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Yields of the Field Experiments 1974

Full Table of Content

Rotations

Rotations , Rothamsted Research (1975) Yields Of The Field Experiments 1974, pp 57 - 139 **- DOI: https://doi.org/10.23637/ERADOC-1-119**

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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

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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 C
All-grass ley N

From 1963 (reseeded) and 1968 (old grass) some grass plots were ploughed and cropped with the same test crops as above thereafter 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

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74/R/RN/1 and 74/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 P205, 150 kg K20 as (0:14:28) in winter, 75 kg N, 48 kg K20 as (25:0:16) for each cut.
Clover-grass ley: Manures: 75 kg P205, 150 kg K20 as (0:14:28) in winter, 48 kg K20 as muriate of potash for each cut.
Lucerne: Manures: 115 kg P205, 230 kg K20 as (0:14:28) in winter. Weedkiller: Paraquat at 1.4 kg ion in 220 l.
Sugar beet: Manures: 175 kg K20 as muriate of potash on plough furrow, 180 kg N, 125 kg P205, 125 kg K20 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 P205 and 75 kg K20 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 P205 and 150 kg K20 as (0:14:28) in winter.
All-grass half plots: Manures: 75 kg N and 48 kg K20 as (25:0:16) for each cut.
Clover-grass half plots: Manures: 48 kg K20 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. Disced 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.

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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/hecctare.

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.)

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

TABLES OF MEANS

WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

HIGHFIELD

ROTATION

	Lucerne	CloGra	Grass	Arable	Mean
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

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WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

FOSTERS

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 74					
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

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

WHEAT 6TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

HIGHFIELD

	N 74				
	75	126	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

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

WHEAT 6TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

FOSTERS

	N 74				
	75	126	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

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

WHEAT 7TH TEST CROP CEREAL6

GRAIN: TONNES/HECTARE

HIGHFIELD

	N 74				
	75	126	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

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

WHEAT 7TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

FOSTERS

	N 74				
	75	126	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

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

WHEAT 9TH TEST CROP CEREAL7

GRAIN: TONNES/HECTARE

HIGHFIELD

	N 74				
	75	126	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

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

WHEAT 9TH TEST CROP CEREAL7

GRAIN: TONNES/HECTARE

FOSTERS

	N 74				
	75	126	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

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

WHEAT 10TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

HIGHFIELD

	N 74				
	75	126	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

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

WHEAT 10TH TEST CROP CEREALS

GRAIN: TONNES/HECTARE

FOSTERS

	N 74				
	75	126	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

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

DRY MATTER: TONNES/HECTARE

	HIGHFIELD Mean	FOSTERS Mean
	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	

	HIGHFIELD			FOSTERS		
	Blocks	C	N	Blocks	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

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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

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74/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without three-year leys. The effects of the cropping systems on soil-borne pathogens are also studied - Woburn Stackyard D.

Sponsors: D.A. Boyd, J.M. Hirst, A.E. Johnston, F.G.W. Jones.

The 37th year, leys, barley, potatoes, wheat.

For previous years see 'Details' 1967, 68/B/2(t), 69/W/RN/3(t), 70/W/RN/3(t), 71/W/RN/3(t), 72/W/RN/3(t) and 73/W/RN/3.

Design: 5 series of 8 plots, split for treatments other than rotations.

Whole plot dimensions: 8.53 x 40.7. Areas harvested: Barley, 2nd treatment crop: 0.00260, Potatoes, 1st treatment crop (LEY and SAINFOIN) - 0.00280, 1st treatment crop (ARABLE and ARABLE H) - 0.00130. Wheat - 0.00260.

Treatments: All phases of four five-course rotations are present:		ROTATION
Grass/clover ley:	L, L, L, P, W	Ley
All legume ley:	SA, SA, SA, P, W until 1971 then CL, CL, CL, P, W	Sainfoin Clover
Arable with roots:	P, R, C, P, W until 1971 then P, B, B, P, W	Arable
Arable with hay:	P, R, H, P, W until 1971 then P, B, H, P, W	Arable H

P = potatoes, R = rye, C = carrots, W = wheat, B = barley, H = hay, L = grass/clover ley, SA = sainfoin ley, CL = red clover ley

Additional treatments to first test crop, potatoes:-

1/2 plots:	1. Farmyard manure residues, last applied 1964:-	FYMRES64
	None	None
	38 tonnes on each occasion	FYM
1/4 plots:	2. Fumigant applied in 1974:-	FUM74
	None	None
	Dichloropropene, 220 kg, plus aldicarb, 6.7 kg	Dichl/al

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Additional treatments to second test crop, winter wheat:-

1/2 plots	1. Farmyard manure residues, last applied 1963:-	FYMRES63
	None	None
	38 tonnes on each occasion	FYM
1/4 plots (A,AH only)	2. Fumigant residues, applied 1970:-	FUMRES70
	None	None
	Chloropicrin, 448 kg	Chlorop
1/4 plots (L,S) 1/8 plots (A,AH)	3. Fumigant residues, applied 1973:-	FUMRES73
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 6.7 kg	Chlcr/al
1/8 plots	4. Nitrogen fertiliser (kg N) in 1974:-	N74
	None	0
	63	63
	126	126
	189	189

Additional treatments to first treatment crop, potatoes:-

1/2 plots	1. Farmyard manure residues, last applied 1967:-	FYMRES67
	None	None
	38 tonnes on each occasion	FYM
1/8 plots (A,AH only)	2. Fumigant residues, applied 1972:-	FUMRES72
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 11 kg	Chlor/al
1/4 plots	3. Fumigant applied in 1974:-	FUM74
	None	None
	Dichloropropene, 220 kg, plus aldicarb, 6.7 kg	Dichl/al

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Additional treatments to second treatment crop, barley:-

1/2 plots	1.	Farmyard manure residues, last applied 1966:-	FYMRES66
		none	None
		38 tonnes on each occasion	FYM
1/8 plots	2.	Fumigant residues, applied 1971:-	FUMRES71
		None	None
		Chloropicrin, 448 kg, plus aldicarb, 11.2 kg	Chlor/al
1/4 plots	3.	Fumigant residues, applied 1973:-	FUMRES73
		None	None
		Chloropicrin, 448 kg, plus aldicarb, 6.7 kg	Chlor/al

Additional treatments to third treatment crop, barley:-

1/2 plots	1.	Farmyard manure residues, last applied 1965:-	FYMRES65
		None	None
		38 tonnes on each occasion	FYM
1/4 plots	2.	Fumigant residues, applied 1972:-	FUMRES72
		None	None
		Chloropicrin, 448 kg, plus aldicarb, 5.6 kg	Chlor/al

Corrective K dressings (in kg K_2O) as muriate of potash applied to first test crop, potatoes:-

	No FYM half plots	FYM half plots
Continuous rotations		
Ley	201	276
Clover	88	38
Arable with hay	38	100
Arable	151	0
Alternating rotations (last two rotations in order)		
Ley/arable with hay	213	50
Sainfoin/arable	251	251
Arable/clover	176	188
Arable with hay/ley	238	389

NOTE: For a fuller record of previous treatments see 'Details' 1967 etc.

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Standard applications:-

Winter wheat: Manures: Magnesian limestone at 5 tonnes. (0:20:20) at 290 kg, combine drilled. Weedkiller: Mecoprop at 0.84 kg in 280 l. Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Barley: Manures: 2nd and 3rd treatment crops: (15:15:15) at 390 kg combine drilled. Weedkillers: 2nd treatment crop: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l). 3rd treatment: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Potatoes: Treatment and test crops: Manures: (13:13:20) at 1940 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide and insecticide: Mancozeb at 1.3 kg plus demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

Hay: Manures: N at 130 kg, as 'Nitro-Chalk', plus (0:14:28) at 540 kg in spring. (25:0:16) at 270 kg after the first cut.

Ley, 1st year: Manures: N at 50 kg, as 'Nitro-Chalk', P205 at 190 kg as superphosphate, K20 at 130 kg as muriate of potash in the seedbed. (25:0:16) at 360 kg in late summer. Weedkillers: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Ley, 2nd and 3rd years: Manures: (25:0:16) at 360 kg for each cut.

Clover, 1st year: Manures: N at 60 kg as 'Nitro-Chalk', P205 at 190 kg as superphosphate, K20 at 130 kg as muriate of potash. Weedkillers: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Clover, 2nd and 3rd years: N at 60 kg as 'Nitro-Chalk', K20 at 190 kg as muriate of potash. Weedkillers 3rd year only: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Varieties: Winter wheat: Cappelle, dressed with dieldrin, sown at 190 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: First test and treatment crops: Maris Piper.
Red clover: 1st year: S123, sown at 45 kg.
Red clover: 3rd year resown: English Broad Red, sown at 45 kg.
Ley: 1st year: Perennial ryegrass S23, Cocksfoot S143, late flowering red clover, Alsike clover, sown at 30 kg.

Cultivations, etc.:- Treatment crops:

Ley, 1st year: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Power harrowed: 3 Apr, 1974. Power harrowed, rolled, N, P and K applied, seeds sown: 5 Apr. Rolled: 8 Apr. Weedkiller applied: 26 May. Cut twice: 8 Aug, 16 Sept. NK applied: 19 Aug.

Ley, 2nd and 3rd years: NK applied: 6 Mar, 1974, 24 June. Cut twice: 14 June, 16 Sept.

Clover, 1st year: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Power harrowed: 3 Apr, 1974. Power harrowed, rolled, N and K applied, seeds sown: 5 Apr. Rolled: 8 Apr. P applied: 16 Apr. Weedkiller applied: 26 May. Cut twice: 8 Aug, 16 Sept.

