ROTHAMSTED RESEARCH

Yields of the Field Experiments 1979

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Rotations

Rothamsted Research

Rothamsted Research (1980) *Rotations ;* Yields Of The Field Experiments 1979, pp 45 - 92 **- DOI: https://doi.org/10.23637/ERADOC-1-45**

79/R/RN/1 and 79/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 were introduced on these blocks - Highfield and Fosters.

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

The 31st year, old grass, leys, oats, potatoes, beans, barley, wheat.

For previous years see 'Details' 1967 & 1973 and 74-78/R/RN/1&2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (79/R/RN/1)

FOSTERS — A site with little organic matter initially (79/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 un-ploughed, 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

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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, 1978 and 1979 one phase, fallowed in the previous year started a new sequence of treatment cropping. In 1979 the remaining phase was fallowed prior to introducing the new sequences in 1980. 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 1st test crop potatoes in the original rotation:-

Sub plots

FYMRES68 Farmyard manure residues, last applied 1968:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N 79 Nitrogen fertiliser (kg N as 'Nitro-Chalk'):

0
80
160
240

Standard applications:
Museum blocks:
1st Treatment crops:
All-grass ley and clover-grass ley: (0:14:28) at 540 kg. Weedkillers: Glyphosate at 1.5 kg in 220 l, paraquat at 0.70 kg ion in 220 l, MCPA at 0.26 kg and MCPB at 1.6 kg in 220 l.
All-grass ley only: 'Nitro-Chalk' at 290 kg.
Lucerne: Manures: (0:20:20) at 380 kg. Weedkillers: Glyphosate at 1.5 kg in 220 l, paraquat at 0.70 kg ion, 2,4-DB at 1.8 kg in 220 l.

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1-year seeds hay: Manures: (0:14:28) at 540 kg. 'Nitro-Chalk' at 290 kg. Weedkillers: Paraquat at 0.70 kg ion. MCPA at 0.26 kg and MCPB at 1.6 kg in 220 l.

1st Test crop:

Potatoes: Manures: (0:20:20) at 1500 kg. Weedkillers: Paraquat at 0.42 kg ion with linuron at 1.1 kg in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l applied four times with and twice without pirimicarb. Insecticides: Phorate granules (at planting) at 1.7 kg, pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 170 l.

Reseeded grass and Old grass: Manures: (0:14:28) at 540 kg.

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

New sequence blocks:

1st Treatment crops:

All crops: Manures: Chalk at 8.7 t, Highfield only.

Lucerne: Manures: (0:14:28) at 720 kg. Weedkillers: 2,4-DB at 1.8 kg in 220 l.

Clover-grass ley: Manures: (0:14:28) at 720 kg (25:0:16) at 300 kg. Weedkillers: MCPA at 0.26 kg with MCPB at 1.6 kg in 220 l.

Ryegrass: Manures: (0:14:28) at 720 kg. (25:0:16) at 300 kg. Weedkillers: MCPA at 0.26 kg with MCPB at 1.6 kg in 220 l.

Oats and Barley: Manures: (20:14:14) at 350 kg, combine drilled. Weedkillers: Bromoxynil and ioxynil (as 'Oxytril CM' at 1.4 kg) with mecoprop at 1.7 kg in 220 l. Fungicide (to barley only): Tridemorph at 0.53 kg in 220 l.

2nd Treatment crops:

Lucerne: Manures: (0:14:28) at 720 kg. Weedkillers: Propyzamide at 0.70 kg in 220 l.

Clover-grass ley and Ryegrass: Manures: (0:14:28) at 720 kg. (25:0:16) at 300 kg in spring, repeated (ryegrass only) after each cut except the last.

Potatoes: Manures: (13:13:20) at 1500 kg. Weedkillers: Paraquat at 0.42 kg ion with linuron at 1.1 kg in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l applied four times with and twice without pirimicarb. Insecticides: Phorate granules (at planting) at 1.7 kg, pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 170 l.

Barley: Manures: (20:14:14) at 350 kg, combine drilled. Weedkillers: Bromoxynil and ioxynil (as 'Oxytril CM' at 1.4 kg) with mecoprop at 1.7 kg in 220 l. Fungicide: Tridemorph at 0.53 kg in 220 l.

3rd Treatment crops:

Lucerne: Manures: (0:14:28) at 720 kg. Weedkillers: Propyzamide at 0.70 kg in 220 l.

Clover-grass ley and Ryegrass: Manures: (0:14:28) at 720 kg. (25:0:16) at 300 kg in spring, repeated (ryegrass only) after each cut except the last.

Beans: Insecticide: Pirimicarb at 0.14 kg in 220 l, applied twice.

Wheat: Manures: (0:20:20) at 250 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkillers: Mecoprop at 2.5 kg with isoproturon at 2.1 kg in 220 l.

Preparatory crops:

Fallow: Weedkillers: Diquat at 0.59 kg ion in 220 l.

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79/R/RN/1 and 79/R/RN/2

Seed:

Museum blocks:

All-grass ley: Meadow Fescue S215 at 17 kg. Timothy Erecta RvP at 17 kg. Mixture sown at 34 kg.

Clover-grass ley: Meadow Fescue S215 at 18 kg. Timothy Erecta RvP at 15 kg. New Zealand White Clover Huia at 4 kg. Mixture sown at 37 kg.

Lucerne: Vertus, sown at 28 kg.

1-year seeds hay: Italian Ryegrass RvP sown at 25 kg (both sowings).

Potatoes: Pentland Crown.

New Sequences:

Lucerne: Vertus, sown at 28 kg.

Clover-grass leys: Meadow Fescue S215 at 18 kg. Timothy Erecta RvP at 15 kg. New Zealand White Clover Huia at 4 kg. Mixture sown at 37 kg.

Ryegrass: S24, sown at 22 kg.

Oats: Manod, sown at 200 kg.

Barley: Porthos, sown at 160 kg.

Potatoes: Pentland Crown.

Beans: Minden, sown at 210 kg.

Wheat: Flanders, sown at 190 kg.

Cultivations, etc.:-

Museum blocks:

All-grass ley and clover-grass ley: Glyphosate applied: 20 Nov, 1978. Ploughed: 20 Dec. Paraquat applied: 6 June, 1979. N and PK applied, rotary harrowed twice, seed sown: 8 June. MCPA and MCPB applied: 11 July. Topped: 18 July. Cut for yield once: 27 Sept.

Lucerne: Glyphosate applied: 20 Nov, 1978. Ploughed: 20 Dec. Paraquat applied: 6 June, 1979. PK applied, rotary harrowed twice, seed sown: 8 June. 2,4-DB applied: 11 July. Topped: 31 July. Cut for yield once: 15 Nov.

1-year seeds hay: Ploughed: 30 Oct, 1978. Disc harrowed (and, Highfield only, rotary harrowed): 31 Oct. Seed sown: 3 Nov. Crop failed, heavy spring-tine cultivated twice: 17 May, 1979. Paraquat applied: 6 June. N and PK applied, rotary harrowed twice, seed sown: 8 June. MCPA and MCPB applied: 11 July. Topped: 18 July. Cut for yield once: 27 Sept.

Potatoes: Ploughed: 20 Dec, 1978. Disc harrowed: 10 May, 1979. PK applied: 14 May. Test N applied, spike rotary cultivated, seed planted: 16 May. Weedkillers applied: 4 June. Grubbed: 18 June (Highfield) and 20 June (Fosters). Rotary ridged: 22 June. Fungicide applied with insecticide four times: 26 June, 5 July, 20 July and 3 Aug. Fungicide applied alone: 15 Aug and 4 Sept. Haulm pulverized: 14 Sept. BOV applied: 21 Sept. Lifted: 9 Oct.

Reseeded Grass and Old Grass: PK applied: 14 Nov, 1978. NK applied (to all-grass half plots only): 8 Mar, 1979, 14 June and 27 July. Cut three times: 4 June, 23 July and 27 Sept.

New sequence blocks:

1st Treatment Crops:

All crops: Chalk applied (Highfield only): 10 Nov, 1978. Ploughed: 19 Dec. Spring-tine cultivated: 23 Apr, 1979.

Lucerne: PK applied, rotary harrowed twice, seed sown: 8 June. 2,4-DB applied: 11 July. Topped: 31 July. Cut: 19 Nov.

Clover-grass ley: PK applied, rotary harrowed twice, seed sown: 8 June. MCPA and MCPB applied: 11 July. Topped: 18 July. NK applied: 20 July. Cut: 27 Sept.

Ryegrass: NK and PK applied: 7 June. Rotary harrowed twice, seed sown: 8 June. MCPA and MCPB applied: 11 July. Topped: 18 July. Cut: 27 Sept.

Oats and barley: Barley sown: 23 Apr. Oats sown: 27 Apr. Weedkillers applied: 5 June. Fungicide applied (Barley only): 12 June. Barley combine harvested: 1 Sept. Oats combine harvested: 6 Sept.

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2nd Treatment crops:

Lucerne: PK applied: 14 Nov, 1978. Weedkiller applied: 18 Dec. Cut: 12 June, 1979, 26 July, 19 Nov.

Clover-grass ley and ryegrass: PK applied: 14 Nov, 1978. Spring NK applied: 8 Mar, 1979. Cut: 6 June, 26 July, 27 Sept. NK applied, to ryegrass only: 14 June, 27 July.

