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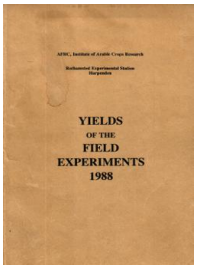
ROTHAMSTED RESEARCH

Yields of the Field Experiments 1988

Full Table of Content



Rotations

Rothamsted Research

Rothamsted Research (1989) *Rotations ;* Yields Of The Field Experiments 1988, pp 33 - 75 **- DOI: https://doi.org/10.23637/ERADOC-1-43**

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88/R/RN/1 and 88/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 40th year, old grass, leys, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-87/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (88/R/RN/1)

FOSTERS — A site with little organic matter initially (88/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.

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88/R/RN/1 and 88/R/RN/2

Additional treatments to 1st 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 1988 (kg N) as 'Nitram':

0
50
100
150

NOTE: Because of an error nitrogen treatments were not fully factorial with **FYMRES70** on Highfield.

Standard applications:

1st Treatment crops:

All crops: Weedkiller: Paraquat at 0.60 kg ion in 200 l.
Lucerne: Manures: (0:24:24) at 310 kg.
All-grass ley and 1-year hay: Manures: (0:18:36) at 420 kg. 'Nitram' at 220 kg. (25:0:16) at 300 kg.
Clover-grass ley: Manures: (0:18:36) at 420 kg.

1st Test crop:

W. wheat: Manures: (0:24:24), combine drilled at 210 kg. Weedkillers: Glyphosate at 1.4 kg in 500 l (to ex-lucerne, grass-ley and clover/grass ley plots only). Chlortoluron at 3.5 kg in 200 l. Fluroxypyr at 0.20 kg with isoproturon at 2.1 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: Lucerne: Vertus, sown at 31 kg.
All-grass ley: Meadow Fescue (17 kg) and Timothy Climax (17 kg), mixture sown at 34 kg.
Clover-grass ley: Meadow Fescue (4 kg), Timothy Climax (4 kg) and white clover (1 kg), mixture sown at 37 kg.
1-year hay: Londras Westerwolths Ryegrass, sown at 25 kg.
W. wheat: Avalon, sown at 180 kg.

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88/R/RN/1 and 88/R/RN/2

Cultivations, etc.:-

1st Treatment crops:

All crops: Ploughed: 28 Sept, 1987. Paraquat applied: 11 Apr, 1988. Heavy spring-tine cultivated: 22 Apr.

Lucerne: PK applied: 11 May, 1988. Rotary harrowed, rolled, seed broadcast and harrowed in: 13 May. Cut: 18 Nov.

All-grass ley, clover-grass ley and 1-year hay: PK applied, N applied (except to clover-grass ley) and 1-year hay plots rotary harrowed and rolled: 11 May, 1988. All-grass ley and clover-grass ley plots rotary harrowed and rolled, all seed broadcast and harrowed in: 13 May. Cut: 18 July. NK applied (except to clover-grass ley): 21 July. Cut: 18 Nov.

1st Test crop wheat: Glyphosate applied (to ex-lucerne, grass-ley and clover/grass-ley plots): 19 Aug, 1987. Ploughed: 28 Sept. Rotary harrowed, PK applied, seed sown: 5 Oct. Chlortoluron applied: 6 Nov. N applied: 13 Apr, 1988. Fluroxypyr and isoproturon applied: 26 Apr. Combine harvested: 22 Aug.

Reseeded grass and old grass: PK applied: 12 Jan, 1988. NK applied to all-grass half plots: 5 Apr, 27 May, 21 July. Cut: 25 May, 18 July, 18 Nov.

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88/R/RN/1 AND 88/R/RN/2

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
TOTAL OF 2 CUTS	3.48	3.15
MEAN DM%	16.4	16.6
ALL-GRASS LEY		
TOTAL OF 2 CUTS	6.31	5.59
MEAN DM%	15.6	16.2
LUCERNE		
1 CUT ONLY	0.69	1.79
MEAN DM%	29.7	28.0
HAY		
TOTAL OF 2 CUTS	5.31	5.58
MEAN DM%	21.6	25.3

OLD GRASS	HIGHFIELD	
TOTAL OF 3 CUTS 40TH EXPTL YEAR	C	N
BLOCKS 1 & 4	5.54	10.02
BLOCK 2	5.41	10.68
MEAN DM%	19.2	18.6

RESEEDED GRASS

TOTAL OF 3 CUTS

		HIGHFIELD			FOSTERS	
	BLOCKS	C	N	BLOCKS	C	N
40TH EXPTL YEAR	1 & 4	5.48	10.69	1 & 3	6.57	11.16
40TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	5.04	12.02	2 & 4	6.45	10.15
MEAN DM%		18.5	18.9		18.9	21.0

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88/R/RN/1 HIGHFIELD W.WHEAT (1ST TEST CROP)

GRAIN TONNES/HECTARE

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

	N	0	50	100	150
ROTATION	**FYMRES70**				
LUCERNE	NONE	7.20	7.63	8.00	6.63
	FYM	5.58	7.69	6.33	7.62
CLOGRA	NONE	4.81	7.68	6.38	6.45
	FYM	6.38	7.43	6.62	7.78
GRASS	NONE	4.28	5.97	5.63	6.03
	FYM	4.39	5.13	6.14	5.71
ARABLE	NONE	3.79	*	6.39	6.17
	FYM	*	5.62	6.58	5.88

GRAIN MEAN DM% 81.9

PLOT AREA HARVESTED 0.00663

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88/R/RN/2 FOSTERS W.WHEAT (1ST TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	Mean
ROTATION			
LUCERNE	9.02	8.52	8.77
CLOGRA	8.01	8.26	8.13
GRASS	6.30	6.41	6.35
ARABLE	6.26	6.09	6.18
Mean	7.40	7.32	7.36

N	0	50	100	150	Mean
ROTATION					
LUCERNE	8.19	8.94	9.19	8.77	8.77
CLOGRA	6.73	8.29	9.14	8.38	8.13
GRASS	4.77	6.37	7.01	7.26	6.35
ARABLE	3.55	6.21	7.35	7.59	6.18
Mean	5.81	7.45	8.17	8.00	7.36

N	0	50	100	150	Mean
FYMRES70					
NONE	5.93	7.45	8.15	8.06	7.40
FYM	5.69	7.46	8.19	7.94	7.32
Mean	5.81	7.45	8.17	8.00	7.36

N		0	50	100	150
ROTATION	FYMRES70				
LUCERNE	NONE	9.16	8.88	9.23	8.81
	FYM	7.23	9.01	9.14	8.73
CLOGRA	NONE	6.51	8.37	9.06	8.11
	FYM	6.95	8.22	9.22	8.65
GRASS	NONE	4.18	6.68	6.64	7.69
	FYM	5.36	6.06	7.37	6.83
ARABLE	NONE	3.86	5.85	7.68	7.62
	FYM	3.23	6.57	7.02	7.56

GRAIN MEAN DM% 82.4

PLOT AREA HARVESTED 0.00663

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88/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without leys - Woburn Stackyard D.

Sponsor: A.E. Johnston.

The 51st year, leys, w. beans, w. wheat, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-87/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, B
LC 3	(Previous CLO) LC, LC, LC, W, B
AF	(Previous A) F, F, BE, W, B
AB	(Previous A H) B, B, BE, W, B

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, B
LLC	LC, LC, LC, LC, LC, LC, LC, LC, W, B

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).

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

Treatments to second test crop s. barley, all combinations of:

Whole plots

1. **ROTATION** Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

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88/W/RN/3

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
60
120
180

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 K2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block:

Continuous rotations	No FYM half plots	FYM half plots
LN	0	0
LC	0	0
AF	155	120
AB	265	275
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	95	40

Standard applications:-

Grass ley and clover/grass ley, 1st year: Manures: (0:18:36) at 420 kg. N at 76 kg to grass ley and 50 kg to clover/grass as 'Nitram'. Weedkiller: Glyphosate at 1.4 kg in 200 l.

Grass ley; 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: (0:18:36) at 560 kg. (25:0:16) at 300 kg in spring and after each cut except the last.

Clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: (0:18:36) at 560 kg. K2O at 40 kg as muriate of potash in spring and after each cut except the last.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l, to 1st treatment crop only. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 1.8 kg in 220 l. Fungicide: Tridemorph at 0.52 kg in 220 l.

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88/W/RN/3

Standard applications:-

W. beans, 3rd treatment crop: Weedkillers: Propyzamide at 0.85 kg in 200 l. Simazine at 0.85 kg in 200 l. Fungicide: Chlorothalonil at 1.5 kg in 220 l. Insecticide: Deltamethrin at 0.075 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 400 l.

Fallow, 1st treatment year only: Weedkiller: Glyphosate at 1.4 kg in 200 l.

W. wheat, 1st test crop: Manures: (0:24:24) at 260 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Isoproturon at 2.1 kg with mecoprop at 1.6 kg, bromoxynil at 0.20 kg and ioxynil at 0.20 kg in 220 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 220 l. Insecticide: Carbofuran at 7.5 kg.

S. barley, 2nd test crop: Manures: (0:24:24) at 260 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 220 l. Fungicide: Tridemorph at 0.52 kg in 220 l. Insecticide: Carbofuran at 7.5 kg.

Seed: Grass ley: Climax timothy at 19 kg and meadow fescue at 19 kg, mixture sown at 39 kg.

Clover/grass ley: Climax timothy at 19 kg, meadow fescue at 16 kg and Huia white clover at 4.7 kg, mixture sown at 39 kg.

S. barley: Klaxon, sown at 150 kg.

W. beans: Bourdon, dressed thiram and thiabendazole, sown at 250 kg.

W. wheat: Mercia, sown at 190 kg.

Cultivations, etc.:-

Treatment crops:

Grass ley and clover/grass ley, 1st year: Glyphosate applied: 22 Sept, 1987. Ploughed: 23 Feb, 1988. Rolled: 1 Mar. Manures applied: 25 Apr. Spring-tine cultivated, grass ley only: 18 May. Spike harrowed with crumbler attached, seed sown, rolled: 24 May. Topped: 19 July. Cut: 13 Sept.

Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Corrective K applied to 4th year only: 13 Nov, 1987. (0:18:36) applied: 10 Feb, 1988. Topped and produce removed: 17 Feb. Chain harrowed: 8 Mar. N K applied to grass ley, K applied to grass/clover ley: 18 Mar and 30 June. Cut: 16 June and 13 Sept.

S. barley, 1st and 2nd treatment crops: Glyphosate applied to 1st year only: 22 Sept, 1987. Ploughed: 23 Feb, 1988. Rolled: 1 Mar. NPK applied, rotary harrowed with crumbler attached, seed sown: 2 Mar. Clopyralid, bromoxynil and mecoprop applied: 20 May. Fungicide applied: 27 May. Combine harvested: 18 Aug.

W. beans, 3rd treatment crop: Seed broadcast, ploughed: 25 Nov, 1987. Propyzamide applied: 10 Dec. Simazine applied: 15 Dec. Insecticide applied: 5 May, 1988. Fungicide applied: 15 June. Desiccant applied: 6 Sept. Combine harvested: 10 Sept.

Fallow, 1st and 2nd treatment years: Glyphosate applied to 1st year only: 22 Sept, 1987. Ploughed: 23 Feb, 1988. Rolled: 1 Mar. Spring-tine cultivated: 18 May and 20 July.

Test crops:

W. wheat, 1st test crop: Glyphosate applied: 22 Sept, 1987. Ploughed: 5 Oct. PK applied: 22 Oct. Insecticide applied, rotary harrowed with crumbler attached, seed sown, harrowed: 23 Oct. Corrective K applied: 13 Nov. Isoproturon, mecoprop, ioxynil and bromoxynil applied, N treatments applied: 27 Apr, 1988. Fungicides applied: 22 June. Combine harvested: 26 Aug.

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88/W/RN/3

Cultivations, etc.:-
Test crops:
S. barley, 2nd test crop: Glyphosate applied: 22 Sept, 1987. Ploughed: 23 Feb, 1988. Rolled: 1 Mar. Insecticide applied, PK applied, spike harrowed with crumbler attached, seed sown: 2 Mar. N treatments applied: 7 Mar. Clopyralid, bromoxynil and mecoprop applied: 6 May. Fungicide applied: 27 May. Combine harvested: 18 Aug.

LEYS

1ST CUTTING OCCASION (16/6/88) DRY MATTER TONNES/HECTARE

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

FYM RES / LEY	NONE	FYM	Mean
LC1	*	*	*
LC2	5.31	6.50	5.91
LC3	6.13	5.43	5.78
LN1	*	*	*
LN2	7.61	7.60	7.60
LN3	7.12	6.48	6.80
LLC1	*	*	*
LLC2	6.05	6.65	6.35
LLC3	6.46	5.74	6.10
LLC4	6.78	5.54	6.16
LLC5	6.74	7.55	7.14
LLC6	6.97	7.03	7.00
LLC7	6.62	5.12	5.87
LLC8	6.32	5.61	5.97
LLN1	*	*	*
LLN2	7.42	7.14	7.28
LLN3	7.17	6.74	6.96
LLN4	5.63	5.42	5.53
LLN5	6.90	6.93	6.92
LLN6	7.85	7.15	7.50
LLN7	8.00	8.78	8.39
LLN8	7.60	7.82	7.71
Mean	6.82	6.63	6.72

1ST CUT MEAN DM% 22.3

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88/W/RN/3

LEYS

2ND CUTTING OCCASION (13/9/88) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.42	2.05	2.23
LC2	3.19	3.25	3.22
LC3	3.09	3.72	3.40
LN1	3.00	3.41	3.20
LN2	3.18	3.11	3.14
LN3	3.82	4.23	4.02
LLC1	4.29	4.22	4.26
LLC2	3.13	3.52	3.33
LLC3	2.84	3.13	2.99
LLC4	6.45	4.63	5.54
LLC5	3.40	4.20	3.80
LLC6	2.88	4.22	3.55
LLC7	1.71	2.26	1.98
LLC8	3.36	3.84	3.60
LLN1	4.61	4.67	4.64
LLN2	3.42	3.63	3.53
LLN3	3.47	4.18	3.82
LLN4	2.86	3.03	2.95
LLN5	3.31	3.43	3.37
LLN6	5.60	4.75	5.17
LLN7	4.08	4.54	4.31
LLN8	4.59	4.51	4.55
Mean	3.58	3.75	3.66

2ND CUT MEAN DM% 27.8

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88/W/RN/3

LEYS

TOTAL OF 2 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.42	2.05	2.23
LC2	8.50	9.75	9.13
LC3	9.22	9.16	9.19
LN1	3.00	3.41	3.20
LN2	10.78	10.71	10.75
LN3	10.94	10.71	10.83
LLC1	4.29	4.22	4.26
LLC2	9.18	10.18	9.68
LLC3	9.30	8.87	9.08
LLC4	13.23	10.17	11.70
LLC5	10.13	11.75	10.94
LLC6	9.85	11.26	10.55
LLC7	8.33	7.38	7.85
LLC8	9.68	9.45	9.56
LLN1	4.61	4.67	4.64
LLN2	10.85	10.77	10.81
LLN3	10.64	10.92	10.78
LLN4	8.49	8.45	8.47
LLN5	10.21	10.37	10.29
LLN6	13.45	11.91	12.68
LLN7	12.08	13.32	12.70
LLN8	12.19	12.33	12.26
Mean	9.15	9.17	9.16

TOTAL OF 2 CUTTING OCCASIONS MEAN DM% 24.9

PLOT AREA HARVESTED 0.00200

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88/W/RN/3

WINTER WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	Mean
ROTATION			
LN 8	6.29	6.59	6.44
LN 3	5.75	6.26	6.01
LC 8	7.25	6.31	6.78
LC 3	6.82	7.24	7.03
AF	5.84	5.62	5.73
AB	5.20	5.92	5.56
Mean	6.19	6.32	6.26

