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Yields of the Field Experiments 1998

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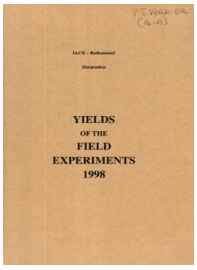

98/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley

Rothamsted Research

Rothamsted Research (1999) *98/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley ;* Yields Of The Field Experiments 1998, pp 39 - 48 **- DOI: https://doi.org/10.23637/ERADOC-1-52**

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98/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 61st year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-97/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) LN1, LN2, LN3, W, R
LC 3	(Previous CLO) LC1, LC2, LC3, W, R
AF	(Previous A) F, F, BE, W, R
AB	(Previous A H) B, B, BE, W, R

From 1998 rotations AF and AB are replaced by AM and ABe respectively. Phased in at the beginning of each treatment crop sequence.

ABe	R, M, BE, W, R
AM	R, BE, M, W, R

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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,
M = maize

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

LLN	LLN1, LLN2, LLN3, LLN4, LLN5, LLN6, LLN7, LLN8, W, R
LLC	LLC1, LLC2, LLC3, LLC4, LLC5, LLC6, LLC7, LLC8, W, R

LLN1 to LLN8 = eight year grass ley with nitrogen, first year to eighth year, similarly for LLC - clover/grass ley, no nitrogen

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).

In 1992 w. rye (R) replaced s. barley (B) as the second test crop.

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 before wheat:

   LLN 8
   LN 3
   LLC 8
   LC 3
   AF
   AB

½ plots

2. **FYMRES62** Farmyard manure residues, last applied 1962:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1998 (kg N) as 27.5% N:

   0
   70
   140
   210

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98/W/RN/3

Treatments to second test crop w. rye, all combinations of:

Whole plots

1. **ROTATION** Rotations before first test crop:

LLN 8
LN 3
LLC 8
LC 3
AF
AB

½ plots

2. **FYMRES66** Farmyard manure residues, last applied 1966:

NONE
FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1998 (kg N) as 27.5% N:

0
40
80
120

Treatments to leys:

FYM RES Farmyard manure residues:

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

NOTE: Corrective K dressings (kg K_2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block, applied 12-Sep-97:

Continuous rotations before wheat	No FYM half plots	FYM half plots
AF	240	270
AB	240	230

None to other plots.

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Experimental diary:

Grass ley and clover/grass ley, 1st year (**ROTATION** LN1, LC1, LLN1 and LLC1):

17-Sep-97 : **T** : Ploughed, rolled.
18-Sep-97 : **T** : Rotary harrowed.
: **T** : LC1 and LLC1 only: 27.5% N at 182 kg. 45% Stella meadow fescue, 45% Erecta RVP Timothy and 10% Huia white clover mixture drilled at 30 kg.
: **T** : LN1 and LLN1 only: 27.5% N at 273 kg. 50% Stella meadow fescue and 50% Erecta RVP Timothy drilled at 30 kg.
22-Sep-97 : **T** : Rolled.
12-Mar-98 : **T** : PK as (0:20:32) at 469 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
: **T** : LN1 and LLN1 only: NK as (24:0:16) at 312 kg.
09-May-98 : **T** : Legumex Extra at 7.0 l in 200 l.
29-Jun-98 : **T** : First cut.
07-Jul-98 : **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
: **T** : LN1 and LLN1 only : NK as (24:0:16) at 312 kg.
04-Dec-98 : **T** : Second cut.

Grass leys, 2nd to 8th year (**ROTATION** LN2-3 and LLN2-8):

24-Feb-98 : **T** : Chain harrowed.
12-Mar-98 : **T** : PK as (0:20:32) at 469 kg. NK as (24:0:16) at 312 kg.
09-May-98 : **T** : Legumex Extra at 7.0 l in 200 l.
29-Jun-98 : **T** : First cut.
07-Jul-98 : **T** : NK as (24:0:16) at 312 kg.
02-Aug-98 : **T** : LN3 and LLN8 only: Roundup Biactive at 4.0 l in 200 l.
04-Dec-98 : **T** : LN2 and LLN2-7 only: Second cut.