Potatoes: Ploughed: 18 Dec, 1978. Spring-tine cultivated (Fosters only): 19 Apr, 1979. Spring-tine cultivated: 23 Apr. NPK applied: 14 May. Spike rotary cultivated, seed planted: 16 May. Weedkillers applied: 4 June. Grubbed: 18 June (Highfield), 20 June (Fosters). Rotary ridged: 22 June. Fungicide applied with insecticide: 26 June, 5 July, 20 July, 3 Aug. Fungicide applied: 15 Aug, 4 Sept. Haulm pulverized: 14 Sept. BOV applied: 21 Sept. Lifted: 16 Oct.

Barley: Ploughed: 18 Dec, 1978 (Fosters) 21 Dec, (Highfield). Spring-tine cultivated: 19 Apr, 1979 (Fosters), 23 Apr (Highfield). Seed sown: 23 Apr. Weedkillers applied: 5 June. Fungicide applied: 12 June. Combine harvested: 1 Sept.

3rd Treatment Crops:

Lucerne: PK applied: 14 Nov, 1978. Weedkiller applied: 18 Dec. Cut: 12 June, 27 July. Topped: 17 Aug.

Clover-grass ley and ryegrass: PK applied: 14 Nov, 1978. NK applied: 8 Mar, 1979. Cut: 6 June, 26 July. NK applied (to ryegrass only): 14 June. Topped: 17 Aug.

Beans: Ploughed (Highfield only) Deep tine cultivated (Fosters only): 20 Dec, 1978. Spring-tine cultivated (Fosters only): 19 Apr, 1979. Rotary harrowed, seed sown: 23 Apr. Tractor hoed: 6 June. Insecticide applied: 22 June, 12 July. Combine harvested: 20 Sept.

Wheat: Ploughed: 16 Oct, 1978. Rotary harrowed, seed sown: 17 Oct. N applied: 3 May, 1979. Weedkillers applied: 9 May. Combine harvested: 29 Aug.

Preparatory area:

Fallow: Ploughed: 18 Dec, 1978 (Fosters only), 20 Dec (Highfield). Heavy spring-tine cultivated (Highfield only): 17 May, 1979. Rotary cultivated: 18 May, 12 June, 29 June. Cultivated with thistle bar: 2 Aug. Weedkiller applied: 14 Sept. Spring-tine cultivated: 3 Oct. Deep tine cultivated: 30 Oct.

NOTE: In July wheat and barley on the New Sequence blocks were sampled for take-all and Phialophora.

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79/R/RN/1 AND 79/R/RN/2

MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
1ST AND ONLY CUT	2.16	2.40
MEAN DM%	22.9	15.6
ALL GRASS LEY		
1ST AND ONLY CUT	3.55	2.94
MEAN DM%	20.6	18.6
HAY		
1ST AND ONLY CUT	3.16	2.83
MEAN DM%	20.7	19.5

OLD GRASS

TOTAL OF 3 CUTS

	HIGHFIELD	
	C	N
31ST EXPTL YEAR		
BLOCKS 1 & 4	4.34	9.53
BLOCK 2	4.29	10.45
MEAN DM%	20.3	24.4

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RESEEDED GRASS

TOTAL OF 3 CUTS

		HIGHFIELD			FOSTERS	
	BLOCKS	C	N	BLOCKS	C	N
31ST EXPTL YEAR	1 & 4	4.55	10.05	1 & 3	6.00	10.07
31ST EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	5.49	10.43	2 & 4	5.76	9.02
MEAN DM%		23.6	23.3		19.9	20.8

NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

BARLEY

	HIGHFIELD	FOSTERS
	5.77	5.24
MEAN DM%	83.7	83.9

WHEAT

	HIGHFIELD	FOSTERS
	4.56	5.28
MEAN DM%	85.3	85.7

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79/R/RN/1 HIGHFIELD

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

ROTATION FYMRES68	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
NONE	39.5	44.9	39.0	29.9	38.3
FYM	40.1	44.9	39.0	27.0	37.7
MEAN	39.8	44.9	39.0	28.4	38.0

N 79 FYMRES68	0	80	160	240	MEAN
NONE	32.7	37.1	41.1	42.3	38.3
FYM	29.3	39.3	42.4	40.0	37.7
MEAN	31.0	38.2	41.8	41.1	38.0

N 79 ROTATION	0	80	160	240	MEAN
LUCERNE	36.3	42.3	41.6	39.1	39.8
CLOGRA	40.3	45.3	46.0	47.9	44.9
GRASS	33.6	36.8	42.8	42.7	39.0
ARABLE	13.8	28.4	36.7	34.9	28.4
MEAN	31.0	38.2	41.8	41.1	38.0

FYMRES68	N 79 ROTATION	0	80	160	240
NONE	LUCERNE	38.2	40.4	40.4	39.1
	CLOGRA	39.4	45.6	47.9	46.8
	GRASS	33.4	36.2	43.5	42.9
	ARABLE	19.9	26.3	32.7	40.6
FYM	LUCERNE	34.5	44.3	42.7	39.0
	CLOGRA	41.2	45.0	44.2	49.1
	GRASS	33.8	37.4	42.2	42.5
	ARABLE	7.7	30.5	40.6	29.2

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79/R/RN/1 HIGHFIELD

POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES68					
NONE	95.8	96.2	96.3	94.4	95.7
FYM	95.7	96.4	95.6	89.8	94.4
MEAN	95.8	96.3	96.0	92.1	95.0

N 79	0	80	160	240	MEAN
FYMRES68					
NONE	95.6	95.4	95.8	95.8	95.7
FYM	90.6	95.7	96.3	94.9	94.4
MEAN	93.1	95.5	96.1	95.3	95.0

N 79	0	80	160	240	MEAN
ROTATION					
LUCERNE	96.1	95.7	96.3	94.9	95.8
CLOGRA	95.9	96.5	96.3	96.3	96.3
GRASS	96.5	95.5	96.2	95.6	96.0
ARABLE	84.0	94.4	95.5	94.6	92.1
MEAN	93.1	95.5	96.1	95.3	95.0

	N 79	0	80	160	240
FYMRES68	ROTATION				
NONE	LUCERNE	95.5	96.5	95.6	95.5
	CLOGRA	96.7	95.8	95.8	96.4
	GRASS	96.8	95.5	97.7	95.2
	ARABLE	93.4	93.8	94.3	96.2
FYM	LUCERNE	96.6	95.0	97.1	94.3
	CLOGRA	95.1	97.3	96.8	96.2
	GRASS	96.2	95.6	94.7	96.0
	ARABLE	74.5	95.0	96.7	93.0

PLOT AREA HARVESTED 0.00353

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79/R/RN/2 FOSTERS

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

ROTATION FYMRES68	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
NONE	34.8	36.2	31.8	26.9	32.4
FYM	36.4	37.3	34.5	29.9	34.5
MEAN	35.6	36.8	33.1	28.4	33.5

N 79 FYMRES68	0	80	160	240	MEAN
NONE	26.4	35.0	32.7	35.5	32.4
FYM	29.2	35.6	38.0	35.2	34.5
MEAN	27.8	35.3	35.4	35.3	33.5

N 79 ROTATION	0	80	160	240	MEAN
LUCERNE	31.5	37.7	35.4	37.6	35.6
CLOGRA	33.9	38.5	37.9	36.8	36.8
GRASS	27.5	36.3	35.7	33.1	33.1
ARABLE	18.5	28.7	32.5	33.8	28.4
MEAN	27.8	35.3	35.4	35.3	33.5

FYMRES68	N 79 ROTATION	0	80	160	240
NONE	LUCERNE	30.5	36.7	34.2	37.7
	CLOGRA	33.7	38.9	35.1	37.0
	GRASS	25.6	36.3	31.6	33.6
	ARABLE	15.8	28.2	30.0	33.6
FYM	LUCERNE	32.5	38.8	36.7	37.5
	CLOGRA	34.0	38.0	40.6	36.7
	GRASS	29.3	36.2	39.8	32.6
	ARABLE	21.1	29.3	35.1	34.1

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79/R/RN/2 FOSTERS

POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

ROTATION / FYMRES68	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
NONE	95.2	95.4	95.3	94.6	95.1
FYM	95.2	94.3	95.3	94.4	94.8
MEAN	95.2	94.8	95.3	94.5	95.0

N 79 / FYMRES68	0	80	160	240	MEAN
NONE	95.1	94.9	95.4	95.0	95.1
FYM	94.1	95.4	94.8	94.9	94.8
MEAN	94.6	95.1	95.1	95.0	95.0

N 79 / ROTATION	0	80	160	240	MEAN
LUCERNE	94.9	94.9	95.4	95.7	95.2
CLOGRA	94.5	95.2	95.2	94.5	94.8
GRASS	95.1	96.0	95.4	94.7	95.3
ARABLE	93.9	94.4	94.5	95.1	94.5
MEAN	94.6	95.1	95.1	95.0	95.0

FYMRES68 / ROTATION	N 79	0	80	160	240
NONE	LUCERNE	94.4	94.7	95.5	96.3
	CLOGRA	95.9	94.8	96.5	94.3
	GRASS	95.4	96.0	95.4	94.6
	ARABLE	94.7	94.3	94.4	94.9
FYM	LUCERNE	95.4	95.1	95.3	95.0
	CLOGRA	93.1	95.7	93.8	94.6
	GRASS	94.8	96.1	95.5	94.7
	ARABLE	93.0	94.5	94.7	95.4

PLOT AREA HARVESTED 0.00353

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79/W/RN/3

LEY/ARABLE

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

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

The 42nd year, leys, barley, oats, wheat.