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Clover, 2nd year: N and K applied: 6 Mar, 1974. Cut twice: 25 July, 16 Sept.

Clover, 3rd year: N and K applied: 6 Mar, 1974. Ploughed, because of weeds: 4 Apr. Rolled, power harrowed, rolled, seed sown: 5 Apr. Weedkiller applied: 26 May. Cut once: 16 Sept.

Potatoes, 1st treatment crop: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Dichloropropene applied, spring-tine harrowed: 22 Nov. Power harrowed: 3 Apr, 1974. NPK applied: 8 Apr. Aldicarb applied, rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 16 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 14 Oct.

Barley, 2nd treatment crop: Deep-tine cultivated: 18 Dec, 1973. Spring-tine cultivated: 27 Mar, 1974. Spring-tine cultivated with crumbler: 28 Mar. Seed sown: 29 Mar. Rolled: 2 Apr. Seeds hay undersown (Arable H plots), harrowed and rolled: 30 Apr. Weedkiller applied: 26 May. Combine harvested: 22 Aug.

Barley, 3rd treatment crop: Ploughed: 13 Nov, 1973. Spring-tine cultivated twice, with crumbler the second time: 28 Mar, 1974. Seed sown: 29 Mar. Rolled: 2 Apr. Weedkiller applied: 20 May. Combine harvested: 22 Aug.

Seeds Hay: Seeds undersown in barley: 15 Mar, 1973. N, P and K applied: 6 Mar, 1974. Cut twice: 14 June, 16 Sept. NK applied: 24 June.

Test crops:

Potatoes, 1st test crop: First half corrective K applied, ploughed: 12 Nov, 1973. Disced: 14 Nov. Rotary cultivated, dichloropropene applied, spring-tine harrowed: 23 Nov. Second half corrective K applied: 18 Feb, 1974. Power harrowed: 3 Apr. NPK applied: 8 Apr. Aldicarb applied, all plots rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 16 May. Rotary ridged: 12 June. Fungicide and insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 16 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 14 Oct.

Wheat, 2nd test crop: Magnesian limestone applied, rotary cultivated twice: 11 Oct, 1973. Spring-tine cultivated: 13 Oct. Seed sown: 15 Oct. Mecoprop applied: 5 Apr, 1974. N applied: 11 Apr. Ioxynil and mecoprop applied: 14 May. Combine harvested: 29 Aug.

NOTE: Soil samples were taken from the potatoes throughout the growing season for counts of nematodes.

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TABLES OF MEANS

POTATOES 1ST TEST CROP

ROTATION

	Ley	Clover	Arable	Arable H	Mean
	TOTAL TUBERS: TONNES/HECTARE				
FYMRES64					
None	63.9	61.9	47.3	52.1	56.3
FYM	68.0	71.6	57.8	61.1	64.6
FUM74					
None	62.3	61.5	47.7	48.4	55.0
Dichl/al	69.6	71.9	57.4	64.9	65.9
Mean	65.9	66.7	52.5	56.6	60.5
	PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE				
FYMRES64					
None	97.8	97.1	96.1	96.3	96.8
FYM	97.5	98.0	97.6	96.4	97.4
FUM74					
None	97.2	97.1	96.0	95.5	96.5
Dichl/al	98.1	98.0	97.7	97.2	97.8
Mean	97.6	97.6	96.8	96.4	97.1

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WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

	ROTATION			ROTATION		
	Ley	Sainfoin	Mean	Arable	Arable H	Mean
N74						
0	4.92	4.46	4.69	2.98	3.84	3.41
63	6.18	5.91	6.04	4.70	5.75	5.23
126	6.10	6.69	6.40	6.01	6.58	6.29
189	5.74	6.52	6.13	5.45	5.83	5.64
FYMRES63						
None	5.80	6.03	5.92	4.78	5.44	5.11
FYM	5.67	5.76	5.71	4.79	5.56	5.18
FUMRES73						
None	5.66	5.82	5.74	4.76	5.31	5.03
Chlor/al	5.81	5.96	5.89	4.81	5.70	5.25
FUMRES70						
None				4.72	5.38	5.05
Chlorop				4.85	5.63	5.24
Mean	5.73	5.89	5.81	4.79	5.50	5.14

Mean D.M. % 83.2

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WHEAT 2ND TEST CROP

STRAW: TONNES/HECTARE

	ROTATION			ROTATION		
	Ley	Sainfoin	Mean	Arable	Arable H	Mean
N74						
0	2.96	2.75	2.85	2.26	2.79	2.53
63	4.48	4.01	4.24	4.05	4.41	4.23
126	4.96	5.32	5.14	5.01	4.88	4.94
189	5.02	5.87	5.44	4.61	4.66	4.64
FYMRES63						
None	4.38	4.27	4.33	4.05	4.13	4.09
FYM	4.33	4.70	4.51	3.91	4.24	4.08
FUMRES73						
None	4.29	4.14	4.21	3.54	4.03	3.79
Chlor/al	4.42	4.83	4.63	4.42	4.35	4.38
FUMRES70						
None				3.64	3.95	3.80
Chlorop				4.32	4.42	4.37
Mean	4.35	4.49	4.42	3.98	4.19	4.08

Mean D.M. % 82.4

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POTATOES 1ST TREATMENT CROP

	ROTATION Ley	Sainfoin	Mean	ROTATION Arable	Arable H	Mean
	TOTAL TUBERS: TONNES/HECTARE					
FYMRES67						
None	59.0	62.6	60.8	58.7	62.1	60.4
FYM	66.7	58.6	62.7	61.9	58.9	60.4
FUM74						
None	61.3	59.4	60.4	59.2	54.3	56.8
Dichl/al	64.4	61.8	63.1	61.3	66.7	64.0
FUMRES72						
None				58.5	60.6	59.5
Chlor/al				62.1	60.4	61.2
Mean	62.8	60.6	61.7	60.3	60.5	60.4
	PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE					
FYMRES67						
None	97.6	97.9	97.7	97.3	97.7	97.5
FYM	97.7	96.4	97.0	98.0	97.7	97.8
FUM74						
None	98.1	97.1	97.6	97.7	98.0	97.8
Dichl/al	97.2	97.1	97.2	97.6	97.4	97.5
FUMRES72						
None				98.1	97.3	97.7
Chlor/al				97.1	98.1	97.6
Mean	97.7	97.1	97.4	97.6	97.7	97.7

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BARLEY 2ND TREATMENT CROP

	ROTATION				
	Ley	Sainfoin	Arable	Arable H	Mean
	GRAIN: TONNES/HECTARE				
FYMRES66					
None	5.61	5.41	4.86	4.90	5.20
FYM	5.59	5.30	5.55	5.31	5.44
FUMRES71					
None	5.34	5.43	5.28	5.16	5.30
Chlor/al	5.86	5.27	5.14	5.05	5.33
FUMRES73					
None	5.64	5.28	5.06	4.81	5.20
Chlor/al	5.56	5.43	5.35	5.40	5.44
Mean	5.60	5.35	5.21	5.11	5.32
	STRAW: TONNES/HECTARE				
FYMRES66					
None	3.83	3.55	3.22	2.89	3.37
FYM	4.10	3.82	3.60	3.42	3.74
FUMRES71					
None	3.66	3.83	3.35	3.22	3.51
Chlor/al	4.27	3.55	3.47	3.08	3.59
FUMRES73					
None	3.97	3.63	3.38	2.97	3.49
Chlor/al	3.96	3.74	3.45	3.33	3.62
Mean	3.97	3.69	3.41	3.15	3.55

Mean D.M. % Grain: 85.0
Straw: 85.2

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74/W/RN/4

MARKET GARDEN

Object: To study the residual effects of fertilisers and organic manures applied in the period 1942-67 - Woburn Lansome I.

Sponsor: A.E. Johnston.

The 33rd year, fallow.

For previous years see 'Details' 1967, 68/B/4(t), 69/W/RN/4, 70/W/RN/4(t), 71/W/RN/4(t), 72/W/RN/4(t) and 73/W/RN/4.

Design: 2 series each of 40 plots divided into 4 blocks of 10 plots. Series B has the plots split into 2.

Whole plot dimensions: 8.53 x 5.18.

NOTE: Series B only: Balancing applications of peat at 94 tonnes d.m. were made to the opposite half plots to those that received peat 1965-67, and FYM at 75 tonnes and 150 tonnes to half plots opposite those that received FYM 1965-67.

Cultivations, etc.:- Both Series.
Paraquat at 0.56 kg ion in 370 l applied: 12 Sept, 1973. Subsoiled, tines 140 cm apart, 50 cm deep: 18 Sept. Peat applied (Series B only): 21 Nov. FYM applied (Series B only), ploughed: 22 Nov. Spring-tine cultivated: 2 Apr, 1974. Power harrowed: 7 May. Spring-tine cultivated: 20 June. Deep-tine cultivated: 18 July. Spring-tine cultivated: 22 Aug.

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74/W/RN/4

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For previous years see 'Details' 1967, 68/B/4(t), 69/W/RN/4, 70/W/RN/4(t), 71/W/RN/4(t), 72/W/RN/4(t) and 73/W/RN/4.

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Cultivations, etc.:- Both Series.
Paraquat at 0.56 kg ion in 370 l applied: 12 Sept, 1973. Subsoiled, tines 140 cm apart, 50 cm deep: 18 Sept. Peat applied (Series B only): 21 Nov. FYM applied (Series B only), ploughed: 22 Nov. Spring-tine cultivated: 2 Apr, 1974. Power harrowed: 7 May. Spring-tine cultivated: 20 June. Deep-tine cultivated: 18 July. Spring-tine cultivated: 22 Aug.

