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Yields of the Field Experiments 1991

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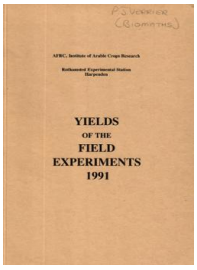

91/W/RN/3 Ley/ARABLE - Leys, S. Barley, W. Beans, W. Wheat

Rothamsted Research

Rothamsted Research (1992) *91/W/RN/3 Ley/ARABLE - Leys, S. Barley, W. Beans, W. Wheat ;* Yields Of The Field Experiments 1991, pp 33 - 41 **- DOI: https://doi.org/10.23637/ERADOC-1-46**

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91/W/RN/3

LEY/ARABLE

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

Sponsor: P.R. Poulton.

The 54th year, leys, w. beans, w. wheat, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-90/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

LN1 to LN3 = three year grass ley with N, 1st year to 3rd year, LC = clover/grass ley no N, BE = beans (s. oats until 1980), F = fallow

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

LLN	LN, LN, LN, LN, LN, LN, LN, LN, W, B
LLC	LC, LC, LC, LC, LC, LC, LC, LC, W, B

LLN1 to LLN8 = eight year grass ley with N, first year to eighth year, similarly for LLC

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 leys and the test crops.

Treatments to first test crop w. wheat, 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

1/8 plots

3. **N** Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

   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

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91/W/RN/3

1/2 plots

2. **FYMRES64** Farmyard manure residues, last applied 1964:

NONE	None
FYM	38 tonnes on each occasion

1/8 plots

3. **N** Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

0
60
120
180

Treatments to leys:

FYM RES Farmyard manure residues:

NONE	None
FYM	38 tonnes on each occasion, last applied 1963 to 1st and 6th year leys, 1962 to 2nd and 7th year leys, 1966 to 3rd and 8th year leys, 1965 to 4th year leys, 1964 to 5th year leys

Corrective K dressings (kg K2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block, applied: 13 Mar, 1991:

Continuous rotations	No FYM half plots	FYM half plots
LN	0	0
LC	0	0
AF	295	180
AB	180	180
Ex-alternating rotations		
LN 8 ploughed for w. wheat	0	0
LN 8 not ploughed	100	35
LC 8 ploughed for w. wheat	0	0
LC 8 not ploughed	0	0

Standard applications:-

Grass ley and clover/grass ley, 1st year: Manures: (0:16:36) at 470 kg. N at 75 kg to grass ley as 'Nitram', N at 54 kg to clover/grass ley as 'Nitro-Chalk'. (25:0:16) at 300 kg to grass ley in spring and after the first cut. K2O at 54 kg to clover/grass ley in spring and after the first cut.

Grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:16:36) at 470 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. (0:16:36) at 470 kg, K2O at 54 kg in spring and after the first cut.

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Standard applications:-

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkiller: Metsulfuron-methyl at 6.0 g applied with the fungicide in 200 l. Fungicide: Tridemorph at 0.26 kg.

W. beans, 3rd treatment crop: Manures: (0:24:24) at 170 kg. Weedkillers: Simazine at 0.14 kg and trietazine at 0.97 kg in 220 l. Fungicide: Chlorothalonil at 1.5 kg applied with the insecticide in 300 l. Insecticide: Pirimicarb at 0.14 kg.

Fallow, 1st and 2nd treatment years: No applications.

W. wheat, 1st test crop: Manures: (0:24:24) at 260 kg. Weedkillers: Glyphosate at 0.36 kg in 220 l. Diflufenican at 0.10 kg and isoproturon at 1.0 kg applied with the deltamethrin in 220 l. Fungicides: Fenpropimorph at 0.38 kg in 210 l and on a second occasion with chlorothalonil at 0.49 kg and flutriafol at 0.078 kg in 300 l. Insecticide: Deltamethrin at 5.0 g. Carbofuran at 7.5 kg. Desiccant: Glyphosate at 1.4 kg in 200 l.

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:24:24) at 260 kg. Weedkiller: Metsulfuron-methyl at 6.0 g applied with the fungicide in 200 l. Fungicide: Tridemorph at 0.26 kg. Insecticide: Carbofuran at 7.5 kg.

Seed: Grass ley: Stella meadow fescue at 15 kg, RVP Erecta timothy at 15 kg, mixture sown at 30 kg.

Clover/grass ley: Stella meadow fescue at 14 kg, RVP Erecta timothy at 14 kg, Huia white clover at 3.0 kg, mixture sown at 30 kg.

S. barley: Klaxon, dressed triadimenol and fuberidazole, sown at 135 kg.

W. beans: Banner sown at 120 kg, (21 seeds per square metre).

W. wheat: Mercia sown at 150 kg.

Cultivations, etc.:-

Treatment crops:

Grass ley and clover/grass ley, 1st year: Ploughed: 21 Aug, 1990. N, P and K applied: 28 Aug. Rotary harrowed with crumbler attached, seed sown, rolled: 29 Aug. Spring manures applied: 25 Mar, 1991. Cut: 4 June. Produce removed: 11 June. Second manures applied: 19 June. Cut: 9 Sept. Produce removed: 17 Sept.

Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Magnesian limestone applied to 5th year only: 19 Aug, 1990. Spring manures applied: 22 Mar, 1991. Cut: 4 June. Produce removed: 11 June. Second manures applied: 19 June. Cut: 9 Sept. Produce removed: 17 Sept.

S. barley, 1st and 2nd treatment crops: Ploughed: 21 Aug, 1990 and 20 Mar, 1991. N, P and K applied, rotary harrowed, seed sown: 22 Mar. Weedkiller and fungicide applied: 24 May. Combine harvested: 14 Aug.

W. beans, 3rd treatment crop: P and K applied: 28 Sept, 1990. Disced, seed broadcast, ploughed: 23 Oct. Weedkiller applied: 21 Nov. Fungicide and insecticide applied: 10 July, 1991. Combine harvested: 3 Sept.

Fallow, 1st and 2nd treatment years: Ploughed 1st year only: 21 Aug, 1990. Disced 2nd year only: 23 Oct. Ploughed: 20 Mar, 1991. Rotary cultivated: 5 July.

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91/W/RN/3

Cultivations, etc.:-

Test crops:

W. Wheat, 1st test crop: Glyphosate applied: 22 Aug, 1990. Subsoiled with tines 1.5 m apart and 0.40 m deep: 20 Sept. Rolled, disced and ploughed: 21 Sept. P, K and carbofuran applied, rotary harrowed with crumbler attached, seed sown: 28 Sept. Diflufenican, isoproturon and deltamethrin applied: 8 Nov. Corrective K applied: 13 Mar, 1991. N treatments applied: 2 Apr. Fenpropimorph applied: 24 Apr and with chlorothalonil and flutriafol: 20 June. Desiccant applied: 12 Aug. Combine harvested: 21 Aug.

S. barley, 2nd test crop: Magnesian limestone applied: 19 Aug, 1990. Ploughed: 23 Jan, 1991. P, K and carbofuran applied, rotary harrowed, seed sown: 15 Mar. N treatments applied: 18 Mar. Weedkiller and fungicide applied: 26 May. Combine harvested: 14 Aug.

LEYS

1ST CUTTING OCCASION (4/6/91) DRY MATTER TONNES/HECTARE

***** Tables of means *****

FYM RES	NONE	FYM	Mean
LEY			
LC1	2.02	2.85	2.43
LC2	3.07	3.41	3.24
LC3	5.35	5.79	5.57
LN1	5.05	5.03	5.04
LN2	4.82	6.40	5.61
LN3	4.63	4.79	4.71
LLC1	2.34	2.35	2.34
LLC2	3.46	3.64	3.55
LLC3	5.04	4.71	4.87
LLC4	4.72	4.10	4.41
LLC5	2.94	1.78	2.36
LLC6	3.14	3.88	3.51
LLC7	3.89	4.57	4.23
LLC8	5.13	4.62	4.88
LLN1	4.29	4.02	4.15
LLN2	5.63	6.21	5.92
LLN3	4.78	4.84	4.81
LLN4	4.36	4.76	4.56
LLN5	4.64	4.51	4.58
LLN6	5.78	5.78	5.78
LLN7	5.93	5.39	5.66
LLN8	5.54	6.17	5.85
Mean	4.39	4.53	4.46

1ST CUT MEAN DM% 23.5

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91/W/RN/3

LEYS

2ND CUTTING OCCASION (9/9/91) DRY MATTER TONNES/HECTARE

***** Tables of means *****

FYM RES LEY	NONE	FYM	Mean
LC1	3.05	2.91	2.98
LC2	3.63	3.89	3.76
LC3	3.24	4.36	3.80
LN1	3.33	3.88	3.61
LN2	4.50	4.14	4.32
LN3	5.18	5.30	5.24
LLC1	3.50	2.56	3.03
LLC2	3.75	3.92	3.83
LLC3	3.21	3.23	3.22
LLC4	4.49	4.26	4.38
LLC5	2.92	1.27	2.09
LLC6	0.52	0.62	0.57
LLC7	3.77	2.71	3.24
LLC8	5.02	4.53	4.77
LLN1	4.27	3.49	3.88
LLN2	3.27	3.73	3.50
LLN3	4.43	4.13	4.28
LLN4	5.80	5.73	5.76
LLN5	3.27	3.89	3.58
LLN6	3.31	3.59	3.45
LLN7	3.47	3.65	3.56
LLN8	4.90	5.44	5.17
Mean	3.76	3.69	3.73