For previous years see 'Details' 1967 & 1973 and 74-78/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:

LN	(Previous LEY) LN, LN, LN, W, B
LC	(Previous CLO) LC, LC, LC, W, B
AF	(Previous A) F, F, O, W, B
AB	(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:

ALT LN	LN, LN, LN, LN, LN, LN, LN, LN, W, B
ALT LC	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). Initially some of the long term leys are ploughed up in less than eight years, depending on the starting point in relation to the test crop, to ensure that ultimately eight-year leys will be available for each test crop period.

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79/W/RN/3

Treatments to first test crop wheat and second test crop barley (yields are taken only from the test crops):

ROT CYCL — Combinations of rotations and cycles defined above (all leys ploughed after three years)

LN
LC
AF
AB
ALT LN
ALT LC

Additional treatments to first test crop, wheat:-

1/2 plots

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

   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. FYMRES62 — Farmyard manure residues, last applied 1962:

   NONE — None
   FYM — 38 tonnes on each occasion

1/8 plots

2. N — Nitrogen fertiliser (kg N):

   0
   50
   100
   150

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79/W/RN/3

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

Continuous rotations	No FYM half plots	FYM half plots
LN	289	251
LC	63	0
AF	238	188
AB	188	201
Ex-alternating rotations		
ALT LN ploughed for wheat	226	100
ALT LN not ploughed	138	213
ALT LC ploughed for wheat	138	0
ALT LC not ploughed	0	0

Standard applications:-

Grass ley and Clover/grass ley, 1st year: Manures: (0:14:28) at 540 kg. N at 75 kg as 'Nitro-chalk' to grass ley only.

Grass ley, 2nd, 3rd, 4th, 5th, 6th and 7th years: Manures: Magnesian limestone at 5 t to 5th year only. (0:14:28) at 540 kg. (25:0:16) at 300 kg in spring and after the first cut.

Clover/grass ley, 2nd, 3rd, 4th, 5th, 6th and 7th years: Manures: Magnesian limestone at 5 t to 5th year only. (0:14:28) at 540 kg. K_2O at 48 kg in spring and after the first cut.

Barley, 1st and 2nd treatment crops: Manures: (20:14:14) at 400 kg, combine drilled. Weedkillers: Bromoxynil and ioxynil ('Oxytril CM' at 2.1 kg) in 250 l.

2nd test crop: Manures: Magnesian limestone at 5 t. (0:20:20) at 300 kg, combine drilled. Weedkillers: Bromoxynil and ioxynil ('Oxytril CM' at 2.1 kg) in 250 l. Nematicide: Aldicarb at 10 kg.

Oats: Manures: (20:14:14) at 400 kg, combine drilled. Weedkillers: ('Oxytril CM' at 2.1 kg) in 250 l.

Winter wheat: 1st test crop: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Mecoprop, bromoxynil and ioxynil ('Brittox' at 2.5 kg) in 250 l. Nematicide: Aldicarb at 10 kg.

Varieties: Grass ley: Erecta timothy 17 kg, Meadow fescue S.215 17 kg, sown at 34 kg.
Clover/grass ley: Erecta timothy 20 kg, Meadow fescue S.215 16 kg, Huia white clover 4 kg, sown at 40 kg.
Barley: Porthos, dressed with ethirimol, sown at 160 kg.
Oats: Manod, sown at 200 kg.
Winter wheat: Flanders, sown at 180 kg.

Cultivations, etc.- Treatment crops:

Grass ley and clover/grass ley, 1st year: Ploughed: 21 Nov, 1978. Spring-tine cultivated with crumbler attached: 17 Apr, 1979. PK applied, N applied to grass ley only: 11 May. Rotary cultivated, seeds sown: 4 June. Cut: 4 Sept.

Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th and 7th years: Magnesian limestone applied to 5th year only: 9 Oct, 1978. Corrective K applied to 4th year only: 9 Nov. PK applied: 26 Feb, 1979. NK applied to grass ley, K applied to clover/grass ley: 30 Apr, 5 July. Cut: 19 June, 4 Sept.

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Barley: 1st and 2nd treatment crops: Ploughed: 21 Nov, 1978. Spring-tine cultivated with crumbler attached twice: 17 Apr, 1979, 21 Apr. Seed sown: 23 Apr. Weedkiller applied: 5 June. Combine harvested: 29 Aug.
Oats: 3rd treatment crop: Ploughed: 21 Nov, 1978. Spring-tine cultivated with crumbler attached twice: 17 Apr, 1979, 21 Apr. Seed sown: 23 Apr. Weedkiller applied: 5 June. Combine harvested: 6 Sept.
Fallow: 1st and 2nd treatment year: Ploughed: 21 Nov, 1978. Spring-tine cultivated with crumbler attached: 17 Apr, 1979. Spring-tine cultivated with crumbler attached 2nd year only: 21 Apr. Rotary cultivated 2nd year only: 11 June. Spring-tine cultivated 1st year only: 12 June. Deep-tine cultivated twice: 12 July, 21 Aug.
Test Crops:
Winter wheat, 1st test crop: Rotary cultivated and ploughed: 8 Nov, 1978. Corrective K applied, aldicarb applied, rotary cultivated, spring-tine cultivated, seed sown: 9 Nov. N applied: 17 Apr, 1979. Weedkiller applied: 15 May. Combine harvested: 30 Aug.
Barley, 2nd test crop: Magnesian limestone applied: 9 Oct, 1978. Ploughed: 21 Nov. Spring-tine cultivated with crumbler attached twice: 17 Apr, 1979, 21 Apr. Aldicarb applied, rotary cultivated, seed sown, N applied: 3 May. Weedkiller applied: 5 June. Combine harvested: 28 Aug.

79/W/RN/3 2ND TEST CROP BARLEY

GRAIN TONNES/HECTARE

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

ROT CYCL	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
FYMRES62							
NONE	5.78	5.32	4.86	4.44	4.81	5.53	5.12
FYM	5.09	5.35	4.81	4.57	5.08	5.64	5.09
N							
0	3.69	3.23	2.43	2.57	2.98	3.48	3.06
50	6.15	5.22	4.69	3.96	5.08	6.02	5.19
100	5.86	6.09	5.95	5.37	5.65	6.42	5.89
150	6.05	6.82	6.28	6.12	6.06	6.41	6.29
MEAN	5.44	5.34	4.83	4.51	4.94	5.59	5.11

ROT CYCL	N	LN	LC	AF	AB	ALT LN	ALT LC
FYMRES62							
NONE	0	3.88	3.27	2.40	2.54	2.98	3.49
	50	6.40	5.03	4.91	3.74	4.79	6.04
	100	6.37	5.83	5.91	5.02	5.70	6.25
	150	6.49	7.17	6.21	6.44	5.78	6.34
FYM	0	3.50	3.19	2.45	2.61	2.98	3.47
	50	5.91	5.41	4.47	4.17	5.38	6.01
	100	5.34	6.34	5.99	5.73	5.60	6.60
	150	5.61	6.48	6.34	5.79	6.34	6.49

GRAIN MEAN DM% 83.3

PLOT AREA HARVESTED 0.00260

https://doi.org/10.23637/ERADOC-1-45

79/W/RN/3 1ST TEST CROP WINTER WHEAT

GRAIN TONNES/HECTARE

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

ROT CYCL FYMRES63	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	3.10	3.89	3.92	2.74	2.72	4.43	3.47
FYM	3.13	4.21	4.16	2.74	2.78	4.59	3.60
N							
0	1.68	3.38	0.78	1.03	1.41	3.61	1.98
63	3.18	4.34	4.27	3.02	2.62	4.80	3.71
126	3.88	4.46	5.69	3.45	3.54	4.97	4.33
189	3.74	4.03	5.41	3.47	3.43	4.67	4.12
MEAN	3.12	4.05	4.04	2.74	2.75	4.51	3.54

FYMRES63	ROT CYCL N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	1.79	2.98	0.63	0.78	1.25	3.52
	63	3.12	3.93	3.95	3.03	2.44	4.72
	126	3.93	4.64	5.57	3.36	3.91	4.92
	189	3.56	4.01	5.55	3.79	3.30	4.56
FYM	0	1.56	3.77	0.94	1.29	1.56	3.70
	63	3.24	4.75	4.60	3.00	2.80	4.88
	126	3.83	4.28	5.81	3.55	3.17	5.01
	189	3.91	4.04	5.28	3.14	3.57	4.78

GRAIN MEAN DM% 86.7

STRAW TONNES/HECTARE

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

ROT CYCL FYMRES63	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	4.79	5.32	2.90	1.93	3.50	5.31	3.96
FYM	4.60	5.53	3.12	2.04	3.65	5.35	4.05
N							
0	1.75	3.89	0.58	0.74	1.31	3.70	2.00
63	4.83	5.58	2.45	1.86	3.53	5.30	3.93
126	5.52	5.98	4.29	2.66	4.64	6.01	4.85
189	6.68	6.25	4.69	2.66	4.81	6.32	5.24
MEAN	4.69	5.43	3.01	1.98	3.57	5.33	4.00

FYMRES63	ROT CYCL N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	1.84	3.89	0.54	0.59	1.20	3.66
	63	5.04	5.40	2.25	1.90	3.39	5.52
	126	5.50	5.58	4.24	2.51	4.91	5.87
	189	6.77	6.40	4.55	2.71	4.49	6.21
FYM	0	1.65	3.89	0.62	0.89	1.43	3.75
	63	4.62	5.76	2.66	1.82	3.67	5.08
	126	5.53	6.39	4.34	2.81	4.38	6.15
	189	6.60	6.10	4.84	2.61	5.13	6.43

STRAW MEAN DM% 83.7 PLOT AREA HARVESTED 0.00260

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79/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 38th year, ryegrass.

