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Yields of the Field Experiments 1974

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74/R/RN/1 and 74/R/RN/2 Ley/ARABLE - Old Grass, Leys, Sugar Beet, Wheat

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74/R/RN/1 and 74/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. Since 1968, continuous wheat has been grown after the three test crops to study the build-up and decline of take-all (*Gaeumannomyces graminis*) after the different cropping sequences - Highfield and Fosters.

Sponsors: A.E. Johnston, D.B. Slope.

The 26th year, old grass, leys, sugar beet, wheat.

For previous years see 'Details' 1967, 68/B/1(t), 69/R/RN/1&2(t), 70/R/RN/1&2(t), 71/R/RN/1&2(t) and 72-73/R/RN/1&2.

The experiment is duplicated on:-

A site with much organic matter initially (ploughed out from permanent grass) HIGHFIELD

A site with little organic matter initially FOSTERS

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

ROTATION

Treatment crops	Test crops	
LU, LU, LU,	W, P, B	Lucerne
LC, LC, LC,	W, P, B	CloGra
LN, LN, LN,	W, P, B	Grass
H, SB, O,	W, P, B	Arable

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

In 1968 the order of test crops was changed to P, W, B except for those phases that had already started the sequence W, P, B.

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

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

74/R/RN/1 and 74/R/RN/2

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

C
N

From 1963 (reseeded) and 1968 (old grass) some grass plots were ploughed and cropped with the same test crops as above there- after these plots followed the Arable rotation. In 1973 some of these plots were returned to reseeded grass.

From 1968 only two phases on each field have continued in the original six-course rotation. All other phases have been sown to wheat every year at the end of the test-crop cycle. In 1974:-

Wheat, 6th test crop, 5th cereal (P,W,B,W,W,W)	CEREAL5
Wheat, 7th test crop, 6th cereal (P,W,B,W,W,W,W)	CEREAL6
Wheat, 9th test crop, 7th cereal (W,P,B,W,W,W,W,W,W)	CEREAL7
Wheat, 10th test crop, 8th cereal (W,P,B,W,W,W,W,W,W,W)	CEREAL8

Treatments to 6th-10th test crops wheat:-

Sub plots: Nitrogen fertiliser (kg N) in 1974:

N 74

75	75
126	126
176	176
226	226

Treatments to 2nd test crop wheat:-

Sub plots: Farmyard manure residues, last applied 1968:-

FYMRES68

None	None
30 tonnes on each occasion	FYM

Sub sub plots: Residues of nitrogen fertiliser applied to potatoes 1973 (kg N):-

NRESID73

None	0
80	80
160	160
240	240

Sub sub plots: Nitrogen fertiliser (kg N) in 1974:-

N 74

None	0
50	50
100	100
150	150

7 $\frac{1}{4}$ /R/RN/1 and 7 $\frac{1}{4}$ /R/RN/2

Seed: Wheat: Cappelle, sown at 200 kg
Sugar beet: Klein E, sown at 5.6 kg

Standard applications:

2nd Treatment crops:

All-grass ley: Manures: 75 kg P2O₅, 150 kg K₂O as (0:14:28) in winter, 75 kg N, 48 kg K₂O as (25:0:16) for each cut.
Clover-grass ley: Manures: 75 kg P2O₅, 150 kg K₂O as (0:14:28) in winter, 48 kg K₂O as muriate of potash for each cut.
Lucerne: Manures: 115 kg P2O₅, 230 kg K₂O as (0:14:28) in winter. Weedkiller: Paraquat at 1.4 kg ion in 220 l.
Sugar beet: Manures: 175 kg K₂O as muriate of potash on plough furrow, 180 kg N, 125 kg P2O₅, 125 kg K₂O as (20:14:14) in seedbed. Insecticide: Demeton-s-methyl at 0.25 kg in 220 l at first and in 450 l at second application. Weedkiller: Phenmedipham ('Betanal E' at 9.8 l in 360 l).

2nd, 6th, 7th, 9th and 10th Test Crops: Winter wheat:

Manures: 75 kg P2O₅ and 75 kg K₂O as (0:20:20) combine drilled.
Weedkiller: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Reseeded grass and Old Grass: Manures: 75 kg P2O₅ and 150 kg K₂O as (0:14:28) in winter.

