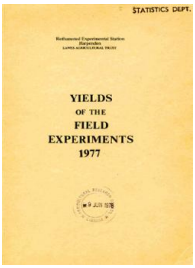
ROTHAMSTED RESEARCH

Yields of the Field Experiments 1977

Full Table of Content



Rotations

Rothamsted Research

Rothamsted Research (1978) *Rotations ;* Yields Of The Field Experiments 1977, pp 46 - 100 **- DOI: https://doi.org/10.23637/ERADOC-1-29**

77/R/RN/1 and 77/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 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 are being introduced on these blocks - Highfield and Fosters.

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

The 29th year, old grass, leys, sugar beet, wheat, oats, barley.

For previous years see 'Details' 1967 & 1973 and 74-76/R/RN/1&2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (77/R/RN/1)

FOSTERS — A site with little organic matter initially (77/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.

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 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-1-29

77/R/RN/1 and 77/R/RN/2

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.

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 wheat every year at the end of the test-crop cycle. In 1977 one phase, fallowed in 1976, started a new sequence of treatment cropping, one phase was fallowed and the other two remained in wheat (no yields). The new sequences will be introduced progressively on these other phases. The new sequences are:

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 = beans. Other symbols as above. All ploughed at the end of the treatment crop cycle except GRASS/OG - direct drilled to wheat. Treatment crop cycles start after nine previous cereals followed by one fallow. In treatment years yields are taken only from barley and wheat.

Additional treatments to 2nd test crop wheat in the original rotation:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N 77 Nitrogen fertiliser (kg N):

0
50
100
150

https://doi.org/10.23637/ERADOC-1-29 *pp 3*

77/R/RN/1 and 77/R/RN/2

Standard applications:
- Museum blocks:
  - 2nd Treatment Crops:
    - All-grass ley: Manures: (0:14:28) at 540 kg. (25:0:16) at 300 kg in spring and after each cut except the last.
    - Clover-grass ley: Manures: (0:14:28) at 540 kg.
    - Lucerne: Manures: (0:14:28) at 810 kg.
    - Sugar beet: Manures: (13:13:20) at 1260 kg. Insecticide: Pirimicarb at 0.14 kg in 220 l.
  - 2nd Test Crop: Wheat: Manures: (0:20:20) at 380 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l). Insecticide: Pirimicarb at 0.14 kg in 280 l.
  - Reseeded Grass and Old Grass: Manures: (0:14:28) at 540 kg.
  - All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.
- New sequence blocks:
  - All crops (except wheat): Manures: Chalk at 8.7 t, Highfield only.
  - Lucerne: Manures: (0:14:28) at 720 kg. Weedkiller: 2,4-DB at 2.5 kg in 340 l.
  - Clover-grass ley and Ryegrass: Manures: (0:14:28) at 720 kg. (25:0:16) at 300 kg. Weedkiller: MCPB ('Tropotox' at 7.0 l in 340 l).
  - Oats and barley: Manures: (20:14:14) at 350 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l).
  - Wheat: Manures: (0:20:20) at 380 kg. 'Nitro-Chalk' at 500 kg. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l). Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed:
- Museum blocks:
  - All-grass ley: Pecora Timothy at 15 kg, Meadow Fescue S215 at 19 kg. Mixture sown at 34 kg.
  - Clover-grass ley: Pecora Timothy at 15 kg, Meadow Fescue S215 at 19 kg, White Clover S100 at 3 kg. Mixture sown at 37 kg.
  - Sugar beet: Klein E, sown at 9 kg.
  - Wheat: Cappelle, sown at 200 kg.
- New sequence blocks:
  - Lucerne: Vertus, sown at 28 kg.
  - Clover-grass ley: Timothy S48 at 15 kg, Meadow Fescue S215 at 19 kg, New Zealand Huia Clover at 3 kg. Mixture sown at 37 kg.
  - Ryegrass: S24, sown at 22 kg.
  - Oats: Manod, sown at 200 kg.
  - Barley: Julia, sown at 160 kg.
  - Wheat: Cappelle, sown at 200 kg.

Cultivations, etc.:-
- Museum blocks:
  - All-grass ley and clover-grass ley: Ploughed: 20 Aug, 1976. Spring-tine cultivated, harrowed, seed sown: 21 Sept. PK applied: 23 Dec. NK applied (all-grass ley only): 3 Mar, 1977, 26 May, 1 July, 5 Aug. Cut: 24 May, 30 June, 4 Aug, 23 Nov.
  - Lucerne: PK applied: 23 Dec, 1976. Cut: 29 June, 1977, 16 Aug, 1 Dec.

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/1 and 77/R/RN/2

Sugar beet: Ploughed: 20 Aug, 1976. Rotary harrowed: 7 Apr, 1977. NPK applied: 9 Apr. Spring-tine cultivated, chain harrowed, rolled, seed sown: 12 Apr. Tractor hoed: 27 May, 16 June. Plants singled: 2 June. Insecticide applied: 6 July. Lifted by hand: 11 Nov.

Wheat: Heavy spring-tine cultivated twice: 23 Nov, 1976. Sown: 24 Nov. Test N applied: 28 Apr, 1977. Weedkillers applied: 2 May. Insecticide applied: 15 July. Combine harvested: 9 Sept.

Reseeded Grass and Old Grass: PK applied: 23 Dec, 1976. NK applied (to N sub plots only): 3 Mar, 1977, 26 May, 1 July, 5 Aug. Cut: 24 May, 30 June, 4 Aug, 23 Nov.

New sequence blocks:

Fallow: Ploughed: 22 Sept, 1976. Deep-tine cultivated: 26 Nov. Rotary cultivated: 3 May, 1977, 21 June, 14 July. Ploughed: 10 Oct.

Lucerne: Chalk applied: 17 Sept, 1976. Deep-tine cultivated: 26 Nov. Rotary harrowed: 8 Mar, 1977. Rotary cultivated, (Highfield only): 5 Apr. Spring-tine cultivated: 7 Apr. PK applied: 19 May. Power harrowed, seed sown: 1 June. Weedkiller applied: 4 Aug. Topped: 13 Aug, 1 Dec.

Clover-grass ley and ryegrass: Chalk applied: 17 Sept, 1976. Deep-tine cultivated: 26 Nov. Rotary harrowed: 8 Mar, 1977. Rotary cultivated, (Highfield only): 5 Apr. Spring-tine cultivated: 7 Apr. NK (ryegrass only) and PK applied: 19 May. Spring-tine cultivated, seed sown: 20 May. NK applied (clover-grass only): 8 July. Weedkiller applied: 27 July. Topped: 13 Aug, 1 Dec.

Oats: Chalk applied: 17 Sept, 1976. Deep-tine cultivated: 26 Nov. Rotary harrowed: 8 Mar, 1977. Rotary cultivated, (Highfield only): 5 Apr. Spring-tine cultivated: 7 Apr. Sown: 8 Apr. Weedkillers applied: 30 May. Combine harvested: 6 Sept.

Barley: Chalk applied: 17 Sept, 1976. Deep-tine cultivated: 26 Nov. Rotary harrowed: 8 Mar, 1977. Rotary cultivated, (Highfield only): 5 Apr. Spring-tine cultivated: 7 Apr. Sown: 8 Apr. Weedkillers applied: 30 May. Combine harvested: 26 Aug.

Wheat: Ploughed: 22 Sept, 1976. Deep-tine cultivated: 23 Nov. Sown: 24 Nov. 'Nitro-Chalk' applied: 15 Apr, 1977. Weedkillers applied: 2 May. Insecticide applied: 15 July. Combine harvested: 11 Sept.

NOTES: (1) Soils from the new sequence blocks were bioassayed for Gaeumannomyces in March before sowing.
(2) Barley was sampled in July to assess take-all.
(3) Test wheat in the museum blocks was sampled in July to assess take-all and Phialophora.
(4) The yields of oats were not recorded.

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/1 AND 77/R/RN/2

MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
TOTAL OF 4 CUTS	5.81	6.55
MEAN DM%	21.2	19.0
ALL GRASS LEY		
TOTAL OF 4 CUTS	12.16	10.91
MEAN DM%	22.0	22.4
LUCERNE		
TOTAL OF 3 CUTS	11.62	11.31
MEAN DM%	19.8	20.5
SUGAR BEET		
ROOTS (WASHED)	39.3	38.2
SUGAR PERCENTAGE	17.2	17.4
TOTAL SUGAR	6.77	6.66
TOPS	45.5	37.4

OLD GRASS

TOTAL OF 4 CUTS

	HIGHFIELD	
	C	N
29TH EXPTL YEAR		
BLOCKS 1 & 4	4.52	9.85
BLOCK 2	4.34	10.66
MEAN DM%	26.0	22.2

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/1 AND 77/R/RN/2

RESEEDED GRASS

TOTAL OF 4 CUTS

		HIGHFIELD			FOSTERS	
	BLOCKS	C	N	BLOCKS	C	N
29TH EXPTL YEAR	1 & 4	4.15	10.36	1 & 3	3.40	9.69
29TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	7.69	11.00	2 & 4	6.88	11.07
MEAN DM%		22.7	22.5		22.8	22.4

NEW SEQUENCE BLOCKS

DRY MATTER: TONNES/HECTARE

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

BARLEY

	HIGHFIELD	FOSTERS
	5.52	5.22
MEAN DM%	76.6	78.2

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/1 HIGHFIELD

WINTER WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N 77	0	50	100	150	MEAN
FYMRES70					
NONE	4.31	5.55	5.60	6.13	5.40
FYM	4.28	5.29	5.96	5.88	5.35
MEAN	4.29	5.42	5.78	6.00	5.37

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	5.97	5.08	5.33	5.21	5.40
FYM	5.72	5.18	5.24	5.26	5.35
MEAN	5.84	5.13	5.28	5.24	5.37

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 77					
0	4.70	4.53	4.31	3.62	4.29
50	5.67	5.66	5.32	5.02	5.42
100	6.47	4.92	5.51	6.22	5.78
150	6.54	5.40	5.99	6.08	6.00
MEAN	5.84	5.13	5.28	5.24	5.37

	ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
FYMRES70	N 77				
NONE	0	4.83	4.60	4.42	3.37
	50	6.01	5.69	5.55	4.93
	100	6.50	4.44	5.38	6.09
	150	6.54	5.57	5.96	6.46
FYM	0	4.58	4.47	4.20	3.87
	50	5.32	5.64	5.09	5.11
	100	6.44	5.39	5.65	6.35
	150	6.54	5.24	6.03	5.69

GRAIN MEAN DM% 76.9

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/1 HIGHFIELD

WINTER WHEAT 2ND TEST CROP

STRAW TONNES/HECTARE

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

N 77 / FYMRES70	0	50	100	150	MEAN
NONE	2.85	4.18	4.49	4.95	4.12
FYM	2.87	3.70	4.63	4.87	4.02
MEAN	2.86	3.94	4.56	4.91	4.07

ROTATION / FYMRES70	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
NONE	4.57	3.99	4.02	3.90	4.12
FYM	4.72	3.79	3.70	3.86	4.02
MEAN	4.64	3.89	3.86	3.88	4.07

ROTATION / N 77	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
0	3.28	3.30	2.45	2.42	2.86
50	4.20	4.10	3.88	3.57	3.94
100	5.58	3.92	4.21	4.54	4.56
150	5.52	4.23	4.89	4.99	4.91
MEAN	4.64	3.89	3.86	3.88	4.07

FYMRES70 / ROTATION / N 77	LUCERNE	CLOGRA	GRASS	ARABLE
NONE 0	3.42	3.25	2.45	2.28
50	4.28	4.31	4.42	3.70
100	5.54	4.11	4.18	4.14
150	5.02	4.28	5.02	5.49
FYM 0	3.13	3.35	2.45	2.56
50	4.12	3.89	3.34	3.44
100	5.62	3.72	4.25	4.95
150	6.03	4.18	4.77	4.49

STRAW MEAN DM% 87.9

SUB PLOT AREA HARVESTED 0.00659

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/2 FOSTERS

WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N 77	0	50	100	150	MEAN
FYMRES70					
NONE	4.02	5.08	6.02	6.36	5.37
FYM	4.30	5.31	6.22	6.45	5.57
MEAN	4.16	5.20	6.12	6.41	5.47

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	5.69	5.51	4.98	5.31	5.37
FYM	6.05	5.67	5.23	5.33	5.57
MEAN	5.87	5.59	5.10	5.32	5.47

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 77					
0	4.53	4.73	3.94	3.45	4.16
50	6.04	5.30	4.75	4.71	5.20
100	6.35	5.92	5.81	6.40	6.12
150	6.58	6.41	5.91	6.73	6.41
MEAN	5.87	5.59	5.10	5.32	5.47

	ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
FYMRES70	N 77				
NONE	0	4.36	4.45	3.67	3.60
	50	5.87	5.56	4.45	4.46
	100	5.88	5.48	6.01	6.71
	150	6.66	6.55	5.77	6.47
FYM	0	4.70	5.01	4.21	3.29
	50	6.20	5.04	5.05	4.95
	100	6.82	6.37	5.60	6.10
	150	6.49	6.27	6.06	6.99

GRAIN MEAN DM% 80.3

https://doi.org/10.23637/ERADOC-1-29 *pp 10*

77/R/RN/2 FOSTERS

WHEAT 2ND TEST CROP

STRAW TONNES/HECTARE

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

N 77	0	50	100	150	MEAN
FYMRES70					
NONE	2.12	3.53	4.26	4.88	3.70
FYM	2.37	3.77	4.74	5.27	4.04
MEAN	2.25	3.65	4.50	5.08	3.87

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	4.08	3.68	3.39	3.64	3.70
FYM	4.39	4.03	3.81	3.92	4.04
MEAN	4.23	3.86	3.60	3.78	3.87

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 77					
0	2.41	2.57	2.29	1.71	2.25
50	4.48	3.49	3.16	3.48	3.65
100	4.57	4.34	4.31	4.79	4.50
150	5.48	5.02	4.65	5.16	5.08
MEAN	4.23	3.86	3.60	3.78	3.87

	ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
FYMRES70	N 77				
NONE	0	2.20	2.41	2.07	1.79
	50	4.65	3.52	2.88	3.10
	100	3.89	3.92	4.57	4.67
	150	5.58	4.88	4.03	5.02
FYM	0	2.62	2.73	2.50	1.63
	50	4.31	3.47	3.44	3.86
	100	5.25	4.76	4.04	4.91
	150	5.38	5.16	5.26	5.29

STRAW MEAN DM% 89.1

SUB PLOT AREA HARVESTED 0.00659

https://doi.org/10.23637/ERADOC-1-29 *pp 11*

77/W/RN/3

LEY/ARABLE

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

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

The 40th year, leys, barley, oats, wheat.

For previous years see 'Details' 1967 & 1973 and 74-76/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 = rye, C = carrots, W = wheat, B = 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 (PER)
On four plots in each block arable rotations alternated each five years with ley rotations (ALT)

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

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

LN = grass ley with N, LC = clover/grass ley no N, O = oats, F = fallow

Plots hitherto in alternating rotations were 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

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). The long-term leys will be ploughed up after five to eight years initially depending on starting point in relation to test crop.

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/3

Treatments to first test crop wheat and second test crop barley:

ROT CYCL Combinations of rotations and cycles defined above

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

Yields are taken from first and second test crops only.

Additional treatments to first test crop, wheat:-

1/2 plots

1. FYMRES67 Farmyard manure residues, last applied 1967:

   NONE None
   FYM 38 tonnes on each occasion

1/8 plots

2. N Nitrogen fertiliser (kg N):

   0
   63
   126
   189

Additional treatments to second test crop, barley:-

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
   50
   100
   150

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/3

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	50	0
Clover	80	100
Arable with hay	113	113
Arable	188	151
Alternating rotations (last two rotations in order)		
Ley/Arable	113	126
Sainfoin/Arable	126	126
Ley/Arable with hay	100	0
Sainfoin/Arable with hay	63	0

Standard applications:-

Grass ley and Clover/grass ley, 1st year: Manures: (0:14:28) at 540 kg. N at 70 kg as 'Nitro-Chalk'. Weedkiller: Glyphosate at 1.7 kg in 280 l.

Grass ley, 2nd, 3rd, 4th and 5th years: Manures: Magnesian limestone at 5 t to 2nd year only. (25:0:16) at 300 kg in spring, and at 400 kg after the first cut. Weedkiller: Paraquat at 0.84 kg ion in 280 l to 3rd, 4th and 5th years only.

Clover/grass ley, 2nd, 3rd, 4th and 5th years: Manures: Magnesian limestone at 5 t to 2nd year only. K20 at 48 kg in spring and after topping in July. Weedkiller: Paraquat at 0.84 kg ion in 280 l to 3rd, 4th and 5th years only.

Barley: Manures: 1st and 2nd treatment crops: (20:14:14) at 400 kg. 2nd test crop: Magnesian limestone at 5 t, (0:20:20) at 300 kg. Weedkillers: Paraquat at 0.84 kg ion in 280 l. 2nd test crop only: Glyphosate at 1.7 kg in 280 l. 2nd test crop: Nematicide: Aldicarb at 10 kg.

Oats: Manures: (20:14:14) at 400 kg. Weedkillers: Paraquat at 0.84 kg ion in 280 l, Glyphosate at 1.7 kg in 280 l.

Winter wheat: Manures: (0:20:20) at 300 kg combine drilled. Weedkillers: Paraquat at 0.84 kg ion in 280 l. Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 270 l. Nematicide: Aldicarb at 10 kg.

Fallow: Weedkillers: Glyphosate at 1.7 kg in 280 l (1st year fallow). Paraquat at 0.84 kg ion in 280 l (2nd year fallow).

Varieties: Grass ley: Timothy S48 15 kg, Meadow fescue S215 19 kg, sown at 34 kg.
Clover/grass: Timothy S48 20 kg, Meadow fescue S215 16 kg, Huia white clover 4 kg, sown at 40 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Oats: Manod, sown at 200 kg.
Winter wheat: Cappelle, sown at 210 kg.

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/3

Cultivations, etc.:- Treatment crops:

Grass ley and clover/grass ley, 1st year: Subsoiled, tines 140 cm apart, 50 cm deep: 7 Sept, 1976. Glyphosate applied: 24 Sept. Ploughed: 1 Nov. Spring-tine cultivated: 10 Mar, 1977. PK applied, N applied to grass ley only: 25 Apr. Spring-tine cultivated with crumbler attached, seeds sown: 18 May. Cut: 23 Sept.

Grass ley and clover/grass ley, 2nd year: Resown by hand: 13 Oct, 1976. NK applied to grass ley and K applied to clover/grass ley: 7 Apr, 1977. Grass ley cut: 1 July. K applied to clover/grass ley: 19 July. NK applied to grass ley: 21 July. Grass ley and clover/grass ley cut: 22 Sept.

Grass ley and clover/grass ley, 3rd year: Magnesian limestone applied: 6 Sept, 1976. Weedkiller applied: 8 Oct. Resown by hand: 13 Oct. NK applied to Grass ley and K applied to clover/grass ley: 7 Apr, 1977. Grass ley cut: 1 July. K applied to clover/grass ley: 19 July. NK applied to grass ley: 21 July. All leys cut: 22 Sept.

Grass leys and clover/grass leys, 4th and 5th years: Weedkiller applied: 8 Oct, 1976. Resown by hand: 13 Oct. NK applied to grass leys and K applied to clover/grass leys: 7 Apr, 1977. Grass leys cut: 1 July. K applied to clover/grass leys: 19 July. NK applied to grass leys: 21 July. All leys cut: 23 Sept.

