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Yields of the Field Experiments 1979

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Rothamsted Research

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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

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

GRAIN TONNES/HECTARE

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

ROT CYCL	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
FYMRES63							
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

ROT CYCL		LN	LC	AF	AB	ALT LN	ALT LC
FYMRES63	N						
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	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
FYMRES63							
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

ROT CYCL		LN	LC	AF	AB	ALT LN	ALT LC
FYMRES63	N						
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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