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F: N2PK
N2: rates as above, applied as urea
P: 126 kg P2O5 as potassium dihydrogen phosphate
K: 83 kg K2O as potassium sulphate to S plots: 93 kg K2O as potassium chloride to the remainder
Mg: 126 kg MgO as magnesium chloride
Ca: 126 kg CaO as calcium carbonate
S: 30 kg S applied by potassium sulphate
TE: Trace element mixture including Mn, Cu, Zn, B, Mo, Co, Fe. Test varies with crop

Whole plot dimensions: 2.13 x 2.44.

Standard applications:
Winter wheat and barley: Weedkillers: Ioxynil with mecoprop ('Actril C' at 5.6 l in 340 l). Fungicide: Tridemorph at 0.53 kg in 340 l.
Potatoes: Insecticide: Menazon at 0.28 kg in 340 l on two occasions. Fungicide: Mancozeb at 1.3 kg in 340 l on three occasions.

Seed:
Winter wheat: Maris Nimrod, sown at 270 kg.
Barley: Deba Abed sown at 200 kg (Midas on additional plots, seed dressed with ethirimol).
Kale: Thousand Headed.
Potatoes: King Edward.
Grass-clover ley: RVP Italian Ryegrass and Hungaropoly Red Clover.

Cultivations, etc.:-
Winter wheat: Balancing Mg applied to half plots: 4 Sept, 1973. Dug by hand: 6 Sept. P, K, Mg, Ca and S applied and seed sown: 10 Oct. First half N dressing applied: 21 Mar, 1974. Weedkiller applied: 8 Apr. Second half N and all N to additional plots applied: 22 Apr. Trace element spray applied: 10 May. Fungicide applied: 20 May. Harvested: 15 Sept.
Barley: Dug by hand: 26 Oct, 1973. P, K, Mg, Ca and S applied: 12 Mar, 1974. Rotary cultivated and seed sown: 27 Mar. N applied: 22 Apr. Weedkiller applied: 10 May. Fungicide applied: 20 May. Trace element spray applied: 23 May. Harvested: 15 Aug.
Kale: FYM applied and dug by hand: 25 Oct, 1973. P, K, Mg, Ca and S applied: 12 Mar, 1974. Rotary cultivated and seed sown: 29 Mar. First half N applied to additional plots: 29 Mar. All N applied to original plots: 9 May. Second half of N applied to additional plots: 23 May. Trace element spray applied: 10 June. Harvested: 4 Nov.

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Potatoes: FYM applied and dug by hand: 26 Oct, 1973. P, K, Mg, Ca and S applied: 12 Mar, 1974. All N applied to original plots, half N to additional plots: 8 Apr. Rotary cultivated twice, Mg applied to half plots of main experiment and potatoes planted: 9 Apr. Second half N dressing applied to additional plots: 23 May. Trace element spray applied: 10 June. Insecticide applied: 25 June. Fungicide alone applied: 5 July and 15 Aug. Fungicide with insecticide: 18 July. Plots of the main experiment with neither K nor FYM and no fertiliser plot of additional plots lifted: 7 Aug. Remaining plots lifted: 9 Sept.

Grass-clover ley: Seed sown: 3 Sept, 1973. P, K, Mg, Ca and S applied: 14 Dec. N applied: 12 Mar, 1974. Trace element spray applied: 23 May. Cut five times: 12 Oct, 1973, 9 May, 1974, 1 July, 15 Aug, 11 Oct.

Permanent grass: P and K applied: 14 Dec, 1973. FYM applied: 12 Mar, 1974. N applied: 12 Mar, 9 May, 16 July. Cut three times: 9 May, 16 July, 11 Oct.

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74/R/RN/5

TABLES OF MEANS

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	LEY: DRY MATTER 1st cut	2nd cut	3rd cut	4th cut	5th cut	Total of 5 cuts
MANURE											
0	4.64	4.89	14.0	2.49	2.29	0.05	1.20	2.34	1.78	1.08	6.45
N1	3.34	4.92	24.8	3.74	3.48	0.13	1.63	2.43	1.60	0.80	6.59
P	2.87	3.69	17.4	3.95	2.89	0.07	1.08	2.28	1.69	0.76	5.88
N1P	1.59	3.31	38.4	3.64	3.65	0.06	2.25	2.05	1.32	0.68	6.36
K	4.21	4.66	9.6	3.35	2.78	0.33	1.22	2.83	1.63	0.48	6.49
N1K	6.04	6.22	12.6	3.99	4.00	0.37	1.64	3.06	2.03	0.65	7.75
PK	5.04	5.64	17.9	2.64	2.80	0.98	2.88	4.98	3.67	1.97	14.48
N1PK	7.38	8.48	34.4	5.00	4.31	0.81	2.87	4.42	3.91	2.08	14.09
N2PK	9.12	10.02	58.0	7.06	5.98	0.53	2.68	4.31	3.02	1.88	12.42
D	5.86	6.99	28.3	5.01	3.66	0.78	2.41	4.92	3.50	2.05	13.66
N1PKD	6.64	11.00	50.1	5.20	6.86	1.02	3.43	5.28	4.32	2.22	16.27
N2PKD	7.05	10.61	73.2	7.46	6.47	1.02	2.34	5.78	4.17	2.27	15.58
Mean D.M.%	76.9	63.5	-	74.0	49.7	19.9	21.2	22.6	17.8	15.0	19.3

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74/R/RN/5

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

	POTATOES: TOTAL TUBERS			PERMANENT GRASS: DRY MATTER			
	0	Mg	Mean	1st cut	2nd cut	3rd cut	Total of 3 cuts
MANURE							
0	7.7	7.6	7.6	1.02	1.30	1.06	3.38
N1	19.1	9.9	14.5	0.62	1.59	1.64	3.85
P	30.4	13.6	22.0	0.12	1.40	0.99	2.51
N1P	16.9	9.6	13.3	1.16	1.80	2.50	5.46
K	35.4	34.2	34.8	0.24	1.38	1.52	3.14
N1K	49.2	48.4	48.8	1.23	2.41	2.47	6.11
PK	43.8	39.2	41.5	1.60	1.42	1.50	4.52
N1PK	57.7	55.7	56.7	1.12	2.14	2.31	5.57
N2PK	68.8	56.5	62.7	2.79	2.96	3.55	9.30
D	49.2	53.8	51.5	1.69	2.08	2.07	5.84
N1PKD	60.7	65.0	62.8	3.30	2.40	2.89	8.59
N2PKD	65.0	80.7	72.8	4.24	3.59	4.70	12.53
Mean D.M. %	-	-	-	29.1	28.5	20.8	26.1

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74/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

TONNES/HECTARE

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	LEY: DRY MATTER 1st cut	2nd cut	3rd cut	4th cut	5th cut	Total of 5 cuts	POTATOES: TOTAL TUBERS
MANURE												
0	5.14	5.26	23.5	2.42	2.64	0.11	1.51	2.96	2.01	0.91	7.50	11.6
F	8.25	9.31	68.4	6.89	5.72	0.44	3.48	4.13	3.12	1.54	12.71	52.7
FMgCa	8.79	10.24	54.1	7.61	6.13	0.75	3.49	4.29	3.53	1.78	13.84	45.8
FMgS	8.07	7.76	60.2	6.93	5.95	0.89	3.34	4.86	3.60	1.72	14.41	46.1
FCaS	8.35	9.00	60.6	6.66	6.35	0.66	3.89	4.92	3.68	1.68	14.83	47.3
FMgCaS	8.15	9.79	62.3	7.40	6.87	0.75	3.70	4.95	3.70	1.95	15.05	44.2
FMgCaSTE	8.64	9.54	59.7	7.47	5.82	0.72	3.70	4.60	3.94	1.71	14.67	42.9
Mean D.M. %	77.1	67.2	-	74.0	57.4	17.9	21.4	22.4	16.5	14.4	18.5	-

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74/W/RN/6

ARABLE REFERENCE PLOTS

Object: To study the long term effects of FYM and N, P and K fertilisers on the yield and mineral content of crops - Woburn Stackyard C.

Sponsor: F.V. Widdowson.

The fifteenth year, oats, sugar beet, barley, ley, potatoes and permanent grass.

For previous years see 60/B/3(t), 61-65/B/2, 66/B/2(t), 67/B/2(t), 68/B/3(t), 69/W/RN/6, 70/W/RN/6(t) and 71-73/W/RN/6.

Design: 1 block of 12 plots for each crop.

Whole plot dimensions: 2.74 x 2.13.

Treatments: All combinations of:-

		CROP
Blocks: 1.	Crops:-	
	After old grass (1960-73):	
	Barley	Barley/G
	In arable rotation since 1960:	
	Barley	Barley/A
	Ley	Ley
	Potatoes	Potatoes
	Sugar beet	SugrBeet
	Oats	Oats
	Permanent grass, sown autumn 1973	PermGras

		MANURE
Plots: 2.	Fertilisers and farmyard manure:-	
	None	0
	N1	N1
	P	P
	N1 P	N1P
	K	K
	N1 K	N1K
	PK	PK
	N1 PK	N1PK
	N2 PK	N2PK
	D	D
	N1 PK D	N1PKD
	N2 PK D	N2PKD

N1,2 (kg N): 31.5, 63 (ley): 63, 126 (barley and oats): 126, 252 (sugar beet and potatoes): 188, 376 (permanent grass) as ammonium nitrate.
P: P2O5 at 63 kg as triple superphosphate.
K: K2O at 252 kg as potassium bicarbonate.
D: Farmyard manure at 25 tonnes (permanent grass): 50 tonnes (sugar beet and potatoes): none to other crops.