2ND CUT MEAN DM% 32.8

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LEYS

TOTAL OF 2 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

***** Tables of means *****

FYM RES LEY	NONE	FYM	Mean
LC1	5.07	5.76	5.41
LC2	6.70	7.29	7.00
LC3	8.59	10.14	9.37
LN1	8.38	8.91	8.64
LN2	9.32	10.54	9.93
LN3	9.80	10.09	9.95
LLC1	5.84	4.91	5.37
LLC2	7.20	7.56	7.38
LLC3	8.25	7.94	8.09
LLC4	9.21	8.36	8.78
LLC5	5.86	3.05	4.46
LLC6	3.66	4.50	4.08
LLC7	7.66	7.28	7.47
LLC8	10.15	9.15	9.65
LLN1	8.56	7.51	8.03
LLN2	8.89	9.94	9.42
LLN3	9.21	8.97	9.09
LLN4	10.15	10.49	10.32
LLN5	7.91	8.40	8.16
LLN6	9.09	9.37	9.23
LLN7	9.39	9.05	9.22
LLN8	10.44	11.61	11.03
Mean	8.15	8.22	8.19

TOTAL OF 2 CUTS MEAN DM% 28.1

PLOT AREA HARVESTED 0.00200

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91/W/RN/3

W.WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

***** Tables of means *****

FYMRES65	NONE	FYM	Mean
ROTATION			
LN 8	8.62	8.46	8.54
LN 3	9.27	8.71	8.99
LC 8	8.63	8.68	8.66
LC 3	9.01	9.38	9.20
AF	7.47	8.42	7.95
AB	8.00	8.61	8.30
Mean	8.50	8.71	8.61

N	0	70	140	210	Mean
ROTATION					
LN 8	5.94	8.83	9.64	9.75	8.54
LN 3	6.75	8.85	9.96	10.41	8.99
LC 8	6.08	8.81	9.63	10.10	8.66
LC 3	6.47	9.37	10.46	10.48	9.20
AF	3.46	8.00	9.75	10.57	7.95
AB	4.48	8.56	9.94	10.23	8.30
Mean	5.53	8.74	9.90	10.26	8.61

N	0	70	140	210	Mean
FYMRES65					
NONE	5.42	8.60	9.92	10.06	8.50
FYM	5.64	8.87	9.87	10.45	8.71
Mean	5.53	8.74	9.90	10.26	8.61

N		0	70	140	210
ROTATION	**FYMRES65**				
LN 8	NONE	5.81	9.03	9.95	9.69
	FYM	6.07	8.63	9.32	9.81
LN 3	NONE	7.61	8.87	10.39	10.21
	FYM	5.88	8.83	9.53	10.61
LC 8	NONE	6.33	8.75	9.42	10.01
	FYM	5.83	8.88	9.83	10.20
LC 3	NONE	6.12	9.36	10.30	10.26
	FYM	6.82	9.38	10.62	10.70
AF	NONE	2.63	7.51	9.44	10.31
	FYM	4.30	8.48	10.06	10.82
AB	NONE	4.02	8.07	10.01	9.89
	FYM	4.93	9.05	9.88	10.58

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.00183

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91/W/RN/3

S.BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

***** Tables of means *****

FYMRES64	NONE	FYM	Mean
ROTATION			
LN 8	6.51	6.60	6.56
LN 3	6.40	6.68	6.54
LC 8	6.86	6.99	6.92
LC 3	6.74	6.94	6.84
AF	5.53	5.43	5.48
AB	5.87	5.75	5.81
Mean	6.32	6.40	6.36

N	0	60	120	180	Mean
ROTATION					
LN 8	5.46	6.87	7.05	6.84	6.56
LN 3	4.68	6.69	7.41	7.38	6.54
LC 8	5.78	7.12	7.61	7.18	6.92
LC 3	5.26	6.99	7.63	7.47	6.84
AF	1.75	5.92	6.94	7.31	5.48
AB	2.73	5.94	7.22	7.33	5.81
Mean	4.28	6.59	7.31	7.25	6.36

N	0	60	120	180	Mean
FYMRES64					
NONE	4.16	6.55	7.22	7.34	6.32
FYM	4.40	6.63	7.40	7.16	6.40
Mean	4.28	6.59	7.31	7.25	6.36

	N	0	60	120	180
ROTATION	**FYMRES64**				
LN 8	NONE	5.08	6.84	7.00	7.12
	FYM	5.85	6.90	7.10	6.56
LN 3	NONE	4.54	6.51	7.15	7.42
	FYM	4.83	6.87	7.68	7.34
LC 8	NONE	5.63	7.22	7.60	6.98
	FYM	5.93	7.02	7.62	7.39
LC 3	NONE	5.02	6.72	7.70	7.51
	FYM	5.50	7.26	7.57	7.43
AF	NONE	1.89	5.90	6.73	7.60
	FYM	1.62	5.93	7.15	7.03
AB	NONE	2.80	6.09	7.14	7.44
	FYM	2.66	5.79	7.31	7.22

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00183

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