Barley: 1st and 2nd treatment crops: Subsoiled, tines 140 cm apart, 50 cm deep: 7 Sept, 1976 (1st treatment crop only). Glyphosate applied: 24 Sept. Ploughed 1st treatment crop: 1 Nov, 2nd treatment crop: 9 Nov. Spring-tine cultivated: 10 Mar, 1977. Rotary cultivated, seed sown: 8 Apr. NPK applied: 12 Apr. Ioxynil plus mecoprop applied: 19 May. Combine harvested: 30 Aug.

Oats: 3rd treatment crop: Glyphosate applied: 24 Sept, 1976. Paraquat applied: 8 Oct. Ploughed: 9 Nov. Spring-tine cultivated: 10 Mar, 1977. Rotary cultivated, seed sown: 8 Apr. NPK applied: 12 Apr. Ioxynil plus mecoprop applied: 19 May. Combine harvested: 3 Sept.

Fallow, 1st treatment year: Subsoiled, tines 140 cm apart, 50 cm deep: 7 Sept, 1976. Glyphosate applied: 24 Sept. Ploughed: 1 Nov. Spring-tine cultivated twice: 10 Mar, 1977, 30 June. Rotary cultivated twice: 17 June, 16 Aug.

Fallow, 2nd treatment year: Paraquat applied: 24 Sept, 1976. Ploughed: 9 Nov. Spring-tine cultivated twice: 10 Mar, 1977, 30 June. Rotary cultivated twice: 17 June, 16 Aug.

Test crops:

Winter wheat, 1st test crop: Paraquat applied: 8 Oct, 1976. Ploughed: 8 Nov. Corrective K applied: 11 Nov. Aldicarb applied, rotary cultivated, seed sown: 24 Nov. N applied: 14 Apr. Ioxynil plus mecoprop applied: 15 May. Insecticide applied: 11 July. Combine harvested: 7 Sept.

Barley, 2nd test crop: Magnesian limestone applied: 6 Sept, 1976. Glyphosate applied: 24 Sept. Paraquat applied: 8 Oct. Ploughed: 9 Nov. Spring-tine cultivated: 10 Mar, 1977. Aldicarb applied, rotary cultivated, seed sown: 8 Apr. N applied: 12 Apr. Weedkiller applied: 19 May. Combine harvested: 30 Aug.

https://doi.org/10.23637/ERADOC-1-29 *pp 15*

77/W/RN/3

BARLEY 2ND TEST CROP

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

GRAIN TONNES/HECTARE

ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	MEAN
FYMRES66							
NONE	4.35	4.56	3.63	4.07	4.22	4.24	4.18
FYM	4.13	4.52	3.54	3.89	4.24	4.25	4.09
N							
0	3.09	3.17	0.52	1.39	1.85	2.45	2.08
50	4.72	4.78	3.79	4.18	4.58	4.16	4.37
100	4.72	5.32	4.77	5.18	5.23	5.12	5.06
150	4.44	4.89	5.27	5.17	5.25	5.25	5.04
MEAN	4.24	4.54	3.59	3.98	4.23	4.25	4.14

ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT
FYMRES66 N						
NONE 0	3.11	3.14	0.83	1.46	1.92	2.37
50	4.60	4.91	3.93	4.13	4.61	4.16
100	5.01	5.18	4.69	5.30	5.12	5.22
150	4.70	5.00	5.06	5.40	5.22	5.21
FYM 0	3.07	3.20	0.21	1.31	1.78	2.53
50	4.84	4.66	3.64	4.23	4.55	4.16
100	4.43	5.45	4.84	5.07	5.34	5.03
150	4.17	4.77	5.48	4.94	5.28	5.28

GRAIN MEAN DM% 82.7

STRAW TONNES/HECTARE

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

ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	MEAN
FYMRES66							
NONE	2.79	3.31	2.16	2.29	2.46	2.44	2.58
FYM	2.86	3.68	2.02	2.12	2.45	2.90	2.67
N							
0	1.51	1.70	0.31	0.53	0.73	1.13	0.98
50	3.11	3.24	2.09	2.01	2.39	2.36	2.53
100	3.37	4.64	2.88	3.12	3.31	3.49	3.47
150	3.32	4.40	3.08	3.18	3.41	3.70	3.51
MEAN	2.83	3.50	2.09	2.21	2.46	2.67	2.63

ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT
FYMRES66 N						
NONE 0	1.51	1.63	0.35	0.59	0.54	1.06
50	2.96	3.07	2.15	2.01	2.45	2.15
100	3.65	4.36	3.00	3.14	3.30	3.16
150	3.04	4.19	3.15	3.43	3.56	3.40
FYM 0	1.51	1.78	0.26	0.47	0.91	1.20
50	3.25	3.41	2.04	2.01	2.32	2.57
100	3.09	4.92	2.77	3.09	3.33	3.83
150	3.60	4.62	3.01	2.93	3.25	4.00

STRAW MEAN DM% 83.4 SUB PLOT AREA HARVESTED 0.00260

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/3

WINTER WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

ROT CYCL / FYMRES67	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	MEAN
NONE	4.13	4.34	4.05	4.14	3.82	3.87	4.06
FYM	4.03	4.08	3.71	4.29	4.32	3.83	4.04
N							
0	2.78	3.35	2.31	2.72	2.64	2.58	2.73
63	4.42	3.88	3.79	4.49	4.65	3.74	4.16
126	5.16	4.75	4.93	5.26	4.89	4.60	4.93
189	3.97	4.86	4.48	4.38	4.12	4.48	4.38
MEAN	4.08	4.21	3.88	4.21	4.07	3.85	4.05

FYMRES67	ROT CYCL N	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT
NONE	0	2.68	3.11	2.22	2.42	2.22	2.57
	63	4.49	4.14	3.99	4.74	4.12	3.73
	126	5.13	4.72	5.08	5.40	5.21	4.36
	189	4.22	5.39	4.90	4.01	3.75	4.81
FYM	0	2.87	3.58	2.40	3.02	3.06	2.58
	63	4.34	3.63	3.59	4.25	5.18	3.75
	126	5.20	4.79	4.78	5.11	4.56	4.84
	189	3.72	4.32	4.05	4.76	4.49	4.16

GRAIN MEAN DM% 80.4

STRAW TONNES/HECTARE

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

ROT CYCL / FYMRES67	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	MEAN
NONE	3.33	3.65	2.52	3.05	3.49	3.23	3.21
FYM	4.14	3.88	2.12	3.06	3.92	2.62	3.29
N							
0	1.91	2.61	1.43	1.91	1.94	1.81	1.93
63	4.03	3.35	2.36	3.50	3.25	2.77	3.21
126	4.87	4.68	2.71	3.73	4.88	3.62	4.08
189	4.14	4.41	2.80	3.08	4.75	3.52	3.78
MEAN	3.74	3.76	2.32	3.06	3.71	2.93	3.25

FYMRES67	ROT CYCL N	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT
NONE	0	1.42	2.12	1.34	1.56	1.40	2.09
	63	3.61	3.35	2.61	3.80	2.88	3.19
	126	4.39	4.36	3.06	4.36	4.61	3.99
	189	3.91	4.76	3.09	2.48	5.09	3.67
FYM	0	2.40	3.10	1.51	2.26	2.48	1.53
	63	4.44	3.36	2.11	3.21	3.63	2.34
	126	5.36	5.00	2.35	3.10	5.15	3.25
	189	4.37	4.05	2.50	3.69	4.40	3.37

STRAW MEAN DM% 67.1 SUB PLOT AREA HARVESTED 0.00260

https://doi.org/10.23637/ERADOC-1-29

77/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 36th year, ryegrass.

For previous years see 'Details' 1967 & 1973 and 74-76/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: Manures: Chalk at 2.8 t. 80 kg N as 'Nitro-Chalk' in spring and after the first cut and 87 kg N after the second cut. Weedkiller: Mecoprop at 1.3 kg in 280 l on the first occasion and in 220 l on the second occasion.

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

Cultivations, etc.:- Both series.
Chalk applied: 26 Aug, 1976. Weedkiller applied: 13 Oct, 12 Apr, 1977.
N applied: 29 Mar, 21 July, 15 Aug. Cut twice: 21 June, 9 Aug.

https://doi.org/10.23637/ERADOC-1-29 *pp 18*

77/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 22nd year of the rotation, barley, ley, potatoes, winter wheat, kale.
The 18th year of the same rotation on the additional plots.
The 21st 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 69-76/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
N1
P
N1P
K
N1K
PK
N1PK
N2PK
D
N1PKD
N2PKD

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 P205 as superphosphate
K: 250 kg K20 as muriate of potash
D: 38 tonnes FYM (permanent grass): 50 tonnes (kale and potatoes): none to other crops.

NOTE: Since 1977 all wheat on these plots receives 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 before wheat. Reference in the 1976 'Yields' to potatoes receiving a standard dressing of Mg in that year was incorrect, no Mg was applied.

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/5

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 P205 as potassium dihydrogen phosphate
K: 251 kg K20 total. As potassium dihydrogen phosphate (83 kg K20) on all NPK plots. In addition plots without S receive 168 kg K20 as potassium chloride, plots with S receive 92 kg K20 as potassium sulphate plus 76 kg K20 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: 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: Weedkillers: Linuron at 0.93 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide: Mancozeb at 1.3 kg in 280 l, (applied twice to original plots). Insecticide: Menazon at 0.28 kg applied with the first fungicide spray.
Winter wheat: Weedkillers: Ioxynil at 0.47 kg with mecoprop at 1.4 kg in 280 l.

Seed: Barley: Maris Mink, sown at 200 kg.
Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover.
Potatoes: Pentland Crown.
Winter wheat: Maris Fundin, sown at 220 kg.
Kale: Thousand-headed.