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NOTES: (1) The old grass block was dug in autumn 1973 and now follows the arable rotation, the crop in 1974 being barley. A new block was sown to permanent grass on adjacent land.

(2) Potatoes and sugar beet test on sub plots: 0, Mg (82 kg MgO as Epsom salts). Yields are recorded from potatoes only. Untreated sub plots receive 82 kg MgO after potato and sugar beet harvest.

Standard applications:

Winter oats: Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 450 l. Fungicide: Tridemorph at 0.53 kg in 340 l.

Sugar beet: Manures: Boron at 7.3 kg B2O3 as 0.8% solution of borax. Insecticide: Menazon at 0.28 kg in 340 l on four occasions.

Barley: Both blocks: Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 340 l. Fungicide: Tridemorph at 0.53 kg in 340 l.

Potatoes: Insecticide: Menazon at 0.28 kg in 340 l on four occasions one being with fungicide. Fungicide: Mancozeb at 1.3 kg in 340 l on two occasions one being with insecticide.

Permanent Grass: Manures: Epsom salts at 500 kg. 'Nitro-Chalk' at 310 kg. (0:20:20) at 190 kg.

Seed: Winter oats: Peniarth, sown at 140 kg.
Sugar beet: Klein E, sown at 5.6 kg.
Barley: Julia, dressed with ethirimol, sown at 180 kg.
Grass-clover ley: R.V.P. Italian ryegrass and Hungaropoly red clover.
Potatoes: Desiree.
Permanent Grass: S215 Meadow fescue at 20 kg, S24 perennial ryegrass at 20 kg, crested dogstail at 7 kg, chewings fescue at 7 kg, smooth stalked meadow grass at 7 kg, alsike clover at 4 kg, wild white clover at 2 kg, mixture sown at 67 kg.

Cultivations, etc.:-

Winter oats: Balancing Mg applied, plots dug by hand: 5 Sept, 1973. P and K applied, seed sown: 8 Oct, 1973. First half N applied: 14 Mar, 1974. Weedkiller applied: 8 Apr. Second half N applied: 24 Apr. Fungicide applied: 22 May. Harvested: 2 Aug.

Sugar beet: FYM applied, plots dug by hand: 4 Dec, 1973. P and K applied: 7 Mar, 1974. First N applied, rotary cultivated, Mg applied to half plots, seed drilled: 8 Apr. Boron applied: 8 May. Second N applied, insecticide applied: 4 June. Insecticide applied: 25 June, 11 July, 18 July. Lifted: 21 Oct.

Barley: Both blocks: Balancing Mg applied to Barley/A only: 11 Oct. 1973. Plots dug by hand: 5 Dec. Rotary cultivated, raked, P and K and first half N applied, seed sown: 7 Mar, 1974. Second half N applied: 24 Apr. Weedkiller applied: 9 May. Fungicide applied: 22 May. Harvested: 9 Aug.

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Grass-clover ley: Rotary cultivated, sown and raked in: 1 Aug, 1973. P and K applied: 4 Dec. N applied: 14 Mar, 1974. Cut five times: 11 Oct, 1973, 22 May, 1974, 18 July, 4 Sept, 15 Oct.

Potatoes: FYM applied, plots dug by hand: 4 Dec, 1973. P and K applied: 7 Mar, 1974. First half N applied, rotary cultivated twice, raked, Mg applied to half plots, potatoes planted, earthed up: 24 Apr. Second half N applied, insecticide applied: 4 June. Insecticide applied: 25 June, 11 July. Fungicide applied: 5 July. Fungicide with insecticide applied: 18 July. Lifted, plots not given K: 2 Aug. Remaining plots lifted: 10 Sept.

Permanent grass: Rotary cultivated: 24 Aug, 1973. Raked, basal Mg, N and PK applied, seeds sown, raked in: 7 Sept. FYM, P and K and first third N applied: 14 Mar, 1974. Second third N applied: 22 May. Third third N applied: 18 July. Cut three times: 22 May, 18 July, 15 Oct.

NOTES: (1) Samples were taken for determinations of dry matter for each crop, and the percentage of N, P and K.
(2) The percentage of Mg in sugar beet tops, potato tubers and leaves was determined.
(3) The percentage of K in potato leaves was determined.

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TABLES OF MEANS

TONNES/HECTARE

	OATS		ROOTS	SUGAR BEET			BARLEY AFTER OLD GRASS		BARLEY AFTER ARABLE		POTATOES TOTAL TUBERS		
	GRAIN	STRAW	(WASHED)	SUGAR %	TOTAL SUGAR	TOPS	GRAIN	STRAW	GRAIN	STRAW	-	Mg	Mean
MANURE													
0	1.66	1.96	15.72	15.7	2.47	12.81	3.79	2.60	1.75	1.26	12.8	13.9	13.3
N1	3.92	4.07	19.99	14.8	2.96	27.51	3.99	3.46	3.69	2.99	13.4	14.4	13.9
P	1.69	1.82	13.67	15.2	2.08	10.94	2.78	1.95	2.06	1.27	12.2	11.8	12.0
N1P	3.94	4.02	16.74	15.1	2.53	21.53	2.34	2.71	3.05	2.82	14.4	12.2	13.3
K	1.92	2.31	16.74	15.5	2.60	10.42	4.41	3.01	2.32	1.41	26.0	29.7	27.8
N1K	3.64	5.54	27.68	15.8	4.37	25.29	5.67	4.27	5.11	3.68	43.4	47.2	45.3
PK	2.12	2.12	14.69	15.2	2.23	11.45	4.29	3.51	2.41	1.60	20.2	25.6	22.9
N1PK	3.25	4.85	34.00	15.9	5.41	27.34	6.18	4.99	5.04	3.93	50.2	56.7	53.5
N2PK	4.71	7.98	33.32	14.9	4.97	41.52	6.86	5.74	6.31	4.99	55.4	57.4	56.4
D	2.28	2.66	25.63	15.6	4.01	22.21	5.11	3.41	3.69	2.48	34.9	43.7	39.3
N1PKD	3.85	6.42	37.59	15.8	5.95	36.56	6.69	5.89	5.89	4.14	51.3	56.4	53.8
N2PKD	3.29	8.07	38.95	15.0	5.86	52.45	6.53	6.09	6.07	5.74	79.6	73.8	76.7
Mean D.M.%	79.6	46.1	-	-	-	-	77.6	57.4	77.2	56.2	-	-	-

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TONNES/HECTARE

	GRASS-CLOVER LEY: DRY MATTER						PERMANENT GRASS: DRY MATTER			
	1st cut	2nd cut	3rd cut	4th cut	5th cut	Total of 5 cuts	1st cut	2nd cut	3rd cut	Total of 3 cuts
MANURE										
0	0.14	1.96	2.59	1.52	0.59	6.80	0.88	1.66	1.49	4.03
N1	0.13	3.51	1.84	1.31	0.38	7.17	2.97	3.01	2.86	8.84
P	0.23	1.91	1.87	1.05	0.42	5.48	0.55	1.02	1.32	2.89
N1P	0.10	3.40	1.32	0.92	0.32	6.06	2.52	3.05	2.81	8.38
K	0.56	3.35	3.46	2.74	0.65	10.76	1.22	2.96	1.90	6.08
N1K	0.37	3.92	3.28	2.44	0.74	10.75	2.97	3.30	3.01	9.28
PK	0.81	3.78	4.24	2.62	0.83	12.28	0.80	3.62	1.97	6.39
N1PK	0.49	4.66	3.98	3.06	0.75	12.94	2.98	3.43	3.03	9.44
N2PK	0.38	5.26	3.35	2.60	0.66	12.25	3.76	4.06	3.44	11.26
D	0.79	3.83	3.76	2.84	0.73	11.95	1.05	2.80	2.16	6.01
N1PKD	0.72	5.88	3.52	2.70	0.62	13.44	2.49	3.40	3.30	9.19
N2PKD	0.48	5.75	3.82	2.65	0.82	13.52	3.88	4.47	4.71	13.06
Mean D.M. %	22.2	25.6	22.1	14.0	17.0	20.2	25.2	21.4	22.4	23.0

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74/R/RN/7

RESIDUAL PHOSPHATE

Object: Originally to study the fresh and residual effects of phosphate fertiliser on yields of three arable crops grown in rotation. Since 1974 the effects on ley and on yield and pathogens of continuous wheat are also studied. Great Field IV and Sawyers I.

Sponsors: G.E.G. Mattingly, D.B. Slope.

The fifteenth year, potatoes, barley, ley (Gt. Field IV). Potatoes, barley, wheat (Sawyers I).

For previous years see 'Details' 1967, 68/B/5(t), 69/R/RN/7, 70/R/RN/7(t) and 71-73/R/RN/7.

Design: Great Field IV: 1 randomised block of 12 plots for each crop.
Sawyers I: 2 randomised blocks of 12 plots for each crop.

Whole plot dimensions:-
Great Field IV: 4.27 x 18.3. Area harvested: potatoes and barley - 0.00520, ley - 0.00186.
Sawyers I: 4.27 x 20.1. Area harvested: potatoes and barley - 0.00572, wheat - 0.00615.

