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Yields of the Field Experiments 1993

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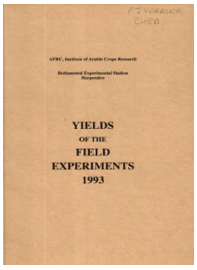

93/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley

Rothamsted Research

Rothamsted Research (1994) *93/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley ;* Yields Of The Field Experiments 1993, pp 39 - 48 **- DOI: https://doi.org/10.23637/ERADOC-1-48**

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93/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 56th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-92/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, R
LC 3	(Previous CLO) LC, LC, LC, 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	LN, LN, LN, LN, LN, LN, LN, LN, W, R
LLC	LC, LC, LC, LC, LC, LC, LC, LC, W, R

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).

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:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

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

   NONE None
   FYM 38 tonnes on each occasion

1/8 plots

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

   0
   70
   140
   210

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

Whole plots

1. **ROTATION** Rotations:

LN 8
LN 3
LC 8
LC 3
AF
AB

1/2 plots

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

NONE None
FYM 38 tonnes on each occasion

1/8 plots

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

0
30
60
90

Treatments to leys:

FYM RES Farmyard manure residues:

NONE None
FYM 38 tonnes 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

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: 21 Oct, 1992:

Continuous rotations	No FYM half plots	FYM half plots
LN	0	0
LC	0	0
AF	240	260
AB	275	245

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93/W/RN/3

Ex-alternating rotations

LN 8 ploughed for w. wheat	0	0
LN 8 not ploughed	0	0
LC 8 ploughed for w. wheat	0	0
LC 8 not ploughed	0	0

Experimental diary:

Treatment crops:

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

14-Sep-92 : **T** : Ploughed.
16-Sep-92 : **T** : LN1 and LLN1 only: 34.5% N at 220 kg. Rotary harrowed with crumbler attached, drilled Rossa meadow fescue at 15 kg and Erecta RVP timothy at 15 kg.
: **T** : LC1 and LLC1 only: 34.5% N at 145 kg. Rotary harrowed with crumbler attached, drilled Rossa meadow fescue at 12 kg, Erecta RVP timothy at 14 kg and Huia white clover at 4 kg.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 90 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 90 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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

06-Oct-92 : **T** : LLN5 only: Dolomite at 5.0 t.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : NK as (25:0:16) at 300 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : NK as (25:0:16) at 300 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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

06-Oct-92 : **T** : LLC5 only: Dolomite at 5.0 t.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : Muriate of potash at 90 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : Muriate of potash at 90 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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Experimental diary:

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

14-Sep_92 : **T** : Ploughed.
03-Mar-93 : **T** : NPK as (20:10:10) at 400 kg.
04-Mar-93 : **T** : Rotary harrowed with crumbler attached, Alexis, dressed Baytan, drilled at 160 kg, harrowed.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
16-Aug-93 : **T** : Combine harvested.

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

30-Oct-92 : **T** : PK as (0:24:24) at 168 kg, Punch broadcast at 180 kg, ploughed.
24-Feb-93 : **T** : Carbetamex at 3.0 kg in 200 l.
15-Jun-93 : **T** : Benlate at 1.0 kg with Chiltern Chorothalonil 500 at 2.0 l in 300 l.
01-Sep-93 : **T** : Combine harvested.

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

14-Sep-92 : **T** : Ploughed.
04-Mar-93 : **T** : Rotary cultivated with crumbler attached.
08-Jul-93 : **T** : Rotary cultivated.

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

29-Sep-92 : **T** : Roundup at 4.0 l in 200 l.
06-Oct-92 : **T** : PK as (0:24:24) at 260 kg, ploughed, Yaltox at 150 kg, spring-tine cultivated.
07-Oct-92 : **T** : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
19-Oct-92 : **T** : Prebane 500 SC at 3.0 l in 200 l.
05-Apr-93 : **T** : **N** 70, 140 and 210: Applied as 27% N.
15-Apr-93 : **T** : New 5C Cycocel at 2.5 l with Ally at 0.03 kg in 200 l.
01-Jun-93 : **T** : Bayleton at 0.50 kg with Mistral at 0.50 l in 200 l.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
17-Aug-93 : **T** : Combine harvested.