Cultivations, etc.:-
Barley: Original plots dug by hand: 8 Nov, 1976. Additional plots dug by hand: 18 Nov. P, K, Mg, Ca and S applied: 3 Mar, 1977. N applied and seed sown: 9 Mar. Weedkillers applied: 6 May. Trace elements applied: 2 June. Fungicide applied: 20 June. Additional plots harvested by hand: 16 Aug. Original plots harvested by hand: 23 Aug.
Grass-clover ley: Rotary cultivated and seed sown: 4 Aug, 1976. P, K applied to original plots: 19 Nov. P, K, Mg, Ca and S applied to additional plots: 8 Dec. N applied: 3 Mar, 1977. Trace elements applied: 19 Apr. Cut three times: 18 May, 11 July, 26 Sept.

https://doi.org/10.23637/ERADOC-1-29 *pp 20*

77/R/RN/5

Potatoes: FYM applied and dug by hand: 17 Sept, 1976. P, K, Mg, Ca and S applied: 3 Mar, 1977. N applied, rotary cultivated and planted: 25 Apr. Weedkillers applied: 23 May. Second N applied to additional plots: 2 June. Trace elements applied: 20 June. Fungicide with insecticide applied: 30 June. Plots of the original plots with neither K nor FYM and no fertiliser plot of the additional plots lifted: 1 Aug. Fungicide applied to remaining original plots: 7 Sept. Remaining plots lifted: 6 Oct.

Winter wheat: Dug by hand: 14 Sept, 1976. Test P, K, Mg, Ca and S and basal Mg to original plots applied: 27 Sept. Seed sown: 8 Oct. Weedkillers applied: 9 Mar, 1977. N and trace elements applied: 19 Apr. Additional plots harvested by hand: 16 Aug. Remaining plots harvested by hand: 23 Aug.

Kale: Additional plots dug by hand: 16 Sept, 1976. FYM applied and remaining plots dug by hand: 11 Oct. P, K, Mg, Ca and S applied: 3 Mar, 1977. N applied and seed sown: 5 Apr. Second N applied to additional plots: 2 June. Trace elements applied: 20 June. Harvested by hand: 24 Oct.

Permanent grass: P and K applied: 19 Nov, 1976. FYM applied: 3 Mar, 1977. N applied: 3 Mar, 18 May, 11 July. Cut three times: 18 May, 11 July, 30 Sept.

https://doi.org/10.23637/ERADOC-1-29 *pp 21*

77/R/RN/5

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE									
0	2.80	2.79	15.7	3.08	2.16	2.02	1.10	0.92	4.04
N1	3.12	3.57	19.2	3.96	3.70	3.02	1.66	0.65	5.33
P	3.52	4.08	26.2	3.20	2.50	2.33	1.20	0.56	4.10
N1P	1.35	2.29	38.4	3.69	3.79	3.35	1.49	0.53	5.38
K	4.31	5.28	6.1	3.14	2.34	2.15	1.46	1.47	5.09
N1K	6.19	7.18	7.4	4.70	3.82	3.13	1.97	1.34	6.44
PK	4.43	5.46	15.7	3.94	2.20	2.75	2.09	3.16	8.00
N1PK	7.30	8.57	49.3	5.21	4.05	4.09	1.89	2.42	8.40
N2PK	6.95	8.37	63.2	6.35	5.30	5.62	2.40	1.20	9.23
D	5.01	5.66	39.7	4.13	3.20	3.14	2.17	2.08	7.39
N1PKD	7.19	9.33	64.5	6.30	4.85	5.16	2.29	2.02	9.47
N2PKD	7.78	10.06	83.7	6.22	5.58	5.22	2.76	1.75	9.73
MEAN DM%	75.7	66.2		76.6	64.0	23.7	27.6	22.3	24.5

	POTATOES: TOTAL TUBERS	PERMANENT GRASS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE					
0	6.1	0.33	1.39	1.12	2.84
N1	7.4	0.68	1.37	1.59	3.64
P	5.0	0.39	1.28	0.95	3.62
N1P	6.4	1.11	1.53	1.98	4.62
K	25.4	0.48	1.35	1.22	3.05
N1K	41.0	1.61	2.64	2.31	6.56
PK	29.0	0.37	1.43	1.21	3.02
N1PK	49.8	2.14	2.79	2.36	7.30
N2PK	55.1	3.37	2.51	2.82	8.70
D	36.7	3.10	1.83	1.93	6.87
N1PKD	57.1	4.16	2.11	2.59	8.86
N2PKD	59.4	3.92	4.35	3.59	11.86
MEAN DM%		24.8	28.4	26.1	26.4

https://doi.org/10.23637/ERADOC-1-29 *pp 22*

77/R/RN/5

GREAT FIELD IV (R) : ADDITIONAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT: GRAIN	STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	STRAW	POTATOES: TOTAL TUBERS
MANURE						
0	2.83	3.15	27.5	2.88	2.63	8.7
F	8.69	10.45	69.8	6.72	6.17	59.8
FMGCA	8.28	10.26	70.6	6.91	6.22	58.0
FMGS	8.14	9.17	75.9	6.90	6.12	63.6
FCAS	7.40	8.22	67.1	6.78	6.58	60.3
FMGCAS	7.98	9.35	69.8	6.47	6.08	60.0
FMGCASTE	8.34	9.30	75.4	6.71	6.08	57.6
MEAN DM%	78.9	69.7		80.9	73.5	

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE				
0	2.08	1.08	0.71	3.86
F	5.54	2.37	1.43	9.34
FMGCA	4.98	2.74	2.01	9.73
FMGS	4.80	1.76	1.10	7.66
FCAS	5.34	2.51	1.97	9.82
FMGCAS	5.29	2.50	2.23	10.03
FMGCASTE	5.48	2.36	2.06	9.90
MEAN DM%	22.1	28.1	21.8	24.0

https://doi.org/10.23637/ERADOC-1-29

77/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 18th 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 71-76/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):
	OATS/G	Oats
		In arable rotation since 1960:
	BARLEY	Barley
	LEY	Ley
	POTATO	Potatoes
	SUGRBEET	Sugar beet
	OATS/A	Oats
	PERMGRAS	Permanent grass, sown autumn 1973

Plots

2. MANURE Fertilisers and farmyard manure:-

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

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.

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/6

NOTES: (1) The old grass block was dug in autumn 1973 and follows the arable rotation, the crop in 1977 being oats. A new block was sown to permanent grass on adjacent land.
(2) Potatoes and sugar beet test on sub plots: - v MG (82 kg MgO 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 After old grass and in rotation: Weedkillers: Ioxynil at 0.42 kg plus mecoprop at 1.3 kg in 280 l on two occasions.
Sugar beet: Manures: Boron at 0.92 kg B_2O_3 as borax in 1120 l. Insecticides: Menazon at 0.28 kg in 280 l. Pirimicarb at 0.14 kg in 280 l.
Barley: Weedkillers: Ioxynil at 0.42 kg plus mecoprop at 1.3 kg in 280 l.
Potatoes: Weedkillers: Linuron at 1.0 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide: Mancozeb at 1.3 kg in 280 l on three occasions, the first with insecticide. Insecticide: Menazon at 0.28 kg with fungicide.

Seed: Winter oats: Peniarth, sown at 200 kg
Sugar beet: Klein E, sown at 5.6 kg
Barley: Julia, dressed with ethirimol, sown at 220 kg
Potatoes: Pentland Crown
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: Both blocks: Balancing Mg applied to oats after long ley only, plots dug by hand, P and K applied: 7 Sept, 1976. Raked, seed sown: 20 Oct. First half N applied, weedkillers applied: 11 Mar, 1977. Second half N applied: 3 May. Weedkiller application repeated: 10 May. Harvested: 3 Aug.
Sugar beet: FYM applied, plots dug by hand: 11 Nov, 1976. P and K applied: 2 Mar, 1977. First half N applied, raked, Mg applied to half plots, raked in, seed drilled and raked in: 25 Mar. Singled, second half N applied, boron applied: 9 June. Menazon applied: 7 July. Pirimicarb applied: 19 July. Lifted: 10 Nov.
Barley: Balancing Mg applied: 7 Oct, 1976. Plots dug by hand: 18 Nov. First half N applied, P and K applied, raked, seed sown, raked in: 2 Mar, 1977. Second half N applied: 3 May. Weedkillers applied: 10 May. Harvested: 11 Aug.
Potatoes: FYM applied, plots dug by hand: 11 Nov, 1976. P and K applied: 2 Mar, 1977. First half N applied, rotary cultivated, raked, Mg applied to half plots, potatoes planted and earthed up: 26 Apr. Weedkillers applied: 23 May. Second half N applied: 9 June. Insecticide with fungicide applied: 7 July. Fungicide applied: 26 July, 11 Aug. Lifted plots without K: 3 Aug. Remaining plots lifted: 3 Oct.
Grass-clover ley: Barley stubble raked, seeds sown, raked in: 5 Aug, 1976. P and K applied: 18 Nov. N applied: 11 Mar, 1977. Cut three times: 23 May, 19 July, 29 Sept.
Permanent Grass: P and K applied: 18 Nov, 1976. FYM applied: 2 Mar, 1977. N applied in three equal amounts: 11 Mar, 23 May, 19 July. Cut three times: 23 May, 19 July, 29 Sept.

https://doi.org/10.23637/ERADOC-1-29 *pp 25*

77/W/RN/6

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.