Treatments: Rates and frequency of applying phosphate:	P205
None	0
Annual dressings, kg P205:-	
29	29 ANN
57	57 ANN
115	115 ANN
172	172 ANN
Triennial dressings, kg P205 (last applied 1972):-	
86	86 TRI
172	172 TRI
Six-yearly dressings, kg P205 (last applied 1973):-	
344	344 SIX
688	688 SIX
1032	1032 SIX
Single dressing, kg P205 applied in 1959:-	
376 as Gafsa rock phosphate	376 G(1)
376 as superphosphate	376 S(1)

NOTES: (1) Since 1974 the original rotation of potatoes, barley, swedes on both fields has been changed. Blocks after barley are sown to ley on Gt. Field IV, to continuous wheat on Sawyers I.
(2) Since 1960 all phosphate has been applied as superphosphate.
(3) The six-yearly dressings were applied half in autumn before ploughing, half in spring.
(4) For a fuller record of treatments see 'Details' etc.

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Standard applications:

Potatoes: Manures: N at 250 kg as 'Nitro-Chalk'. K2O at 250 kg as sulphate of potash. Weedkillers: Linuron at 1.2 kg and paraquat at 0.42 kg ion in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l on two occasions. Insecticide: Demeton-s-methyl at 0.25 kg applied with mancozeb on the first occasion.

Barley: Manures: (25:0:16) at 390 kg combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Tetralex Plus' at 7.0 l in 220 l).

Winter wheat (Sawyers I only): Manures: Ground chalk at 2.9 tonnes. K2O at 87 kg as muriate of potash. N at 125 kg as 'Nitro-Chalk'. Weedkiller: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 370 l).

Ley (Gt.Field IV only): Manures: Chalk at 2.9 tonnes. N at 60 kg as 'Nitro-Chalk' and K2O at 120 kg as muriate of potash in seedbed. N at 100 kg for each cut. Weedkiller: Dicamba with mecoprop and MCPA ('Tetralex Plus' at 7.0 l in 220 l).

Seed: Potatoes: Majestic, Foundation Stock.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Wheat: Cappelle, sown at 200 kg.
Grass Clover mixture: 11.2 kg S215 Meadow Fescue, 3.4 kg S48 Timothy, 2.2 kg S51 Timothy, 3.4 kg S26 Cocksfoot, 1.7 kg N.Z. White Clover, 0.6 kg Wild White clover. Sown at 22.5 kg.

Cultivations, etc.:- (both fields where applicable).

Potatoes: Ploughed: 19 Nov, 1973. N, P and K applied, rotary cultivated, seed planted: 22 Apr, 1974. Weedkiller applied: 16 May. Grubbed: 20 June. Rotary ridged: 24 June. Fungicide and insecticide applied: 11 July. Fungicide applied: 2 Aug. Haulm destroyed mechanically: 10 Sept. Sprayed with undiluted BOV at 220 l: 17 Sept. Lifted: 15 Oct (Sawyers I), 21 Oct (Great Field IV).

Barley: Ploughed: 11 Oct, 1973. Spring-tine cultivated and P applied: 8 Mar, 1974. Power harrowed: 27 Mar. Seed sown and NK applied: 28 Mar. Weedkiller applied: 21 May. Combine harvested: 20 Aug.

Wheat: Chalk applied: 11 Sept, 1973. Ploughed: 11 Oct. P and K applied: 23 Oct. Power harrowed and seed sown: 25 Oct. N applied: 16 Apr, 1974. Weedkiller applied: 7 May. Combine harvested: 29 Aug.

Ley: Chalk applied: 11 Sept, 1973. Ploughed: 13 Sept. Rotary harrowed twice, N and K applied, power harrowed and seed sown: 14 Sept. P applied: 17 Sept. Weedkiller applied: 28 May, 1974. N applied: 5 June, 5 Aug. Cut: 25 July, 23 Dec.

Standard errors per plot. Sawyers I.

Potatoes, total tubers: tonnes/hectare:	2.41 or 7.0% (11 d.f.)
Barley, grain: tonnes/hectare:	0.274 or 5.7% (11 d.f.)
Wheat, grain: tonnes/hectare:	0.484 or 7.2% (11 d.f.)

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74/R/RN/7

TABLES OF MEANS

POTATOES

	TOTAL TUBERS: TONNES/HECTARE		% WARE: 3.81 CM (1.5 INCH) RIDDLE	
	Great Field IV	Sawyers I	Great Field IV	Sawyers I
P205				
0	16.9	19.8	96.8	97.2
29 ANN	21.7	30.8	96.9	97.6
57 ANN	18.8	36.7	95.8	98.2
115 ANN	35.4	47.0	98.3	98.0
172 ANN	39.1	47.6	98.0	98.0
86 TRI	18.6	24.8	95.1	96.2
172 TRI	25.6	31.5	97.1	96.6
344 SIX	33.9	41.2	98.3	98.1
688 SIX	39.1	47.3	98.6	98.1
1032 SIX	40.5	47.8	97.8	98.7
376 G(1)	15.9	19.2	97.9	96.2
376 S(1)	17.6	18.8	97.0	96.1
Mean	26.9	34.4	97.3	97.4

Sawyers I only - TOTAL TUBERS

STANDARD ERROR OF DIFFERENCES

P205

2.41

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BARLEY

	GRAIN: TONNES/HECTARE		STRAW: TONNES/HECTARE	
	Great Field IV	Sawyers I	Great Field IV	Sawyers I
P205				
0	3.18	4.06	2.04	2.58
29 ANN	3.98	4.75	2.61	2.55
57 ANN	4.71	4.86	4.06	2.85
115 ANN	3.47	5.15	3.29	3.00
172 ANN	5.05	5.38	4.67	3.38
86 TRI	3.76	4.25	3.10	2.82
172 TRI	4.09	5.01	3.96	2.81
344 SIX	3.65	5.06	3.55	2.68
688 SIX	4.23	4.97	2.73	3.03
1032 SIX	3.58	5.53	3.10	3.19
376 G(1)	4.55	4.22	3.63	2.49
376 S(1)	3.64	4.47	4.02	2.72
Mean	3.99	4.81	3.40	2.84

Sawyers I only - GRAIN

STANDARD ERROR OF DIFFERENCES

P205

0.274

Mean D.M. %	73.7	74.5	68.2	86.3

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	Great Field IV LEY DRY MATTER: TONNES/HECTARE			Sawyers I WHEAT TONNES/HECTARE	
	1st cut	2nd cut	Total of 2 cuts	Grain	Straw
P205					
0	3.70	3.80	7.50	4.80	3.14
29 ANN	3.63	3.56	7.19	7.48	4.84
57 ANN	4.07	3.90	7.97	7.01	4.46
115 ANN	3.71	4.27	7.98	6.91	3.99
172 ANN	3.99	3.73	7.72	7.12	4.55
86 TRI	4.10	3.76	7.86	6.17	3.73
172 TRI	4.10	3.45	7.55	7.11	4.20
344 SIX	4.23	3.57	7.80	7.41	4.32
688 SIX	3.91	3.93	7.84	6.68	4.41
1032 SIX	3.50	4.18	7.68	7.39	4.69
376 G(1)	4.52	3.55	8.07	6.17	3.73
376 S(1)	3.83	3.65	7.48	6.65	3.80
Mean	3.94	3.78	7.72	6.74	4.15

Sawyers I only - Wheat grain

STANDARD ERROR OF DIFFERENCES

P205

0.484

Mean D.M. %	22.9	23.9	23.4	84.1	91.0

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74/R/RN/8

CULTIVATION/WEEDKILLER

Object: To determine the long term effects of weedkillers and different methods of primary cultivation on a rotation of crops - Great Harpenden I.

Sponsors: J.R. Moffatt, G.V. Dyke, J.A. Currie.

The 14th year, potatoes.

For previous years see 'Details' 1967, 68/B/6(t), 69/R/RN/8(t), 70/R/RN/8, 71/R/RN/8(t), 72/R/RN/8 and 73/R/RN/8.

Design: 2 randomised blocks of 12 plots, split into 2.

Whole plot dimensions: 12.8 x 15.2. Sub plot area harvested: 0.00217.

Treatments: All combinations of:-

Whole plots: 1. Primary cultivations annually:-	CULTIVTN
Ploughed: 7 Nov, 1973, rotary harrowed: 23 Apr, 1974	Plough
Rotary cultivated: 6 Nov, 23 Apr	Rotavate
Deep-tine cultivated twice: 6 Nov, deep-tine cultivated and rotary harrowed: 23 Apr	Deeptine
2. Weed control to potatoes, 1974:-	WEEDCNTL(74)
Mechanical, grubbed: 20 May, mechanically weeded twice: 30 May, grubbed: 20 June, rotary ridged: 22 June	Mechancl
Linuron at 1.2 kg, plus paraquat at 0.42 kg ion in 450 l: 17 May	Lin/Par
Linuron plus paraquat on 17 May, grubbed: 20 June, rotary ridged: 22 June	Lin/ParR
Sub plots: 3. Paraquat weedkiller to wheat stubble autumn 1973:-	WEEDKLLR(732)
None	None
Paraquat at 0.56 kg ion in 220 l: 12 Sept	Paraquat
4. Hormone weedkiller to wheat 1973:-	WEEDKLLR(731)
None	None
Ioxynil plus mecoprop	Ioxy/mec

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plus three extra treatments:- EXTRA

Deep-tine cultivated twice and spike rotary cultivated: 23 Apr, given linuron plus paraquat, with sub plot treatments 3 and 4 above. — Spike

Shallow ploughed for wheat 1973, standard ploughing and spike rotary cultivation for potatoes, given linuron plus paraquat, whole plot given paraquat as 3 above, with sub plot treatment 4 above. — (Sh)Plgh

Standard cultivations as considered best for each crop, ploughed for potatoes: 6 Nov, 1973, spike rotary cultivated: 23 Apr, 1974 with sub plot treatments 3 and 4 above. — Standard

Basal applications: Manures: (13:13:20) at 1510 kg. Weedkiller: Paraquat at 0.56 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l on two occasions. Insecticide: Demeton-s-methyl at 0.25 kg with mancozeb on first occasion.

