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82/W/RN/3 Ley/ARABLE - Leys, S. Barley, S. Beans, W. Wheat

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82/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.

The 45th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-81/W/RN/3.

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

Whole plot dimensions: 8.53 x 40.7.

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

ROTATION

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

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

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated

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

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

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

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

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

LN 8	LN, LN, LN, LN, LN, LN, LN, LN, W, B
LC 8	LC, LC, LC, LC, LC, LC, LC, LC, W, B

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

Yields are taken only from the test crops.

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

1. ROTATION Rotations:

LN 8
LN 3
LC 8
LC 3
AF
AB

1/2 plots

2. FYMRES66 Farmyard manure residues, last applied 1966:

NONE None
FYM 38 tonnes on each occasion

1/8 plots

3. N Nitrogen fertilizer (kg N):

0
70
140
210

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

whole plots

1. ROTATION Rotations:

LN 8
LN 3
LC 8
LC 3
AF
AB

1/2 plots

2. FYMRES65 Farmyard manure residues, last applied 1965:

NONE None
FYM 38 tonnes on each occasion

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1/8 plots

3. N Nitrogen fertilizer (kg N):

0
60
120
180

Corrective K dressings (kg K₂O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block:

Continuous rotations	No FYM half plots	FYM half plots
LN	163	151
LC	0	38
AF	264	276
AB	276	251

Ex-alternating rotations

LN 8 ploughed for w. wheat	238	188
LN 8 not ploughed	126	100
LC 8 ploughed for w. wheat	13	25
LC 8 not ploughed	88	151

Standard applications:-

Grass ley and clover/grass, 1st year: Manures: (0:18:36) at 420 kg. N at 75 kg as 'Nitro-Chalk' to grass ley only. Weedkiller: Glyphosate at 1.5 kg in 280 l.

Grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:14:28) at 530 kg. (25:0:16) at 300 kg in spring and after the first cut.

Clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:14:28) at 530 kg. K₂O at 48 kg in spring and after the first cut.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.

Fallow, 1st treatment crop: Glyphosate at 1.5 kg in 280 l.

S. beans, 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, 0.76 kg trietazine with 0.10 kg simazine in 280 l.

W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, chlortoluron at 5.6 l in 280 l. Nematicide: Aldicarb at 10 kg.

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 300 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l. Nematicide: Aldicarb at 10 kg.

Varieties: Grass ley: Climax timothy at 17 kg, meadow fescue at 17 kg, mixture sown at 34 kg.

Clover/grass ley: Climax timothy at 18 kg, meadow fescue at 15 kg, Huia white clover at 4 kg, mixture sown at 37 kg.

S. barley: Triumph, dressed with ethirimol, sown at 160 kg.

S. beans: Minden, sown at 220 kg.

W. wheat: Avalon, sown at 200 kg.

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Cultivations, etc.:— Treatment crops:

- Grass ley and clover/grass ley, 1st year: Weedkiller applied: 1 Oct, 1981. Ploughed: 12 Nov. Spring-tine cultivated with crumbler attached, PK applied, N applied to grass ley only: 15 Apr, 1982. Spring-tine cultivated with crumbler attached: 19 Apr. Seeds sown: 29 Apr. Topped: 16 June, 29 June, 26 July. Cut: 8 Sept.
- Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Magnesian limestone applied to 5th year only: 6 Oct, 1981. Corrective K applied to 4th year only: 5 Nov. PK applied: 5 Feb, 1982. NK applied to grass ley, K applied to clover/grass ley: 24 Mar, 15 June. Cut: 8 June, 8 Sept.
- S. barley, 1st and 2nd treatment crops: Glyphosate applied: 1 Oct, 1981. Ploughed: 12 Nov. NPK applied, deep-tine cultivated: 25 Mar, 1982. Spring-tine cultivated with crumbler attached, seed sown: 29 Mar. 'Poly-Farmon' applied: 17 May. Combine harvested: 11 Aug.
- S. beans, 3rd treatment crop: Glyphosate applied: 1 Oct, 1981. Ploughed: 13 Nov. PK applied, deep-tine cultivated: 25 Mar, 1982. Spring-tine cultivated: 29 Mar. Seed sown: 30 Mar. Simazine and trietazine applied: 5 Apr. Combine harvested: 4 Sept.
- Fallow, 1st and 2nd treatment years: Glyphosate applied to 1st treatment year only: 1 Oct, 1981. Ploughed: 12 Nov. Spring-tine cultivated: 15 Apr, 1982, 19 Apr, 5 July. Deep-tine cultivated: 16 June.