All-grass half plots: Manures: 75 kg N and 48 kg K₂O as (25:0:16) for each cut.

Clover-grass half plots: Manures: 48 kg K₂O as muriate of potash for each cut.

Cultivations, etc.:—

2nd year Treatment crops:

All-grass ley: PK applied: 13 Dec, 1973. NK applied: 26 Feb, 1974, 3 June, 1 Aug. Cut three times: 30 May, 30 July, 3 Dec.
Clover-grass ley: PK applied: 13 Dec, 1973. K applied: 26 Feb, 1974, 3 June, 1 Aug. Cut three times: 30 May, 30 July, 3 Dec.
Lucerne: PK applied: 13 Dec, 1973. Paraquat applied: 21 Jan, 1974. Cut three times: 5 June, 31 July, 2 Dec.
Sugar beet: Ploughed: 28 Sept, 1973. K applied: 21 Feb, 1974. Discd twice and NPK applied: 8 Apr. Spike rotary cultivated and seed drilled: 9 Apr. Weedkiller applied: 21 May. Insecticide applied: 4 June and 24 June. Lifted: 15 Nov.

74/R/RN/1 and 74/R/RN/2

Test crops: Winter wheat, 2nd, 6th, 7th, 9th and 10th test crops.
 (6th, 7th, 9th and 10th tests only): Ploughed: 28 Sept, 1973.
 (2nd test): Deep-tine cultivated twice: 4 Oct. Spring-tine cultivated:
 10 Oct. Rotary harrowed and seed sown: 25 Oct. N applied: 10 Apr, 1974.
 Weedkiller applied: 30 Apr. Combine harvested: 29 Aug.

Reseeded and Old Grass: PK applied: 13 Dec, 1973. NK applied to all-grass
 half plots and K to clover-grass half plots: 26 Feb, 1974, 3 June,
 1 Aug. Cut three times: 30 May, 30 July, 3 Dec.

Standard errors per plot.

Wheat, grain, tonnes/hectare.

6th Test Crop: Highfield.	Whole plot:	0.370 or 6.0% (5 d.f.)
	Sub plot:	0.539 or 8.8% (17 d.f.)
Fosters.	Whole plot:	0.180 or 2.6% (4 d.f.)
	Sub plot:	0.331 or 4.8% (15 d.f.)
7th Test Crop: Highfield.	Whole plot:	0.157 or 2.5% (5 d.f.)
	Sub plot:	0.432 or 6.8% (17 d.f.)
Fosters.	Whole plot:	0.135 or 2.1% (4 d.f.)
	Sub plot:	0.336 or 5.2% (15 d.f.)
9th Test Crop: Highfield.	Whole plot:	0.378 or 6.0% (5 d.f.)
	Sub plot:	0.442 or 7.0% (17 d.f.)
Fosters.	Whole plot:	0.296 or 4.8% (4 d.f.)
	Sub plot:	0.379 or 6.1% (15 d.f.)
10th Test Crop: Highfield.	Whole plot:	0.328 or 5.3% (5 d.f.)
	Sub plot:	0.441 or 7.1% (16 d.f.)
Fosters.	Whole plot:	0.417 or 6.5% (4 d.f.)
	Sub plot:	0.356 or 5.5% (15 d.f.)

74/R/RN/1 and 74/R/RN/2

TABLES OF MEANS

WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

HIGHFIELD

	ROTATION				Mean
	Lucerne	CloGra	Grass	Arable	
FYMRES68					
None	6.37	6.37	6.45	6.88	6.52
FYM	6.47	7.02	6.83	7.30	6.91
NRESID73					
0	6.21	6.36	6.51	6.72	6.45
80	6.96	7.11	6.68	6.99	6.93
160	6.39	6.58	6.54	7.58	6.77
240	6.14	6.74	6.82	7.08	6.70
N 74					
0	5.68	5.99	5.63	6.27	5.89
50	6.43	6.80	6.72	7.10	6.76
100	7.01	7.44	7.31	7.41	7.29
150	6.58	6.55	6.89	7.58	6.90
Mean	6.42	6.70	6.64	7.09	6.71