Seed: Pentland Crown.

Cultivations, etc.:- NPK applied: 17 Apr, 1974. Basal weedkiller applied: 18 Apr. Potatoes planted: 24 Apr. Fungicide applied: 11 July and 2 Aug. Insecticide applied: 11 July. Haulm mechanically destroyed: 10 Sept. Sprayed with undiluted BOV at 220 l: 16 Sept. Lifted: 31 Oct.

Standard errors per plot (omitting EXTRA plots). Total tubers: tonnes/hectare.
Whole plot: 4.17 or 7.1% (8 d.f.)
Sub plot: 3.86 or 6.6% (8 d.f.)

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TABLES OF MEANS

TOTAL TUBERS: TONNES/HECTARE

	CULTIVTN Plough	Rotavate	Deeptine	Mean	Spike	EXTRA (Sh)Plgh	Standard
Mean	60.4	57.5	58.0	58.6	50.5	62.3	60.2
WEEDCNTL(74)							
Mechancl	58.9	54.5	55.6	56.4			
Lin/Par	63.1	59.1	57.6	59.9			
Lin/ParR	59.2	59.0	60.7	59.6			
WEEDKLLR(732)							
Nonc	60.3	58.1	56.3	58.2	49.5		60.6
Paraquat	60.5	57.0	59.7	59.0	51.4	62.3	59.8
WEEDKLLR(731)							
None	59.6	57.5	55.7	57.6	51.2	61.0	61.4
Ioxy/mec	61.2	57.6	60.3	59.7	49.8	63.6	59.0

STANDARD ERRORS OF DIFFERENCES

CULTIVTN	WEEDCNTL(74)	WEEDKLLR(732)	WEEDKLLR(731)	CULTIVTN WEEDCNTL(74)	CULTIVTN WEEDKLLR(732)	CULTIVTN WEEDKLLR(731)
2.41	2.41	1.29	1.29	4.17	2.88	2.88
Except when comparing means with same level of CULTIVTN					2.23	2.23

GRAND MEAN 58.4

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PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE

	Plough	CULTIVIN Rotavate	Deeptine	Mean	Spike	EXTRA (Sh)Plgh	Standard
Mean	99.4	99.3	99.3	99.3	98.9	99.2	99.1
WEEDCNTL(74)							
Mechancl	99.3	99.2	99.3	99.3			
Lin/Par	99.4	99.3	99.4	99.4			
Lin/ParR	99.6	99.3	99.2	99.3			
WEEDKLLR(732)							
None	99.5	99.5	99.3	99.4	98.8		99.0
Paraquat	99.4	99.1	99.3	99.2	99.0	99.2	99.2
WEEDKLLR(731)							
None	99.5	99.1	99.2	99.3	98.4	98.9	99.2
Ioxy/mec	99.4	99.4	99.4	99.4	99.4	99.5	99.0

GRAND MEAN 99.3

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74/R/RN/9

CEREAL DISEASE REFERENCE PLOTS

Object: To study the effects of intensive cereal cropping on the incidence of soil-borne diseases, especially in relation to seasonal variation - Pennell's Piece.

Sponsors: D.B. Slope, E.W. Broom, G.A. Salt.

The twelfth year, winter wheat, spring oats, beans.

For previous years see 63/C/10(t), 64-65/C/9, 66/C/7, 67-68/C/5 and 69-73/R/RN/9.

Design: 2 randomised blocks of 6 plots.

Whole plot dimensions: 17.1 x 4.27. Area harvested: 0.00479.

Treatments: Previous crops (1963-73):-

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	PREVCROP
O	W	W	W	BE	O	W	W	W	BE	O	W/W/BE/O
W	W	W	BE	O	W	W	W	BE	O	W	W/BE/O/W
W	W	BE	O	W	W	W	BE	O	W	W	BE/O/W/W
W	BE	O	W	W	W	BE	O	W	W	W	-
BE	O	W	W	W	BE	O	W	W	W	BE	-
W	W	W	W	W	W	W	W	W	W	W	W/W/W/W

where: W = wheat, BE = beans, O = oats

Standard applications:

Winter wheat: Manures: (0:14:28) at 270 kg, combine drilled, 'Nitro-Chalk' at 500 kg. Weedkillers: Chlortoluron ('Dicurane 80 WP' at 4.5 kg in 220 l), dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 370 l).

Spring beans: Manures: (0:14:28) at 450 kg, placement drilled. Insecticide: Demeton-s-methyl at 0.25 kg in 220 l.

Spring oats: Manures: (0:14:28) at 270 kg, combine drilled, 'Nitro-Chalk' at 200 kg. Weedkiller: Dicamba with mecoprop and MCPA ('Tetralex Plus' at 7.0 l in 220 l).

Seed: Winter wheat: Cappelle, sown at 200 kg.
Spring beans: Minor, sown at 220 kg.
Spring oats: Manod, sown at 190 kg.

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Cultivations, etc.:- All plots: Ploughed: 17 Sept, 1973.
Winter wheat: Power harrowed, seed sown: 15 Oct. 'Dicurane' applied: 22 Oct. N applied: 22 Mar, 1974. 'Banlene Plus' applied: 6 May. Combine harvested: 27 Aug.
Spring beans: Power harrowed: 27 Mar, 1974. Seed sown and spring-tine cultivated: 27 Mar. Insecticide applied: 13 June. Combine harvested: 14 Oct.
Spring oats: Power harrowed: 27 Mar, 1974. Seed sown: 28 Mar. N applied: 8 Apr. Weedkiller applied: 28 May. Combine harvested: 27 Aug.

NOTES: (1) Yields were taken for winter wheat only.
(2) Estimates were made in July of incidence of take-all (Gaeumannomyces graminis) and eyespot (Cercosporella herpotrichoides) in the wheat.

TABLES OF MEANS

WINTER WHEAT

GRAIN: TONNES/HECTARE

PREVCROP				
W/W/BE/O	W/BE/O/W	BE/O/W/W	W/W/W/W	Mean
6.28	5.70	5.79	5.67	5.86

Mean D.M.% 83.6

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74/R/RN/11

IRRIGATION

Object: To study the effects of irrigation on a rotation of crops. Other agronomic factors are included from time to time - Great Field I and II.

Sponsors: B.J. Legg, B.K. French.

The eleventh year, wheat (Gt. Field I), kale (Gt. Field II).

For previous years see 64/C/15(t), 65/C/14(t), 66/C/9(t), 67/C/7(t), 68/C/6(t), 69/R/RN/11(t), 70/R/RN/11(t), 71/R/RN/11(t), 72/R/RN/11(t) and 73/R/RN/11.

Design: 4 randomised blocks of 4 plots, split into half and quarter plots (Gt. Field I)
2 randomised blocks of 2 plots, split into half and quarter plots (Gt. Field II)

Whole plot dimensions: Wheat - 15.2 x 32.0, kale - 15.2 x 30.5. Sub plot area harvested: Wheat - 0.00356, kale - 0.00098.

Treatments to wheat: All combinations of:-

Whole plots:	1. Irrigation:	IRRIGTN
	None	None
	Full	Full
	2. Plant population:	POPULATN
	Normal, 18 cm (7 inch) between rows, seed rate 224 kg	Normal
	Quarter normal, 36 cm (14 inch) between rows, seed rate 56 kg	Quarter
Half plots:	3. Sowing date:	SOWING
	Autumn, 12 Oct, 1973	Autumn
	Spring, 27 Mar, 1974	Spring
Quarter plots:	4. Nitrogen fertiliser (kg N):	N
	45	45
	90	90

Treatments to kale: All combinations of:-

Whole plots:	1. Irrigation:	IRRIGTN
	None	None
	Full	Full

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Half plots: 2. Rates of compound fertiliser (20:14:14) kg: COMPFERT

750	750
1130	1130

Quarter plots: 3. Residues of N fertiliser to potatoes in 1973 (kg N): NRES(73)

163	163
326	326

Standard applications:

Wheat: Manures: (0:20:20) at 280 kg, combine drilled. Weedkiller: Dicamba with mecoprop and MCPA (Autumn sown wheat: 'Banlene Plus' at 5.6 l in 220 l, spring sown wheat: 'Tetralex Plus' at 7.0 l in 220 l).

Kale: Weedkiller: Desmetryne ('Semeron 25 WP' at 1.7 kg in 220 l).

Seed: Wheat: Maris Ranger, dressed with dieldrin.
Kale: Maris Kestrel, dressed with BHC and captan, sown at 2.2 kg.

Cultivations, etc.:-

Wheat: Deep-tine cultivated: 28 July, 1973. Rotary cultivated: 29 Aug. Spring-tine cultivated: 9 Oct. Autumn seed sown: 12 Oct. Plots for spring sowing power harrowed and seed sown: 27 Mar, 1974. N applied: to spring sowing: 8 Mar, to autumn sowing: 19 Apr. Weedkiller applied: to autumn sowing: 18 Apr, to spring sowing: 28 May. Combine harvested: 18 Sept.

Kale: Ploughed: 17 Dec, 1973. Spring-tine cultivated and NPK applied: 9 Apr, 1974. Rotary harrowed and seed sown: 10 Apr. Weedkiller applied: 3 June. Cut: 19 Nov.

