ROTHAMSTED RESEARCH

Yields of the Field Experiments 1978

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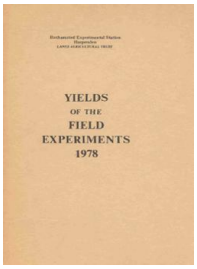

78/W/RN/3 Ley/ARABLE - Leys, Barley, Oats ,wheat

Rothamsted Research

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78/W/RN/3

LEY/ARABLE

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

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The 41st year, leys, barley, oats, wheat.

For previous years see 'Details' 1967 & 1973 and 74-77/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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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

LN
LC
AF
AB
ALT LN
ALT LC

Additional treatments to first test crop, wheat:-

1/2 plots

1. FYMRES65 — Farmyard manure residues, last applied 1965:

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. FYMRES67 — Farmyard manure residues, last applied 1967:

NONE	None
FYM	38 tonnes on each occasion

1/8 plots

2. N — Nitrogen fertiliser (kg N):

0
50
100
150

NOTE: The first and second treatment crop barley was resown because of bird damage to the first sowing.

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78/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
Ley	326	176
Clover	63	126
Arable with hay	126	138
Arable	126	163
Alternating rotations (last two rotations in order)		
Ley/Arable with hay	151	213
Sainfoin/Arable	75	0
Arable with hay/Ley	264	264
Arable/Clover	100	38

Standard applications:-

Grass ley and Clover/grass ley, 1st year: Manures: (0:14:28) at 540 kg. N at 75 kg as 'Nitro-Chalk 25' to grass ley only. Weedkillers: Paraquat at 0.84 kg ion in 280 l. Dinoseb amine at 2.0 kg in 450 l.

Grass ley, 2nd, 3rd, 4th, 5th and 6th 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 and 6th 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: Manures: 1st and 2nd treatment crops: (20:14:14) at 400 kg combine drilled. 2nd test crop: Magnesian limestone at 5 t. (0:20:20) at 300 kg combine drilled. Weedkillers: Mecoprop, bromoxynil and ioxynil ('Brittox' at 2.5 kg in 280 l). Fungicide: Tridemorph at 0.53 kg in 280 l, with weedkillers. 2nd test crop only: Nematicide: Aldicarb at 10 kg.

Oats: Manures: (20:14:14) at 400 kg combine drilled. Weedkillers: Mecoprop, bromoxynil and ioxynil ('Brittox' at 2.5 kg in 280 l).

Winter wheat: Manures: (0:20:20) at 310 kg combine drilled. Weedkillers: Paraquat at 0.84 kg ion in 220 l. Mecoprop, bromoxynil and ioxynil ('Brittox' at 3.5 kg in 280 l). Nematicide: Aldicarb at 10 kg.

Fallow, 1st year: Paraquat at 0.84 kg ion in 280 l.

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.

Cultivations, etc.:- Treatment crops.

Grass ley and Clover/grass ley, 1st year: Ploughed: 27 Sept, 1977. Spring-tine cultivated with crumbler attached: 13 Mar, 1978. PK applied, N applied to grass ley only: 17 Apr. Paraquat applied: 8 May. Spring-tine cultivated, seeds sown: 10 May. Dinoseb amine applied: 9 June. Cut once: 13 Sept.

Grass ley and Clover/grass ley, 2nd, 3rd, 4th, 5th and 6th years: Magnesian limestone applied to 5th year only: 21 Oct, 1977. PK applied: 6 Jan, 1978. NK applied to grass ley, K applied to Clover/grass ley: 8 Mar, 20 June. Cut twice: 12 June, 13 Sept.

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Barley: 1st and 2nd treatment crops: Ploughed: 27 Sept, 1977. Spring-tine cultivated with crumbler attached, seed sown: 15 Mar, 1978. Spring-tine cultivated, seed resown: 7 Apr. Weedkiller applied: 15 May. Combine harvested: 4 Sept.

Oats: 3rd treatment crop: Ploughed: 27 Sept, 1977. Spring-tine cultivated with crumbler attached, seed sown: 13 Mar, 1978. Weedkiller applied: 15 May. Combine harvested: 4 Sept.

Fallow: 1st treatment year: Ploughed: 27 Sept, 1977. Spring-tine cultivated with crumbler attached: 13 Mar, 1978. Weedkiller applied: 8 May. Spring-tine cultivated twice: 10 May, 24 July. Rotary cultivated twice: 16 June, 8 Sept.

Fallow: 2nd treatment year: Ploughed: 27 Sept, 1977. Spring-tine cultivated with crumbler attached: 13 Mar. Spring-tine cultivated: 24 July. Rotary cultivated: 8 Sept.

Test Crops:

Winter wheat, 1st test crop: Paraquat applied: 26 Sept, 1977. Ploughed: 7 Oct. Corrective K applied: 10 Oct. Aldicarb applied, rotary cultivated: 24 Oct. Spring-tine cultivated, seed sown: 25 Oct. N applied: 7 Apr, 1978. Mecoprop, bromoxynil and ioxynil applied: 10 May. Combine harvested: 25 Aug.

Barley, 2nd test crop: Magnesian limestone applied: 21 Oct, 1977. Ploughed: 8 Nov. Spring-tine cultivated with crumbler attached: 13 Mar, 1978. Aldicarb applied, rotary cultivated, spring-tine cultivated with crumbler attached, seed sown: 3 Apr. N applied: 7 Apr. Weedkiller applied: 15 May. Combine harvested: 23 Aug.