Clover/grass leys, 2nd to 8th year (**ROTATION** LC2-3 and LLC2-8):

24-Feb-98 : **T** : Chain harrowed.
12-Mar-98 : **T** : PK as (0:20:32) at 469 kg. Muriate of potash at 80 kg.
09-May-98 : **T** : Legumex Extra at 7.0 l in 200 l.
29-Jun-98 : **T** : First cut.
07-Jul-98 : **T** : Muriate of potash at 80 kg.
02-Aug-98 : **T** : LC3 and LLC8 only: Roundup Biactive at 4.0 l in 200 l.
04-Dec-98 : **T** : LC2 and LLC2-7 only: Second cut.

S. barley, 2nd treatment crop (**ROTATION** AB):

04-Feb-98 : **T** : Heavy spring-tine cultivated.
05-Feb-98 : **T** : Rotary harrowed, Cooper, dressed Raxil S, drilled at 375 seeds per m^2.
17-Mar-98 : **T** : Deloxil at 2.0 l in 200 l.
02-Apr-98 : **T** : NPK as (20:10:10) at 400 kg.
20-May-98 : **T** : Asset at 2.0 l with Astix at 1.0 l in 200 l.
31-May-98 : **T** : Opus at 0.8 l in 200 l.
19-Aug-98 : **T** : Combine harvested.

W. beans, 3rd treatment crop (**ROTATION** AF and AB):

29-Sep-97 : **T** : PK as (0:24:24) at 168 kg.
24-Oct-97 : **T** : Barclay Gallup at 6.0 l in 300 l.
27-Oct-97 : **T** : Punch broadcast at 21 seeds per m^2. Ploughed.
25-Nov-97 : **T** : Gesatop 500 SC at 2.0 l in 200 l.
28-Apr-98 : **T** : Bavistin DF at 0.5 kg with Clayton Turret at 2.0 l in 200 l.
19-Aug-98 : **T** : Combine harvested.

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Experimental diary:

Fallow, 2nd treatment year (**ROTATION** AF):

17-Sep-97 : **T** : Ploughed.
27-Feb-98 : **T** : Heavy spring-tine cultivated.
29-Apr-98 : **T** : Spring-tine cultivated.
08-May-98 : **T** : Spiked rotary cultivated.

W. wheat, 1st test crop (W):

10-Sep-97 : **T** : Barclay Gallup at 6.0 l in 200 l.
17-Sep-97 : **T** : Ploughed.
29-Sep-97 : **T** : PK as (0:24:24) at 260 kg.
02-Oct-97 : **T** : Rotary harrowed, Hereward, dressed Sibutol, drilled at 385 seeds per m^2. Yaltox at 150 kg.
13-Nov-97 : **T** : Stomp 400 SC with Isoproturon 500 at 1.0 l and Cyperkill 10 at 0.25 l in 200 l.
19-Mar-98 : **T** : Mn and Cu as Phosyn Manganese at 2.0 l with Profol Copper at 0.25 l in 200 l.
02-Apr-98 : **T** : **N** 70, 140, 210: N applied as 27.5% N.
28-Apr-98 : **T** : Folicur at 0.5 l in 200 l.
29-May-98 : **T** : Ally at 15 g in 200 l.
31-May-98 : **T** : Opus at 0.8 l in 200 l.
12-Jun-98 : **T** : Folicur at 0.3 l with Bavistin DF at 0.3 kg in 200 l.
02-Aug-98 : **T** : Roundup Biactive at 3.0 l in 200 l.
12-Aug-98 : **T** : Combine harvested.

