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

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81/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, G.A. Salt.

The 44th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-80/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 (ALT) 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

81/W/RN/3

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 ALT LN 3, ALT LC 3, 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.

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. FYMRES65 Farmyard manure residues, last applied 1965:

NONE None
FYM 38 tonnes on each occasion

1/8 plots

3. N Nitrogen fertiliser (kg N):

0
63
126
189

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

whole plots

1. ROTATION Rotations:

ALT LN 3
LN 3
ALT LC 3
LC 3
AF
AB

1/2 plots

2. FYMRES64 Farmyard manure residues, last applied 1964:

NONE None
FYM 38 tonnes on each occasion

81/W/RN/3

1/8 plots

3. N Nitrogen fertiliser (kg N):

0
50
100
150

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	126	50
LC	113	113
AF	188	251
AB	276	301

Ex-alternating rotations

LN 8 ploughed for w. wheat	251	251
LN 8 not ploughed	188	138
LC 8 ploughed for w. wheat	13	0
LC 8 not ploughed	126	25

Standard applications:-

Grass ley and clover/grass, 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, 7th and 8th years: Manures: Magnesian limestone at 5.0 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, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:14:28) at 540 kg. K₂O at 48 kg in spring and 43 kg after the first cut.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. N at 40 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l applied with fungicide to 1st treatment crop. Dicamba with mecoprop and MCPA (as 'Herrisol' at 4.9 l) in 280 l applied with fungicide to 2nd treatment crop. Fungicide: Tridemorph at 0.53 kg.

S. beans, 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkiller: Simazine at 0.84 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l on two occasions.

W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkiller: Chlortoluron at 5.6 l in 300 l, mecoprop at 2.5 l with isoproturon at 2.5 l in 280 l. Fungicide: Triadimefon with captafol (as 'Bayleton CF' at 2 kg) in 280 l.

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 300 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l with fungicide. Fungicide: Tridemorph at 0.53 kg.

81/W/RN/3

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: Flanders, sown at 200 kg.

Cultivations, etc.: - Treatment crops:

- Grass ley and clover/grass ley, 1st year: Ploughed: 6 Nov, 1980.
Spring-tine cultivated: 8 Apr, 1981. Rotary cultivated, PK applied, N applied to grass ley only: 7 May. Spring-tine cultivated with crumbler attached, seeds sown: 8 May. Topped: 29 June, 20 July.
Cut: 26 Aug.
- Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Corrective K applied to 4th year only: 3 Oct, 1980.
Magnesian limestone applied to 5th year only: 24 Oct. PK applied: 3 Dec. NK applied to grass ley: 19 Mar, 1981, 24 June. K applied to clover/grass ley: 19 Mar, 26 June. Cut: 15 June, 26 Aug.
- S. barley, 1st and 2nd treatment crops: Ploughed: 6 Nov, 1980. NPK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Rotary cultivated with crumbler attached, seed sown: 6 Apr. Weedkillers and fungicide applied 1st treatment crop: 15 May, 2nd treatment crop: 1 June. N applied: 3 June. Combine harvested: 17 Aug.
- S. beans, 3rd treatment crop: Ploughed: 5 Nov, 1980. PK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Rotary cultivated with crumbler attached, seed sown: 6 Apr. Weedkiller applied: 7 Apr. Insecticide applied: 18 June, 27 July. Combine harvested: 3 Sept.
- Fallow, 1st and 2nd treatment years: Ploughed: 6 Nov, 1980. Spring-tine cultivated: 8 Apr, 1981. Deep-tine cultivated: 21 Aug.
- Test Crops:
- W. wheat, 1st test crop: Ploughed: 12 Sept, 1980. Discd: 29 Sept. Spring-tine cultivated with crumbler attached: 30 Sept. Corrective K applied: 3 Oct. PK applied, aldicarb applied, harrowed: 6 Oct. Rotary cultivated, seed sown: 7 Oct. Chlortoluron applied: 8 Oct. N applied: 3 Apr, 1981. Mecoprop with isoproturon applied: 22 Apr. Fungicide applied: 20 June. Combine harvested: 19 Aug.
- S. barley, 2nd test crop: Magnesian limestone applied: 24 Oct, 1980. Ploughed: 6 Nov. PK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Aldicarb applied, rotary cultivated with crumbler attached, seed sown: 6 Apr. N applied: 14 Apr. Weedkiller and fungicide applied: 15 May. Combine harvested: 17 Aug.