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78/W/RN/3

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

ROT CYCL / FYMRES65	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	5.08	4.76	4.50	4.62	4.99	4.63	4.76
FYM	4.74	5.08	4.58	4.78	4.49	4.73	4.73
N							
0	3.58	3.45	2.14	2.80	3.61	2.95	3.09
63	5.52	5.37	4.59	5.00	5.31	4.82	5.10
126	5.33	5.42	5.77	5.62	5.01	5.70	5.47
189	5.22	5.44	5.66	5.39	5.02	5.26	5.33
MEAN	4.91	4.92	4.54	4.70	4.74	4.68	4.75

FYMRES65	ROT CYCL / N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	3.69	3.39	2.26	2.95	3.74	2.80
	63	5.51	5.15	4.57	4.73	5.39	4.74
	126	5.47	5.35	5.81	5.22	5.46	5.48
	189	5.66	5.17	5.33	5.56	5.36	5.50
FYM	0	3.47	3.51	2.02	2.64	3.48	3.09
	63	5.53	5.60	4.61	5.27	5.23	4.90
	126	5.19	5.48	5.72	6.01	4.56	5.91
	189	4.77	5.72	5.99	5.21	4.69	5.03

GRAIN MEAN DM% 79.8

STRAW TONNES/HECTARE

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

ROT CYCL / FYMRES65	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	5.34	5.28	4.12	4.98	5.33	4.67	4.95
FYM	5.03	5.60	4.53	4.92	5.52	4.60	5.03
N							
0	3.31	2.80	1.48	2.26	3.35	2.68	2.65
63	5.62	5.31	4.88	5.09	6.09	4.99	5.33
126	5.66	6.55	5.81	5.85	5.81	5.29	5.83
189	6.13	7.08	5.12	6.59	6.44	5.57	6.15
MEAN	5.18	5.44	4.32	4.95	5.42	4.63	4.99

FYMRES65	ROT CYCL / N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	3.79	2.69	1.48	2.29	3.30	2.44
	63	5.64	4.17	5.28	5.16	6.09	4.97
	126	6.29	6.11	5.21	5.63	5.97	5.96
	189	5.63	8.13	4.52	6.83	5.94	5.29
FYM	0	2.84	2.91	1.49	2.23	3.39	2.92
	63	5.60	6.45	4.48	5.03	6.09	5.00
	126	5.04	7.00	6.42	6.06	5.65	4.61
	189	6.63	6.03	5.72	6.35	6.93	5.85

STRAW MEAN DM% 80.6 PLOT AREA HARVESTED 0.00260

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BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

ROT CYCL / FYMRES67	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	4.84	4.84	4.65	5.46	4.78	4.68	4.87
FYM	5.81	4.54	4.02	5.07	5.23	4.59	4.88
N							
0	3.49	2.72	1.88	3.01	2.75	2.51	2.73
50	5.44	4.21	3.52	4.79	4.82	4.65	4.57
100	6.10	6.06	5.63	6.17	6.23	5.62	5.97
200	6.27	5.75	6.29	7.09	6.21	5.77	6.23
MEAN	5.33	4.69	4.33	5.27	5.00	4.64	4.88

FYMRES67	ROT CYCL N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	3.00	2.90	1.91	2.86	2.07	2.58
	50	4.69	4.71	3.84	4.71	5.18	4.52
	100	5.55	6.28	5.76	6.12	5.93	5.46
	200	6.11	5.46	7.07	8.16	5.93	6.17
FYM	0	3.99	2.55	1.85	3.16	3.42	2.44
	50	6.18	3.72	3.21	4.87	4.46	4.78
	100	6.64	5.85	5.50	6.23	6.54	5.78
	200	6.43	6.05	5.51	6.01	6.50	5.36

GRAIN MEAN DM% 79.9

STRAW TONNES/HECTARE

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

ROT CYCL / FYMRES67	LN	LC	AF	AB	ALT LN	ALT LC	MEAN
NONE	3.55	3.58	3.02	3.41	3.01	3.48	3.34
FYM	4.41	3.49	2.27	3.23	3.47	3.39	3.38
N							
0	1.79	1.52	1.07	1.40	1.33	1.35	1.41
50	3.94	2.65	1.84	3.01	2.95	3.09	2.91
100	4.79	4.78	3.34	4.30	4.12	3.84	4.19
200	5.40	5.20	4.33	4.57	4.58	5.46	4.92
MEAN	3.98	3.54	2.65	3.32	3.24	3.44	3.36

FYMRES67	ROT CYCL N	LN	LC	AF	AB	ALT LN	ALT LC
NONE	0	1.48	1.45	1.12	1.34	1.00	1.53
	50	3.67	3.26	2.03	2.93	3.17	2.96
	100	3.65	4.80	3.31	4.27	3.54	3.78
	200	5.40	4.84	5.62	5.09	4.35	5.66
FYM	0	2.10	1.59	1.02	1.46	1.66	1.17
	50	4.21	2.04	1.66	3.09	2.74	3.23
	100	5.93	4.76	3.37	4.33	4.69	3.91
	200	5.40	5.56	3.04	4.06	4.81	5.26

STRAW MEAN DM% 74.2 PLOT AREA HARVESTED 0.00260

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