TONNES/HECTARE

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

	OATS/A		OATS/G		ROOTS	SUGRBEET SUGAR %	TOTAL SUGAR	TOPS
	GRAIN	STRAW	GRAIN	STRAW	WASHED			
MANURE								
0	0.80	0.94	1.73	2.08	12.6	16.6	2.10	8.2
N1	2.63	2.90	3.71	4.04	19.1	16.3	3.12	21.9
P	0.98	1.17	1.83	2.46	10.6	16.3	1.72	9.2
N1P	3.55	4.08	3.31	3.88	15.7	15.6	2.45	17.4
K	0.92	1.24	1.74	2.28	13.0	17.1	2.22	8.5
N1K	2.89	4.06	3.66	5.06	32.3	17.3	5.60	20.5
PK	0.88	1.34	1.70	2.32	14.2	17.1	2.42	8.4
N1PK	2.46	3.73	3.64	5.29	32.8	16.8	5.51	25.1
N2PK	3.80	6.20	4.76	6.79	38.3	16.5	6.32	40.2
D	1.64	2.28	1.95	2.79	33.3	17.2	5.73	22.2
N1PKD	1.90	2.88	3.55	6.12	46.8	17.6	8.24	35.9
N2PKD	3.82	6.55	4.27	6.59	51.8	16.8	8.68	50.9
MEAN DM%	76.3	49.1	74.4	47.3				

	BARLEY		LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS	POTATOES TOTAL TUBERS -	MG	MEAN
	GRAIN	STRAW							
MANURE									
0	1.41	1.20	0.53	0.37	0.31	1.22	7.5	5.8	6.7
N1	2.96	2.92	2.44	0.76	0.34	3.53	8.2	7.9	8.0
P	1.61	1.33	0.49	0.41	0.26	1.17	7.2	6.2	6.7
N1P	1.73	2.60	2.65	0.60	0.32	3.56	7.9	7.5	7.7
K	1.76	1.57	0.74	0.41	0.68	1.84	11.3	9.9	10.6
N1K	3.54	3.79	2.78	0.67	0.59	4.04	27.0	32.1	29.6
PK	1.50	1.30	0.88	0.60	0.95	2.43	16.1	16.7	16.4
N1PK	3.64	3.57	3.31	0.66	0.57	4.54	31.4	32.8	32.1
N2PK	4.88	5.96	4.76	1.10	0.55	6.41	27.3	36.9	32.1
D	2.20	2.04	1.58	0.94	1.06	3.57	26.0	28.7	27.3
N1PKD	4.68	4.44	4.12	0.98	0.90	6.00	36.9	41.3	39.1
N2PKD	4.99	5.82	6.02	1.58	0.76	8.37	53.6	56.7	55.2
MEAN DM%	79.2	70.2	27.1	33.9	23.2	28.1			

https://doi.org/10.23637/ERADOC-1-29 *pp 26*

77/W/RN/6

TONNES/HECTARE

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

PERMGRAS : DRY MATTER

MANURE	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
0	1.49	0.38	0.58	2.45
N1	3.75	1.62	2.23	7.60
P	1.03	0.22	0.43	1.69
N1P	3.57	1.50	1.96	7.03
K	2.04	0.84	0.99	3.87
N1K	4.21	1.86	2.10	8.17
PK	1.79	0.50	0.83	3.12
N1PK	4.46	1.80	2.24	8.50
N2PK	4.68	1.89	2.44	9.00
D	3.36	0.96	1.06	5.38
N1PKD	5.54	1.89	2.57	10.01
N2PKD	5.66	2.11	2.96	10.73
MEAN DM%	23.1	33.5	23.8	26.8

https://doi.org/10.23637/ERADOC-1-29 *pp 27*

77/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 18th year, ley (Great Field IV): wheat (Sawyers I).

For previous years see 'Details' 1967 and 1973 and 74-76/R/RN/7.

Design: Great 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:
Great 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

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.

https://doi.org/10.23637/ERADOC-1-29 *pp 28*

77/R/RN/7

Standard applications:
Leys (Great Field IV only): Manures: K20 at 250 kg as muriate of potash.
Wheat (Sawyers I only): Manures: K20 at 90 kg as muriate of potash. 'Nitro-Chalk' at 500 kg. Weedkillers: Ioxynil at 0.53 kg with mecoprop at 1.6 kg in 220 l.

Seed: Wheat: Cappelle, sown at 190 kg.

Cultivations, etc.:-
Leys: Standard K applied: 14 Dec, 1976. Treatment P applied: 3 Mar. Cut three times: 25 May, 20 July, 24 Nov.
Wheat: Ploughed: 30 Sept, 1976. Heavy spring-tine cultivated: 3 Nov. Standard K applied: 4 Nov. Treatment P applied: 19 Nov. Seed sown, spring-tine cultivated: 20 Nov. N applied: 13 Apr. Weedkillers applied: 10 May. Combine harvested: 9 Sept.

NOTE: Incidence of take-all was measured in May and July on Sawyers I only.

77/R/RN/7 GREAT FIELD IV

SERIES I

DRY MATTER TONNES/HECTARE

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

	CUT 1 (25/5/77)	CUT 2 (20/7/77)	CUT 3(24/11/77)	TOTAL OF 3 CUTS
P2O5				
NONE	2.28	4.75	1.61	8.64
29 ANN	3.04	4.00	2.10	9.14
57 ANN	3.09	3.24	1.72	8.06
115 ANN	2.93	4.00	2.10	9.03
172 ANN	3.79	4.27	2.20	10.27
86 TRI	3.51	2.77	2.17	8.45
172 TRI	1.96	4.63	1.47	8.06
344 SIX	3.27	3.83	2.07	9.17
688 SIX	3.47	4.10	2.34	9.91
1032 SIX	2.57	4.80	2.11	9.48
376 G(1)	2.38	4.91	2.05	9.34
376 S(1)	2.60	4.35	1.62	8.57
MEAN	2.91	4.14	1.96	9.01
MEAN DM%	21.5	22.8	24.4	22.9

PLOT AREA HARVESTED 0.00186

https://doi.org/10.23637/ERADOC-1-29 *pp 29*

77/R/RN/7 GREAT FIELD IV

SERIES II

DRY MATTER TONNES/HECTARE

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

P205	CUT 1 (25/5/77)	CUT 2 (20/7/77)	CUT 3(24/11/77)	TOTAL OF 3 CUTS
NONE	1.49	3.69	0.96	6.13
29 ANN	1.10	4.02	1.45	6.57
57 ANN	1.51	3.24	1.58	6.33
115 ANN	1.21	3.83	1.57	6.61
172 ANN	1.32	3.28	1.41	6.01
86 TRI	1.30	3.39	1.19	5.88
172 TRI	0.96	4.30	1.41	6.67
344 SIX	1.37	3.94	1.30	6.61
688 SIX	1.53	3.91	1.37	6.82
1032 SIX	0.89	3.24	0.91	5.04
376 G(1)	1.24	3.57	1.03	5.83
376 S(1)	1.61	4.41	1.27	7.30
MEAN	1.29	3.73	1.29	6.32
MEAN DM%	24.5	24.1	22.3	23.6

PLOT AREA HARVESTED 0.00186

SERIES III

DRY MATTER TONNES/HECTARE

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

P205	CUT 1 (25/5/77)	CUT 2 (20/7/77)	CUT 3(24/11/77)	TOTAL OF 3 CUTS
NONE	1.44	4.27	0.67	6.37
29 ANN	1.17	3.50	1.10	5.77
57 ANN	1.42	4.17	1.60	7.20
115 ANN	1.65	4.10	1.50	7.25
172 ANN	1.06	1.74	1.28	4.08
86 TRI	1.38	3.45	1.13	5.96
172 TRI	1.01	3.07	1.53	5.62
344 SIX	1.47	3.55	1.15	6.18
688 SIX	1.33	4.26	1.42	7.01
1032 SIX	1.09	2.29	1.05	4.43
376 G(1)	1.40	3.63	1.09	6.12
376 S(1)	1.24	3.70	0.71	5.65
MEAN	1.30	3.48	1.19	5.97
MEAN DM%	25.0	24.3	21.7	23.7

PLOT AREA HARVESTED 0.00186

https://doi.org/10.23637/ERADOC-1-29 *pp 30*

77/R/RN/7 SAWYERS I

SERIES I 3RD CEREAL WHEAT

GRAIN TONNES/HECTARE

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

P2O5	
NONE	5.29
29 ANN	5.76
57 ANN	6.09
115 ANN	6.02
172 ANN	5.60
86 TRI	6.12
172 TRI	6.12
344 SIX	5.38
688 SIX	5.88
1032 SIX	6.12
376 G(1)	5.61
376 S(1)	5.55
MEAN	5.80

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

TABLE	P2O5
SED	0.420

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.420	7.3

GRAIN MEAN DM% 81.1

STRAW TONNES/HECTARE

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

P2O5	
NONE	4.46
29 ANN	4.51
57 ANN	5.07
115 ANN	4.78
172 ANN	5.29
86 TRI	4.69
172 TRI	4.95
344 SIX	4.58
688 SIX	5.20
1032 SIX	5.22
376 G(1)	4.43
376 S(1)	4.21
MEAN	4.78

STRAW MEAN DM% 91.0

PLOT AREA HARVESTED 0.00562

https://doi.org/10.23637/ERADOC-1-29 *pp 31*

77/R/RN/7 SAWYERS I

SERIES II 4TH CEREAL WHEAT

GRAIN TONNES/HECTARE

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

	P2O5
NONE	3.27
29 ANN	3.91
57 ANN	4.90
115 ANN	4.65
172 ANN	5.12
86 TRI	4.74
172 TRI	4.01
344 SIX	3.55
688 SIX	4.64
1032 SIX	5.06
376 G(1)	3.07
376 S(1)	3.79
MEAN	4.23

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

TABLE	P2O5
SED	0.569

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.569	13.5

GRAIN MEAN DM% 81.7

STRAW TONNES/HECTARE

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

	P2O5
NONE	2.92
29 ANN	3.51
57 ANN	4.08
115 ANN	4.24
172 ANN	4.16
86 TRI	3.48
172 TRI	3.48
344 SIX	3.36
688 SIX	4.32
1032 SIX	4.25
376 G(1)	3.01
376 S(1)	3.31
MEAN	3.68

STRAW MEAN DM% 91.2

PLOT AREA HARVESTED 0.00562

https://doi.org/10.23637/ERADOC-1-29

77/R/RN/7

SERIES III 5TH CEREAL WHEAT

GRAIN TONNES/HECTARE

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

P205	
NONE	4.29
29 ANN	3.89
57 ANN	4.09
115 ANN	3.86
172 ANN	4.32
86 TRI	3.44
172 TRI	4.28
344 SIX	3.56
688 SIX	3.87
1032 SIX	4.31
376 G(1)	3.89
376 S(1)	3.31
MEAN	3.93

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

TABLE	P205
SED	0.527

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.527	13.4

GRAIN MEAN DM% 81.8

STRAW TONNES/HECTARE

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

P205	
NONE	3.33
29 ANN	3.13
57 ANN	3.44
115 ANN	3.67
172 ANN	3.58
86 TRI	2.84
172 TRI	3.63
344 SIX	3.50
688 SIX	3.34
1032 SIX	3.31
376 G(1)	3.48
376 S(1)	2.85
MEAN	3.34

STRAW MEAN DM% 90.6

PLOT AREA HARVESTED 0.00562

https://doi.org/10.23637/ERADOC-1-29

77/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 17th year, spring wheat.