Test crops:

- W. wheat, 1st test crop: Glyphosate applied after beans: 1 Oct, 1981, after leys: 14 Oct. Ploughed: 4 Nov. Corrective K applied, PK applied, aldicarb applied, rotary cultivated, seed sown: 5 Nov. Chlortoluron applied: 13 Nov. N applied: 15 Apr, 1982. Combine harvested: 16 Aug.
- S. barley, 2nd test crop: Glyphosate applied: 1 Oct, 1981. Magnesian limestone applied: 6 Oct. Ploughed: 13 Nov. PK applied, deep-tine cultivated: 25 Mar, 1982. Aldicarb applied, rotary cultivated, seed sown: 29 Mar. N applied: 1 Apr. 'Poly-Farmon' applied: 17 May. Combine harvested: 11 Aug.

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WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

	N	0	70	140	210	MEAN	
FYMRES66							
NONE		5.16	7.50	8.23	8.11	7.25	
FYM		5.31	7.60	8.03	7.96	7.23	
MEAN		5.23	7.55	8.13	8.04	7.24	
ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
FYMRES66							
NONE		7.27	7.47	7.79	7.37	7.18	6.42
FYM		7.32	7.16	8.17	7.01	6.72	6.97
MEAN		7.29	7.32	7.98	7.19	6.95	6.70
ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
N							
0		5.55	5.37	6.56	5.16	4.30	4.47
70		8.04	7.91	8.36	7.81	6.82	6.38
140		8.27	7.53	8.60	8.38	8.16	7.82
210		7.31	8.46	8.41	7.40	8.52	8.13
MEAN		7.29	7.32	7.98	7.19	6.95	6.70
	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
FYMRES66	N						
NONE	0	5.59	5.95	6.17	5.38	4.41	3.44
	70	7.90	7.96	8.42	7.28	7.52	5.94
	140	8.27	7.59	8.64	8.43	8.31	8.12
	210	7.30	8.39	7.92	8.39	8.48	8.19
FYM	0	5.50	4.78	6.96	4.93	4.19	5.50
	70	8.17	7.86	8.29	8.35	6.11	6.82
	140	8.27	7.46	8.56	8.33	8.02	7.52
	210	7.32	8.54	8.89	6.41	8.56	8.06

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00251

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BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

	N	0	60	120	180	MEAN	
FYMRES65							
NONE		4.06	6.63	8.09	7.97	6.69	
FYM		4.65	6.87	8.21	7.67	6.85	
MEAN		4.36	6.75	8.15	7.82	6.77	
ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
FYMRES65							
NONE		6.53	7.14	7.35	7.27	5.72	6.12
FYM		7.32	6.87	7.53	7.04	6.15	6.19
MEAN		6.93	7.01	7.44	7.16	5.94	6.15
ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
N							
0		5.17	5.04	5.66	5.00	2.40	2.86
60		6.98	7.11	7.87	7.78	5.20	5.55
120		7.91	8.40	8.72	8.21	7.65	8.02
180		7.63	7.47	7.50	7.65	8.49	8.19
MEAN		6.93	7.01	7.44	7.16	5.94	6.15
	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
FYMRES65	N						
NONE	0	4.03	5.21	5.17	5.01	2.32	2.60
	60	6.84	7.29	7.41	7.70	4.76	5.78
	120	7.44	8.53	8.81	8.49	7.50	7.77
	180	7.81	7.52	7.99	7.90	8.30	8.33
FYM	0	6.32	4.87	6.14	4.99	2.48	3.12
	60	7.13	6.94	8.33	7.86	5.65	5.31
	120	8.38	8.26	8.63	7.94	7.80	8.26
	180	7.46	7.41	7.01	7.39	8.67	8.06

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.00251