For previous years see 'Details' 1967 & 1973 and 74-78/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: 75 kg N in spring and after the first cut.

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

Cultivations, etc.:- Both series.
N applied: 6 Apr, 1979, 5 July. Cut three times: 18 June, 3 Aug, 3 Sept.

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79/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 24th year of the rotation, barley, ley, potatoes, winter wheat, kale.
The 20th year of the same rotation on the additional plots.
The 23rd 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 69-78/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 P_2O_5 as superphosphate
K: 250 kg K_2O as muriate of potash
D: 38 tonnes FYM (permanent grass): 50 tonnes (kale and potatoes): none to other crops.

NOTE: 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.

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Additional plots

MANURE

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

F: N PK
N: N2 applied as urea.
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. Since 1978 all F plots received in addition 126 kg K20 for potatoes - applied in autumn 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 and mecoprop at 1.3 kg in 280 l.
Fungicide: Tridemorph at 0.53 kg with benodanil at 1.1 kg in 280 l.
Insecticide: Pirimicarb at 0.14 kg in 280 l.
Potatoes: Fungicide: Mancozeb at 1.3 kg in 280 l applied three times to additional plots and four times to original plots. Insecticides: Pirimicarb at 0.14 kg in 280 l applied twice with the first and second fungicide applications. Menazon at 0.28 kg in 280 l alone to additional plots, with mancozeb to original plots.
Wheat: Ioxynil at 0.32 kg and mecoprop at 0.95 kg in 280 l. Fungicides: Tridemorph at 0.53 kg with benodanil at 1.1 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Kale: Pirimicarb at 0.07 kg in 280 l.

Seed: Barley: Minak, sown at 200 kg.
Grass-clover ley: Italian ryegrass RvP, and red clover Hungaropoly.
Potatoes: Pentland Crown.
Winter wheat: Maris Hobbit, sown at 210 kg.
Kale: Thousand Head.

Cultivations, etc.:-
Barley: Dug by hand: 20 Nov, 1978. P, K, Mg, Ca and S applied: 26 Feb, 1979. N applied, rotary cultivated, raked by hand, seed sown: 19 Apr. Weedkillers applied: 25 May. Trace elements applied: 5 June. Fungicides applied: 25 June. Insecticide applied: 16 July. Harvested by hand: 28 Aug.
Grass-clover ley: Rotary cultivated, raked by hand, seed sown: 1 Sept, 1978. P, K, Mg and S applied: 20 Nov. N applied: 23 Mar, 1979. Cut: 31 May, 19 July, 21 Sept.
Potatoes: Dug by hand: 6 Dec, 1978. P, K, Mg, Ca and S applied: 26 Feb, 1979. N applied (first half on additional plots), rotary cultivated, raked by hand, potatoes planted: 8 May. Second half N applied to additional plots: 5 June.

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Trace elements applied: 11 June. Fungicide with pirimicarb applied: 27 June and 16 July. Fungicide with menazon applied to original plots, additional plots not given manures lifted: 2 Aug. Menazon applied to remaining additional plots, original plots given neither K nor FYM, lifted: 3 Aug. Mancozeb applied to remaining plots: 20 Aug. Remaining plots lifted: 24 Sept.

Wheat: P, K and Mg applied: 21 Sept, 1978. Dug by hand: 22 Sept. Raked by hand, seed sown: 29 Sept. Weedkillers applied: 20 Nov. N applied (first half on additional plots): 23 Mar, 1979. Second half N applied to additional plots: 19 Apr. Fungicides applied: 8 May. Insecticide applied: 16 July. Harvested by hand: 14 Aug.

Kale: FYM applied to original plots, all plots dug: 24 Oct, 1978. P, K, Ca, Mg and S applied: 26 Feb, 1979. N applied (first half on additional plots), rotary cultivated, raked by hand, seed sown: 8 May. Second half N applied to additional plots: 5 June. Trace elements applied to additional plots: 11 June. Insecticide applied: 16 July. Harvested by hand: 11 Oct.

Permanent grass: P and K applied: 20 Nov, 1978. FYM applied: 26 Feb, 1979. N applied: 23 Mar, 31 May, 19 July. Cut: 31 May, 19 July, 20 Sept.

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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	4.68	4.59	10.5	2.83	2.23	1.64	2.01	1.87	5.52
N1	5.56	5.75	11.3	4.17	3.75	2.22	1.86	1.58	5.67
P	4.70	4.66	15.3	3.37	2.73	1.67	1.95	1.58	5.20
N1P	2.19	4.05	20.9	4.89	4.68	2.45	1.38	1.05	4.89
K	4.37	4.42	7.0	3.14	2.70	2.10	3.14	2.15	7.38
N1K	7.31	6.68	13.9	5.29	4.94	2.73	3.13	2.02	7.89
PK	4.72	5.04	14.8	3.61	3.18	4.00	4.92	4.22	13.15
N1PK	8.44	8.44	30.5	5.72	5.45	4.41	4.68	4.46	13.55
N2PK	9.59	8.95	53.6	6.18	6.74	4.94	4.41	3.76	13.11
D	6.03	5.92	25.7	4.62	3.74	3.74	4.62	4.19	12.54
N1PKD	9.85	9.93	44.0	6.66	6.57	4.91	5.40	5.07	15.38
N2PKD	9.68	10.39	63.6	6.53	7.47	5.13	5.19	4.64	14.96
MEAN DM%	79.4	68.2		83.7	71.8	16.5	25.0	21.6	21.0

	POTATOES: TOTAL TUBERS	PERMANENT GRASS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE					
0	7.8	0.60	0.82	0.68	2.10
N1	13.1	1.77	1.14	1.75	4.66
P	20.0	0.70	0.59	0.63	1.92
N1P	12.5	1.96	1.30	1.86	5.12
K	23.1	0.90	1.01	0.93	2.83
N1K	41.3	2.57	2.08	2.01	6.66
PK	32.7	1.11	1.57	1.26	3.94
N1PK	53.8	2.36	1.91	1.85	6.12
N2PK	60.4	4.39	2.55	2.88	9.82
D	43.4	3.36	1.85	1.45	6.65
N1PKD	61.7	5.06	2.43	2.25	9.74
N2PKD	67.5	2.70	3.97	3.61	10.28
MEAN DM%		21.4	31.7	28.0	27.0

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79/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	POTATOES TOTAL TUBERS
MANURE						
0	4.38	4.61	13.5	1.83	1.70	11.3
F	9.71	9.95	56.7	6.36	7.13	58.6
FMGCA	9.68	10.33	48.0	6.25	6.57	58.0
FMGS	8.55	8.94	53.2	6.97	7.02	59.8
FCAS	9.93	9.71	54.5	5.81	5.40	58.2
FMGCAS	9.31	9.76	53.6	6.49	6.94	58.6
FMGCASTE	8.59	9.73	48.4	6.03	6.36	59.2
MEAN DM%	80.7	73.2		84.4	79.5	

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE				
0	2.43	2.55	1.91	6.88
F	3.67	3.34	2.77	9.78
FMGCA	5.05	4.49	4.26	13.80
FMGS	4.56	3.64	3.64	11.83
FCAS	5.06	4.56	4.51	14.13
FMGCAS	5.63	5.10	4.54	15.26
FMGCASTE	4.77	4.82	4.27	13.87
MEAN DM%	17.3	23.8	20.7	20.6

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79/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 20th 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 71-78/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):

BARLEY/G — Barley

In arable rotation since 1960:

BARLEY/A — Barley
LEY — Ley
POTATOES — Potatoes
S BEET — Sugar beet
OATS — Oats

Also:

PERMGRAS — Permanent grass, sown autumn 1973

Plots

2. MANURE — Fertilisers and farmyard manure:-

0
N1
P
N1P
K
NIK
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.

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NOTES: (1) The old grass block was dug in autumn 1973 and follows the arable rotation, the crop in 1979 being barley. A new block was sown to permanent grass in 1974.
(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: Insecticide: Phorate at 2 kg as granules. Weedkillers: Ioxynil at 0.32 kg and mecoprop at 0.94 kg in 280 l; ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l, on both occasions with fungicide. Fungicide: Tridemorph at 0.53 kg on two occasions with weedkiller.
Sugar beet: Manures: Boron at 0.92 kg B203 as borax in 1120 l. Insecticide: Pirimicarb at 0.14 kg in 280 l on two occasions.
Barley: Weedkillers: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l, with fungicide. Fungicide: Tridemorph at 0.53 kg on two occasions the first with weedkiller the second with benodanil. Benodanil at 0.56 kg in 280 l with tridemorph.
Potatoes: Weedkillers: Linuron at 1.0 kg plus paraquat at 0.28 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg on two occasions, alone in 280 l on the first occasion, with the fungicide on the second occasion. Fungicide: Mancozeb at 1.3 kg in 280 l on two occasions, the first with insecticide.