W. rye, 2nd test crop (R) and 1st treatment crop (**ROTATION** ABe, AM):

23-Sep-97 : **T** : Ploughed.
29-Sep-97 : **T** : PK as (0:24:24) at 260 kg.
02-Oct-97 : **T** : Rotary harrowed, Yaltox at 150 kg.
: **T** : **ROTATION** ABe, AM: 27.5% N at 73 kg.
21-Oct-97 : **T** : Espirit, dressed Baytan Flowable, drilled at 375 seeds per m^2, harrowed.
17-Mar-98 : **T** : Deloxil at 2.0 l in 200 l.
02-Apr-98 : **T** : **N** 40, 80, 120: N applied as 27.5% N.
03-Apr-98 : **T** : **ROTATION** ABe, AM: NK as (20:10:10) at 400 kg.
28-Apr-98 : **T** : Folicur at 0.5 l in 200 l. Quantum at 30 g in 200 l.
14-Aug-98 : **T** : Combine harvested.

NOTE: Samples of grass, grass and clover, wheat and rye grain were taken for chemical analysis.

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98/W/RN/3

LEYS

1ST CUT (29/6/98) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.50	1.22	0.86
LC2	5.94	6.34	6.14
LC3	5.43	6.43	5.93
LN1	3.37	3.40	3.38
LN2	8.17	7.79	7.98
LN3	7.67	7.64	7.65
LLC1	1.21	0.77	0.99
LLC2	5.58	5.44	5.51
LLC3	4.27	3.64	3.95
LLC4	5.47	5.97	5.72
LLC5	5.58	4.43	5.01
LLC6	5.65	5.17	5.41
LLC7	2.72	2.77	2.74
LLC8	3.87	2.99	3.43
LLN1	5.08	3.73	4.41
LLN2	7.92	9.01	8.47
LLN3	7.76	8.17	7.97
LLN4	6.70	7.07	6.89
LLN5	7.17	6.76	6.96
LLN6	6.52	4.94	5.73
LLN7	5.69	4.95	5.32
LLN8	7.73	6.70	7.22
Mean	5.45	5.24	5.35

1ST CUT MEAN DM% 31.5

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LEYS

2ND CUT (04/12/98) DRY MATTER TONNES/HECTARE

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

FYM RES	NONE	FYM	Mean
LEY			
LC1	0.18	0.28	0.23
LC2	0.16	0.19	0.17
LN1	1.32	1.19	1.25
LN2	0.92	0.59	0.76
LLC1	0.60	0.63	0.61
LLC2	0.30	0.14	0.22
LLC3	0.22	0.14	0.18
LLC4	0.63	0.63	0.63
LLC5	0.79	0.58	0.68
LLC6	0.65	2.56	1.61
LLC7	0.13	0.22	0.18
LLN1	1.22	1.84	1.53
LLN2	1.25	1.43	1.34
LLN3	1.35	1.19	1.27
LLN4	2.07	2.35	2.21
LLN5	1.00	1.48	1.24
LLN6	1.06	0.59	0.83
LLN7	1.13	0.64	0.89
Mean	0.83	0.93	0.88

2ND CUT MEAN DM% 18.9

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LEYS

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.69	1.50	1.10
LC2	6.10	6.53	6.32
LN1	4.69	4.59	4.64
LN2	9.09	8.39	8.74
LLC1	1.81	1.39	1.60
LLC2	5.87	5.57	5.72
LLC3	4.49	3.79	4.14
LLC4	6.10	6.60	6.35
LLC5	6.37	5.01	5.69
LLC6	6.30	7.74	7.02
LLC7	2.84	3.00	2.92
LLN1	6.30	5.57	5.93
LLN2	9.17	10.44	9.81
LLN3	9.11	9.36	9.24
LLN4	8.77	9.42	9.10
LLN5	8.17	8.24	8.20
LLN6	7.58	5.53	6.55
LLN7	6.83	5.59	6.21
Mean	6.13	6.01	6.07