7⁴/R/RN/1 and 7⁴/R/RN/2

WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

POSTERS

ROTATION

	Lucerne	CloGra	Grass	Arable	Mean
FYMRES68					
None	7.17	6.93	6.43	6.89	6.85
FYM	7.54	7.07	6.89	6.97	7.12
NRESID73					
0	6.91	6.83	6.35	6.68	6.69
80	7.46	6.63	6.36	6.72	6.79
160	7.48	7.36	6.85	7.07	7.19
240	7.56	7.17	7.07	7.25	7.26
N 7 ⁴					
0	6.55	6.37	5.14	5.72	5.95
50	6.79	6.96	6.62	6.74	6.78
100	8.18	7.23	7.60	7.49	7.63
150	7.90	7.43	7.27	7.77	7.59
Mean	7.35	7.00	6.66	6.93	6.98

74/R/RN/1 and 74/R/RN/2

WHEAT 6TH TEST CROP CEREAL5

GRAIN: TONNES/HECTARE

HIGHFIELD

	75	126	N 74	176	226	Mean
ROTATION						
Lucerne	5.89	6.24		5.88	4.87	5.72
CloGra	6.47	6.21		6.62	5.73	6.26
Grass	6.54	6.86		5.72	5.69	6.20
Arable	6.41	6.82		6.96	6.28	6.62
Reseeded	6.55	6.87		6.09	5.41	6.23
OldGrass	6.98	5.70		5.35	5.43	5.87
Mean	6.47	6.45		6.10	5.57	6.15

STANDARD ERRORS OF DIFFERENCES

ROTATION N 74 ROTATION
N 74.

0.370 0.220 0.596

Except when comparing means
with same level of

ROTATION 0.539

Mean D.M. % 84.2

74/R/RN/1 and 74/R/RN/2
WHEAT 6TH TEST CROP CEREAL5

GRAIN: TONNES/HECTARE

FOSTERS

	75	126	N 74 176	226	Mean
ROTATION					
Lucerne	6.46	7.14	7.27	6.97	6.96
CloGra	6.59	7.31	6.85	6.70	6.86
Grass	6.55	7.26	6.70	6.55	6.76
Arable	5.81	7.04	7.25	6.97	6.77
Reseeded	6.33	7.21	6.88	6.74	6.79
Mean	6.35	7.19	6.99	6.79	6.83

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.180	0.148	0.339
Except when comparing means with same level of		
ROTATION		0.331

Mean D.M. % 83.2

74/R/RN/1 and 74/R/RN/2
WHEAT 7TH TEST CROP CEREAL6
GRAIN: TONNES/HECTARE

HIGHFIELD

	75	126	N 74 176	226	Mean
ROTATION					
Lucerne	6.29	7.18	6.25	6.51	6.56
CloGra	6.26	6.95	6.35	6.21	6.44
Grass	6.72	6.91	6.46	5.79	6.47
Arable	5.93	7.07	6.66	5.75	6.35
Reseeded	6.76	6.51	6.03	5.05	6.09
OldGrass	6.47	6.45	6.52	5.95	6.35
Mean	6.41	6.85	6.38	5.88	6.38

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.157	0.176	0.406
Except when comparing means with same level of		
ROTATION		0.432
Mean D.M. % 83.7		

74/R/RN/1 and 74/R/RN/2
WHEAT 7TH TEST CROP CEREAL6
GRAIN: TONNES/HECTARE

FOSTERS

	75	126	N 74	176	226	Mean
ROTATION						
Lucerne	6.08	7.13		7.00	6.66	6.72
CloGra	5.80	6.77		7.00	6.77	6.58
Grass	5.90	6.80		6.80	6.25	6.43
Arable	5.24	5.99		6.90	6.67	6.20
Reseeded	6.09	6.82		6.43	6.30	6.41
Mean	5.82	6.70		6.83	6.53	6.47

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.135	0.150	0.321
Except when comparing means with same level of		
ROTATION		0.336