For previous years see 'Details' 1967 and 1973 and 74-76/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: 20 Oct, 1976
ROTAVATE	Rotary cultivated: 13 Oct
DEEPTINE	Deep-tine cultivated twice: 5 Oct
2. WEEDCNTL(76)	Weed control to beans 1976:
MECHANCL	Mechanical
SIMAZINE	Simazine

Sub plots

3. WEEDKLLR(751)	Hormone weedkiller to previous cereals, last applied to barley 1975 (basal weedkiller 'Banlene Plus' at 4.9 l in 220 l in 1977):
NONE	None
DI+ME+MC	Dicamba + mecoprop + MCPA
4. WEEDKLLR(752)	Paraquat weedkiller to previous cereal stubbles, last applied to barley stubble autumn 1975 (basal weedkiller, glyphosate at 1.7 kg in 220 l to bean stubble 1976):
NONE	
PARAQUAT	
EXTRA	plus three extra whole plot treatments:
SPNGTINE	Heavy spring-tine cultivated twice: 6 Oct, 1976. Given simazine to beans 1976, with sub plot treatments 3 and 4 above.
(SH)PLGH	Shallow ploughed: 7 Oct, 1976. Given simazine to beans 1976 and paraquat to barley stubble autumn 1975, with sub plot treatment 3 above.
STANDARD	Standard cultivations as considered best for each crop. Ploughed 20 Oct, 1976. Given simazine to beans 1976, with sub plot treatments 3 and 4 above.

https://doi.org/10.23637/ERADOC-1-29 *pp 34*

77/R/RN/8

NOTE: It was intended to sow winter wheat but prolonged wet weather prevented this.

Basal applications: Manures: (10:24:24) at 250 kg, combine drilled. Insecticide: Pirimicarb at 0.14 kg in 270 l.

Seed: Sappo, sown at 190 kg.

Cultivations, etc.:- Glyphosate applied: 6 Sept, 1976. All plots heavy spring-tine cultivated twice: 25 Nov, 16 Dec. All plots rotary harrowed: 16 Dec. All plots spring-tine cultivated: 4 Apr, 1977. Seed sown: 5 Apr. 'Banlene Plus' applied: 26 May. Insecticide applied: 14 July. Combine harvested: 23 Sept.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

	EXTRA	SPNGTINE	(SH)PLGH	STANDARD
WEEDKLLR(751)				
	NONE	4.32	4.77	4.32
	D1+ME+ML	4.82	5.25	4.48
WEEDKLLR(752)				
	NONE	4.62		4.39
	PARAQUAT	4.53	5.01	4.41
	MEAN	4.58	5.01	4.40

GRAIN MEAN DM% 76.3

SUB PLOT AREA HARVESTED 0.00434

https://doi.org/10.23637/ERADOC-1-29 *pp 35*

77/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

CULTIVTN	PLOUGH	ROTAVATE	DEEPTINE	MEAN
WEEDCNTL(76)				
MECHANCL	4.26	4.04	4.82	4.37
SIMAZINE	4.70	4.45	4.70	4.62
WEEDKLLR(751)				
NONE	4.62	4.33	4.71	4.55
D1+ME+ML	4.49	4.30	4.77	4.52
WEEDKLLR(752)				
NONE	4.56	4.31	4.78	4.55
PARAQUAT	4.55	4.33	4.70	4.53
MEAN	4.55	4.32	4.74	4.54

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

TABLE	CULTIVTN	WEEDCNTL(76)	WEEDKLLR(751)	WEEDKLLR(752)
SED	0.178	0.154	0.038	0.038

TABLE	CULTIVTN WEEDCNTL(76)	CULTIVTN WEEDKLLR(751)	CULTIVTN WEEDKLLR(752)	
SED	0.309			MIN REP
	0.268	0.184	0.184	MAX-MIN
	0.218			MAX REP

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

CULTIVTN	0.066	0.066	

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

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.309	6.8
BLOCK.WP.SP	10	0.114	2.5

GRAIN MEAN DM% 76.4

SUB PLOT AREA HARVESTED 0.00434

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/12

ORGANIC MANURING

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

Sponsor: G.E.G. Mattingly.

The 13th year, winter oats, potatoes.

For previous years see 'Details' 1973 and 74-76/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. An arable rotation 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 RES(76) N 77 — Fertiliser nitrogen (kg N) (residues of treatments to barley 1976 on winter oats, fresh dressings 1977 to potatoes):

W. OATS	POTATOES
0	0
25	75
50	150
75	225
100	300
125	375
150	450
175	525

No fresh nitrogen was applied to winter oats 1977. The crop was cut green in July.

https://doi.org/10.23637/ERADOC-1-29 *pp 37*

77/W/RN/12

Standard applications:
Winter oats: Manures: (0:20:20) at 290 kg, combine drilled. Weedkillers: Glyphosate at 1.7 kg in 280 l. Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l.
Potatoes: Manures: (0:20:20) at 1140 kg in winter. (0:20:20) at 1210 kg in spring. 60 kg Mg as kieserite. Weedkiller: Linuron at 1.3 kg plus paraquat at 0.42 kg ion in 420 l. Fungicide: Mancozeb at 1.3 kg on four occasions, the last three with insecticide, in 420 l, 390 l and twice in 370 l successively. Insecticide: Pirimicarb at 0.14 kg on three occasions with fungicide.

Seed: Winter oats: Peniarth, sown at 200 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
Winter oats: Glyphosate applied: 23 Sept, 1976. Ploughed: 15 Oct. Spring-tine cultivated, seed sown: 8 Nov. Ioxynil plus mecoprop applied: 15 May, 1977. Harvested green: 7-8 July.
Potatoes: Heavy-tine cultivated: 28 July, 1976. Power harrowed: 16 Aug. Ploughed: 15 Oct. Winter PK applied: 17 Jan, 1977. Spring PK and kieserite applied: 6 Apr. Heavy-tine cultivated: 13 Apr. N applied: 19-21 Apr. Power harrowed, potatoes planted: 22 Apr. Grubbed and earthed up, weedkiller applied: 25 May. Fungicide applied: 23 June. Fungicide with insecticide applied: 8 July, 21 July, 12 Aug. Haulm mechanically destroyed: 21 Oct. Lifted: 1 Nov.

https://doi.org/10.23637/ERADOC-1-29 *pp 38*

77/W/RN/12

WINTER OATS

GREEN CROP DRY MATTER TONNES/HECTARE

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

N RES(76) / MANURE	0	25	50	75	100	125	150	175	MEAN
FYM	0.99	0.98	1.05	0.98	1.05	1.09	0.86	0.95	0.99
STRAW	0.73	0.77	0.79	0.80	0.76	0.78	0.82	0.77	0.78
PEAT	0.71	0.76	0.81	0.84	0.79	0.84	0.83	0.81	0.80
GREENMNR	0.61	0.74	0.52	0.55	0.72	0.75	0.80	0.77	0.68
FERT-FYM	0.52	0.62	0.59	0.60	0.71	0.63	0.69	0.67	0.63
FERT-STR	0.68	0.80	0.80	0.87	0.86	0.83	0.78	0.82	0.80
CLOVRLEY	0.93	0.90	0.98	1.10	1.04	1.09	1.22	1.13	1.05
GRASSLEY	0.99	1.09	1.12	1.10	1.17	1.03	1.21	1.10	1.10
MEAN	0.77	0.83	0.83	0.86	0.89	0.88	0.90	0.88	0.85

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

TABLE	MANURE	N RES(76)	MANURE N RES(76)
SED	0.097	0.034	0.132
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.096

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.097	11.4
BLOCK.WP.SP	56	0.096	11.2

GREENCROP MEAN DM% 32.7

SUB PLOT AREA HARVESTED 0.00149

https://doi.org/10.23637/ERADOC-1-29 *pp 39*

77/W/RN/12

TOTAL TUBERS TONNES/HECTARE

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

N 77 MANURE	0	75	150	225	300	375	450	525	MEAN
FYM	17.1	27.9	37.0	40.3	47.5	48.2	49.2	53.6	40.1
STRAW	18.8	32.6	34.7	45.2	46.3	47.6	48.3	43.7	39.7
PEAT	14.2	23.9	33.7	37.7	39.5	42.6	49.1	51.2	36.5
GREENMNR	15.5	34.3	35.5	43.6	44.5	52.4	49.6	52.0	40.9
FERT-FYM	15.2	26.1	33.1	38.3	40.1	44.9	49.9	45.6	36.6
FERT-STR	14.2	28.6	37.1	37.1	42.9	42.8	43.3	44.3	36.3
CLOVRLEY	24.3	32.8	44.1	54.0	50.4	57.4	55.7	54.3	46.6
GRASSLEY	25.3	38.2	43.8	52.8	54.5	52.4	54.7	52.9	46.8
MEAN	18.1	30.6	37.4	43.7	45.7	48.5	50.0	49.7	40.4

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

TABLE	MANURE	N 77	MANURE N 77
SED	2.44	1.28	4.17
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			3.61

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	2.44	6.0
BLOCK.WP.SP	56	3.61	8.9

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

N 77 MANURE	0	75	150	225	300	375	450	525	MEAN
FYM	81.4	89.3	93.2	93.6	93.0	93.8	95.6	95.2	91.9
STRAW	81.1	85.1	89.8	95.2	94.2	96.2	94.9	93.8	91.3
PEAT	73.6	84.0	91.5	91.9	94.0	95.2	95.2	92.9	89.8
GREENMNR	83.7	89.7	92.0	91.6	93.8	94.2	94.3	94.4	91.7
FERT-FYM	82.5	84.2	90.3	90.2	92.9	91.4	94.2	93.3	89.9
FERT-STR	87.0	89.4	93.0	93.2	93.6	94.1	93.2	94.8	92.3
CLOVRLEY	88.7	89.6	93.5	93.0	95.1	94.7	95.3	96.0	93.2
GRASSLEY	84.4	91.6	93.3	94.1	97.0	95.4	95.8	95.7	93.4
MEAN	82.8	87.9	92.1	92.8	94.2	94.4	94.8	94.5	91.7

SUB PLOT AREA HARVESTED 0.00087

https://doi.org/10.23637/ERADOC-1-29 *pp 40*

77/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 12th year, winter wheat, barley.