N	0	70	140	210	Mean
ROTATION					
LN 8	4.34	6.73	7.46	7.23	6.44
LN 3	4.01	6.77	7.12	6.14	6.01
LC 8	5.26	7.87	6.94	7.06	6.78
LC 3	5.68	7.39	7.54	7.51	7.03
AF	3.09	6.60	6.63	6.61	5.73
AB	2.98	6.28	6.77	6.20	5.56
Mean	4.23	6.94	7.07	6.79	6.26

N	0	70	140	210	Mean
FYMRES62					
NONE	4.29	6.90	7.01	6.55	6.19
FYM	4.16	6.98	7.13	7.03	6.32
Mean	4.23	6.94	7.07	6.79	6.26

N		0	70	140	210
ROTATION	FYMRES62				
LN 8	NONE	4.13	6.52	7.49	7.02
	FYM	4.55	6.93	7.42	7.44
LN 3	NONE	3.94	6.14	6.89	6.05
	FYM	4.08	7.40	7.34	6.22
LC 8	NONE	6.04	8.57	6.99	7.41
	FYM	4.48	7.17	6.88	6.72
LC 3	NONE	5.41	7.27	7.42	7.19
	FYM	5.96	7.52	7.65	7.84
AF	NONE	3.39	6.93	6.70	6.32
	FYM	2.79	6.27	6.55	6.89
AB	NONE	2.84	6.01	6.59	5.35
	FYM	3.12	6.56	6.95	7.05

GRAIN MEAN DM% 82.6

PLOT AREA HARVESTED 0.00251

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88/W/RN/3

SPRING BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LN 8	4.86	4.37	4.61
LN 3	4.52	4.28	4.40
LC 8	4.44	4.26	4.35
LC 3	4.41	4.33	4.37
AF	3.49	4.01	3.75
AB	3.60	4.04	3.82
Mean	4.22	4.21	4.22

N	0	60	120	180	Mean
ROTATION					
LN 8	3.93	4.90	5.00	4.63	4.61
LN 3	3.91	4.65	4.54	4.50	4.40
LC 8	3.92	4.70	4.33	4.45	4.35
LC 3	3.78	4.59	4.92	4.19	4.37
AF	2.01	3.64	4.70	4.64	3.75
AB	2.30	4.11	4.43	4.44	3.82
Mean	3.31	4.43	4.65	4.47	4.22

N	0	60	120	180	Mean
FYMRES66					
NONE	3.27	4.41	4.59	4.61	4.22
FYM	3.35	4.45	4.71	4.34	4.21
Mean	3.31	4.43	4.65	4.47	4.22

N		0	60	120	180
ROTATION	FYMRES66				
LN 8	NONE	4.13	4.59	5.37	5.36
	FYM	3.73	5.21	4.62	3.91
LN 3	NONE	4.06	4.79	4.56	4.66
	FYM	3.76	4.52	4.51	4.33
LC 8	NONE	3.69	5.20	4.61	4.26
	FYM	4.16	4.21	4.04	4.64
LC 3	NONE	3.69	4.83	4.85	4.28
	FYM	3.88	4.34	4.99	4.10
AF	NONE	1.76	3.32	4.07	4.81
	FYM	2.27	3.96	5.33	4.47
AB	NONE	2.30	3.75	4.10	4.26
	FYM	2.30	4.47	4.77	4.61

GRAIN MEAN DM% 84.1

PLOT AREA HARVESTED 0.00251

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88/W/RN/4

MARKET GARDEN

Object: The experiment compared the effects of fertilizers and organic manures applied annually in the period 1942 to 1967, on market garden crops. Residual effects of the organic manures were studied in arable crops from 1968 to 1973. From 1974 until 1982 the site was maintained in grass without yields. A new sequence of cropping started in 1983 to study further the residual effects of the organic manures, particularly the availability of metals from sewage sludge - Woburn Lansome I.

Sponsor: S.P. McGrath.

The 47th year, clover.

For previous years see 'Details' 1967 & 1973, 74-80/W/RN/4 and 83-87/W/RN/4.

Design: 2 series each of 4 blocks of 10 plots split, systematically, into 2.

Whole plot dimensions: 8.15 x 5.18.

Treatments:

To Series A, first year white clover after two-year white clover, all combinations of:-

Whole plots

1.	**OM RESID**	Residues of organic manures:
	FYM	Farmyard manure until 1967
	SEWAGE	Sewage sludge until 1961
	SEW COM	Sewage sludge, composted with straw, until 1961
	VEG COM	Vegetable compost until 1962, then farmyard manure until 1967
2.	**OM RATE**	Rates of organic manures (t per crop):
	25	
	50	
	EXTRA	plus one extra treatment (duplicated):
	NONE	No organic manures

Sub plots

3.	**N RESID**	Nitrogen (kg N) per cut in previous years:
	0	
	100	

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88/W/RN/4

To Series B, first year white clover after four-year white clover, all combinations of:-

Whole plots

1. **OM RESID** Residues of organic manures:

FYM	Farmyard manure to whole plots until 1964, to half plots until 1967. Untreated half plots received a balancing dressing in 1974
SEWAGE	Sewage sludge until 1961
SEW COM	Sewage sludge, composted with straw, until 1961
VEG COM	Vegetable compost until 1962, then farmyard manure until 1965

2. **OM RATE** Rates of organic manures (t per crop):

25
50

EXTRA plus one extra treatment (duplicated):

PEAT Peat at 31 t per crop to half plots 1965 to 1967. Untreated half plots received a balancing dressing in 1974.

Sub plots

3. **N RESID** Nitrogen (kg N) per cut in previous years:

0
100

NOTE: The crop failed to establish from the spring sowing and was therefore resown in July.

Basal applications:
Series A and B: Manures: K2O at 156 kg as muriate of potash. Weedkillers: Glyphosate at 1.0 kg in 220 l. Benazolin, 2,4-DB and MCPA (as 'Legumex Extra' at 7.0 l) in 220 l.

Seed: Blanca at 17 kg, resown at 22 kg.

Cultivations, etc.:- Ploughed: 11 Feb, 1988. Heavy spring-tine cultivated: 6 Apr. Basal K applied: 25 Apr. Rotary cultivated with crumbler attached, seed sown: 26 Apr. Glyphosate applied: 22 June. Ploughed: 7 July. Spike harrowed with crumbler attached, rolled, spike harrowed with crumbler attached, seed sown, rolled: 15 July. Benazolin, 2,4-DB and MCPA applied: 16 Aug. Cut: 7 Dec.

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88/W/RN/4 WHITE CLOVER SERIES A

1ST AND ONLY CUT (7/12/88) DRY MATTER TONNES/HECTARE

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

OM RESID / OM RATE	FYM	SEWAGE	SEW COM	VEG COM	Mean
25	0.74	0.60	0.44	0.85	0.66
50	0.58	0.37	0.41	0.59	0.49
Mean	0.66	0.49	0.43	0.72	0.57

N RESID / OM RATE	0	100	Mean
25	0.50	0.82	0.66
50	0.34	0.64	0.49
Mean	0.42	0.73	0.57

N RESID / OM RESID	0	100	Mean
FYM	0.45	0.86	0.66
SEWAGE	0.36	0.61	0.49
SEW COM	0.36	0.49	0.43
VEG COM	0.50	0.95	0.72
Mean	0.42	0.73	0.57

OM RATE	N RESID / OM RESID	0	100
25	FYM	0.44	1.03
	SEWAGE	0.55	0.65
	SEW COM	0.40	0.49
	VEG COM	0.60	1.11
50	FYM	0.47	0.69
	SEWAGE	0.18	0.56
	SEW COM	0.33	0.50
	VEG COM	0.39	0.79

NONE	N RESID	0	100	Mean
		0.48	0.92	0.70

Grand mean 0.60

*** Standard errors of differences of means ***

OM RESID	OM RATE	N RESID	OM RESID OM RATE
0.125	0.088	0.070	0.176

OM RESID N RESID	OM RATE N RESID	OM RESID OM RATE N RESID	NONENRES
0.159	0.112	0.225	0.140

Except when comparing means with the same level(s) of

OM RESID	0.140		
OM RATE		0.099	
OM RESID.OM RATE			0.197

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88/W/RN/4 WHITE CLOVER SERIES A

