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RESEARCH

Yields of the Field Experiments 1987

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87/R/RN/1 and 87/R/RN/2 Ley Arable - Old Grass, Leys, S. Oats, W. Wheat

Rothamsted Research

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87/R/RN/1 and 87/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: A.E. Johnston.

The 39th year, old grass, leys, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-86/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (87/R/RN/1)

FOSTERS A site with little organic matter initially (87/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.

87/R/RN/1 and 87/R/RN/2

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

Sub plots

FYMRES68 Farmyard manure residues, last applied 1968:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1987 (kg N) as 'Nitram':

0
50
100
150

Standard applications:

3rd Treatment crops:

All crops: Manures: Chalk at 5.8 t (Highfield only).
Lucerne: Manures: (0:18:36) at 630 kg.
All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg
in spring and after the first cut.
Clover-grass ley: Manures: (0:18:36) at 420 kg.
S. oats: Manures: (20:10:10) at 350 kg. Weedkillers: Clopyralid at
0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 500 l.

3rd Test crop:

W. wheat: Manures: (0:24:24), combine drilled at 210 kg.
Weedkillers: Isoproturon at 2.5 kg, clopyralid at 0.07 kg,
bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l.
Reseeded grass and old grass: Manures: Chalk at 5.8 t (to plots
in 3rd treatment crop blocks on Highfield and to plots in 3rd
test crop blocks on Fosters). (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: S. oats: Rollo, sown at 190 kg.
W. wheat: Avalon, sown at 180 kg.

Cultivations, etc.:-

3rd Treatment crops:

All Crops: Chalk applied (Highfield only): 28 Nov, 1986.
Lucerne: PK applied: 24 Feb, 1987. Cut: 1 June, 11 Aug.
All-grass ley and clover-grass ley: PK applied: 24 Feb, 1987. NK
applied to all-grass ley: 31 Mar, 3 June. Cut: 1 June, 11 Aug.
S. oats: Ploughed: 28 Nov, 1986. Spring-tine cultivated: 19 Mar,
1987. NPK applied, spring-tine cultivated, seed sown: 21 Mar.
Weedkillers applied: 8 May. Combine harvested: 9 Sept.

3rd Test crop wheat: Ploughed: 30 Sept, 1986 (Fosters), 1 Oct
(Highfield). PK applied: 1 Oct. Rotary harrowed: 3 Oct.
Seed sown: 4 Oct. N applied: 14 Apr, 1987. Weedkillers
applied: 15 Apr. Combine harvested: 1 Sept.

Reseeded grass and old grass: Chalk applied: 28 Nov, 1986. PK
applied: 24 Feb, 1987. NK applied to all-grass half plots:
31 Mar, 3 June, 29 Aug. Cut: 1 June, 27 Aug, 2 Dec.

87/R/RN/1 AND 87/R/RN/2

DRY MATTER: TONNES/HECTARE

***** TABLES OF MEANS *****

	HIGHFIELD		FOSTERS			
CLOVER-GRASS LEY						
TOTAL OF 2 CUTS	7.10		7.37			
MEAN DM%	19.0		17.8			
ALL-GRASS LEY						
TOTAL OF 2 CUTS	7.69		7.74			
MEAN DM%	25.5		23.4			
LUCERNE						
TOTAL OF 2 CUTS	8.58		9.00			
MEAN DM%	19.3		18.4			
OLD GRASS						
	HIGHFIELD					
TOTAL OF 3 CUTS	C		N			
39TH EXPTL YEAR						
BLOCKS 1 & 4	6.46		10.07			
BLOCK 2	6.73		10.67			
MEAN DM%	20.5		21.4			
RESEDED GRASS						
TOTAL OF 3 CUTS						
	HIGHFIELD		FOSTERS			
	BLOCKS	C	N	BLOCKS	C	N
39TH EXPTL YEAR	1 & 4	7.12	10.09	1 & 3	7.42	10.85
39TH EXPTL YEAR	2 & 3	6.46	11.76	2 & 4	7.93	10.45
(SEEDED 1949 RESEDED 1973)						
MEAN DM%		19.5	20.9		19.0	23.0
OATS:						
	HIGHFIELD			FOSTERS		
GRAIN TONNES/HECTARE		7.51			7.35	
MEAN DM%		84.6			83.5	

87/R/RN/1 HIGHFIELD W.WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES68	NONE	FYM	Mean		
ROTATION					
LUCERNE	5.34	5.48	5.41		
CLOGRA	5.96	5.97	5.97		
GRASS	5.79	5.50	5.64		
ARABLE	5.10	5.17	5.14		
Mean	5.55	5.53	5.54		
N	0	50	100	150	Mean
ROTATION					
LUCERNE	3.70	5.26	6.42	6.28	5.41
CLOGRA	4.02	6.07	6.44	7.34	5.97
GRASS	3.50	5.55	6.35	7.17	5.64
ARABLE	3.26	4.83	5.74	6.71	5.14
Mean	3.62	5.43	6.24	6.88	5.54
N	0	50	100	150	Mean
FYMRES68					
NONE	3.78	5.53	6.21	6.68	5.55
FYM	3.46	5.33	6.27	7.07	5.53
Mean	3.62	5.43	6.24	6.88	5.54
N	0	50	100	150	
ROTATION	FYMRES68				
LUCERNE	NONE	3.78	5.76	5.77	6.07
	FYM	3.62	4.76	7.07	6.48
CLOGRA	NONE	4.21	5.69	6.75	7.20
	FYM	3.83	6.44	6.13	7.48
GRASS	NONE	3.98	5.63	6.94	6.60
	FYM	3.03	5.47	5.75	7.75
ARABLE	NONE	3.17	5.03	5.37	6.84
	FYM	3.36	4.64	6.12	6.57

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00663

87/R/RN/2 FOSTERS W.WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES68	NONE	FYM	Mean		
ROTATION					
LUCERNE	5.35	5.61	5.48		
CLOGRA	5.29	5.24	5.27		
GRASS	5.34	5.53	5.43		
ARABLE	4.95	4.73	4.84		
Mean	5.23	5.28	5.25		
N	0	50	100	150	Mean
ROTATION					
LUCERNE	3.42	5.31	5.96	7.23	5.48
CLOGRA	3.56	5.24	5.87	6.41	5.27
GRASS	3.69	5.19	6.13	6.72	5.43
ARABLE	2.86	4.73	5.63	6.14	4.84
Mean	3.38	5.12	5.90	6.62	5.25
N	0	50	100	150	Mean
FYMRES68					
NONE	3.42	5.10	5.85	6.56	5.23
FYM	3.34	5.13	5.94	6.69	5.28
Mean	3.38	5.12	5.90	6.62	5.25
	N	0	50	100	150
ROTATION	FYMRES68				
LUCERNE	NONE	3.11	5.32	5.87	7.12
	FYM	3.73	5.29	6.06	7.35
CLOGRA	NONE	3.74	5.10	5.97	6.36
	FYM	3.37	5.38	5.77	6.45
GRASS	NONE	3.74	5.26	5.77	6.58
	FYM	3.64	5.12	6.49	6.85
ARABLE	NONE	3.09	4.73	5.80	6.19
	FYM	2.64	4.72	5.46	6.09

GRAIN MEAN DM% 81.4

PLOT AREA HARVESTED 0.00663