TOTAL OF 2 CUTS MEAN DM% 50.5

PLOT AREA HARVESTED 0.00200

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98/W/RN/3

W. WHEAT

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	Mean
ROTATION			
LLN 8	7.46	8.13	7.79
LN 3	7.44	7.16	7.30
LLC 8	7.66	7.17	7.41
LC 3	7.12	7.63	7.38
AF	6.85	6.85	6.85
AB	7.47	7.29	7.38
Mean	7.33	7.37	7.35

N	0	70	140	210	Mean
ROTATION					
LLN 8	4.97	7.77	9.21	9.24	7.79
LN 3	3.77	7.13	8.67	9.62	7.30
LLC 8	4.11	7.55	9.01	8.98	7.41
LC 3	4.78	7.48	8.50	8.75	7.38
AF	2.52	6.35	8.80	9.72	6.85
AB	3.21	6.70	9.35	10.26	7.38
Mean	3.89	7.16	8.92	9.43	7.35

N	0	70	140	210	Mean
FYMRES62					
NONE	4.04	7.02	8.94	9.34	7.33
FYM	3.75	7.31	8.91	9.52	7.37
Mean	3.89	7.16	8.92	9.43	7.35

N		0	70	140	210
ROTATION	FYMRES62				
LLN 8	NONE	4.85	7.31	9.02	8.65
	FYM	5.08	8.23	9.40	9.82
LN 3	NONE	4.08	7.06	8.97	9.64
	FYM	3.46	7.20	8.37	9.60
LLC 8	NONE	4.55	7.62	9.31	9.15
	FYM	3.67	7.49	8.71	8.81
LC 3	NONE	4.84	7.04	8.04	8.56
	FYM	4.71	7.91	8.96	8.93
AF	NONE	2.50	6.31	8.83	9.75
	FYM	2.55	6.39	8.77	9.70
AB	NONE	3.38	6.77	9.46	10.28
	FYM	3.04	6.64	9.24	10.25

GRAIN MEAN DM% 88.5

PLOT AREA HARVESTED 0.00183

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98/W/RN/3

W. RYE

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LLN 8	7.60	8.16	7.88
LN 3	7.40	7.95	7.68
LLC 8	7.67	6.92	7.29
LC 3	6.23	6.59	6.41
AF	5.58	5.69	5.64
AB	6.18	6.96	6.57
Mean	6.78	7.04	6.91

N	0	40	80	120	Mean
ROTATION					
LLN 8	7.86	8.52	7.62	7.53	7.88
LN 3	6.92	8.41	8.35	7.03	7.68
LLC 8	7.02	7.32	7.87	6.97	7.29
LC 3	6.72	6.55	6.98	5.39	6.41
AF	3.64	5.55	6.75	6.59	5.64
AB	4.71	7.08	7.77	6.71	6.57
Mean	6.14	7.24	7.56	6.70	6.91

N	0	40	80	120	Mean
FYMRES66					
NONE	6.09	7.18	7.18	6.66	6.78
FYM	6.20	7.30	7.94	6.75	7.04
Mean	6.14	7.24	7.56	6.70	6.91

N		0	40	80	120
ROTATION	**FYMRES66**				
LLN 8	NONE	7.32	8.84	7.21	7.04
	FYM	8.39	8.21	8.03	8.02
LN 3	NONE	6.97	8.00	7.96	6.69
	FYM	6.87	8.82	8.74	7.37
LLC 8	NONE	7.62	7.95	7.57	7.55
	FYM	6.42	6.69	8.17	6.39
LC 3	NONE	7.32	6.48	6.20	4.94
	FYM	6.12	6.63	7.77	5.83
AF	NONE	3.16	5.55	6.70	6.91
	FYM	4.13	5.56	6.81	6.28
AB	NONE	4.18	6.28	7.44	6.84
	FYM	5.25	7.88	8.10	6.59

GRAIN MEAN DM% 88.1

PLOT AREA HARVESTED 0.00183

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