Seed: Winter oats: Peniarth, sown at 210 kg.
Sugar beet: Klein E, sown at 5.6 kg.
Barley: Julia, sown at 180 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: Plots dug by hand, P, K and balancing Mg applied, raked, phorate applied, raked, seed sown, raked in: 2 Oct, 1978. Weedkillers and fungicide applied: 17 Nov. First half N applied: 27 Mar, 1979. Second half N applied: 23 Apr. Weedkillers and fungicide applied: 9 May. Harvested: 26 July.
Sugar beet: FYM applied, plots dug by hand: 14 Nov, 1978. P and K applied: 27 Feb, 1979. First N applied, Mg applied to half plots, rotary cultivated, seed sown, raked in: 23 Mar. Second N and boron applied: 30 Apr. Singled: 7 June. Insecticide applied twice: 27 June, 16 July. Lifted: 10 Oct.
Barley: Balancing Mg applied: 25 Oct, 1978. Plots dug by hand: 13 Nov. P and K applied: 27 Feb, 1979. First N applied, raked, seed sown, raked in: 5 Apr. Second N, weedkillers and tridemorph applied: 9 May. Tridemorph and benodanil applied: 20 June. Harvested: 16 Aug.
Potatoes: FYM applied, plots dug by hand: 5 Dec, 1978. P and K applied: 27 Feb, 1979. First N applied, rotary cultivated, Mg applied to half plots, raked, potatoes planted and earthed up: 9 May. Second N applied, weedkillers applied: 30 May. Insecticide applied: 27 June. Insecticide and fungicide applied: 16 July. Lifted plots without K, fungicide applied to remainder: 20 Aug. Remaining plots lifted: 1 Oct.

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Grass-clover ley: Barley stubble lightly cultivated, seeds sown, raked in: 15 Aug, 1978. P and K applied: 17 Nov. N applied: 27 Mar, 1979. Cut: 7 June, 23 July, 18 Sept.
Permanent Grass: P and K applied: 17 Nov, 1978. FYM applied: 27 Feb, 1979. N applied in three equal amounts: 27 Mar, 7 June, 23 July. Cut: 7 June, 23 July, 18 Sept.

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

TONNES/HECTARE

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

	BARLEY/G		BARLEY/A		LEY : DRY MATTER			
	GRAIN	STRAW	GRAIN	STRAW	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE								
0	1.67	1.50	1.17	1.13	0.99	1.00	1.06	3.05
N1	2.29	2.89	2.44	2.94	2.69	1.07	1.08	4.84
P	1.73	1.52	1.17	1.18	1.27	0.96	1.13	3.36
N1P	1.85	2.61	2.21	2.88	2.69	0.75	0.53	3.97
K	1.97	1.68	1.45	1.22	2.44	2.91	2.82	8.16
N1K	4.11	3.56	4.08	4.04	2.97	2.19	2.54	7.69
PK	1.84	1.58	1.71	1.46	3.05	2.45	2.68	8.18
N1PK	4.51	4.34	4.44	4.45	4.29	2.64	3.73	10.66
N2PK	5.29	6.03	5.27	6.20	5.09	2.64	2.60	10.33
D	2.82	2.28	2.43	2.10	4.21	3.12	2.46	9.79
N1PKD	5.24	5.26	4.77	4.91	5.21	2.72	2.57	10.51
N2PKD	5.42	6.56	5.69	7.14	6.27	2.43	2.37	11.07
MEAN DM%	81.4	77.9	82.3	79.3	19.5	29.9	22.6	24.0

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TONNES/HECTARE

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

	POTATOES TOTAL TUBERS -	MG	MEAN	S BEET ROOTS WASHED	SUGAR %	TOTAL SUGAR	TOPS
MANURE							
0	8.9	9.6	9.2	12.0	15.7	1.88	10.9
N1	6.8	8.5	7.7	19.8	15.3	3.04	23.6
P	8.9	9.6	9.2	11.3	15.9	1.79	10.4
N1P	10.6	9.6	10.1	17.6	14.9	2.62	18.8
K	18.8	26.0	22.4	11.3	16.4	1.85	10.1
N1K	36.6	38.3	37.4	29.6	17.8	5.27	27.5
PK	22.2	26.7	24.4	14.4	16.5	2.37	11.6
N1PK	44.4	46.1	45.3	34.7	17.7	6.13	33.0
N2PK	40.7	27.7	34.2	35.9	16.5	5.92	39.3
D	39.3	36.9	38.1	28.4	18.3	5.20	19.5
N1PKD	52.3	49.5	50.9	41.7	18.0	7.49	32.3
N2PKD	46.1	44.1	45.1	46.8	17.1	8.01	43.7

	OATS GRAIN	STRAW	PERMGRAS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE						
0	1.48	2.25	2.56	0.88	0.84	4.28
N1	4.13	4.67	3.04	1.20	1.85	6.09
P	1.29	2.04	2.47	1.00	0.71	4.19
N1P	4.28	4.77	3.22	1.16	1.81	6.18
K	1.42	2.41	2.67	0.93	1.19	4.78
N1K	3.95	5.37	3.46	1.67	1.84	6.97
PK	1.62	2.70	3.32	1.21	1.13	5.66
N1PK	3.64	5.21	4.03	1.71	1.79	7.54
N2PK	6.23	9.55	4.82	1.63	1.89	8.34
D	2.27	2.93	3.53	1.18	1.35	6.05
N1PKD	4.75	7.17	2.96	1.78	2.14	6.88
N2PKD	6.23	10.23	4.88	2.41	2.07	9.36
MEAN DM%	71.1	45.1	21.7	35.1	23.7	26.8

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79/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 20th year, ley (Great Field IV): wheat and ley (Sawyers I).

For previous years see 'Details' 1967 and 1973 and 74-78/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 1978):
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 were sown to continuous wheat on Sawyers I, to ley on Great Field IV. In 1978 & 1979 one series was sown to ley each year on Sawyers I.
(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.

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Standard applications:
Leys: (Great Field IV and Sawyers I: Series III second-year ley): Manures: K_2O at 250 kg as muriate of potash. (Sawyers I: Series II: First-year ley): Manures: Chalk at 2.9 t. N at 60 kg as 'Nitro-Chalk'. K_2O at 250 kg as muriate of potash. Weedkillers: Glyphosate at 1.5 kg in 220 l.
Wheat: (Sawyers I: Series I: Fifth cereal): Manures: K_2O at 90 kg as muriate of potash. N at 125 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 220 l. Methabenzthiazuron at 3.1 kg in 220 l.

Seed: Ley: (Sawyers I: Series II: First year of ley): Timothy RvP Erecta at 7 kg, Meadow Fescue S215 at 14 kg, New Zealand White Clover Huia at 3 kg, mixture sown at 24 kg.
Wheat: Cappelle, sown at 200 kg.

Cultivations, etc.:-
Leys: (Great Field IV): Standard K applied: 17 Nov, 1978. Test P applied: 6 Mar, 1979. Cut: 6 June, 23 July, 28 Sept.
(Sawyers I: Series III: Second year ley): Standard K applied: 16 Nov, 1978. Test P applied: 6 Mar, 1979. Cut: 6 June, 24 July, 1 Oct.
(Sawyers I: Series II: First year ley): Weedkiller applied: 2 Oct, 1978. Chalk applied: 4 Oct. Ploughed: 26 Oct. Heavy spring-tine cultivated twice: 27 Oct, 17 May, 1979. Standard N and K and test P applied, rotary harrowed, seed sown: 11 June. Cut: 1 Oct.
Wheat: (Sawyers I: Series I: Fifth cereal): Glyphosate applied: 2 Oct, 1978. Ploughed: 26 Oct. Heavy spring-tine cultivated, standard K and test P applied, rotary harrowed, seed sown and methabenzthiazuron applied: 27 Oct. Standard N applied: 23 Apr, 1979. Combine harvested: 31 Aug.

NOTE: Estimates of take-all (Gaeumannomyces graminis) were made on wheat in April and early July.

79/R/RN/7 GREAT FIELD IV

SERIES I LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (6/6/79)	CUT 2 (23/7/79)	CUT 3 (28/9/79)	TOTAL OF 3 CUTS
P_2O_5				
NONE	2.05	3.25	1.47	6.77
29 ANN	1.88	3.02	1.63	6.53
57 ANN	2.31	0.97	2.06	5.34
115 ANN	2.18	2.53	1.70	6.41
172 ANN	2.41	3.31	2.26	7.98
86 TRI	2.74	0.95	2.36	6.05
172 TRI	2.28	3.16	1.85	7.29
344 SIX	2.39	2.55	2.06	6.99
688 SIX	2.17	2.57	2.02	6.76
1032 SIX	2.32	3.12	2.22	7.66
376 G(1)	2.17	3.21	1.38	6.75
376 S(1)	2.52	2.85	1.67	7.04
MEAN	2.28	2.62	1.89	6.80
MEAN DM%	13.5	22.6	22.0	19.4

PLOT AREA HARVESTED 0.00186

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79/R/RN/7 GREAT FIELD IV

SERIES II LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (6/6/79)	CUT 2 (23/7/79)	CUT 3 (28/9/79)	TOTAL OF 3 CUTS
P205				
NONE	2.24	2.95	1.44	6.63
29 ANN	3.19	3.01	1.99	8.19
57 ANN	3.69	3.18	2.12	8.99
115 ANN	3.37	2.80	2.28	8.45
172 ANN	3.38	2.91	2.25	8.55
86 TRI	3.10	3.38	1.85	8.32
172 TRI	3.88	3.13	2.37	9.38
344 SIX	3.35	3.52	1.93	8.80
688 SIX	3.69	2.66	2.16	8.50
1032 SIX	3.51	3.05	2.04	8.60
376 G(1)	2.69	3.51	1.46	7.66
376 S(1)	2.64	3.14	1.58	7.36
MEAN	3.23	3.10	1.96	8.29
MEAN DM%	14.3	22.7	23.5	20.1

