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Yields of the Field Experiments 1997

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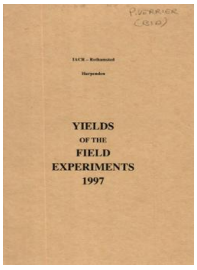

97/W/RN/3 Ley/ARABLE - W. Beans, W. Wheat, W. Rye, S. Barley

Rothamsted Research

Rothamsted Research (1998) *97/W/RN/3 Ley/ARABLE - W. Beans, W. Wheat, W. Rye, S. Barley ;* Yields Of The Field Experiments 1997, pp 40 - 49 **- DOI: https://doi.org/10.23637/ERADOC-1-53**

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97/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 60th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-96/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

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	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

1/2 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 1997 (kg N) as 27.5% N:

   0
   70
   140
   210

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97/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

1/2 plots

2. **FYMRES65** Farmyard manure residues, last applied 1965:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1997 (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 1964 to 1st and 6th year leys, 1963 to 2nd and 7th year leys, 1962 to 3rd and 8th year leys, 1966 to 4th year leys, 1965 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 14-Mar-97:

Continuous rotations before wheat	No FYM half plots	FYM half plots
AF	300	300
AB	300	300

None to other plots.

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97/W/RN/3

Experimental diary:

Treatment crops:

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

04-Sep-96 : **T** : Ploughed.
: **T** : LC1 and LLC1 only: 27.5% N at 182 kg.
: **T** : LN1 and LLN1 only: 27.5% N at 273 kg.
06-Sep-96 : **T** : Rotary harrowed.
09-Sep-96 : **T** : LC1 and LLC1 only: 40% Rossa meadow fescue, 48% Erecta RVP Timothy and 12% Huia white clover mixture drilled at 30 kg.
: **T** : LN1 and LLN1 only: 50% Rossa meadow fescue and 50% Erecta RVP Timothy mixture drilled at 30 kg.
10-Sep-96 : **T** : Rolled.
25-Mar-96 : **T** : PK as (0:20:32) at 469 kg.
: **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
30-Oct-97 : **T** : Second cut.

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

01-Oct-96 : **T** : LLN5 only: Dolomite at 5.0 t.
20-Mar-97 : **T** : Chain harrowed.
25-Mar-97 : **T** : PK as (0:20:32) at 469 kg. NK as (25:0:16) at 300 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : NK as (25:0:16) at 300 kg.
30-Oct-97 : **T** : Second cut.

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

01-Oct-96 : **T** : LLC5 only: Dolomite at 5.0 t.
20-Mar-97 : **T** : Chain harrowed.
25-Mar-97 : **T** : PK as (0:20:32) at 469 kg. Muriate of potash at 80 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : Muriate of potash at 80 kg.
30-Oct-97 : **T** : Second cut.

S. barley, 1st and 2nd treatment crops (**ROTATION** AB):

13-Mar-97 : **T** : NPK as (20:10:10) at 400 kg. Rotary harrowed, Cooper, dressed Raxil S, drilled at 375 seed per m^2.
11-Apr-97 : **T** : Cooper, dressed Raxil S, redrilled at 420 seeds per m^2.
29-May-97 : **T** : MSS Optica at 2.0 l with Vindex at 1.0 l in 200 l.
24-Jun-97 : **T** : Dorin at 1.0 l in 300 l.
20-Aug-97 : **T** : Combine harvested.

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

23-Oct-96 : **T** : PK as (0:24:24) at 168 kg. Punch, undressed, broadcast at 21 seeds per m^2, ploughed.
05-Dec-96 : **T** : Carbetamex at 3.0 kg in 200 l.
13-Aug-97 : **T** : Reglone at 3.0 l with Vassgro Non-ionic at 400 ml in 400 l.
21-Aug-97 : **T** : Combine harvested.

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Experimental diary:

Fallow, 1st and 2nd treatment years (**ROTATION** AF):

14-Mar-97 : **T** : Spring-tine cultivated.
17-Apr-97 : **T** : Spike rotary cultivated
11-Jul-97 : **T** : Rotary cultivated.