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RAINFALL AND IRRIGATION: MM

Week-ending	Rainfall	IRRIGATION WHEAT (Winter & Spring)	IRRIGATION KALE
May 4	9.2		
May 11	6.7	15.0	
May 18	4.6	15.0	
May 25	7.0		
June 1	1.9		
June 8	14.1	25.0	
June 15	1.6	20.0	
June 22	23.9		
June 29	36.7		
July 6	8.6		
July 13	10.3		
July 20	8.7		
July 27	1.9	25.0	25.0
Aug 3	2.6		
Aug 10	32.7		
Aug 17	20.7		
Aug 24	2.6		
Aug 31	21.8		
Sept 7	52.4		
Sept 14	5.0		
Sept 21	3.9		
Sept 28	54.1		
Total	331.0	100.0	25.0

Standard errors per plot. Wheat. Grain: tonnes/hectare.

Whole plot: 0.319 or 6.0% (9 d.f.)
Half plot: 0.441 or 8.3% (12 d.f.)
Quarter plot: 0.505 or 9.5% (24 d.f.)

Kale. Total weight: tonnes/hectare.

Quarter plot: 3.17 or 4.0% (4 d.f.)

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TABLES OF MEANS

WHEAT

GRAIN: TONNES/HECTARE

	POPULATN Normal	POPULATN Quarter	SOWING Autumn	SOWING Spring	N 45	N 90	Mean
IRRIGTN							
None	6.05	5.05	7.01	4.09	5.45	5.65	5.55
Full	5.57	4.51	6.26	3.82	4.85	5.23	5.04
		POPULATN					
		Normal	6.70	4.92	5.65	5.96	5.81
		Quarter	6.58	2.99	4.64	4.92	4.78
				SOWING			
				Autumn	6.52	6.76	6.64
				Spring	3.78	4.13	3.95
Mean					5.15	5.44	5.29

	SOWING N	Autumn 45	Autumn 90	Spring 45	Spring 90
IRRIGTN	POPULATN				
None	Normal	6.72	7.35	5.06	5.07
None	Quarter	7.11	6.88	2.92	3.30
Full	Normal	6.28	6.44	4.56	4.99
Full	Quarter	5.96	6.36	2.59	3.14

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STANDARD ERRORS OF DIFFERENCES

IRRIGTN	POPULATN	SOWING	N	IRRIGTN POPULATN	IRRIGTN SOWING	IRRIGTN N
0.159	0.159	0.156	0.126	0.226	0.223	0.203
Except when comparing means with same levels of						
IRRIGTN					0.221	0.179

	POPULATN SOWING	POPULATN N	SOWING N	IRRIGTN POPULATN SOWING N
	0.223	0.203	0.201	0.404
Except when comparing means with same levels of				
POPULATN	0.221	0.179		
SOWING			0.179	
IRRIGTN.POPULATN				0.401
IRRIGTN.POPULATN.SOWING				0.357
IRRIGTN.POPULATN.N				0.401

Mean D.M. % 78.0

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WHEAT

STRAW: TONNES/HECTARE

	POPULATN Normal	POPULATN Quarter	SOWING Autumn	SOWING Spring	N 45	N 90	Mean
IRRIGTN							
None	4.07	3.27	5.22	2.12	3.75	3.59	3.67
Full	5.20	4.07	5.82	3.45	4.63	4.64	4.64
		POPULATN					
		Normal	6.01	3.27	4.63	4.64	4.64
		Quarter	5.04	2.30	3.75	3.59	3.67
				SOWING			
				Autumn	5.60	5.44	5.52
				Spring	2.78	2.79	2.79
Mean					4.19	4.12	4.15

	SOWING N	Autumn 45	Autumn 90	Spring 45	Spring 90
IRRIGTN	POPULATN				
None	Normal	5.90	5.54	2.42	2.44
None	Quarter	4.72	4.73	1.97	1.66
Full	Normal	6.25	6.33	3.96	4.27
Full	Quarter	5.53	5.18	2.79	2.77

Mean D.M. % 74.0

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74/R/RN/11

KALE

TOTAL WEIGHT: TONNES/HECTARE

	COMPFERT 750	COMPFERT 1130	NRES(73) 163	NRES(73) 326	Mean
IRRIGTN					
None	77.9	85.1	78.4	84.6	81.5
Full	74.1	77.8	74.1	77.8	75.9
	COMPFERT				
	750		71.4	80.6	76.0
	1130		81.0	81.8	81.4
Mean			76.2	81.2	78.7

COMPFERT	750		1130	
NRES(73)	163	326	163	326
IRRIGTN				
None	73.9	81.8	82.8	87.4
Full	68.8	79.3	79.3	76.3

STANDARD ERRORS OF DIFFERENCES

NRES(73)	IRRIGTN(1) NRES(73)	COMPFERT(2) NRES(73)	IRRIGTN(3) COMPFERT NRES(73)
1.58	2.24	2.24	3.17

(1) Within the same level of IRRIGTN only
(2) Within the same level of COMPFERT only
(3) Within the same level of IRRIGTN*COMPFERT only

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74/W/RN/12

ORGANIC MANURING

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

Sponsor: G.E.G. Mattingly.

The tenth year, sugar beet and winter wheat.

For previous years see 66/C/31(t), 67/C/24(t), 68/C/18(t), 69/W/RN/12(t), 70/W/RN/12(t), 71/W/RN/12(t), 72/W/RN/12(t) and 73/W/RN/12.

Design: For each crop: 2 blocks of 8 plots split into 8.

Whole plot dimensions: 8.53 x 30.5. Sub plot area harvested: Sugar beet: 0.00130. Winter wheat: 0.00173.

Treatments: Between 1966 and 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. A rotation of potatoes, wheat, sugar beet and barley was started on two blocks in 1972 and the remaining two blocks in 1973. Organic manures were last applied in 1971, leys were ploughed in autumn 1971 and 1972 before starting the rotation. The experiment now tests all combinations of:-

Whole plots: 1. Organic manures and fertilisers in the preliminary period:

	MANURE
Farmyard Manure	FYM
Straw	Straw
Peat	Peat
Green manures	Greenmnr
Fertilisers equivalent to FYM	Fert-FYM
Fertilisers equivalent to straw	Fert-Str
Grass/clover ley no N	Clovrley
Grass ley with N for each cut	Grassley

Sub plots: 2. Fertiliser nitrogen (kg N) in 1974:

Sugar beet	Wheat	N S. Beet	N Wheat
None	None	0	0
40	25	40	25
80	50	80	50
120	75	120	75
160	100	160	100
200	125	200	125
240	150	240	150
280	175	280	175

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Standard applications:

Sugar beet: Manures: Ground chalk at 5 tonnes. (0:20:20) in autumn at 1140 kg. (0:20:20) in the seedbed at 580 kg. MgO at 100 kg as Epsom salts. Boron at 6.7 kg B_2O_3 (as 'Solubor') applied with the second application of insecticide. Insecticide: Demeton-s-methyl at 0.25 kg in 280 l followed by 0.21 kg in 390 l. Weedkillers: Aminotriazole at 4.5 kg with ammonium thiocyanate at 4.1 kg in 370 l. Phenmedipham at 1.1 kg in 340 l.

Winter wheat: Manures: P_2O_5 at 110 kg as superphosphate. K_2O at 60 kg as muriate of potash. Weedkiller: Ioxynil at 0.63 kg with mecoprop at 1.9 kg in 280 l.

Seed: Sugar beet: Klein E, sown at 8.0 kg.
Winter wheat: Cappelle, dressed with dieldrin, sown at 190 kg.

Cultivations, etc.:-

Sugar beet: Aminotriazole with ammonium thiocyanate applied: 13 Sept, 1973. Ground chalk applied: 27 Sept. Subsoiled, tines 140 cm apart and 50 cm deep: 20 Oct. PK applied: 25 Oct. Ploughed: 13 Nov. Spring-tine cultivated: 30 Mar, 1974. N applied: 4 Apr. PK and Mg applied, power harrowed, seed sown: 5 Apr. Phenmedipham applied: 26 May. Singled: 29-30 May. Insecticide applied: 5 June. Boron and insecticide applied: 24 June. Lifted: 22-29 Nov.

Winter wheat: P and K applied, deep-tine cultivated, spring-tine cultivated: 18 Oct, 1973. Seed sown: 22 Oct. Weedkiller applied: 5 Apr, 1974. N applied: 10 Apr. Combine harvested: 29 Aug.

Standard errors per plot.

Sugar beet. Roots (washed), tonnes/hectare:	Whole plot:	1.19 or 4.9% (7 d.f.)
	Sub plot:	2.01 or 8.3% (56 d.f.)
Total sugar, tonnes/hectare:	Whole plot:	0.178 or 4.7% (7 d.f.)
	Sub plot:	0.317 or 8.5% (56 d.f.)
Tops, tonnes/hectare:	Whole plot:	1.78 or 7.9% (7 d.f.)
	Sub plot:	3.09 or 13.8% (56 d.f.)
Winter wheat. Grain, tonnes/hectare:	Whole plot:	0.454 or 9.4% (7 d.f.)
	Sub plot:	0.572 or 11.9% (56 d.f.)