1ST AND ONLY CUT (7/12/88) DRY MATTER TONNES /HECTARE

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.249	41.6
BLOCK.WP.SP	31	0.279	46.6

1ST CUT MEAN DM% 18.1

PLOT AREA HARVESTED 0.00052

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88/W/RN/4 WHITE CLOVER SERIES B

1ST AND ONLY CUT (7/12/88) DRY MATTER TONNES/HECTARE

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

OM RESID / OM RATE	FYM	SEWAGE	SEW COM	VEG COM	Mean
25	1.02	1.21	0.79	0.93	0.99
50	1.73	0.58	0.74	0.70	0.94
Mean	1.38	0.89	0.76	0.81	0.96

N RESID / OM RATE	0	100	Mean
25	0.83	1.14	0.99
50	0.97	0.91	0.94
Mean	0.90	1.02	0.96

N RESID / OM RESID	0	100	Mean
FYM	1.43	1.32	1.38
SEWAGE	0.92	0.87	0.89
SEW COM	0.67	0.86	0.76
VEG COM	0.59	1.04	0.81
Mean	0.90	1.02	0.96

OM RATE	N RESID / OM RESID	0	100
25	FYM	0.75	1.29
	SEWAGE	1.31	1.10
	SEW COM	0.57	1.00
	VEG COM	0.69	1.17
50	FYM	2.11	1.35
	SEWAGE	0.52	0.64
	SEW COM	0.77	0.71
	VEG COM	0.48	0.92

PEAT	N RESID	0	100	Mean
		0.53	0.90	0.72

Grand mean 0.91

*** Standard errors of differences of means ***

OM RESID	OM RATE	N RESID	OM RESID OM RATE
0.283	0.200	0.168	0.401

OM RESID N RESID	OM RATE N RESID	OM RESID OM RATE N RESID	PEATNRES
0.370	0.262	0.523	0.337

Except when comparing means with the same level(s) of

OM RESID	0.337
OM RATE	0.238
OM RESID.OM RATE	0.476

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88/W/RN/4 WHITE CLOVER SERIES B

1ST AND ONLY CUT (7/12/88) DRY MATTER TONNES/HECTARE

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.566	62.0
BLOCK.WP.SP	31	0.673	73.7

1ST CUT MEAN DM% 26.6

PLOT AREA HARVESTED 0.00052

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88/R/RN/5

ARABLE REFERENCE PLOTS

Object: To study the long-term effects of FYM and N, P and K fertilizers on the yield and mineral content of crops - Great Field IV.

Sponsor: A. Penny.

The 33rd year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980; w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 29th year of a rotation on the additional plots (as the initial above rotation for 20 years; w. barley, ley, potatoes, w. wheat, w. oats since 1980). The 32nd year of permanent grass.

For previous years see 58/Bc/1(t), 59/Bc/1(t), 60/B/3(t), 61-64/B/2, 65/B/2(t), 66/B/2(t), 67/B/2, 68/B/3(t) and 69-87/R/RN/5.

Design: 1 block of 12 plots for each crop on original plots. 1 block of 7 plots for each crop on additional plots.

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilizers and farmyard manure:

MANURE

Original plots

O
N1
P
N1P
K
N1K
PK
N1PK
N2PK
D
N1PKD
N2PKD

N1, 2 (kg N): 20, 40 (ley): 100, 200 (w. wheat, w. barley and w. oats): 125, 250 (potatoes, and permanent grass) as 'Nitro-Chalk' (26% N)
P: 63 kg P_2O_5 as superphosphate
K: 250 kg K_2O as muriate of potash
D: 38 tonnes FYM (permanent grass): 100 tonnes (to potatoes only - 50 tonnes to potatoes and kale until 1980): none to other crops

NOTES: (1) All w. wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts.
(2) Cereals receive 20 kg of N1 and 40 kg of N2 in February or March, remainder in April.

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Additional plots

MANURE	Fertilizers from 1980 to 1988 and in previous years:
1980-88	Until 1979
O	O
N2PK	N2 PK
N2PKMG	N2 PK MG CA
N2PKS	N2 PK CA S
N2PKMGS	N2 PK MG S
N1PKMGS	N2 PK CA MG S
N3PKMGS	N2 PK CA MG S TE

N: In 1988: N1: 20 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 200 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). Until 1979 N2 = larger rate on original plots in these years. As urea in all years. Cereals receive 40 kg N in March, remainder in April.

P: 126 kg P_2O_5 as potassium dihydrogen phosphate.

K: 251 kg K_2O total. As potassium dihydrogen phosphate (83 kg K_2O) on all PK plots. In addition plots without S receive 168 kg K_2O as potassium chloride, plots with S receive 92 kg K_2O as potassium sulphate plus 76 kg K_2O as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg K_2O for potatoes, applied in autumn as potassium chloride.

MG: 126 kg MgO as magnesium chloride.

CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given Ca received calcium carbonate at 7.5 t, except O which was given 5.0 t.

S: 30 kg S supplied by the potassium sulphate.

TE: Trace element mixture which included Mn, Cu, Zn, B, Mo, Ca and Fe.

Standard applications:

Original and additional plots:

All cereals: Weedkillers: Mecoprop at 0.72 kg, bromoxynil at 0.16 kg and ioxynil at 0.16 kg with dicamba at 0.025 kg, mecoprop at 0.11 kg and MCPA at 0.33 kg in 220 l. Fungicides: Prochloraz at 0.56 kg and carbendazim at 0.21 kg in 220 l. Tridemorph at 0.53 kg in 220 l. Propiconazole at 0.14 kg in 220 l. Chlorothalonil at 1.1 kg in 220 l on two occasions. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg in 220 l, (and on a second occasion to wheat only). Insecticide: Pirimicarb at 0.14 kg in 220 l. Growth regulators: Chlormequat at 1.6 kg in 220 l, (to wheat & oats). Mepiquat chloride at 0.86 kg and 2-chloroethylphosphonic acid at 0.44 kg in 220 l, (to barley).

W. wheat: Manures: MgO at 82 kg as Epsom salts.

Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l on two occasions applied with the insecticide on the second. Applied on a third occasion to later-harvested plots only. Insecticide: Pirimicarb at 0.14 kg in 220 l and on a second occasion at 0.14 kg with the fungicide.

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88/R/RN/5

Seed: W. wheat: Galahad, sown at 210 kg.
W. barley: Panda, sown at 250 kg.
W. oats: Peniarth, sown at 250 kg.
Potatoes: Cara.
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.

Cultivations, etc.:-

Original and additional plots:

All cereals: Weedkillers applied: 6 Nov, 1987. First N treatments applied: 7 Mar, 1988. Second N treatments applied: 12 Apr. Prochloraz and carbendazim applied, tridemorph applied: 21 Apr. Growth regulators applied to barley: 28 Apr, and to wheat and oats: 10 May. Propiconazole applied, first chlorothalonil applied: 10 May (to barley) and 25 May (to wheat and oats). Insecticide applied: 6 June. Carbendazim, maneb and tridemorph applied, second chlorothalonil applied: 13 June. Second carbendazim, maneb and tridemorph applied (to wheat only): 15 July.

W. wheat: P, K, Mg and S applied (to additional plots): 1 Oct, 1987. Rotary cultivated, P, K and Mg applied (to original plots), seed sown and raked in: 2 Oct. Hand harvested: 16 Aug, 1988.

W. barley: Rotary cultivated: 8 Sept, 1987. Rotary cultivated, P and K (to additional plots only) Mg and S applied, seed sown and raked in: 21 Sept. Hand harvested: 20 July, 1988.

W. oats: P, K and (to additional plots only) Mg and S applied: 9 Sept, 1987. Rotary cultivated, seed sown, raked level: 6 Oct. Hand harvested: 3 Aug, 1988.

