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Yields of the Field Experiments 1989

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89/R/RN/1 and 89/R/RN/2 Ley Arable - Old Grass, Leys, Sugar Beet, W. Wheat

Rothamsted Research

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89/R/RN/1 and 89/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 41st year, old grass, leys, sugar beet, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-88/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (89/R/RN/1)

FOSTERS A site with little organic matter initially (89/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.

89/R/RN/1 and 89/R/RN/2

Additional treatments to 2nd 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 1989 (kg N) as 'Nitram':

0
50
100
150

Standard applications:

2nd Treatment crops:

Lucerne: Manures: (0:18:36) at 630 kg.

All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg on two occasions.

Clover-grass ley: Manures: (0:18:36) at 420 kg.

Sugar beet: Manures: (13:13:20) at 1150 kg. Weedkiller:

Metamitron at 3.5 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg in 200 l.

2nd Test crop:

W. wheat: Manures: (0:18:36) at 560 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Chlortoluron at 3.5 kg in 200 l.

Reseeded grass and old grass: Manures: (0:18:36) at 420 kg. All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.

Seed: Sugar beet: Monoire, seed spaced 3.8 cm apart in rows 51 cm apart.

W. wheat: Avalon, sown at 180 kg.

Cultivations, etc.:-

2nd Treatment crops:

Lucerne: PK applied: 9 Dec, 1988. First cut: 24 May, 1989.

Second cut: 25 Sept (Fosters), 27 Sept (Highfield).

All-grass ley and clover-grass ley: PK applied: 9 Dec, 1988. NK applied to all-grass ley: 10 Apr, 1989 and 26 May. Cut: 24 May, 25 Sept.

Sugar beet: Ploughed: 19 Dec, 1988. NPK applied: 10 Apr, 1989.

Spring-tine cultivated twice: 18 Apr. Weedkiller applied, rotary harrowed and harrowed: 2 May. Rolled, seed sown, rolled: 3 May. Insecticide applied: 9 June. Singled: 20 June. Lifted: 21 Nov.

2nd Test crop w. wheat: Glyphosate applied: 1 Oct, 1988. PK applied: 7 Oct. Ploughed: 11 Oct. Rotary harrowed, seed sown: 27 Oct. Chlortoluron applied: 15 Nov. N treatments applied: 18 Apr, 1989. Combine harvested: 7 Aug.

Reseeded grass and old grass: PK applied: 9 Dec, 1988. NK applied to all-grass half plots: 10 Apr, 1989 and 26 May. Cut: 24 May, 25 Sept.

89/R/RN/1 and 89/R/RN/2

NOTE: Lucerne on Highfield grew poorly and no yields were recorded.

DRY MATTER: TONNES/HECTARE

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

		HIGHFIELD		FOSTERS		
CLOVER-GRASS LEY						
TOTAL OF 2 CUTS		3.29		3.62		
MEAN DM%		35.1		36.2		
ALL-GRASS LEY						
TOTAL OF 2 CUTS		6.58		6.40		
MEAN DM%		36.6		37.1		
LUCERNE		FOSTERS				
TOTAL OF 2 CUTS		6.70				
MEAN DM%		31.6				
OLD GRASS		HIGHFIELD				
TOTAL OF 2 CUTS		C		N		
41ST EXPTL YEAR						
BLOCKS 1 & 4		1.96		6.46		
BLOCK 2		3.06		6.43		
MEAN DM%		35.1		35.2		
RESEEDED GRASS						
TOTAL OF 2 CUTS		HIGHFIELD			FOSTERS	
		BLOCKS		BLOCKS		
41ST EXPTL YEAR		C		C		N
41ST EXPTL YEAR		N				
41ST EXPTL YEAR		1 & 4		1 & 3		6.28
(SEEDED 1949		2.24		3.85		
RESEEDED 1973)		6.71		3.83		5.68
		2 & 3		2 & 4		
		3.18		6.77		
		6.77		3.83		
MEAN DM%		34.7		35.5		36.5
SUGAR BEET: TONNES/HECTARE						
		HIGHFIELD			FOSTERS	
ROOTS WASHED		40.0			36.4	
SUGAR PERCENTAGE		17.1			16.7	
TOTAL SUGAR		6.85			6.07	
TOPS		28.6			29.7	

89/R/RN/1 HIGHFIELD W.WHEAT (2ND TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	Mean
ROTATION			
LUCERNE	5.96	5.46	5.71
CLOGRA	5.82	5.97	5.90
GRASS	5.99	5.37	5.68
ARABLE	3.94	3.24	3.59
Mean	5.43	5.01	5.22

N	0	50	100	150	Mean
ROTATION					
LUCERNE	4.23	6.10	6.23	6.30	5.71
CLOGRA	4.92	6.16	5.73	6.77	5.90
GRASS	4.54	5.29	6.47	6.42	5.68
ARABLE	1.94	3.28	4.59	4.56	3.59
Mean	3.91	5.21	5.75	6.01	5.22

N	0	50	100	150	Mean
FYMRES70					
NONE	4.10	5.47	5.96	6.18	5.43
FYM	3.71	4.95	5.55	5.85	5.01
Mean	3.91	5.21	5.75	6.01	5.22

	N	0	50	100	150
ROTATION	FYMRES70				
LUCERNE	NONE	4.95	6.35	6.49	6.05
	FYM	3.51	5.85	5.96	6.54
CLOGRA	NONE	4.84	6.20	5.56	6.68
	FYM	4.99	6.13	5.90	6.86
GRASS	NONE	4.68	5.69	6.84	6.73
	FYM	4.39	4.89	6.10	6.10
ARABLE	NONE	1.94	3.63	4.94	5.25
	FYM	1.94	2.92	4.24	3.88

GRAIN MEAN DM% 89.0

PLOT AREA HARVESTED 0.00663

89/R/RN/2 FOSTERS W.WHEAT (2ND TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	Mean
ROTATION			
LUCERNE	6.06	6.33	6.19
CLOGRA	6.13	6.17	6.15
GRASS	5.27	5.47	5.37
ARABLE	4.37	3.99	4.18
Mean	5.46	5.49	5.48

N	0	50	100	150	Mean
ROTATION					
LUCERNE	5.08	5.95	6.80	6.95	6.19
CLOGRA	4.69	5.54	6.68	7.69	6.15
GRASS	4.63	5.35	5.40	6.12	5.37
ARABLE	2.27	3.78	4.74	5.94	4.18
Mean	4.17	5.15	5.90	6.68	5.48

N	0	50	100	150	Mean
FYMRES70					
NONE	3.97	5.19	5.76	6.91	5.46
FYM	4.36	5.11	6.05	6.44	5.49
Mean	4.17	5.15	5.90	6.68	5.48

	N	0	50	100	150
ROTATION	FYMRES70				
LUCERNE	NONE	4.98	5.61	6.37	7.27
	FYM	5.18	6.28	7.22	6.64
CLOGRA	NONE	3.99	6.37	6.34	7.81
	FYM	5.39	4.71	7.02	7.57
GRASS	NONE	4.35	5.17	4.49	7.08
	FYM	4.90	5.54	6.31	5.15
ARABLE	NONE	2.56	3.63	5.84	5.47
	FYM	1.98	3.92	3.64	6.42

GRAIN MEAN DM% 88.9

PLOT AREA HARVESTED 0.00663