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

07-Oct-96 : **T** : Roundup at 4.0 l in 200 l.
14-Oct-96 : **T** : Ploughed and rolled.
16-Oct-96 : **T** : Yaltox at 150 kg. Rotary harrowed. Hereward, dressed Anchor, drilled at 400 seeds per m^2.
06-Dec-96 : **T** : Panther at 2.0 l in 200 l.
09-Jan-97 : **T** : PK as (0:24:24) at 260 kg.
04-Apr-97 : **T** : **N** 70, 140, 210: N applied as 27.5% N.
16-May-97 : **T** : Halo at 2.0 l in 300 l.
16-Aug-97 : **T** : Combine harvested.

W. rye, 2nd test crop (R).

27-Sep-96 : **T** : Ploughed.
28-Sep-96 : **T** : Rolled.
30-Sep-96 : **T** : PK as (0:24:24) at 260 kg.
01-Oct-96 : **T** : Yaltox at 150 kg. Rotary harrowed.
02-Oct-96 : **T** : Amando, dressed Baytan Flowable, drilled at 400 seeds per m^2.
11-Dec-96 : **T** : Stomp 400 SC at 3.3 l in 200 l.
04-Apr-97 : **T** : **N** 40, 80, 120: N applied as 27.5% N.
04-Jun-97 : **T** : Mistral at 1.0 l in 300 l.
13-Aug-97 : **T** : Combine harvested.

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

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97/W/RN/3

LEYS

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.51	0.64	0.57
LC2	1.89	2.81	2.35
LC3	3.29	3.80	3.55
LN1	2.44	3.01	2.72
LN2	5.19	5.21	5.20
LN3	4.63	4.88	4.75
LLC1	0.85	0.70	0.77
LLC2	1.01	1.85	1.43
LLC3	2.74	2.78	2.76
LLC4	3.86	3.77	3.82
LLC5	4.65	4.29	4.47
LLC6	3.53	2.75	3.14
LLC7	2.93	2.17	2.55
LLC8	4.86	3.79	4.33
LLN1	2.46	2.76	2.61
LLN2	5.33	4.87	5.10
LLN3	5.02	5.38	5.20
LLN4	6.56	6.53	6.54
LLN5	4.16	4.69	4.43
LLN6	5.20	5.43	5.31
LLN7	6.21	5.80	6.01
LLN8	5.62	5.32	5.47
Mean	3.77	3.78	3.78

1ST CUT MEAN DM% 28.6

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97/W/RN/3

LEYS

2ND CUT (30/10/97) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.17	0.15	0.16
LC2	0.44	0.61	0.53
LC3	0.00	0.00	0.00
LN1	1.90	1.77	1.83
LN2	2.56	2.35	2.45
LN3	0.00	0.00	0.00
LLC1	0.32	0.30	0.31
LLC2	0.33	0.42	0.37
LLC3	0.51	0.63	0.57
LLC4	0.34	0.37	0.36
LLC5	0.32	1.24	0.78
LLC6	0.42	0.52	0.47
LLC7	1.03	0.83	0.93
LLC8	0.00	0.00	0.00
LLN1	2.72	2.39	2.55
LLN2	2.48	1.45	1.96
LLN3	2.78	3.05	2.91
LLN4	1.81	1.95	1.88
LLN5	2.02	1.28	1.65
LLN6	1.79	1.76	1.78
LLN7	2.70	2.29	2.49
LLN8	0.00	0.00	0.00
Mean	1.12	1.06	1.09

2ND CUT MEAN DM% 40.9

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LEYS

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.68	0.79	0.73
LC2	2.33	3.43	2.88
LC3	3.29	3.80	3.55
LN1	4.34	4.78	4.56
LN2	7.75	7.57	7.66
LN3	4.63	4.88	4.75
LLC1	1.16	0.99	1.08
LLC2	1.34	2.26	1.80
LLC3	3.25	3.41	3.33
LLC4	4.20	4.14	4.17
LLC5	4.97	5.53	5.25
LLC6	3.95	3.28	3.61
LLC7	3.96	3.00	3.48
LLC8	4.86	3.79	4.33
LLN1	5.17	5.15	5.16
LLN2	7.81	6.32	7.06
LLN3	7.80	8.43	8.12
LLN4	8.37	8.48	8.42
LLN5	6.18	5.96	6.07
LLN6	6.99	7.19	7.09
LLN7	8.91	8.09	8.50
LLN8	5.62	5.32	5.47
Mean	4.89	4.84	4.87