Potatoes: FYM applied to original plots and all original plots dug by hand: 7 Dec, 1987. All additional plots dug by hand: 8 Dec. P, K and (to additional plots only), Mg and S applied: 9 Dec. N applied, rotary cultivated, potatoes planted: 14 Apr, 1988. Weedkillers applied: 10 May. Insecticide applied: 6 June. Fungicide applied: 23 June. Fungicide with insecticide applied: 15 July. Plots given neither FYM nor K on original plots and plot given no fertilizer on additional plots, harvested by hand, fungicide applied to remaining plots: 10 Aug. Remaining plots harvested by hand: 20 Sept.

Grass-clover ley: Rotary cultivated: 4 Aug, 1987. Rotary cultivated, seed sown and raked in: 21 Aug. Cut: 5 Nov. P, K and (to additional plots only), Mg and S applied: 18 Nov. N applied: 7 Mar, 1988. Cut: 19 May, 12 July and 2 Sept.

Permanent grass: P and K applied: 18 Nov, 1987. FYM and first N applied: 7 Mar, 1988. Cut, second N applied: 16 May. Cut, third N applied: 12 July. Cut: 2 Sept.

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88/R/RN/5

ORIGINAL PLOTS

TONNES/HECTARE

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

	W. WHEAT:		W. BARLEY:		LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	4TH CUT	TOTAL OF 4 CUTS
MANURE	GRAIN	STRAW	GRAIN	STRAW					
0	4.88	4.66	2.70	1.87	0.36	2.44	1.17	1.39	5.36
N1	6.51	6.74	2.16	3.21	0.39	4.90	1.27	0.90	7.47
P	3.24	3.58	2.98	2.01	0.80	3.00	1.88	2.25	7.92
N1P	3.84	5.71	2.15	3.24	0.87	5.04	1.11	1.09	8.11
K	4.10	4.05	3.26	2.54	0.53	2.73	1.44	1.45	6.14
N1K	7.46	8.45	5.32	4.81	0.51	4.63	1.45	1.28	7.88
PK	4.74	5.27	4.34	3.31	0.84	3.76	3.68	3.78	12.06
N1PK	8.37	9.01	9.28	7.11	0.96	5.30	2.36	3.82	12.44
N2PK	10.32	11.13	10.01	8.18	1.20	7.44	1.95	3.03	13.62
D	6.95	7.37	4.83	3.72	1.16	4.75	2.32	3.45	11.67
N1PKD	9.47	10.48	8.74	7.36	1.38	6.41	2.43	4.37	14.58
N2PKD	10.05	12.41	10.20	8.82	1.44	7.78	1.95	2.69	13.87
MEAN DM%	82.7	59.1	81.9	59.3	18.2	24.9	22.7	17.6	20.9

	W. OATS:		POTATOES:	PERMANENT GRASS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE	GRAIN	STRAW	TOTAL TUBERS				
0	3.37	4.39	12.7	0.79	0.77	0.54	2.09
N1	6.18	8.54	9.8	1.78	1.33	1.42	4.53
P	3.13	4.36	8.5	0.84	0.95	0.55	2.34
N1P	7.05	9.09	7.5	2.42	1.68	1.66	5.76
K	3.01	4.65	34.6	0.92	0.97	0.67	2.57
N1K	5.95	8.42	34.4	2.34	2.02	1.49	5.86
PK	3.48	5.02	55.7	1.44	1.27	1.24	3.95
N1PK	7.41	10.94	68.8	3.01	2.38	2.11	7.51
N2PK	6.86	13.77	68.0	4.42	2.73	2.58	9.72
D	3.55	5.36	64.0	4.95	1.70	1.54	8.18
N1PKD	8.36	12.09	85.2	5.48	2.15	2.66	10.29
N2PKD	7.36	14.62	82.1	6.24	3.58	3.17	12.99
MEAN DM%	75.9	37.6	21.6	24.9	27.7	22.8	25.1

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ADDITIONAL PLOTS

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

	W. WHEAT: GRAIN	W. WHEAT: STRAW	W. BARLEY: GRAIN	W. BARLEY: STRAW	W. OATS: GRAIN	W. OATS: STRAW	POTATOES: TOTAL TUBERS
MANURE							
0	4.40	4.57	3.25	2.44	2.37	3.84	11.3
N2PK	9.36	10.00	8.99	7.32	8.15	13.27	78.6
N2PKMG	7.34	10.34	8.68	7.67	7.07	13.57	73.8
N2PKS	9.27	9.62	9.55	7.57	7.09	10.78	71.9
N2PKMGS	8.93	9.30	9.09	7.68	8.11	11.68	68.6
N1PKMGS	8.41	9.35	9.34	7.04	7.62	12.38	75.3
N3PKMGS	9.76	10.74	9.79	8.35	7.37	13.33	79.2
MEAN DM%	83.5	52.8	83.0	63.6	74.6	38.9	22.0

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	4TH CUT	TOTAL OF 4 CUTS
MANURE					
0	0.53	3.05	1.09	1.25	5.92
N2PK	1.23	6.22	2.19	3.95	13.59
N2PKMG	1.04	5.71	2.46	3.54	12.75
N2PKS	1.10	5.70	2.47	4.21	13.48
N2PKMGS	1.17	6.34	2.47	4.00	13.98
N1PKMGS	1.01	5.12	2.76	4.09	12.99
N3PKMGS	1.11	6.04	2.15	3.92	13.22
MEAN DM%	17.3	23.7	20.9	15.8	19.4

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88/R/RN/8

CULTIVATION/WEEDKILLER

Object: To study the long-term effects of different methods of primary cultivation on a sequence of crops; weedkillers were also tested until 1981 - Great Harpenden I.

Sponsor: R. Moffitt.

The 28th year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-87/R/RN/8.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 12.8 x 12.2.

Treatments: All combinations of:-

Whole plots

1. **CLT CHOP** — Primary cultivations annually; straw chopped since 1985:

PLOUGH	Ploughed: 18 Aug, 1987
ROTA DIG	Cultivated by rotary digger: 18 Aug
DEEPTINE	Deep-tine cultivated, twice: 18 Aug

2. **SUBSOIL[82]** — Subsoiling in September 1982:

NONE	None
CNVNTIAL	Conventional vertical tine
PARAPLOW	'Paraplow'

XTR BURN — plus three extra treatments with straw burnt since 1985, direct drilled until 1984, sprayed with paraquat at 0.60 kg ion in 500 l on 19 Aug, 1987 in addition to basal cultivating, differing in subsoiling in September 1982:

NONE	None
CNVNTIAL	Conventional vertical tine
PARAPLOW	'Paraplow'

NOTES: (1) Straw was chopped on 8 Aug, 1987 and was burnt and disced on XTR BURN on 21 Aug.
(2) The conventional vertical tine subsoiler had tines 76 cm apart and worked at a depth of about 50 cm.
(3) The 'Paraplow' had rigid tines set at a 45 degree angle. The tip of each tine was in line with the attachment of an adjacent tine. The tines were 51 cm apart and worked at a depth of about 38 cm.

Basal applications: Manures: 'Nitram' at 120 kg followed by 480 kg. Weedkillers: Glyphosate at 0.27 kg in 200 l. Chlortoluron at 3.5 kg in 200 l.

Seed: Igri, sown at 150 kg.

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88/R/RN/8

Cultivations, etc.:- Glyphosate applied: 22 Sept, 1987. Heavy spring-tine cultivated, rotary harrowed, seed sown: 2 Oct. Chlortoluron applied: 6 Nov. First N applied: 1 Mar, 1988. Second N applied: 7 Apr. Combine harvested: 3 Aug.

GRAIN TONNES/HECTARE

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

SUBSOIL[82] CLT CHOP	NONE	CNVNTIAL	PARAPLOW	Mean
PLOUGH	5.81	5.37	5.52	5.57
ROTA DIG	5.41	4.85	5.58	5.28
DEEPTINE	5.40	5.35	5.12	5.29
Mean	5.54	5.19	5.40	5.38

XTR BURN	NONE	CNVNTIAL	PARAPLOW	Mean
	5.54	5.21	5.62	5.46

Grand mean 5.40

*** Standard errors of differences of means ***

XTR BURN	CLT CHOP	SUBSOIL[82]	CLT CHOP SUBSOIL[82]
0.300	0.173	0.173	0.300

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.300	5.6

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00280

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88/W/RN/12

ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the effects of a range of types of organic matter - Woburn, Stackyard B.

