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Yields of the Field Experiments 1990

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90/R/RN/1 and 90/R/RN/2 Ley Arable - Old Grass, Leys, W. Wheat, Oats

Rothamsted Research

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90/R/RN/1 and 90/R/RN/2

LEY ARABLE

Object: To study the effects of three-year leys on the fertility of the soil as measured by a sequence of three arable test crops - Highfield and Fosters.

Sponsor: P.R. Poulton.

The 42nd year, old grass, leys, s. oats, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-89/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (90/R/RN/1)

FOSTERS A site with little organic matter initially (90/R/RN/2)

ROTATION Treatments: The experiment originally tested four six-course rotations, with all phases present each year. For many years these rotations were:-

	Treatment crops	Test crops
LUCERNE	LU, LU, LU	W, P, B
CLOGRA	LC, LC, LC	W, P, B
GRASS	LN, LN, LN	W, P, B
ARABLE	H, SB, O	W, P, B

LU = lucerne, LC = clover-grass ley, no nitrogen fertilizer,
LN = all-grass ley with nitrogen fertilizer, H = 1-year seeds hay,
SB = sugar beet, O = s. oats, W = w. wheat, P = potatoes,
B = s. barley.

From 1983 the test crops have been W, W, W.

RESEEDED On both fields in the first three years other plots were sown with long-term reseeded grass

OLDGRASS On Highfield plots of the old turf were left initially unploughed, for comparison with the three-year leys

In 1962 and 1963 some of the old and reseeded grass plots were divided for management identical to:-

C Clover-grass ley
N All-grass ley

From 1968 only two phases on each field continued in the six-course rotation (the museum blocks). The four other phases (the new sequence blocks) were used for studies on take-all (*Gaeumannomyces graminis*) in wheat. These studies ended in 1985 and these phases are no longer included in the experiment.

90/R/RN/1 and 90/R/RN/2

Additional treatments to 3rd test crop w. wheat:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:

NONE None

FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1990 (kg N) as 'Nitram':

0
50
100
150

Standard applications:

3rd Treatment crops:

Lucerne: Manures: (0:24:24) at 940 kg.

All-grass ley: Manures: (0:24:24) at 620 kg. (25:0:16) at 300 kg on two occasions.

Clover-grass ley: Manures: (0:24:24) at 620 kg.

S. oats: Manures: (20:10:10) at 350 kg. Weedkillers: Mecoprop at 1.6 kg, bromoxynil at 0.20 kg and ioxynil at 0.20 kg with the fungicide in 200 l. Fungicide: Fenpropimorph at 0.75 kg.

3rd Test crop:

W. wheat: Weedkillers: Isoproturon at 1.7 kg in 200 l. Mecoprop at 2.2 kg, bromoxynil at 0.28 kg and ioxynil at 0.28 kg with the fungicide in 200 l. Fungicide: Prochloraz at 0.40 kg.

Reseeded grass and old grass: Manures: (0:24:24) at 620 kg. All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.

Seed: S. oats: Dula, sown at 190 kg.

W. wheat: Avalon, sown at 180 kg.

Cultivations, etc.:-

3rd Treatment crops:

Lucerne: PK applied: 28 Nov, 1989 (Highfield), 29 Nov (Fosters). First cut: 31 May, 1990. Second cut: 10 July.

All-grass ley and clover-grass ley: PK applied: 28 Nov, 1989 (Highfield), 29 Nov (Fosters). NK applied to all-grass ley: 1 Mar, 1990 and 4 June. Cut: 31 May, 10 July.

S. oats: Ploughed: 4 Jan, 1990. Spring-tine cultivated twice, rotary harrowed, seed sown: 9 Mar. NPK applied: 12 Apr. Weedkillers with the fungicide applied: 14 May. Combine harvested: 7 Aug.

3rd Test crop w. wheat: Ploughed: 29 Aug, 1989. Rotary harrowed: 3 Oct. Rotary harrowed, seed sown: 4 Oct. Isoproturon applied: 23 Nov. N treatments applied: 11 Apr, 1990. Remaining weedkillers with the fungicide applied: 25 Apr. Combine harvested: 9 Aug.

Reseeded grass and old grass: PK applied: 28 Nov, 1989 (Highfield), 29 Nov (Fosters). NK applied to all-grass half plots: 1 Mar, 1990 and 4 June. Cut: 31 May, 14 Nov.