TOTAL OF 2 CUTS MEAN DM% 33.5

PLOT AREA HARVESTED 0.00200

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97/W/RN/3

W. WHEAT

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LLN 8	5.40	6.05	5.72
LN 3	3.63	4.24	3.93
LLC 8	6.55	6.28	6.42
LC 3	6.88	7.33	7.10
AF	6.78	6.93	6.85
AB	5.33	5.96	5.64
Mean	5.76	6.13	5.95

N	0	70	140	210	Mean
ROTATION					
LLN 8	2.53	6.20	6.93	7.25	5.72
LN 3	1.74	3.83	5.15	5.02	3.93
LLC 8	4.10	6.78	7.36	7.43	6.42
LC 3	4.40	7.70	8.01	8.30	7.10
AF	2.40	6.52	9.25	9.24	6.85
AB	1.58	5.73	7.37	7.88	5.64
Mean	2.79	6.12	7.35	7.52	5.95

N	0	70	140	210	Mean
FYMRES66					
NONE	2.50	5.84	7.18	7.53	5.76
FYM	3.08	6.41	7.52	7.51	6.13
Mean	2.79	6.12	7.35	7.52	5.95

N		0	70	140	210
ROTATION	FYMRES66				
LLN 8	NONE	2.27	5.24	6.72	7.38
	FYM	2.79	7.15	7.14	7.11
LN 3	NONE	0.96	3.33	5.29	4.96
	FYM	2.52	4.33	5.02	5.09
LLC 8	NONE	4.29	7.55	6.74	7.61
	FYM	3.90	6.01	7.98	7.24
LC 3	NONE	3.84	7.30	8.13	8.24
	FYM	4.97	8.10	7.89	8.36
AF	NONE	2.40	6.72	8.60	9.41
	FYM	2.40	6.33	9.91	9.07
AB	NONE	1.26	4.90	7.59	7.55
	FYM	1.91	6.55	7.16	8.21

GRAIN MEAN DM% 88.6

SUB-PLOT AREA HARVESTED 0.00183

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97/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES65	NONE	FYM	Mean
ROTATION			
LLN 8	5.37	5.41	5.39
LN 3	4.89	4.65	4.77
LLC 8	4.83	5.32	5.08
LC 3	5.29	5.34	5.31
AF	3.28	3.64	3.46
AB	3.91	4.62	4.26
Mean	4.59	4.83	4.71

N	0	40	80	120	Mean
ROTATION					
LLN 8	3.61	5.50	6.16	6.29	5.39
LN 3	3.21	4.92	5.73	5.23	4.77
LLC 8	3.68	5.30	5.65	5.68	5.08
LC 3	3.28	5.19	6.11	6.68	5.31
AF	1.14	3.12	4.51	5.08	3.46
AB	2.11	3.79	5.19	5.97	4.26
Mean	2.84	4.64	5.56	5.82	4.71

N	0	40	80	120	Mean
FYMRES65					
NONE	2.74	4.47	5.60	5.57	4.59
FYM	2.93	4.80	5.52	6.07	4.83
Mean	2.84	4.64	5.56	5.82	4.71

N		0	40	80	120
ROTATION	FYMRES65				
LLN 8	NONE	3.52	5.33	6.27	6.35
	FYM	3.70	5.67	6.05	6.24
LN 3	NONE	3.46	4.94	6.29	4.87
	FYM	2.95	4.89	5.18	5.59
LLC 8	NONE	3.87	4.68	5.88	4.89
	FYM	3.48	5.92	5.42	6.47
LC 3	NONE	3.02	5.48	5.86	6.78
	FYM	3.53	4.89	6.37	6.58
AF	NONE	0.89	2.82	4.56	4.85
	FYM	1.39	3.42	4.46	5.32
AB	NONE	1.67	3.54	4.73	5.71
	FYM	2.56	4.03	5.65	6.23

GRAIN MEAN DM% 87.5

PLOT AREA HARVESTED 0.00183

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