Mean D.M. % 83.0

74/R/RN/1 and 74/R/RN/2

WHEAT 9TH TEST CROP CEREAL7

GRAIN: TONNES/HECTARE

HIGHFIELD

	75	126	N 74	176	226	Mean
ROTATION						
Lucerne	5.24	6.96	6.80	6.63	6.41	
CloGra	5.47	5.26	6.70	5.92	5.84	
Grass	5.02	6.82	6.59	6.35	6.19	
Arable	5.70	6.89	7.01	6.12	6.43	
Reseeded	6.48	7.52	6.58	6.50	6.77	
OldGrass	6.08	6.76	5.89	5.89	6.15	
Mean	5.66	6.70	6.59	6.23	6.30	

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION
		N 74
0.378	0.181	0.538
Except when comparing means		
with same level of		
ROTATION		0.442

Mean D.M. % 83.5

74/R/RN/1 and 74/R/RN/2
WHEAT 9TH TEST CROP CEREAL7

GRAIN: TONNES/HECTARE

FOSTERS

	75	126	N 74 176	226	Mean
ROTATION					
Lucerne	4.59	6.03	6.76	6.62	6.00
CloGra	5.34	6.52	6.67	6.54	6.27
Grass	4.82	6.25	6.93	6.38	6.09
Arable	4.85	6.47	6.61	6.76	6.17
Reseeded	6.14	6.62	6.80	6.29	6.46
Mean	5.15	6.38	6.75	6.52	6.20

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.296	0.169	0.442
Except when comparing means with same level of ROTATION		
		0.379

Mean D.M. % 83.6

74/R/RN/1 and 74/R/RN/2
WHEAT 10TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

HIGHFIELD

	75	126	N 74 176	226	Mean
ROTATION					
Lucerne	5.48	6.40	7.04	5.97	6.22
CloGra	5.60	6.75	6.26	6.20	6.20
Grass	5.68	6.33	6.06	5.83	5.97
Arable	5.52	6.87	6.61	6.34	6.34
Reseeded	6.38	6.77	6.79	5.74	6.42
OldGrass	6.17	6.43	6.25	5.57	6.11
Mean	5.81	6.59	6.50	5.94	6.21

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.328	0.180	0.503
Except when comparing means with same level of		
ROTATION		0.441

Mean D.M. % 83.3

74/R/RN/1 and 74/R/RN/2
WHEAT 10TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

FOSTERS

	75	126	N 74 176	226	Mean
ROTATION					
Lucerne	5.55	6.20	6.73	6.95	6.36
CloGra	5.39	6.61	6.27	6.72	6.25
Grass	5.60	6.94	6.96	6.71	6.55
Arable	5.13	6.17	6.81	7.07	6.30
Reseeded	5.69	7.02	7.15	6.90	6.69
Mean	5.47	6.59	6.78	6.87	6.43

STANDARD ERRORS OF DIFFERENCES

ROTATION	N 74	ROTATION N 74
0.417	0.159	0.518
Except when comparing means with same level of		
ROTATION		0.356

Mean D.M. % 82.8

74/R/RN/1 and 74/R/RN/2

DRY MATTER: TONNES/HECTARE

	HIGHFIELD Mean	FOSTERS Mean
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LUCERNE

TOTAL OF 3 CUTS

2nd year

12.91

12.13

ALL-GRASS LEY

TOTAL OF 3 CUTS

2nd year

15.10

11.77

CLOVER-GRASS LEY

TOTAL OF 3 CUTS

2nd year

7.54

7.31

RESEEDED GRASS

TOTAL OF 3 CUTS

	Blocks	HIGHFIELD		Blocks	FOSTERS	
		C	N		C	N
26th Exptl year	1 & 4	5.70	13.05	1 & 3	6.14	10.17
26th Exptl year (Reseeded 1973)	2 & 3	9.42	15.45	2 & 4	8.21	12.38

74/R/RN/1 and 74/R/RN/2

DRY MATTER: TONNES/HECTARE

OLD GRASS

TOTAL OF 3 CUTS

	C	N
	HIGHFIELD	
26th Exptl year		
Block 1 & 4	7.25	11.79
Block 2	4.61	12.13

SUGAR BEET

HIGHFIELD Mean	FOSTERS Mean
ROOTS (WASHED): TONNES/HECTARE	
43.3	40.4
SUGAR PERCENTAGE	
15.9	15.7
TOTAL SUGAR: TONNES/HECTARE	
6.88	6.32
TOPS: TONNES/HECTARE	
50.5	48.2