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

14-Sep-92 : **T** : Ploughed.
06-Oct-92 : **T** : PK as (0:24:24) at 260 kg, Yaltox at 150 kg and dolomite at 5.0 t, spring-tine cultivated.
07-Oct-92 : **T** : Rotary harrowed, Amando, dressed Baytan, drilled at 350 seeds per square metre.
19-Oct-92 : **T** : Prebane 500 SC at 3.0 l in 200 l.
06-Apr-93 : **T** : **N** 30, 60 and 90: Applied as 27% N.
15-Apr-93 : **T** : New 5C Cycocel at 2.5 l with Ally at 0.03 kg in 200 l.
01-Jun-93 : **T** : Bayleton at 0.50 kg with Mistral at 0.50 l in 200 l.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
16-Aug-93 : **T** : Combine harvested.

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

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93/W/RN/3

LEYS

1ST CUTTING OCCASION (8/6/93) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.88	2.83	2.86
LC2	6.36	6.42	6.39
LC3	7.67	8.48	8.07
LN1	6.95	6.20	6.58
LN2	7.75	6.19	6.97
LN3	8.19	7.67	7.93
LLC1	2.21	2.91	2.56
LLC2	6.68	6.17	6.43
LLC3	6.60	6.87	6.73
LLC4	7.11	7.25	7.18
LLC5	4.49	3.95	4.22
LLC6	6.52	7.77	7.14
LLC7	6.91	7.52	7.21
LLC8	4.83	5.86	5.35
LLN1	6.59	6.20	6.40
LLN2	7.72	8.22	7.97
LLN3	7.23	6.90	7.07
LLN4	7.64	7.79	7.71
LLN5	4.55	6.20	5.38
LLN6	7.28	6.16	6.72
LLN7	6.54	7.45	7.00
LLN8	7.63	7.78	7.71
Mean	6.38	6.49	6.44

1ST CUT MEAN DM% 24.6

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93/W/RN/3

LEYS

2ND CUTTING OCCASION (15/9/93) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	1.56	1.71	1.63
LC2	0.75	1.05	0.90
LC3	0.92	1.03	0.97
LN1	3.36	3.25	3.30
LN2	1.88	1.81	1.85
LN3	2.33	2.72	2.53
LLC1	2.49	2.64	2.57
LLC2	0.69	0.82	0.76
LLC3	1.05	0.71	0.88
LLC4	2.22	2.53	2.38
LLC5	0.80	0.48	0.64
LLC6	0.59	1.07	0.83
LLC7	0.74	1.27	1.00
LLC8	0.82	1.07	0.94
LLN1	2.87	2.71	2.79
LLN2	2.20	2.22	2.21
LLN3	2.10	1.75	1.93
LLN4	3.18	3.26	3.22
LLN5	1.88	1.99	1.94
LLN6	2.36	2.59	2.47
LLN7	1.31	1.42	1.36
LLN8	2.17	2.89	2.53
Mean	1.74	1.86	1.80

2ND CUT MEAN DM% 29.1

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LEYS

TOTAL OF 2 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	4.44	4.54	4.49
LC2	7.10	7.46	7.28
LC3	8.59	9.51	9.05
LN1	10.31	9.45	9.88
LN2	9.63	8.00	8.82
LN3	10.52	10.40	10.46
LLC1	4.70	5.55	5.13
LLC2	7.37	7.00	7.19
LLC3	7.64	7.58	7.61
LLC4	9.33	9.78	9.55
LLC5	5.29	4.43	4.86
LLC6	7.11	8.83	7.97
LLC7	7.65	8.79	8.22
LLC8	5.65	6.93	6.29
LLN1	9.46	8.92	9.19
LLN2	9.92	10.43	10.17
LLN3	9.34	8.65	8.99
LLN4	10.81	11.05	10.93
LLN5	6.43	8.19	7.31
LLN6	9.64	8.75	9.19
LLN7	7.85	8.87	8.36
LLN8	9.80	10.67	10.24
Mean	8.12	8.35	8.24