For previous years see 'Details' 1973 and 74-76/W/RN/13.

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

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:-

Blocks

1. ALDICARB — Aldicarb worked into the seedbed (kg):

0
10

Whole plots

2. PREVCROP — Previous crops:

	1972	1973	1974	1975	1976
C/C/L/P	C	C	C	L	P
C/L/P/C	C	C	L	P	C
L/P/C/C	C	L	P	C	C
P/C/C/C	L	P	C	C	C
C/C/C/L	P	C	C	C	L
C/C/C/C	C	C	C	C	C

Ley = 1 year ley P = Potatoes C = Cereal: wheat or barley. All plots in cereal only from 1977.

Sub plots

3. N — Nitrogen fertiliser (kg N):

Wheat	Barley
63	50
126	100
189	150
252	200

https://doi.org/10.23637/ERADOC-1-29 *pp 41*

77/W/RN/13

Standard applications:
Wheat: Manures: (0:20:20) at 290 kg, combine drilled. Weedkillers: Glyphosate at 1.7 kg in 280 l, methabenzthiazuron at 1.6 kg in 280 l, Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 270 l.
Barley: Manures: (0:20:20) at 300 kg, combine drilled. Weedkillers: Glyphosate at 1.7 kg in 280 l, Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l.

Seed:
Wheat: Cappelle, sown at 210 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:- All plots: Glyphosate applied: 24 Sept, 1976. Rotary cultivated grass leys: 1 Nov. Ploughed: 8 Nov.

Wheat: Aldicarb applied, rotary cultivated, seed sown: 24 Nov, 1976. Methabenzthiazuron applied: 25 Nov. N applied: 13 Apr, 1977. Ioxynil plus mecoprop applied: 15 May. Pirimicarb applied: 11 July. Combine harvested: 7 Sept.
Barley: Spring-tine cultivated: 7 Mar, 1977. Aldicarb applied, rotary cultivated, seed sown: 8 Apr. N applied: 13 Apr. Ioxynil plus mecoprop applied: 19 May. The following treatments were combine harvested on 16 Aug:

ALDICARB 0 PREVCROP C/C/C/L N 50, 150, 200	ALDICARB 10 PREVCROP P/C/C/C N 50, 150	ALDICARB 0 PREVCROP C/C/L/P N 100, 200	ALDICARB 10 PREVCROP C/L/P/C N 100, 150

Remaining treatments combine harvested: 30 Aug.

https://doi.org/10.23637/ERADOC-1-29 *pp 42*

77/W/RN/13

WINTER WHEAT

GRAIN TONNES/HECTARE

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

PREVCROP	C/C/L/P	C/L/P/C	L/P/C/C	P/C/C/C	C/C/C/L	C/C/C/C	MEAN
ALDICARB							
0	3.79	3.58	3.38	2.84	3.44	3.26	3.38
10	3.89	3.65	3.43	2.37	2.70	2.90	3.16
MEAN	3.84	3.62	3.41	2.61	3.07	3.08	3.27

N	63	126	189	252	MEAN
ALDICARB					
0	3.15	3.48	3.56	3.34	3.38
10	2.81	3.55	3.17	3.10	3.16
MEAN	2.98	3.51	3.36	3.22	3.27

N	63	126	189	252	MEAN
PREVCROP					
C/C/L/P	3.55	4.39	3.76	3.66	3.84
C/L/P/C	3.51	4.07	3.60	3.28	3.62
L/P/C/C	2.94	3.50	3.65	3.54	3.41
P/C/C/C	1.98	2.64	2.88	2.93	2.61
C/C/C/L	2.90	3.31	3.00	3.08	3.07
C/C/C/C	3.02	3.18	3.28	2.85	3.08
MEAN	2.98	3.51	3.36	3.22	3.27

N		63	126	189	252
ALDICARB	PREVCROP				
0	C/C/L/P	3.57	4.10	3.68	3.82
	C/L/P/C	3.53	3.86	3.51	3.42
	L/P/C/C	2.79	3.60	3.53	3.59
	P/C/C/C	2.39	2.72	3.18	3.07
	C/C/C/L	3.15	3.57	3.80	3.26
	C/C/C/C	3.50	3.02	3.64	2.90
10	C/C/L/P	3.53	4.69	3.85	3.49
	C/L/P/C	3.49	4.28	3.70	3.14
	L/P/C/C	3.09	3.40	3.76	3.49
	P/C/C/C	1.57	2.56	2.58	2.79
	C/C/C/L	2.66	3.05	2.21	2.90
	C/C/C/C	2.55	3.34	2.92	2.81

GRAIN MEAN DM% 82.6

SUB PLOT AREA HARVESTED 0.00277

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/13

BARLEY

GRAIN TONNES/HECTARE

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

PREVCROP	C/C/L/P	C/L/P/C	L/P/C/C	P/C/C/C	C/C/C/L	C/C/C/C	MEAN
ALDICARB							
0	4.26	4.36	4.49	4.22	4.53	4.06	4.32
10	4.29	4.74	4.48	4.02	4.31	3.82	4.28
MEAN	4.28	4.55	4.48	4.12	4.42	3.94	4.30

N	50	100	150	200	MEAN
ALDICARB					
0	3.35	4.60	4.67	4.67	4.32
10	2.95	4.65	4.98	4.53	4.28
MEAN	3.15	4.63	4.82	4.60	4.30

N	50	100	150	200	MEAN
PREVCROP					
C/C/L/P	3.15	4.62	4.58	4.76	4.28
C/L/P/C	3.88	5.07	4.97	4.29	4.55
L/P/C/C	3.45	4.81	4.97	4.71	4.48
P/C/C/C	2.82	4.33	5.16	4.19	4.12
C/C/C/L	2.83	4.82	4.98	5.06	4.42
C/C/C/C	2.78	4.11	4.28	4.59	3.94
MEAN	3.15	4.63	4.82	4.60	4.30

N		50	100	150	200
ALDICARB	PREVCROP				
0	C/C/L/P	3.49	4.58	4.31	4.67
	C/L/P/C	3.70	4.70	4.65	4.40
	L/P/C/C	3.85	4.65	4.63	4.82
	P/C/C/C	3.38	4.46	4.72	4.34
	C/C/C/L	2.78	4.94	5.05	5.34
	C/C/C/C	2.91	4.27	4.63	4.42
10	C/C/L/P	2.82	4.66	4.84	4.86
	C/L/P/C	4.06	5.43	5.29	4.17
	L/P/C/C	3.05	4.97	5.31	4.60
	P/C/C/C	2.26	4.20	5.60	4.04
	C/C/C/L	2.87	4.70	4.90	4.78
	C/C/C/C	2.64	3.95	3.93	4.76

GRAIN MEAN DM% 81.7

SUB PLOT AREA HARVESTED 0.00277

https://doi.org/10.23637/ERADOC-1-29 *pp 44*

77/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 tenth 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 73-76/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. P205RES(73) Residues of superphosphate applied autumn 1967 and spring 1973 (kg P205):

	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. P205RES(72) Residues of superphosphate applied in three equal dressings 1970-72 (kg P205, total):

0
376

Basal applications: Manures: Ground chalk at 2.5 tonnes. K20 at 110 kg as muriate of potash. MgO at 30 kg as Epsom Salts. K20 at 50 kg as muriate of potash.

Cultivations, etc.:- Ground chalk applied: 3 Sept, 1976. Mg and first K applied: 18 Jan, 1977. Cut once: 22-23 June. Second K applied: 19 July.

https://doi.org/10.23637/ERADOC-1-29 *pp 45*

77/W/RN/14

1ST AND ONLY CUT (22/6/77) DRY MATTER TONNES/HECTARE

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

P205RES(73) / P205RES(72)	0	360	720	1440	2160	MEAN
0	2.86	2.80	3.14	2.92	2.18	2.79
376	3.86	2.85	3.09	2.60	2.24	3.08
MEAN	3.36	2.82	3.11	2.76	2.21	2.94

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

TABLE	P205RES(73)	P205RES(72)	P205RES(73) P205RES(72)	
SED	0.384		0.447	MIN REP
	0.332	0.132	0.387	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.323	MIN REP
			0.228	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	0.665	22.6
BLOCK.WP.SP	31	0.559	19.0

1ST CUT MEAN DM% 32.8

SUB PLOT AREA HARVESTED 0.00145

https://doi.org/10.23637/ERADOC-1-29 *pp 46*

77/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 ninth year, potatoes, barley, sugar beet.

For previous years see 'Details' 1973 and 74-76/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 and S.Beet	Barley
75	38
150	75
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
A D(ALL)	Aldicarb at 6 kg before all crops in 1977. Dazomet at 224 kg before all crops 1970-76
BEN(ALL)	Benomyl at 22 kg before all crops since 1974 only

NOTE: Aldicarb was first used in 1976. From 1969-75 dichloropropane/dichloropropene ('D-D') was applied at 448 kg to CHEMICAL A (P), A (SB), A (B) and A (ALL).

Standard applications:
Potatoes: Manures: (0:14:28) at 1080 kg. Fungicide: Mancozeb at 1.3 kg on four occasions, the last three with insecticide, in 420 l, 390 l and twice in 370 l successively. Insecticide: Pirimicarb at 0.14 kg on three occasions with fungicide.