PLOT AREA HARVESTED 0.00186

SERIES III LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (6/6/79)	CUT 2 (23/7/79)	CUT 3 (28/9/79)	TOTAL OF 3 CUTS
P205				
NONE	2.23	2.80	1.08	6.12
29 ANN	3.47	3.04	1.73	8.24
57 ANN	3.70	3.50	2.04	9.24
115 ANN	4.23	2.91	1.97	9.12
172 ANN	4.05	2.20	2.58	8.83
86 TRI	3.57	3.11	1.76	8.44
172 TRI	3.90	2.82	2.16	8.88
344 SIX	4.28	3.18	1.83	9.30
688 SIX	3.67	2.94	1.81	8.42
1032 SIX	3.53	2.87	2.27	8.67
376 G(1)	2.64	2.86	1.61	7.11
376 S(1)	2.48	3.30	1.21	6.99
MEAN	3.48	2.96	1.84	8.28
MEAN DM%	14.8	23.0	25.0	20.9

PLOT AREA HARVESTED 0.00186

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79/R/RN/7 SAWYERS I

SERIES II LEY

1ST CUT (1/10/79) DRY MATTER TONNES/HECTARE

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

P205	
NONE	1.20
29 ANN	2.20
57 ANN	2.57
115 ANN	2.91
172 ANN	2.67
86 TRI	2.11
172 TRI	2.35
344 SIX	2.40
688 SIX	2.37
1032 SIX	2.45
376 G(1)	1.20
376 S(1)	1.91
MEAN	2.20
SED*	0.276
CV%	12.6
MEAN DM%	20.4

* NOTE STRATUM STANDARD ERROR (11 df) is also equal to this figure

PLOT AREA HARVESTED 0.00204

SERIES III LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (6/6/79)	CUT 2 (25/7/79)	CUT 3 (1/10/79)	TOTAL OF 3 CUTS
P205				
NONE	3.47	1.83	1.30	6.60
29 ANN	3.13	1.67	1.63	6.43
57 ANN	3.12	2.25	1.87	7.25
115 ANN	3.55	2.47	2.02	8.04
172 ANN	3.74	2.64	2.27	8.64
86 TRI	2.86	1.75	1.61	6.22
172 TRI	3.16	2.45	1.96	7.57
344 SIX	2.96	1.88	1.64	6.48
688 SIX	2.99	1.60	1.67	6.27
1032 SIX	3.67	2.32	2.02	8.02
376 G(1)	4.04	1.72	1.39	7.16
376 S(1)	3.51	1.73	1.38	6.63
MEAN	3.35	2.03	1.73	7.11
SED*	0.203	0.262	0.118	0.345
CV%	6.0	12.9	6.8	4.9
MEAN DM%	17.1	24.8	25.5	22.5

PLOT AREA HARVESTED 0.00204

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78/R/RN/7 SAWYERS I

SERIES III LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (1/9/78)	CUT 2 (30/10/78)	TOTAL OF 2 CUTS
SED*	0.171	0.132	0.237
CV%	8.6	27.2	9.6

79/R/RN/7 SAWYERS I

SERIES I 5TH CEREAL WHEAT

TONNES/HECTARE

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

P205	GRAIN	STRAW
NONE	4.39	4.26
29 ANN	5.12	4.89
57 ANN	5.10	4.93
115 ANN	5.28	4.84
172 ANN	5.37	4.89
86 TRI	4.91	4.54
172 TRI	5.13	4.95
344 SIX	4.72	4.42
688 SIX	5.51	5.33
1032 SIX	5.47	4.98
376 G(1)	4.52	4.21
376 S(1)	4.16	3.89
MEAN	4.97	4.68
SED*	0.356	
CV%	7.2	
MEAN DM%	85.6	90.4

PLOT AREA HARVESTED 0.00562

https://doi.org/10.23637/ERADOC-1-45

79/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, G.V. Dyke, J.A. Currie.

The 19th year, barley.

For previous years see 'Details' 1967 and 1973 and 74-78/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: 27 Nov, 1978
   ROTAVATE — Rotary cultivated by rotary digger: 28 Nov
   DEEPTINE — Deep-tine cultivated twice: 27 Nov

2. WEEDCNTL(76) — Weed control to beans and potatoes in the rotation beans, wheat, potatoes, barley practised until 1976. Last applied to beans 1976:

   MECHANCL — Mechanical
   RESIDUAL — Residual weedkiller (duplicated)

Sub plots

3. WEEDKLLR(75) — Hormone weedkiller to cereals in the previous rotation, last applied to barley 1975 (basal hormone weedkiller to spring wheat 1977 and barley 1978 and 1979):

   NONE
   HORMONE

4. WEEDKLLR(79) — Paraquat weedkiller to cereal stubbles: 23 Oct, 1978

   NONE
   PARAQUAT

NOTE: The combinations of 3 and 4 are tested on half plots: WEEDKLLR(75) NONE, WEEDKLLR(79) NONE and WEEDKLLR(75) HORMONE, WEEDKLLR(79) PARAQUAT on one block, remaining combinations on the other.

EXTRA — plus three extra whole plot treatments:

   SPNGTINE — Heavy spring-tine cultivated twice: 27 Nov, 1978. Given simazine to beans 1976, with sub plot tests 3 and 4 above.

   (SH)PLGH — Shallow ploughed: 27 Nov, 1978. Given simazine to beans 1976 and paraquat to cereal stubbles with sub plot test 3 above.

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STANDARD — Standard cultivations as considered best for each crop. Ploughed 27 Nov, 1978. Given simazine to beans 1976, with sub plot tests 3 and 4 above.

NOTE: Paraquat was applied at 0.56 kg ion in 220 l.

Basal applications: Manures: (20:14:14) at 440 kg, combine drilled. Weedkillers: Bromoxynil and ioxynil (as 'Oxytril CM' at 1.4 kg) and mecoprop at 1.7 kg in 220 l. Fungicide: Tridemorph at 0.53 kg in 220 l.

Seed: Porthos, sown at 160 kg.

Cultivations, etc.:- Spring-tine cultivated twice, seed sown: 19 Apr, 1979. Weedkillers applied: 4 June. Fungicide applied: 12 June. Combine harvested: 26 Aug.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

	EXTRA	SPNGTINE	(SH)PLGH	STANDARD
WEEDKLLR(75)				
	NONE	4.90	4.89	4.78
	HORMONE	5.18	5.06	4.74
WEEDKLLR(79)				
	NONE	5.01		4.44
	PARAQUAT	5.08	4.98	5.08
	MEAN	5.04	4.98	4.76

GRAIN MEAN DM% 82.7

SUB PLOT AREA HARVESTED 0.00434

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79/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

CULTIVTN	PLOUGH	ROTAVATE	DEEPTINE	MEAN
WEEDCNTL(76)				
MECHANCL	4.80	4.67	4.61	4.70
RESIDUAL	5.04	4.64	4.68	4.79
WEEDKLLR(75)				
NONE	5.03	4.63	4.74	4.80
HORMONE	4.88	4.67	4.58	4.71
WEEDKLLR(79)				
NONE	5.03	4.61	4.62	4.75
PARAQUAT	4.89	4.69	4.70	4.76
MEAN	4.96	4.65	4.66	4.76

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

TABLE	CULTIVTN	WEEDCNTL(76)	WEEDKLLR(75)	WEEDKLLR(79)
SED	0.181	0.156	0.082	0.082

TABLE	CULTIVTN WEEDCNTL(76)	CULTIVTN WEEDKLLR(75)	CULTIVTN WEEDKLLR(79)	
SED	0.313			MIN REP
	0.271	0.206	0.206	MAX-MIN
	0.221			MAX REP
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CULTIVTN		0.141	0.141	

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

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.313	6.6
BLOCK.WP.SP	10	0.245	5.1

GRAIN MEAN DM% 82.8

SUB PLOT AREA HARVESTED 0.00434

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79/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 15th year, winter wheat, sugar beet, ley.

For previous years see 'Details' 1973 and 74-78/W/RN/12.

Design for winter wheat: 2 blocks of 8 plots split into 8
sugar beet: 2 blocks of 6 plots split into 8
ley: 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. 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	Clover/grass ley, no N
GRASSLEY	Grass ley with N for each cut

In the sugar beet blocks treatments PEAT & GREENMNR were sown to clover/grass ley in 1979. (No yields obtained in 1979).

Sub plots

2. N — Fertiliser nitrogen (kg N):

WHEAT	SUGAR BEET
0	0
30	40
60	80
90	120
120	160
150	200
180	240
210	280

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79/W/RN/12

Standard applications:
Winter wheat: Manures: P_2O_5 at 110 kg as superphosphate, K_2O at 60 kg as muriate of potash. Weedkiller: Methabenzthiazuron at 1.5 kg in 220 l.
Sugar beet: Manures: Chalk at 5 t, (0:20:20) at 1210 kg in autumn, (0:20:20) at 605 kg in spring. Mg at 60 kg as kieserite. Boron at 8.0 kg B_2O_3 (as 'Solubor') applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg in 250 l.
Clover/grass ley: Manures: Chalk at 5 t, (0:20:20) at 1210 kg in autumn, (0:20:20) at 605 kg in spring, Mg at 60 kg as kieserite.

Seed: Winter wheat: Flanders, sown at 180 kg.
Sugar beet: Klein E, sown at 5.6 kg.
Clover/grass ley: sown at 22.4 kg.

