 S AND P5 K4 S

| | TREATMNT |
|---|---|
| MAX-MIN | - - S V ANY OF REMAINDER |
| MIN REP | ANY OF THE REMAINDER |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| WP | 10 | 2.06 | 3.4 |



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

SERIES II POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

| TREATMNT | |
|---|---|
| - - - | 98.0 |
| P6 K6 T | 98.4 |
| - - S | 98.0 |
| - - SR | 98.0 |
| P2 - SR | 98.1 |
| P3 - S | 98.3 |
| P4 - S | 98.8 |
| P5 - S | 97.6 |
| P6 - S | 98.2 |
| - K2 SR | 97.7 |
| - K3 S | 98.2 |
| - K4 S | 98.6 |
| - K5 S | 98.7 |
| - K6 S | 97.7 |
| P1 K1 SR | 99.2 |
| P1 K3 SR | 98.8 |
| P2 K2 SR | 98.9 |
| P3 K1 SR | 98.3 |
| P3 K3 SR | 98.8 |
| P3 K4 S | 99.1 |
| P4 K3 S | 98.7 |
| P4 K4 S | 98.0 |
| P4 K5 S | 98.0 |
| P4 K6 S | 98.1 |
| P5 K4 S | 98.2 |
| P5 K5 S | 98.4 |
| P5 K6 S | 98.5 |
| P6 K4 S | 97.6 |
| P6 K5 S | 98.4 |
| P6 K6 S | 97.7 |
| MEAN | 98.2 |

PLOT AREA HARVESTED 0.00210



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

SERIES III SPRING BARLEY

GRAIN TONNES/HECTARE

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

| TREATMNT | |
|---|---|
| - - - | 9.22 |
| P6 K6 T | 9.37 |
| - - S | 9.17 |
| - - SR | 9.13 |
| P2 - SR | 9.22 |
| P3 - S | 9.31 |
| P4 - S | 9.47 |
| P5 - S | 9.21 |
| P6 - S | 9.71 |
| - K2 SR | 9.01 |
| - K3 S | 9.51 |
| - K4 S | 9.01 |
| - K5 S | 9.20 |
| - K6 S | 8.72 |
| P1 K1 SR | 9.06 |
| P1 K3 SR | 9.37 |
| P2 K2 SR | 9.17 |
| P3 K1 SR | 9.33 |
| P3 K3 SR | 9.37 |
| P3 K4 S | 8.80 |
| P4 K3 S | 9.19 |
| P4 K4 S | 9.41 |
| P4 K5 S | 9.41 |
| P4 K6 S | 9.54 |
| P5 K4 S | 9.15 |
| P5 K5 S | 9.45 |
| P5 K6 S | 9.37 |
| P6 K4 S | 9.25 |
| P6 K5 S | 9.40 |
| P6 K6 S | 9.35 |
| MEAN | 9.25 |

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

| TABLE | TREATMNT* | |
|---|---|---|
| SED | 0.196 | MIN REP |
| | 0.155 | MAX-MIN |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| WP | 10 | 0.139 | 1.5 |

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00286



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

SERIES IV SPRING BEANS

GRAIN TONNES/HECTARE

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

| TREATMNT | |
|---|---|
| - - - | 4.50 |
| P6 K6 T | 4.06 |
| - - S | 4.14 |
| - - SR | 4.42 |
| P2 - SR | 4.73 |
| P3 - S | 4.89 |
| P4 - S | 4.57 |
| P5 - S | 4.61 |
| P6 - S | 3.23 |
| - K2 SR | 6.06 |
| - K3 S | 4.15 |
| - K4 S | 4.31 |
| - K5 S | 4.25 |
| - K6 S | 4.86 |
| P1 K1 SR | 4.67 |
| P1 K3 SR | 4.16 |
| P2 K2 SR | 4.80 |
| P3 K1 SR | 5.22 |
| P3 K3 SR | 4.41 |
| P3 K4 S | 5.00 |
| P4 K3 S | 3.78 |
| P4 K4 S | 3.62 |
| P4 K5 S | 4.62 |
| P4 K6 S | 4.41 |
| P5 K4 S | 3.89 |
| P5 K5 S | 3.74 |
| P5 K6 S | 4.04 |
| P6 K4 S | 4.04 |
| P6 K5 S | 3.88 |
| P6 K6 S | 3.95 |
| MEAN | 4.34 |

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

| TABLE | TREATMNT* | |
|---|---|---|
| SED | 0.453 | MIN REP |
| | 0.358 | MAX-MIN |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| WP | 10 | 0.320 | 7.4 |

GRAIN MEAN DM% 88.0

PLOT AREA HARVESTED 0.00386



*https://doi.org/10.23637/ERADOC-1-32* 

84/R/RN/17

SERIES I WINTER WHEAT

GRAIN TONNES/HECTARE

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

| TREATMNT | |
|---|---|
| - - - | 9.84 |
| P6 K6 T | 10.34 |
| - - S | 9.73 |
| - - SR | 10.56 |
| P2 - SR | 11.19 |
| P3 - S | 11.92 |
| P4 - S | 10.66 |
| P5 - S | 10.48 |
| P6 - S | 10.94 |
| - K2 SR | 11.02 |
| - K3 S | 10.32 |
| - K4 S | 10.13 |
| - K5 S | 9.97 |
| - K6 S | 10.44 |
| P1 K1 SR | 10.06 |
| P1 K3 SR | 10.36 |
| P2 K2 SR | 10.04 |
| P3 K1 SR | 10.37 |
| P3 K3 SR | 11.49 |
| P3 K4 S | 9.75 |
| P4 K3 S | 10.64 |
| P4 K4 S | 10.36 |
| P4 K5 S | 10.26 |
| P4 K6 S | 10.24 |
| P5 K4 S | 10.76 |
| P5 K5 S | 10.04 |
| P5 K6 S | 10.40 |
| P6 K4 S | 10.03 |
| P6 K5 S | 9.08 |
| P6 K6 S | 10.08 |
| MEAN | 10.32 |

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

| TABLE | TREATMNT | |
|---|---|---|
| SED | 0.449 | MIN REP |
| | 0.355 | MAX-MIN |

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

| STRATUM | DF | SE | CV% |
|---|---|---|---|
| WP | 10 | 0.317 | 3.1 |

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00286



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