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/15

Barley: Manures: (0:20:20) at 310 kg. Weedkillers: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 420 l.
Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28) at 1080 kg. Boron at 7.4 kg B_2O_3 (as 'Solubor') applied with insecticide.
Insecticide: Pirimicarb at 0.14 kg in 280 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: Ploughed: 26 Nov, 1976. Aldicarb and benomyl applied, and all plots rotary cultivated: 15 Mar, 1977 (Barley), 15 Apr (Potatoes, sugar beet).
Potatoes: PK applied: 6 Apr, 1977. N applied: 7 Apr. Potatoes planted: 15 Apr. Grubbed: 2 May. Fine tooth cultivated and grubbed twice: 25-26 May. Grubbed and earthed up: 20 June. Fungicide applied four times: 24 June, 8 July, 21 July, 12 Aug. Insecticide applied three times: 8 July, 21 July, 12 Aug. Haulm mechanically destroyed: 20 Sept. Lifted: 4 Oct.
Barley: Spring-tine cultivated: 15 Mar, 1977. N applied, spring-tine cultivated with crumbler attached: 30 Mar. Spring-tine cultivated with crumbler attached, seed sown: 4 Apr. Weedkillers applied: 30 May. Combine harvested: 4 Sept.
Sugar beet: Magnesian limestone applied: 6 Sept, 1976. PK applied: 6 Apr, 1977. N applied: 7 Apr. Spring-tine cultivated with crumbler attached, seed sown: 15 Apr. Tractor hoed: 27 May. Singled: 8-9 June. Steerage hoed: 27 June. Hand hoed: 11 July. Insecticide and boron applied: 18 July. Lifted: 11 Nov.

NOTE: Soil samples were taken after harvest for eelworm counts.

https://doi.org/10.23637/ERADOC-1-29 *pp 48*

77/W/RN/15

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

N / CHEMICAL	75	150	225	MEAN
0	7.1	27.7	26.2	20.3
A (P)	18.4	34.0	35.7	29.4
A (SB)	13.0	20.1	36.3	23.1
A (B)	11.0	28.2	30.7	23.3
A (ALL)	20.6	30.5	41.0	30.7
A D(ALL)	21.0	37.3	44.2	34.2
BEN(ALL)	19.1	23.0	30.8	24.3
MEAN	15.7	28.7	35.0	26.5

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

TABLE	CHEMICAL	N* CHEMICAL
SED	2.98	5.16

* WITHIN SAME LEVEL OF N ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	5.16	19.5

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

N / CHEMICAL	75	150	225	MEAN
0	56.9	85.4	85.5	75.9
A (P)	82.2	90.7	93.0	88.6
A (SB)	77.2	88.1	91.4	85.6
A (B)	73.3	91.1	92.7	85.7
A (ALL)	82.3	91.4	92.3	88.7
A D(ALL)	88.1	90.5	93.6	90.7
BEN(ALL)	81.1	88.8	91.9	87.3
MEAN	77.3	89.4	91.5	86.1

SUB PLOT AREA HARVESTED 0.00052

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/15

BARLEY

GRAIN TONNES/HECTARE

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

N / CHEMICAL	38	75	113	MEAN
0	2.13	3.17	2.85	2.72
A (P)	2.35	3.08	3.44	2.96
A (SB)	2.03	3.49	3.47	2.99
A (B)	2.03	2.68	3.35	2.68
A (ALL)	1.51	3.56	2.82	2.63
A D(ALL)	1.94	3.06	3.45	2.82
BEN(ALL)	2.04	3.19	2.74	2.66
MEAN	2.00	3.18	3.16	2.78

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

TABLE	CHEMICAL	N* CHEMICAL
SED	0.201	0.349

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.349	12.6

GRAIN MEAN DM% 79.4

STRAW TONNES/HECTARE

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

N / CHEMICAL	38	75	113	MEAN
0	1.23	1.91	1.65	1.60
A (P)	1.12	1.43	2.09	1.55
A (SB)	1.08	1.98	1.94	1.67
A (B)	1.29	1.57	1.70	1.52
A (ALL)	0.99	2.07	1.87	1.64
A D(ALL)	1.27	1.85	2.01	1.71
BEN(ALL)	1.22	1.70	1.50	1.47
MEAN	1.17	1.79	1.82	1.59

STRAW MEAN DM% 79.4

SUB PLOT AREA HARVESTED 0.00052

https://doi.org/10.23637/ERADOC-1-29 *pp 50*

77/W/RN/15

SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

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

N / CHEMICAL	75	150	225	MEAN
0	22.0	32.9	34.7	29.8
A (P)	24.6	38.8	36.7	33.4
A (SB)	30.4	40.6	41.0	37.3
A (B)	27.1	35.2	38.6	33.6
A (ALL)	28.6	36.4	40.5	35.2
A D(ALL)	32.3	35.1	36.4	34.6
BEN(ALL)	25.9	31.8	34.0	30.6
MEAN	27.3	35.8	37.4	33.5

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

TABLE	CHEMICAL	N* CHEMICAL
SED	2.04	3.54

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	3.54	10.6

SUGAR PERCENTAGE

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

N / CHEMICAL	75	150	225	MEAN
0	18.8	18.2	17.6	18.2
A (P)	18.7	18.4	17.6	18.3
A (SB)	18.8	18.4	17.6	18.2
A (B)	18.8	18.4	17.7	18.3
A (ALL)	18.7	18.1	17.7	18.2
A D(ALL)	18.7	18.0	17.3	18.0
BEN(ALL)	18.8	18.1	17.7	18.2
MEAN	18.7	18.2	17.6	18.2

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/15

SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

N	75	150	225	MEAN
CHEMICAL				
0	4.13	5.98	6.10	5.40
A (P)	4.61	7.15	6.47	6.08
A (SB)	5.70	7.47	7.22	6.79
A (B)	5.08	6.46	6.82	6.12
A (ALL)	5.35	6.58	7.17	6.37
A D(ALL)	6.05	6.32	6.30	6.22
BEN(ALL)	4.87	5.76	6.01	5.55
MEAN	5.11	6.53	6.58	6.08

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

TABLE	CHEMICAL	N* CHEMICAL
SED	0.392	0.680

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.680	11.2
SUB PLOT AREA HARVESTED	0.00130		

https://doi.org/10.23637/ERADOC-1-29 *pp 52*

77/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 fourth year, winter wheat, sugar beet, spring barley, potatoes.

For previous years see 74-76/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 P205, as superphosphate and 460 kg K20 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 II: Winter wheat: Manures: (0:20:20) at 290 kg combine drilled. N at 100 kg as 'Nitro-Chalk'.
Series III: Sugar beet: Manures: Magnesian limestone at 5 tonnes. (0:14:28) at 750 kg. N at 170 kg as 'Nitro-Chalk'.
Series IV: Barley: Manures: (20:14:14) at 380 kg combine drilled. Weedkillers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 340 l.
Series I: Potatoes: Manures: (13:13:20) at 1860 kg. Weedkillers: Linuron at 1.1 kg plus paraquat at 0.42 kg ion in 340 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.

Cultivations, etc.:-
Series II: Winter wheat: Ploughed, spring-tine cultivated with crumbler attached, seed sown: 9 Nov, 1976. N applied: 12 Apr, 1977. Hand weeded twice: 31 May, 4 June. Hand harvested: 30 Aug.
Series III: Sugar beet: Magnesian limestone applied: 6 Sept, 1976. Ploughed: 9 Nov. PK and N applied: 13 Apr, 1977. Spring-tine cultivated with crumbler attached, seed sown: 15 Apr. Hand weeded: 31 May. Singled: 4 June. Hand lifted: 11 Nov.
Series IV: Barley: Ploughed: 23 Nov, 1976. Spring-tine cultivated with crumbler attached: 8 Mar, 1977. Seed sown: 9 Mar. Weedkillers applied: 18 May. Hand harvested: 23 Aug.

https://doi.org/10.23637/ERADOC-1-29 *pp 53*

77/W/RN/16

Series I: Potatoes: Ploughed: 9 Nov, 1976. NPK applied: 5 Apr, 1977. Rotary cultivated: 14 Apr. Potatoes planted: 15 Apr. Weedkillers applied: 11 May. Hand lifted: 10 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.

WINTER WHEAT

GRAIN TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	4.03	4.51	3.52	4.95	4.25

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

TABLE	PK SUB
SED	0.367

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.450	10.6

GRAIN MEAN DM% 83.1

STRAW TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	6.36	6.51	5.94	6.73	6.38

STRAW MEAN DM% 65.9

PLOT AREA HARVESTED 0.00033

SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	35.8	42.0	38.2	41.8	39.4

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

TABLE	PK SUB
SED	3.30

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	4.04	10.3

https://doi.org/10.23637/ERADOC-1-29

77/W/RN/16

SUGAR BEET

SUGAR PERCENTAGE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	16.9	17.0	16.8	16.7	16.8

TOTAL SUGAR TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	6.03	7.13	6.42	7.01	6.65

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

TABLE	PK SUB
SED	0.691

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.847	12.7

TOPS TONNES/HECTARE

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	25.8	32.1	25.4	30.8	28.5

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

TABLE	PK SUB
SED	3.41

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	4.18	14.6
PLOT AREA HARVESTED	0.00041		

https://doi.org/10.23637/ERADOC-1-29 *pp 55*

77/W/RN/16

BARLEY

GRAIN TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	2.90	3.53	3.20	4.34	3.49

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

TABLE	PK SUB
SED	0.338

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.414	11.9

GRAIN MEAN DM% 78.9

STRAW TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	4.08	3.69	4.17	4.10	4.01

STRAW MEAN DM% 67.1

PLOT AREA HARVESTED 0.00033

POTATOES

TOTAL TUBERS TONNES/HECTARE

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	37.8	40.7	45.7	43.1	41.8

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

TABLE	PK SUB
SED	2.17

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	2.65	6.3

PLOT AREA HARVESTED 0.00043

https://doi.org/10.23637/ERADOC-1-29