Sponsor: A.E. Johnston.

The 24th year, w. wheat, potatoes.

For previous years see 'Details' 1973 and 74-87/W/RN/12.

Design for each crop: 2 blocks of 8 plots split into 6

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. On the first pair leys were ploughed for 1st test crop in 1987, on the second pair for 1st test crop in 1988.

1st test crop of w. wheat tested all combinations of:

Whole plots

1. **TREATMNT** Previous treatments:

LC 8 GM	Eight-year clover/grass ley until 1987, green manure in the preliminary period
LC 8 PT	As above, peat in the preliminary period
LC 6 LC	Six-year clover/grass ley until 1987, clover/grass ley in the preliminary period
LC 6 LN	As above, grass ley with N in the preliminary period
FYM	Farmyard manure annually 1981 to 1986 and in the preliminary period
STRAW	Straw in both periods
FERT-FYM	Fertilizers only in both periods, rates of P, K and Mg equivalent to amounts in FYM
FERT-STR	Fertilizers only in both periods rates of P, K and Mg equivalent to amounts in straw (+P)

Sub plots

2. **N** Nitrogen fertilizer in 1988 (kg N) as 'Nitro-Chalk':

0
50
100
150
200
250

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88/W/RN/12

2nd test crop potatoes tested all combinations of:

Whole plots

1. **TREATMNT** Previous treatments, after w. wheat 1987:

LC 8 GM	Eight-year clover/grass ley until 1986, green manure in the preliminary period
LC 8 PT	As above, peat in the preliminary period
LC 6 LC	Six-year clover/grass ley until 1986, clover/grass ley in the preliminary period
LC 6 LN	As above, grass ley with N in the preliminary period
FYM	Farmyard manure annually 1981 to 1985 and in the preliminary period
STRAW	Straw in both periods
FERT-FYM	Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in FYM
FERT-STR	Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in straw (+P)

Sub plots

2. **N** Nitrogen fertilizer in 1988 (kg N) as 'Nitro-Chalk':

0
70
140
210
280
350

Standard applications:

1st test crop:

W. wheat: Manures: (0:18:36) at 560 kg. Mn at 0.16 kg as manganese sulphate in 220 l. Weedkillers: Glyphosate at 1.4 kg in 200 l. Isoproturon at 2.1 kg with bromoxynil at 0.20 kg, ioxynil at 0.20 kg and mecoprop at 1.6 kg in 220 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 220 l. Insecticide: Carbofuran at 7.5 kg. Molluscicide: Methiocarb at 0.22 kg.

2nd test crop:

Potatoes: Manures: (0:18:36) at 1400 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Linuron at 1.5 kg in 220 l. Fungicides: Mancozeb at 1.4 kg in 220 l on five occasions applied with the pirimicarb on the first, second and fifth. Fentin hydroxide at 0.28 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg on three occasions. Nematicide: Oxamyl at 5.0 kg. Desiccant: Diquat at 0.80 kg ion in 400 l.

Seed: W. wheat: Mercia, sown at 190 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-

W. wheat: Glyphosate applied: 22 Sept, 1987. Subsoiled, tines 56 cm deep and 142 cm apart: 6 Oct. Ploughed: 14 Oct. Methiocarb applied: 21 Oct. PK applied: 22 Oct. Carbofuran applied, power harrowed, seed sown, harrowed: 23 Oct. Isoproturon, bromoxynil, ioxynil and mecoprop applied: 26 Apr, 1988. N treatments applied: 27 Apr. Manganese applied: 5 May. Fungicides applied: 22 June. Combine harvested: 26 Aug.

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88/W/RN/12

Cultivations,etc.:-
Potatoes: Glyphosate applied: 22 Sept, 1987. Ploughed: 24 Feb, 1988. Heavy spring-tine cultivated: 5 Apr. PK applied: 8 Apr. N treatments applied: 14 Apr. Oxamyl applied, spring-tine cultivated: 20 Apr. Rotary harrowed, potatoes planted: 21 Apr. Rotary ridged, linuron applied: 13 May. Mancozeb applied: 15 July and 1 Aug. Mancozeb applied with pirimicarb: 14 June, 5 July and 15 Aug. Fentin hydroxide applied: 30 Aug. Desiccant applied: 15 Sept. Haulm mechanically destroyed: 29 Sept. Potatoes lifted: 19 Oct.

NOTES: (1) W. wheat: Because of water logging the yield of one plot was lost, with treatments FERT-FYM 0. An estimated value was used in the analysis.
(2) Potatoes: Because of a weighing error yields from two plots were lost. Those with treatment combinations

LC 6 LN	LC 6 LN
140	350

Estimated values were used in the analysis.

WINTER WHEAT

GRAIN TONNES/HECTARE

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

N / TREATMNT	0	50	100	150	200	250	Mean
LC 8 GM	4.42	5.78	6.41	5.66	5.77	6.83	5.81
LC 8 PT	3.89	5.45	6.04	6.85	6.35	6.21	5.80
LC 6 LC	4.39	6.16	7.13	6.27	6.96	7.04	6.32
LC 6 LN	4.30	6.91	6.85	6.36	7.53	6.22	6.36
FYM	3.94	5.44	5.69	5.82	6.60	6.63	5.68
STRAW	2.81	3.78	5.12	3.77	4.46	3.91	3.98
FERT-FYM	1.96	2.64	3.71	4.00	2.79	3.03	3.02
FERT-STR	2.30	3.18	4.26	3.72	4.67	4.81	3.82
Mean	3.50	4.92	5.65	5.31	5.64	5.58	5.10

*** Standard errors of differences of means ***

TREATMNT	N	TREATMNT N
0.272	0.233	0.660

Except when comparing means with the same level(s) of **TREATMNT** 0.658

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.272	5.3
BLOCK.WP.SP	39	0.658	12.9

GRAIN MEAN DM% 79.5

SUB PLOT AREA HARVESTED 0.00252

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88/W/RN/12

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

N TREATMNT	0	70	140	210	280	350	Mean
LC 8 GM	47.2	60.1	70.5	71.5	71.5	64.4	64.2
LC 8 PT	46.8	67.9	69.8	75.8	72.4	73.0	67.6
LC 6 LC	52.1	63.2	71.4	65.1	71.0	70.9	65.6
LC 6 LN	47.7	69.7	70.6	72.8	67.4	68.2	66.1
FYM	48.2	61.2	67.2	72.1	64.1	65.6	63.1
STRAW	41.7	58.0	63.4	60.3	62.4	63.6	58.2
FERT-FYM	26.4	49.1	53.3	54.3	56.4	54.4	49.0
FERT-STR	30.2	51.6	57.2	57.6	54.6	51.5	50.5
Mean	42.5	60.1	65.4	66.2	65.0	64.0	60.5

*** Standard errors of differences of means ***

TREATMNT	N	TREATMNT N
2.95	1.34	4.56

Except when comparing means with the same level(s) of TREATMNT 3.80

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	2.95	4.9
BLOCK.WP.SP	38	3.80	6.3

SUB PLOT AREA HARVESTED 0.00137

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

N TREATMNT	0	70	140	210	280	350	Mean
LC 8 GM	97.2	98.0	98.2	98.7	98.3	97.2	97.9
LC 8 PT	95.6	98.4	98.0	98.5	97.9	97.9	97.7
LC 6 LC	97.3	97.8	98.2	98.4	98.5	98.2	98.1
LC 6 LN	97.1	98.2	98.4	98.2	96.7	97.3	97.7
FYM	96.1	98.0	98.5	97.7	98.3	97.8	97.8
STRAW	96.8	98.2	98.3	97.6	96.7	97.4	97.5
FERT-FYM	92.9	96.6	96.4	95.8	95.7	95.9	95.6
FERT-STR	94.7	96.4	97.4	97.0	96.3	95.7	96.3
Mean	96.0	97.7	97.9	97.7	97.3	97.2	97.3

SUB PLOT AREA HARVESTED 0.00137

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88/W/RN/13

INTENSIVE CEREALS

Object: To study the effects of leys of different duration, following prolonged intensive cereal cropping, on a sequence of arable crops - Woburn Stackyard I.