Cultivations, etc.:-
Winter wheat: Heavy spring-tine cultivated, P and K applied, spring-tine cultivated with crumbler attached: 13 Oct, 1978. Seed sown: 14 Oct. Weedkiller applied: 18 Oct. N applied: 18 Apr, 1979. Combine harvested: 29 Aug.
Sugar beet: Chalk applied: 7 Nov, 1978. Autumn PK applied: 24 Nov. Spring PK and Mg applied, spring-tine cultivated: 30 Apr, 1979. Spring-tine cultivated with crumbler attached, seed sown: 1 May. N applied: 4 May. Singled: 11-15 June. Tractor hoed three times: 18 June, 2 July, 16 July. Boron and insecticide applied: 30 June. Lifted: 1 Nov.
Clover/grass ley: Chalk applied: 7 Nov, 1978. Autumn PK applied: 24 Nov. Spring PK and Mg applied, spring-tine cultivated: 30 Apr, 1979. Spring-tine cultivated with crumbler attached: 1 May. N applied: 4 May. Spring-tine cultivated with crumbler attached, seeds sown: 4 June. Topped: 30 July.

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79/W/RN/12 WHEAT

GRAIN TONNES/HECTARE

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

N / MANURE	0	30	60	90	120	150	180	210	MEAN
FYM	1.82	3.82	5.77	6.06	6.88	5.64	6.18	5.89	5.26
STRAW	1.72	3.90	5.48	6.68	6.42	6.58	6.48	6.00	5.41
PEAT	1.38	3.83	5.52	6.42	6.50	7.13	5.89	6.21	5.36
GREENMNR	1.63	3.58	5.16	5.81	4.99	4.76	5.87	5.08	4.61
FERT-FYM	1.16	3.45	4.73	5.83	5.01	4.76	4.44	4.71	4.26
FERT-STR	1.81	3.69	5.44	6.49	6.87	6.33	5.99	5.81	5.30
CLOVRLEY	2.29	4.28	6.11	6.55	6.98	6.17	6.17	6.13	5.59
GRASSLEY	1.57	3.60	5.19	6.52	6.25	5.79	6.52	6.29	5.22
MEAN	1.67	3.77	5.42	6.29	6.24	5.90	5.94	5.77	5.13

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

TABLE	MANURE	N	MANURE N
SED	0.679	0.151	0.787
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.427

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.679	13.2
BLOCK.WP.SP	56	0.427	8.3

GRAIN MEAN DM% 84.7

STRAW TONNES/HECTARE

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

N / MANURE	0	30	60	90	120	150	180	210	MEAN
FYM	1.52	2.96	4.27	5.38	4.78	5.40	5.82	6.75	4.61
STRAW	1.62	3.51	5.15	6.15	6.15	6.66	7.10	6.93	5.41
PEAT	1.14	2.57	3.53	5.30	5.86	4.98	6.34	5.70	4.43
GREENMNR	1.36	3.10	4.23	5.02	4.85	4.79	5.48	5.79	4.33
FERT-FYM	1.17	3.10	4.17	4.89	5.40	5.72	5.39	5.32	4.40
FERT-STR	1.54	3.10	4.79	5.29	6.39	5.76	6.33	6.36	4.95
CLOVRLEY	1.66	3.60	5.29	6.27	6.61	7.04	6.77	7.34	5.57
GRASSLEY	1.31	2.79	4.31	4.97	5.92	5.72	6.27	6.53	4.73
MEAN	1.42	3.09	4.47	5.41	5.74	5.76	6.19	6.34	4.80

STRAW MEAN DM% 90.2

SUB PLOT AREA HARVESTED 0.00173

https://doi.org/10.23637/ERADOC-1-45 *pp 38*

79/W/RN/12 SUGAR BEET

ROOTS WASHED TONNES/HECTARE

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

N	0	40	80	120	160	200	240	280	MEAN
MANURE									
FYM	14.2	25.1	29.6	32.4	33.4	30.6	29.2	32.3	28.4
STRAW	13.1	24.9	30.1	37.6	36.8	32.3	34.6	30.8	30.0
FERT-FYM	8.6	21.4	27.2	29.0	31.1	33.7	27.5	25.7	25.5
FERT-STR	10.1	20.6	29.9	31.7	35.9	34.4	28.2	22.3	26.6
CLOVRLEY	12.3	25.4	34.4	34.4	31.3	32.8	28.8	32.9	29.0
GRASSLEY	16.3	28.3	37.7	40.6	42.5	39.8	39.0	39.7	35.5
MEAN	12.4	24.3	31.5	34.3	35.2	33.9	31.2	30.6	29.2

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

TABLE	MANURE	N	MANURE N
SED	3.11	1.58	4.78
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			3.88

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	3.11	10.7
BLOCK.WP.SP	42	3.88	13.3

SUGAR PERCENTAGE

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

N	0	40	80	120	160	200	240	280	MEAN
MANURE									
FYM	18.0	18.2	18.4	17.7	16.9	16.8	16.4	15.9	17.3
STRAW	17.7	18.0	17.7	17.4	18.1	16.5	16.1	15.8	17.2
FERT-FYM	17.2	18.0	18.1	17.8	17.1	16.6	16.4	16.2	17.2
FERT-STR	17.3	18.1	18.2	17.4	17.5	16.7	16.0	15.9	17.2
CLOVRLEY	17.6	17.8	17.7	17.2	17.1	16.8	16.0	15.8	17.0
GRASSLEY	17.8	18.0	18.4	17.9	17.7	16.8	16.5	16.0	17.4
MEAN	17.6	18.0	18.1	17.6	17.4	16.7	16.2	16.0	17.2

https://doi.org/10.23637/ERADOC-1-45

79/W/RN/12 SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

N / MANURE	0	40	80	120	160	200	240	280	MEAN
FYM	2.57	4.58	5.44	5.74	5.64	5.16	4.81	5.13	4.89
STRAW	2.31	4.49	5.32	6.57	6.67	5.32	5.58	4.87	5.14
FERT-FYM	1.48	3.84	4.93	5.17	5.31	5.58	4.51	4.16	4.37
FERT-STR	1.76	3.73	5.45	5.51	6.29	5.76	4.56	3.56	4.58
CLOVRLEY	2.16	4.53	6.11	5.94	5.35	5.49	4.61	5.19	4.92
GRASSLEY	2.91	5.09	6.90	7.24	7.51	6.71	6.46	6.36	6.15
MEAN	2.20	4.38	5.69	6.03	6.13	5.67	5.09	4.88	5.01

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

TABLE	MANURE	N	MANURE N
SED	0.540	0.282	0.842
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.690

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.540	10.8
BLOCK.WP.SP	42	0.690	13.8

TOPS TONNES/HECTARE

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

N / MANURE	0	40	80	120	160	200	240	280	MEAN
FYM	10.1	14.5	19.5	28.8	31.7	33.5	33.8	38.7	26.3
STRAW	8.4	19.4	21.4	30.5	33.5	39.1	42.4	33.8	28.5
FERT-FYM	5.8	12.4	19.4	23.4	29.6	35.6	28.9	28.2	22.9
FERT-STR	7.5	12.2	21.1	24.8	31.7	35.4	30.2	29.1	24.0
CLOVRLEY	8.9	16.2	25.5	29.5	29.8	35.4	36.6	35.6	27.2
GRASSLEY	11.7	19.2	29.5	36.3	37.8	40.8	42.9	45.3	32.9
MEAN	8.7	15.6	22.7	28.9	32.4	36.6	35.8	35.1	27.0

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

TABLE	MANURE	N	MANURE N
SED	2.85	1.34	4.18
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			3.27

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	2.85	10.6
BLOCK.WP.SP	42	3.27	12.1

SUB PLOT AREA HARVESTED 0.00130

https://doi.org/10.23637/ERADOC-1-45

79/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 14th year, winter wheat, barley.

For previous years see 'Details' 1973 and 74-78/W/RN/13.

Design: For each experiment: 2 randomised blocks of 6 plots, split into 4. DAZOMET 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. DAZOMET — Dazomet (cumulative to a test of none and aldicarb in 1977 & 1978) applied in autumn (kg):

0
336

Whole plots

2. PREVCROP — Previous crops:

	1972	1973	1974	1975	1976	1977	1978
P C2	C	C	C	L	P	C	C
P C3	C	C	L	P	C	C	C
P C4	C	L	P	C	C	C	C
P C5	L	P	C	C	C	C	C
L C2	P	C	C	C	L	C	C
C13	C	C	C	C	C	C	C

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

Sub plots

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

Wheat	Barley	Wheat Autumn	Wheat Spring	Barley Spring
0 + 63	50	0 + 63		50
0 + 126	100	0 + 126		100
0 + 189	150	0 + 189		150
63 + 189	200	63 + 189		200

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79/W/RN/13

Standard applications:
Wheat: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Methabenzthiazuron at 1.5 kg in 220 l.
Barley: Manures: (0:20:20) at 300 kg, combine drilled. Weedkillers: Bromoxynil with ioxynil ('Oxytril CM' at 2.1 kg in 250 l).

Seed: Wheat: Flanders, sown at 180 kg.
Barley: Porthos, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-
All plots: Ploughed: 30 Aug, 1978. Spring-tine cultivated, with crumbler attached: 31 Aug. Dazomet applied and all plots rotary cultivated: 7 Sept.
Wheat: Rotary cultivated: 11 Oct, 1978. Seed sown: 13 Oct. Autumn N and weedkiller applied: 18 Oct. Spring N applied: 10 Apr, 1979. Combine harvested: 30 Aug.
Barley: Heavy spring-tine cultivated: 16 Oct, 1978. Spring-tine cultivated, with crumbler attached, twice: 16 Apr, 1979, 20 Apr. Seed sown: 23 Apr. N applied: 30 Apr. Weedkiller applied: 5 June. Combine harvested: 28 Aug.