81/W/RN/3

BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

	N	0	50	100	150	MEAN
FYMRES64						
	NONE	3.69	5.83	7.09	6.80	5.85
	FYM	3.77	6.25	7.06	6.93	6.00
	MEAN	3.73	6.04	7.07	6.86	5.93

ROTATION	ALT LN 3	LN 3 ALT LC 3	LC 3	AF	AB	MEAN		
FYMRES64								
	NONE	6.42	6.38	6.96	6.56	4.42	4.38	5.85
	FYM	6.98	6.90	6.92	6.51	4.12	4.59	6.00
	MEAN	6.70	6.64	6.94	6.53	4.27	4.48	5.93

ROTATION	ALT LN 3	LN 3 ALT LC 3	LC 3	AF	AB	MEAN		
N								
	0	4.42	5.12	5.08	4.51	1.65	1.59	3.73
	50	7.02	7.10	7.02	6.77	3.79	4.54	6.04
	100	7.46	8.00	7.89	7.78	5.64	5.67	7.07
	150	7.87	6.33	7.78	7.07	5.99	6.13	6.86
	MEAN	6.70	6.64	6.94	6.53	4.27	4.48	5.93

FYMRES64	ROTATION	ALT LN 3	LN 3 ALT LC 3	LC 3	AF	AB	
NONE	N						
	0	3.78	5.03	5.13	4.78	1.86	1.53
	50	6.68	7.04	6.76	6.76	3.74	4.00
	100	7.59	7.98	8.25	7.50	5.78	5.47
FYM	150	7.62	5.46	7.71	7.20	6.28	6.51
	0	5.07	5.22	5.02	4.24	1.44	1.65
	50	7.37	7.16	7.28	6.78	3.84	5.08
	100	7.34	8.01	7.54	8.07	5.51	5.87
	150	8.12	7.20	7.86	6.93	5.70	5.75

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00251

81/W/RN/3

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	63	126	189	MEAN		
FYMRES65							
NONE	4.58	6.91	7.69	7.41	6.65		
FYM	5.17	6.91	7.95	7.79	6.96		
MEAN	4.88	6.91	7.82	7.60	6.80		
ROTATION							
FYMRES65	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
NONE	6.60	7.31	7.49	6.76	5.85	5.89	6.65
FYM	6.95	7.12	7.49	6.87	6.54	6.76	6.96
MEAN	6.78	7.21	7.49	6.82	6.19	6.32	6.80
ROTATION							
N	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
0	4.71	5.82	6.47	5.35	3.06	3.84	4.88
63	6.52	7.52	7.84	6.70	6.32	6.59	6.91
126	8.03	8.12	7.98	7.69	7.61	7.49	7.82
189	7.83	7.40	7.68	7.53	7.78	7.39	7.60
MEAN	6.78	7.21	7.49	6.82	6.19	6.32	6.80
FYMRES65							
NONE	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
	N						
	0	4.05	5.82	6.23	5.38	2.78	3.24
	63	6.66	7.69	7.75	6.71	6.24	6.42
	126	7.94	8.16	8.31	7.28	7.16	7.30
	189	7.75	7.55	7.68	7.68	7.20	6.61
FYM	0	5.38	5.82	6.71	5.32	3.35	4.43
	63	6.39	7.34	7.92	6.68	6.40	6.75
	126	8.13	8.07	7.66	8.11	8.05	7.68
	189	7.92	7.26	7.68	7.38	8.37	8.16

GRAIN MEAN DM% 83.1

PLOT AREA HARVESTED 0.00260