Sponsors: A.E. Johnston, J. McEwen.

The 23rd year, potatoes.

For previous years see 'Details' 1973 and 74-87/W/RN/13.

Design: 4 randomised blocks of 6 plots split into 6.

Treatments: Until 1977 the experiment tested all phases of the five-course rotation: ley, potatoes, cereal, cereal, cereal and continous cereal. From 1977 to 1980 all phases were cropped with cereal. The experiment was in two halves, one in which the cereal was w. wheat, sown on part of the site of the classical continuous wheat experiment 1877-1954 and one in which the cereal was s. barley, sown on part of the site of the classical continuous barley experiment 1877-1954. From 1981 the experiment was used to establish grass/clover leys of different durations for tests on w. wheat in 1987. Plots not in ley were sown to w. wheat on both halves of the experiment. All leys were ploughed for 1987 and the site sown to w. wheat. This was followed in 1988 by potatoes testing all combinations of the following treatments:

Whole plots

1. **LEY AGE** Length of ley (until ploughing in summer 1986):

   1 YEAR
   2 YEARS
   3 YEARS
   4 YEARS
   5 YEARS
   6 YEARS

Sub plots

2. **N** Nitrogen fertilizer in 1988 (kg N) as 'Nitro-Chalk':

   0
   70
   140
   210
   280
   350

Basal applications: Manures: (0:18:36) at 1400 kg. Mg at 100 kg as kieserite. Weedkillers: Glyphosate at 1.4 kg in 200 l. Linuron at 1.5 kg in 220 l. Fungicides: Mancozeb at 1.4 kg in 220 l on five occasions, applied with the pirimicarb on the first, second and fifth. Fentin hydroxide at 0.28 kg in 220 l. Nematicide: Oxamyl at 5.0 kg. Insecticide: Pirimicarb at 0.14 kg on three occasions. Desiccant: Diquat at 0.80 kg ion in 400 l.

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88/W/RN/13

Seed: Pentland Crown.

Cultivations, etc.:- Glyphosate applied: 22 Sept, 1987. Ploughed: 22 Feb, 1988. Heavy spring-tine cultivated: 5 Apr. PK applied: 8 Apr. N treatments applied, oxamyl applied, spring-tine cultivated: 20 Apr. Mg applied, rotary harrowed, potatoes planted: 21 Apr. Rotary ridged, linuron applied: 13 May. Mancozeb applied: 15 July and 1 Aug. Mancozeb applied with pirimicarb: 14 June, 5 July and 15 Aug. Fentin hydroxide applied: 30 Aug. Desiccant applied: 15 Sept. Haulm mechanically destroyed: 29 Sept. Potatoes lifted: 26 Oct.

TOTAL TUBERS TONNES/HECTARE

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

N	0	70	140	210	280	350	Mean
LEY AGE							
1 YEAR	37.5	52.6	64.6	60.4	59.4	62.9	56.2
2 YEARS	41.9	57.8	66.2	59.9	64.5	63.3	58.9
3 YEARS	44.9	59.9	64.7	67.6	65.8	63.4	61.0
4 YEARS	46.8	58.1	66.0	67.6	67.9	62.9	61.5
5 YEARS	43.6	61.1	68.6	75.8	69.1	64.9	63.9
6 YEARS	47.5	66.5	64.2	71.1	65.8	67.9	63.8
Mean	43.7	59.3	65.7	67.1	65.4	64.2	60.9

*** Standard errors of differences of means ***

LEY AGE	**N**	**LEY AGE N**
2.08	1.73	4.40

Except when comparing means with the same level(s) of **LEY AGE** 4.25

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	2.94	4.8
BLOCK.WP.SP	90	6.01	9.9

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88/W/RN/13

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

N	0	70	140	210	280	350	Mean
LEY AGE							
1 YEAR	94.2	96.5	97.5	96.9	96.9	97.3	96.6
2 YEARS	96.0	97.8	98.0	98.2	98.3	97.5	97.6
3 YEARS	96.7	97.4	98.1	97.3	98.4	97.3	97.5
4 YEARS	95.5	96.9	98.1	97.5	97.5	96.6	97.0
5 YEARS	95.4	97.6	97.9	98.0	98.0	97.5	97.4
6 YEARS	96.1	98.0	97.7	97.7	97.9	97.4	97.5
Mean	95.7	97.4	97.9	97.6	97.8	97.3	97.3

SUB PLOT AREA HARVESTED 0.00090

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88/R/RN/17

RATES OF P AND K TO THE SUBSOIL

Object: To study the effects of a range of rates and frequencies of application of P and K to the subsoil, singly and together, on the yields and nutrient uptakes of a rotation of crops - Meadow.

Sponsors: J. McEwen, A.E. Johnston.

The eighth year, potatoes, s. barley, s. beans, w. wheat.

For previous years see 81-87/R/RN/17.

Design: 4 series (for crops) each of 40 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments to each series:

TREATMNT Extra P and K and primary cultivation tool in autumn 1980 only, except on A plots, treatments repeated annually, and F plots treatments repeated four yearly:

	P_2O_5 (kg)	K_2O (kg)	Tool	
- - -	0	0	Plough	(duplicated)
P6 K6 T	1000	500 to topsoil	"	(")
- - S	0	0	Wye double-digger	(triplicated)
- - SA	0	0	" " "	(duplicated)
- - SF	0	0	" " "	
P2 - SA	63	0 to subsoil	" " "	
P3 - SF	125	0 " "	" " "	
P4 - S	250	0 " "	" " "	
P5 - S	500	0 " "	" " "	
P5 - SF	500	0 " "	" " "	
P6 - S	1000	0 " "	" " "	
- K2 SA	0	31 " "	" " "	
- K3 SF	0	63 " "	" " "	
- K4 S	0	125 " "	" " "	
- K5 S	0	250 " "	" " "	
- K5 SF	0	250 " "	" " "	
- K6 S	0	350 " "	" " "	
P1 K1 SA	31	16 " "	" " "	
P1 K3 SA	31	63 " "	" " "	
P2 K2 SA	63	31 " "	" " "	
P3 K1 SA	125	16 " "	" " "	
P3 K3 SA	125	63 " "	" " "	
P3 K4 SF	125	125 " "	" " "	
P4 K3 SF	250	63 " "	" " "	
P4 K4 S	250	125 " "	" " "	
P4 K5 S	250	250 " "	" " "	
P4 K5 SF	250	250 " "	" " "	
P4 K6 S	250	350 " "	" " "	
P5 K4 S	500	125 " "	" " "	
P5 K4 SF	500	125 " "	" " "	
P5 K5 S	500	250 " "	" " "	
P5 K6 S	500	350 " "	" " "	
P6 K4 S	1000	125 " "	" " "	
P6 K5 S	1000	250 " "	" " "	
P6 K6 S	1000	350 " "	" " "	

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88/R/RN/17

NOTES: (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(2) The topsoil PK dressing was equally divided before and after ploughing.
(3) All plots were conventionally ploughed each autumn unless the Wye double-digging treatment was due.
(4) The rate of 350 kg K2O applied was in error for 500 kg K2O.

Standard applications:

Potatoes: Manures: (10:10:15+4.5 Mg) at 1960 kg. Weedkiller: Linuron at 1.6 kg in 260 l. Fungicides: Mancozeb at 1.4 kg in 200 l on five occasions, applied with the insecticide on the first two occasions. Manganese zinc ethylene bisdithiocarbamate at 1.4 kg in 200 l. Fentin hydroxide at 0.27 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.

S. barley: Manures: (20:10:10) at 630 kg. Weedkillers: Mecoprop at 2.4 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 200 l. Fungicides: Fenpropimorph at 0.75 kg in 200 l. Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l.