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79/W/RN/13

WINTER WHEAT

GRAIN TONNES/HECTARE

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

PREVCROP / DAZOMET	P C2	P C3	P C4	P C5	L C2	C13	MEAN
0	4.38	4.37	4.15	4.76	3.96	4.64	4.38
336	5.19	5.15	4.94	5.23	4.64	4.91	5.01
MEAN	4.79	4.76	4.54	5.00	4.30	4.77	4.69

N / DAZOMET	0+63	0+126	0+189	63+189	MEAN
0	3.50	4.61	4.80	4.60	4.38
336	4.96	5.67	4.95	4.47	5.01
MEAN	4.23	5.14	4.87	4.54	4.69

N / PREVCROP	0+63	0+126	0+189	63+189	MEAN
P C2	4.00	5.37	4.82	4.96	4.79
P C3	4.25	5.15	5.08	4.56	4.76
P C4	4.17	4.87	4.58	4.55	4.54
P C5	4.47	5.56	5.29	4.68	5.00
L C2	3.80	4.86	4.31	4.23	4.30
C13	4.68	5.01	5.16	4.24	4.77
MEAN	4.23	5.14	4.87	4.54	4.69

DAZOMET / N / PREVCROP	0+63	0+126	0+189	63+189
0 P C2	3.25	4.69	4.69	4.91
P C3	3.36	4.87	4.55	4.69
P C4	3.38	3.97	4.64	4.61
P C5	3.82	5.18	5.23	4.84
L C2	2.92	4.19	4.43	4.32
C13	4.26	4.75	5.27	4.27
336 P C2	4.74	6.06	4.96	5.02
P C3	5.14	5.42	5.61	4.43
P C4	4.97	5.76	4.53	4.48
P C5	5.13	5.93	5.35	4.53
L C2	4.68	5.54	4.20	4.14
C13	5.10	5.27	5.04	4.21

GRAIN MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00277

https://doi.org/10.23637/ERADOC-1-45 *pp 43*

79/W/RN/13

BARLEY

GRAIN TONNES/HECTARE

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

PREVCROP / DAZOMET	P C2	P C3	P C4	P C5	L C2	C13	MEAN
0	4.52	4.28	4.72	4.28	4.42	4.03	4.38
336	4.96	4.99	5.06	4.71	4.70	4.86	4.88
MEAN	4.74	4.63	4.89	4.50	4.56	4.44	4.63

N / DAZOMET	50	100	150	200	MEAN
0	2.61	4.26	5.26	5.37	4.38
336	3.84	5.15	5.23	5.29	4.88
MEAN	3.22	4.71	5.25	5.33	4.63

N / PREVCROP	50	100	150	200	MEAN
P C2	3.10	4.88	5.35	5.64	4.74
P C3	3.28	4.83	5.11	5.31	4.63
P C4	3.66	4.94	5.44	5.51	4.89
P C5	2.90	4.63	5.24	5.22	4.50
L C2	3.34	4.43	5.18	5.28	4.56
C13	3.06	4.52	5.16	5.03	4.44
MEAN	3.22	4.71	5.25	5.33	4.63

DAZOMET / N / PREVCROP	50	100	150	200
0 P C2	2.29	4.52	5.58	5.70
P C3	2.52	4.41	5.02	5.18
P C4	3.34	4.53	5.37	5.64
P C5	2.03	4.36	5.30	5.44
L C2	3.09	3.85	5.37	5.38
C13	2.37	3.93	4.92	4.89
336 P C2	3.90	5.25	5.12	5.58
P C3	4.05	5.25	5.20	5.44
P C4	3.97	5.36	5.52	5.38
P C5	3.78	4.90	5.18	5.00
L C2	3.59	5.02	5.00	5.18
C13	3.75	5.12	5.40	5.17

GRAIN MEAN DM% 85.3

SUB PLOT AREA HARVESTED 0.00277

https://doi.org/10.23637/ERADOC-1-45

79/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 12th 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 73-78/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: K20 at 240 kg as muriate of potash. MgO at 30 kg as Epsom Salts in winter. K20 at 48 kg as muriate of potash after the first cut.

Cultivations, etc.:- K and Mg applied: 6 Feb, 1979. Cut twice: 21 June, 7 Sept. K applied: 5 July.

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79/W/RN/14

1ST CUT (21/6/79) DRY MATTER TONNES/HECTARE

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

P205RES(73) / P205RES(72)	0	360	720	1440	2160	MEAN
0	4.94	5.21	4.90	6.06	4.92	5.16
376	5.10	5.27	4.84	5.30	4.42	5.01
MEAN	5.02	5.24	4.87	5.68	4.67	5.08

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

TABLE	P205RES(73)	P205RES(72)	P205RES(73) P205RES(72)	
SED	0.328		0.368	MIN REP
	0.284	0.096	0.319	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.235	MIN REP
			0.167	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	0.568	11.2
BLOCK.WP.SP	31	0.408	8.0

1ST CUT MEAN DM% 20.3

1ST CUT PLOT AREA HARVESTED 0.00145

https://doi.org/10.23637/ERADOC-1-45

79/W/RN/14

2ND CUT (7/9/79) DRY MATTER TONNES/HECTARE

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

P205RES(73) / P205RES(72)	0	360	720	1440	2160	MEAN
0	0.77	0.97	0.71	0.93	0.76	0.82
376	0.90	0.80	0.84	0.84	0.66	0.82
MEAN	0.83	0.89	0.77	0.88	0.71	0.82

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

TABLE	P205RES(73)	P205RES(72)	P205RES(73) P205RES(72)	
SED	0.170		0.176	MIN REP
	0.147	0.027	0.152	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.067	MIN REP
			0.047	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.294	35.8
BLOCK.WP.SP	31	0.116	14.1

2ND CUT MEAN DM% 24.6 2ND CUT PLOT AREA HARVESTED 0.00129

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

P205RES(73) / P205RES(72)	0	360	720	1440	2160	MEAN
0	5.71	6.18	5.61	6.99	5.68	5.98
376	6.00	6.07	5.67	6.14	5.09	5.83
MEAN	5.85	6.12	5.64	6.57	5.38	5.90

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

TABLE	P205RES(73)	P205RES(72)	P205RES(73) P205RES(72)	
SED	0.452		0.485	MIN REP
	0.392	0.101	0.420	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.248	MIN REP
			0.176	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.783	13.3
BLOCK.WP.SP	31	0.430	7.3

TOTAL OF 2 CUTS MEAN DM% 22.5

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79/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 barley - Woburn Butt Furlong.

Sponsor: J. McEwen.

The sixth year, spring barley.

For previous years see 74-78/W/RN/16.

Design: 4 series of 3 randomised blocks of 4 plots with PREVCROP on series.

Whole plot dimensions: 4.27 x 2.59.

Treatments: All combinations of:-

Series

1. PREVCROP — Previous cropping (1974-1977) (all in barley 1978):

P B	Wheat, sugar beet, barley, potatoes
W B	Sugar beet, barley, potatoes, wheat
S B	Barley, potatoes, wheat, sugar beet
B B	Potatoes, wheat, sugar beet, barley

Plots

2. PK SUB — Extra PK and subsoil treatment (applied autumn 1973):

	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.

Basal applications: Manures: All Series: (20:14:14) at 450 kg combine drilled. Weedkillers: Glyphosate at 1.7 kg in 280 l, Mecoprop, bromoxynil and ioxynil ('Brittox' 3.5 kg in 250 l).

Seed: Porthos, dressed with ethirimol, sown at 160 kg.

https://doi.org/10.23637/ERADOC-1-45 *pp 48*

79/W/RN/16

Cultivations, etc.:- Glyphosate applied: 14 Sept, 1978. Ploughed: 17 Nov. Spring-tine cultivated, with crumbler attached, twice: 16 Apr, 1979, 20 Apr. Seed sown: 23 Apr. 'Brittox' applied: 1 June. Combine harvested: 28 Aug.

NOTE: Samples of grain were analysed for contents of N, P, K, Na, Ca and Mg.

GRAIN TONNES/HECTARE

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

PK SUB / PREVCROP	- -	- SUB	PKTOP -	- PKSUB	MEAN
P B	4.17	4.98	4.24	4.74	4.53
W B	3.04	3.34	3.07	3.44	3.22
S B	4.67	5.01	4.35	5.28	4.83
B B	2.82	3.21	2.80	3.11	2.99
MEAN	3.68	4.13	3.62	4.14	3.89

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

TABLE	PK SUB	PREVCROP* PK SUB
SED	0.150	0.300

* ONLY WHEN COMPARING MEANS WITH SAME LEVELS OF PREVCROP

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.278	7.1
BLOCK.WP.SP	24	0.368	9.5

GRAIN MEAN DM% 81.8

STRAW TONNES/HECTARE

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

PK SUB / PREVCROP	- -	- SUB	PKTOP -	- PKSUB	MEAN
P B	3.33	4.45	3.82	4.21	3.95
W B	3.48	3.58	3.25	3.87	3.55
S B	4.68	4.76	4.01	5.06	4.63
B B	2.95	3.35	2.86	3.23	3.10
MEAN	3.61	4.04	3.49	4.09	3.81

STRAW MEAN DM% 79.1

SUB PLOT AREA HARVESTED 0.00065

https://doi.org/10.23637/ERADOC-1-45 *pp 49*