90/R/RN/1 and 90/R/RN/2

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD		FOSTERS			
CLOVER-GRASS LEY						
TOTAL OF 2 CUTS	4.25		3.45			
MEAN DM%	28.8		29.5			
ALL-GRASS LEY						
TOTAL OF 2 CUTS	4.47		4.28			
MEAN DM%	29.9		29.0			
LUCERNE						
TOTAL OF 2 CUTS	2.85		10.29			
MEAN DM%	25.3		21.9			
OLD GRASS						
	HIGHFIELD					
TOTAL OF 2 CUTS	C		N			
42ND EXPTL YEAR						
BLOCKS 1 & 4	1.69		6.31			
BLOCK 2	1.78		5.63			
MEAN DM%	31.3		29.9			
RESEDED GRASS						
TOTAL OF 2 CUTS	HIGHFIELD		FOSTERS			
	BLOCKS	C	N	BLOCKS	C	N
42ND EXPTL YEAR	1 & 4	1.76	6.48	1 & 3	1.65	4.51
42ND EXPTL YEAR	2 & 3	1.95	6.42	2 & 4	2.08	4.72
(SEEDED 1949 RESEDED 1973)						
MEAN DM%		31.3	29.5		28.4	27.8
WINTER OATS: TONNES/HECTARE						
	HIGHFIELD		FOSTERS			
GRAIN	3.77		3.80			
MEAN DM%	82.8		83.8			

90/R/RN/1 HIGHFIELD W.WHEAT (3RD TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	Mean
ROTATION			
LUCERNE	4.21	4.50	4.36
CLOGRA	4.11	4.15	4.13
GRASS	4.44	4.40	4.42
ARABLE	3.25	3.23	3.24
Mean	4.00	4.07	4.04

	N	0	50	100	150	Mean
ROTATION						
LUCERNE		2.41	4.24	4.79	6.00	4.36
CLOGRA		2.49	4.08	4.81	5.14	4.13
GRASS		2.40	4.18	5.45	5.63	4.42
ARABLE		1.52	3.34	3.47	4.63	3.24
Mean		2.20	3.96	4.63	5.35	4.04

	N	0	50	100	150	Mean
FYMRES70						
NONE		2.16	4.02	4.61	5.22	4.00
FYM		2.25	3.90	4.65	5.48	4.07
Mean		2.20	3.96	4.63	5.35	4.04

		N	0	50	100	150
ROTATION						
FYMRES70						
LUCERNE	NONE		2.32	3.72	5.06	5.76
	FYM		2.50	4.75	4.51	6.24
CLOGRA	NONE		2.46	4.84	4.41	4.74
	FYM		2.52	3.31	5.20	5.55
GRASS	NONE		2.26	4.32	5.32	5.84
	FYM		2.54	4.05	5.58	5.42
ARABLE	NONE		1.61	3.18	3.63	4.56
	FYM		1.42	3.49	3.31	4.70

GRAIN MEAN DM% 90.3

PLOT AREA HARVESTED 0.00571

90/R/RN/2 FOSTERS W.WHEAT (3RD TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	Mean
ROTATION			
LUCERNE	3.80	3.53	3.67
CLOGRA	3.91	3.96	3.93
GRASS	3.57	3.86	3.72
ARABLE	3.66	3.66	3.66
Mean	3.74	3.75	3.75

	N	0	50	100	150	Mean
ROTATION						
LUCERNE		2.21	3.59	3.85	5.02	3.67
CLOGRA		2.18	3.76	4.58	5.20	3.93
GRASS		2.08	3.48	4.52	4.79	3.72
ARABLE		1.83	3.81	4.27	4.73	3.66
Mean		2.08	3.66	4.31	4.94	3.75

	N	0	50	100	150	Mean
FYMRES70						
NONE		2.19	3.45	4.40	4.92	3.74
FYM		1.97	3.87	4.22	4.96	3.75
Mean		2.08	3.66	4.31	4.94	3.75

		N	0	50	100	150
ROTATION	FYMRES70					
LUCERNE	NONE		2.87	3.34	4.16	4.85
	FYM		1.55	3.84	3.54	5.19
CLOGRA	NONE		2.25	3.75	4.86	4.78
	FYM		2.12	3.78	4.31	5.63
GRASS	NONE		1.59	3.32	4.33	5.04
	FYM		2.58	3.63	4.72	4.53
ARABLE	NONE		2.04	3.39	4.23	4.99
	FYM		1.62	4.23	4.31	4.47

GRAIN MEAN DM% 90.4

PLOT AREA HARVESTED 0.00571