S. beans: Weedkiller: Simazine at 1.2 kg in 200 l. Insecticide: Phorate at 4.5 kg.

W. wheat: Manures: (0:18:36) at 350 kg. 'Nitram' at 120 kg and later at 480 kg. Weedkillers: Chlortoluron at 3.5 kg in 200 l. Fluroxypyr at 0.20 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg in 200 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l.

Seed: Potatoes: Pentland Crown.
S. barley: Klaxon, sown at 160 kg.
S. beans: Minden, sown at 250 kg.
W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-

All crops: Treatments applied by double-digger: 3 Nov, 1987 and 10 Nov. Ploughed: 13 Nov.

Potatoes: NPK+Mg applied, rotary harrowed, potatoes planted: 6 Apr, 1988. Rotary ridged: 25 Apr. Linuron applied: 5 May. Mancozeb with pirimicarb applied: 15 June, 30 June. Manganese zinc ethylene bisdithiocarbamate applied: 8 July. Mancozeb applied: 18 July, 1 Aug, 15 Aug. Fentin hydroxide applied: 30 Aug. Haulm mechanically destroyed: 14 Sept. Desiccant applied: 19 Sept. Lifted: 1 Nov.

S. barley: Heavy spring-tine cultivated twice: 7 Mar, 1988. NPK applied, heavy spring-tine cultivated, rotary harrowed, seed sown: 8 Mar. Weedkillers applied: 11 May. Fenpropimorph applied: 17 May. Remaining fungicide applied: 20 June. Combine harvested: 15 Aug.

S. beans: Heavy spring-tine cultivated: 7 Mar, 1988. Phorate applied, heavy spring-tine cultivated: 8 Mar. Rotary harrowed, seed sown: 10 Mar. Weedkiller applied: 17 Mar. Combine harvested: 19 Sept.

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Cultivations, etc.:-

W. wheat: PK applied: 16 Nov, 1987. Rotary harrowed, seed sown: 17 Nov. Chlortoluron applied: 30 Nov. First N applied: 1 Mar, 1988. Second N applied: 21 Apr. Remaining weedkillers applied: 26 Apr. Fungicides applied: 20 June. Combine harvested: 23 Aug.

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88/R/RN/17

SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	
- - -	63.1
P6 K6 T	67.4
- - S	65.2
- - SA	60.7
- - SF	61.0
P2 - SA	62.6
P3 - SF	60.4
P4 - S	62.9
P5 - S	64.9
P5 - SF	64.9
P6 - S	58.1
- K2 SA	65.8
- K3 SF	67.9
- K4 S	64.2
- K5 S	67.9
- K5 SF	64.1
- K6 S	66.3
P1 K1 SA	61.7
P1 K3 SA	62.0
P2 K2 SA	59.4
P3 K1 SA	65.7
P3 K3 SA	64.5
P3 K4 SF	58.7
P4 K3 SF	60.9
P4 K4 S	62.0
P4 K5 S	63.1
P4 K5 SF	69.6
P4 K6 S	69.5
P5 K4 S	61.1
P5 K4 SF	63.9
P5 K5 S	62.1
P5 K6 S	64.9
P6 K4 S	59.6
P6 K5 S	62.8
P6 K6 S	67.1
Mean	63.7

*** Standard errors of differences of means ***

TREATMNT	
3.72	min.rep
3.04	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	2.63	4.1

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88/R/RN/17

SERIES II POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	
- - -	98.9
P6 K6 T	98.9
- - S	98.3
- - SA	98.5
- - SF	97.8
P2 - SA	98.4
P3 - SF	99.0
P4 - S	98.6
P5 - S	99.1
P5 - SF	97.3
P6 - S	97.7
- K2 SA	98.5
- K3 SF	97.5
- K4 S	99.0
- K5 S	98.8
- K5 SF	99.1
- K6 S	98.4
P1 K1 SA	98.1
P1 K3 SA	98.8
P2 K2 SA	97.9
P3 K1 SA	98.4
P3 K3 SA	98.1
P3 K4 SF	99.2
P4 K3 SF	98.5
P4 K4 S	98.9
P4 K5 S	97.7
P4 K5 SF	98.5
P4 K6 S	99.0
P5 K4 S	98.4
P5 K4 SF	98.4
P5 K5 S	98.3
P5 K6 S	99.2
P6 K4 S	97.3
P6 K5 S	98.0
P6 K6 S	98.4
Mean	98.4

PLOT AREA HARVESTED 0.00210

* SEDs apply only to - - -, P6 K6 T, - - S and - - SA

	TREATMNT
max-min	- - S v any of remainder
min.rep	any of remainder

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88/R/RN/17

SERIES III BARLEY

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.21
P6 K6 T	7.11
- - S	6.89
- - SA	6.83
- - SF	7.00
P2 - SA	6.75
P3 - SF	6.75
P4 - S	7.28
P5 - S	6.74
P5 - SF	6.98
P6 - S	7.37
- K2 SA	7.16
- K3 SF	7.14
- K4 S	6.85
- K5 S	7.44
- K5 SF	6.98
- K6 S	6.93
P1 K1 SA	6.93
P1 K3 SA	7.28
P2 K2 SA	7.00
P3 K1 SA	6.95
P3 K3 SA	7.09
P3 K4 SF	6.88
P4 K3 SF	6.75
P4 K4 S	7.16
P4 K5 S	6.81
P4 K5 SF	7.04
P4 K6 S	7.30
P5 K4 S	7.01
P5 K4 SF	6.83
P5 K5 S	7.06
P5 K6 S	6.73
P6 K4 S	6.58
P6 K5 S	6.55
P6 K6 S	6.86
Mean	6.98

*** Standard errors of differences of means ***

TREATMNT	
0.356	min.rep
0.291	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.252	3.6

GRAIN MEAN DM% 85.1 PLOT AREA HARVESTED 0.00286

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SERIES IV BEANS

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	6.78
P6 K6 T	7.31
- - S	6.88
- - SA	6.63
- - SF	6.92
P2 - SA	7.15
P3 - SF	7.60
P4 - S	7.03
P5 - S	6.45
P5 - SF	7.43
P6 - S	6.66
- K2 SA	6.84
- K3 SF	6.82
- K4 S	6.68
- K5 S	6.89
- K5 SF	6.88
- K6 S	6.56
P1 K1 SA	6.98
P1 K3 SA	7.04
P2 K2 SA	6.99
P3 K1 SA	6.69
P3 K3 SA	6.78
P3 K4 SF	7.42
P4 K3 SF	7.08
P4 K4 S	6.81
P4 K5 S	6.67
P4 K5 SF	6.83
P4 K6 S	7.43
P5 K4 S	7.13
P5 K4 SF	6.94
P5 K5 S	6.94
P5 K6 S	7.00
P6 K4 S	6.72
P6 K5 S	7.56
P6 K6 S	7.09
Mean	6.95

*** Standard errors of differences of means ***

TREATMNT	
0.220	min.rep
0.179	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.155	2.2

GRAIN MEAN DM% 86.1 PLOT AREA HARVESTED 0.00386

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SERIES I WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.96
P6 K6 T	7.75
- - S	7.73
- - SA	7.62
- - SF	7.30
P2 - SA	8.13
P3 - SF	6.70
P4 - S	7.61
P5 - S	7.57
P5 - SF	7.30
P6 - S	7.66
- K2 SA	8.47
- K3 SF	8.24
- K4 S	8.46
- K5 S	7.46
- K5 SF	7.94
- K6 S	7.57
P1 K1 SA	7.64
P1 K3 SA	7.85
P2 K2 SA	8.14
P3 K1 SA	8.14
P3 K3 SA	7.98
P3 K4 SF	7.86
P4 K3 SF	7.93
P4 K4 S	7.83
P4 K5 S	7.52
P4 K5 SF	7.59
P4 K6 S	7.62
P5 K4 S	8.33
P5 K4 SF	7.92
P5 K5 S	7.68
P5 K6 S	8.63
P6 K4 S	7.76
P6 K5 S	8.29
P6 K6 S	7.44
Mean	7.81

*** Standard errors of differences of means ***

TREATMNT	
0.180	min.rep
0.147	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.127	1.6

GRAIN MEAN DM% 83.1 PLOT AREA HARVESTED 0.00286

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