TOTAL OF 2 CUTS MEAN DM% 26.8

PLOT AREA HARVESTED 0.00204

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93/W/RN/3

W. WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	Mean
ROTATION			
LN 8	5.30	5.50	5.40
LN 3	5.48	5.34	5.41
LC 8	7.02	6.98	7.00
LC 3	7.09	7.00	7.05
AF	5.75	5.61	5.68
AB	5.46	5.32	5.39
Mean	6.02	5.96	5.99

N	0	70	140	210	Mean
ROTATION					
LN 8	3.42	5.16	6.47	6.55	5.40
LN 3	3.13	5.40	6.60	6.52	5.41
LC 8	6.08	7.03	7.20	7.69	7.00
LC 3	5.58	7.01	7.69	7.91	7.05
AF	2.86	5.79	6.72	7.37	5.68
AB	3.11	5.92	5.89	6.63	5.39
Mean	4.03	6.05	6.76	7.11	5.99

N	0	70	140	210	Mean
FYMRES62					
NONE	4.02	6.19	6.90	6.96	6.02
FYM	4.05	5.91	6.62	7.26	5.96
Mean	4.03	6.05	6.76	7.11	5.99

	N	0	70	140	210
ROTATION	**FYMRES62**				
LN 8	NONE	3.27	5.22	6.32	6.38
	FYM	3.58	5.09	6.62	6.71
LN 3	NONE	3.04	5.65	6.70	6.56
	FYM	3.21	5.15	6.50	6.48
LC 8	NONE	5.83	7.35	7.40	7.51
	FYM	6.34	6.72	6.99	7.86
LC 3	NONE	6.02	7.04	7.52	7.77
	FYM	5.13	6.98	7.86	8.04
AF	NONE	2.71	5.77	7.20	7.33
	FYM	3.01	5.80	6.23	7.42
AB	NONE	3.22	6.11	6.28	6.23
	FYM	3.01	5.73	5.51	7.03

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00183

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93/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LN 8	4.25	4.27	4.26
LN 3	4.04	4.20	4.12
LC 8	4.68	4.49	4.59
LC 3	3.92	4.03	3.98
AF	3.41	3.47	3.44
AB	3.37	3.51	3.44
Mean	3.94	4.00	3.97

N	0	30	60	90	Mean
ROTATION					
LN 8	2.76	4.02	5.08	5.19	4.26
LN 3	2.67	3.97	4.78	5.06	4.12
LC 8	2.97	4.92	5.14	5.32	4.59
LC 3	2.69	3.64	4.35	5.22	3.98
AF	1.62	2.96	4.36	4.80	3.44
AB	1.74	3.12	4.36	4.53	3.44
Mean	2.41	3.77	4.68	5.02	3.97

N	0	30	60	90	Mean
FYMRES66					
NONE	2.47	3.72	4.62	4.97	3.94
FYM	2.35	3.83	4.74	5.07	4.00
Mean	2.41	3.77	4.68	5.02	3.97

N		0	30	60	90
ROTATION	**FYMRES66**				
LN 8	NONE	3.09	3.71	4.97	5.24
	FYM	2.42	4.33	5.19	5.14
LN 3	NONE	2.58	3.89	4.69	4.98
	FYM	2.77	4.05	4.86	5.13
LC 8	NONE	3.02	5.15	5.03	5.53
	FYM	2.91	4.69	5.25	5.12
LC 3	NONE	2.64	3.48	4.57	4.99
	FYM	2.75	3.81	4.12	5.45
AF	NONE	1.65	3.04	4.30	4.63
	FYM	1.59	2.87	4.42	4.98
AB	NONE	1.82	3.04	4.16	4.46
	FYM	1.66	3.21	4.57	4.59

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00183

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