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74/W/RN/12

TABLES OF MEANS

SUGAR BEET

ROOTS (WASHED): TONNES/HECTARE

N

	0	40	80	120	160	200	240	280	Mean
MANURE									
FYM	12.8	21.1	27.3	29.0	30.9	29.9	31.8	28.1	26.4
Straw	11.2	19.9	23.9	27.3	26.4	29.3	25.7	28.3	24.0
Peat	7.0	20.6	23.6	27.6	26.5	27.7	26.9	27.5	23.4
Greenmnr	11.0	22.3	24.1	25.9	26.6	23.7	23.8	22.5	22.5
Fert-FYM	4.4	13.7	24.4	27.3	29.8	27.8	27.4	24.7	22.5
Fert-Str	6.5	19.1	24.0	25.3	28.2	29.3	27.1	23.0	22.8
Clovrley	10.7	25.2	25.9	25.6	27.5	29.5	27.0	29.6	25.1
Grassley	17.1	24.3	29.5	30.0	30.2	29.8	27.6	27.1	26.9
Mean	10.1	20.8	25.3	27.2	28.3	28.4	27.2	26.3	24.2

STANDARD ERRORS OF DIFFERENCES

MANURE	N	MANURE N
1.19	0.71	2.22
Except when comparing means with the same level of MANURE		2.01

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SUGAR BEET

SUGAR PERCENTAGE

N

	0	40	80	120	160	200	240	280	Mean
MANURE									
FYM	16.2	16.3	16.2	15.7	15.7	15.4	14.6	14.7	15.6
Straw	15.7	16.2	16.2	15.7	15.4	15.4	15.3	14.6	15.6
Peat	16.0	16.2	16.2	16.3	15.7	15.4	15.0	15.0	15.7
Greenmnr	15.6	16.1	15.9	15.6	15.3	15.1	14.8	14.6	15.4
Fert-FYM	15.9	15.7	16.3	15.9	15.8	15.6	15.1	14.5	15.6
Fert-Str	15.4	16.1	16.0	15.9	15.5	15.0	14.8	14.7	15.4
Clovrley	16.1	15.9	16.0	16.1	15.2	15.0	14.8	14.6	15.5
Grassley	16.0	16.3	16.2	15.9	15.3	15.0	14.7	14.4	15.5
Mean	15.9	16.1	16.1	15.9	15.5	15.2	14.9	14.6	15.5

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SUGAR BEET

TOTAL SUGAR: TONNES/HECTARE

N

	0	40	80	120	160	200	240	280	Mean
MANURE									
FYM	2.08	3.44	4.43	4.57	4.85	4.62	4.66	4.12	4.10
Straw	1.76	3.24	3.87	4.30	4.07	4.51	3.92	4.13	3.72
Peat	1.12	3.32	3.82	4.48	4.17	4.25	4.05	4.13	3.67
Greenmnr	1.71	3.61	3.84	4.04	4.07	3.58	3.53	3.28	3.46
Fert-FYM	0.70	2.16	3.98	4.34	4.71	4.35	4.12	3.59	3.49
Fert-Str	1.02	3.06	3.84	4.03	4.37	4.40	4.01	3.39	3.52
Clovrley	1.72	3.99	4.13	4.13	4.19	4.43	4.00	4.33	3.87
Grassley	2.74	3.95	4.78	4.76	4.62	4.47	4.07	3.89	4.16
Mean	1.61	3.35	4.09	4.33	4.38	4.33	4.04	3.86	3.75

STANDARD ERRORS OF DIFFERENCES

MANURE	N	MANURE N
0.178	0.112	0.346
Except when comparing means with same level of MANURE		0.317

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SUGAR BEET

TOPS: TONNES/HECTARE

N

	0	40	80	120	160	200	240	280	Mean
MANURE									
FYM	7.0	11.2	13.9	20.9	25.5	27.9	34.5	32.4	21.7
Straw	7.0	10.8	16.7	20.2	29.3	32.4	31.0	34.5	22.8
Peat	3.1	9.8	12.2	18.8	25.5	27.9	33.5	33.5	20.5
Greenmnr	8.4	13.3	17.8	22.3	32.1	28.9	30.3	33.1	23.3
Fert-FYM	2.4	4.5	11.5	18.1	24.4	27.2	30.3	26.5	18.1
Fert-Str	4.9	13.9	19.5	25.5	32.4	37.7	40.1	34.9	26.1
Clovrley	8.7	13.6	18.5	24.4	26.9	31.4	30.7	37.3	23.9
Grassley	10.1	10.8	18.8	26.5	26.2	31.7	30.7	30.0	23.1
Mean	6.5	11.0	16.1	22.1	27.8	30.6	32.7	32.8	22.4

STANDARD ERRORS OF DIFFERENCES

MANURE	N	MANURE N
1.78	1.09	3.40
Except when comparing means with same level of MANURE		3.09

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WINTER WHEAT

GRAIN: TONNES/HECTARE

N

	0	25	50	75	100	125	150	175	Mean
MANURE									
FYM	2.17	3.38	3.75	5.52	5.58	6.13	5.61	6.03	4.77
Straw	2.03	2.60	3.61	5.12	5.85	6.66	7.01	6.54	4.93
Peat	1.88	2.21	3.80	4.80	5.86	6.24	6.46	6.06	4.66
Greenmnr	1.70	3.12	3.28	4.21	5.57	5.69	5.42	6.03	4.38
Fert-FYM	1.71	2.25	3.20	4.46	5.73	4.88	4.78	4.55	3.95
Fert-Str	1.72	2.62	3.83	4.90	5.51	6.51	6.13	6.36	4.70
Clovrley	3.51	4.67	5.38	6.71	6.47	6.15	6.01	5.82	5.59
Grassley	3.64	5.12	5.47	6.41	6.51	6.21	5.52	4.90	5.47
Mean	2.29	3.25	4.04	5.27	5.89	6.06	5.87	5.79	4.81

STANDARD ERRORS OF DIFFERENCES

MANURE	N	MANURE N
0.454	0.202	0.701

Except when comparing means with same level of MANURE 0.572

Mean D.M. % 82.4

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WINTER WHEAT

STRAW: TONNES/HECTARE

N

	0	25	50	75	100	125	150	175	Mean
MANURE									
FYM	1.58	2.45	3.47	4.00	4.34	4.09	3.57	4.01	3.44
Straw	1.03	2.22	2.83	3.87	4.68	4.72	3.97	4.22	3.44
Peat	0.93	1.92	3.20	4.20	3.68	4.32	3.85	4.17	3.28
Greenmnr	1.20	2.44	2.86	3.46	4.12	4.29	3.99	4.03	3.30
Fert-FYM	1.11	2.07	2.81	3.59	3.37	4.00	4.09	3.86	3.11
Fert-Str	0.92	1.97	3.12	3.61	4.24	3.88	3.98	3.93	3.21
Clovrley	1.91	2.87	4.08	4.42	3.88	4.22	4.18	3.83	3.67
Grassley	2.36	3.89	3.88	4.25	4.48	4.41	4.55	4.38	4.03
Mean	1.38	2.48	3.28	3.93	4.10	4.24	4.02	4.05	3.44

Mean D.M. % 84.9

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74/W/RN/13

INTENSIVE CEREALS

Object: To study the effects of intensive cereal cropping on yield, incidence of soil-borne diseases and organic matter in the soil- Woburn Stackyard I.

Sponsors: G.W. Cooke, D.B. Slope.

The ninth year, ley, potatoes, winter wheat, barley.

For previous years see 66/B/9(t), 67/B/9, 68/B/7(t), 69/W/RN/13(t), 70/W/RN/13(t), 71/W/RN/13(t) and 72-73/W/RN/13.

Design: For each experiment: 2 randomised blocks of 6 plots, split into 4.

Whole plot dimensions: 8.53 x 20.4. Sub plot area harvested: Ley - 0.00089. Potatoes - 0.00139. Wheat - 0.00277. Barley - 0.00273.

Treatments:-

One experiment on winter wheat on part of the site of the classical wheat experiment 1877-1954

One experiment on barley on part of the site of the classical barley experiment 1877-1954

Factors tested on both experiments are the same but crop and nitrogen rates differ. All combinations of:-

Whole plots: 1. Previous crops:

1967	1968	1969	1970	1971	1972	1973	PREVCROP
L	P	C	C	C	L	P	C/C/L/P
P	C	C	C	L	P	C	C/L/P/C
C	C	C	L	P	C	C	L/P/C/C
C	C	L	P	C	C	C	P/C/C/C
C	L	P	C	C	C	L	C/C/C/L
C	C	C	C	C	C	C	C/C/C/C

Ley = 1 year ley P = Potatoes C = Cereal: wheat or barley.

Sub plots: 2. Nitrogen fertiliser (kg N):

To wheat	To barley	N Wheat	N Barley
63	50	63	50
126	100	126	100
189	150	189	150
252	200	252	200

NOTE: Ley and potatoes receive basal N only, residues of dressings to cereals are tested (NRESID).

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Basal applications: All crops: Manures: Magnesian limestone applied at 3.5 tonnes. P205 at 130 kg, K20 at 260 kg as (0:14:28), half ploughed in, half applied to the plough-farrow. Weedkillers: Paraquat at 0.56 kg ion in 370 l.

Standard applications:

Leys: N at 60 kg, as 'Nitro-Chalk', in seedbed and repeated after sowing and after each cut except the last.

Potatoes: N at 150 kg as 'Nitro-Chalk'. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide with insecticide: Mancozeb at 1.3 kg plus demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

Wheat: Weedkiller: Ioxynil at 0.63 kg with mecoprop at 1.9 kg in 280 l on the first occasion and ioxynil at 0.52 kg with mecoprop at 1.6 kg in 280 l on the second occasion.

Barley: Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.

Seed: Leys: Italian ryegrass sown at 40 kg.
Potatoes: Pentland Crown.
Wheat: Cappelle, sown at 190 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:- All plots: Paraquat applied: 12 Sept, 1973. Magnesian limestone applied: 5 Oct. Half PK applied: 10 Oct. Ploughed: 11 Oct. Remaining PK applied: 12 Oct. Spring-tine cultivated: 13 Oct.

Leys: Spring-tine cultivated: 30 Mar, 1974. Power harrowed, N applied, seeds sown: 5 Apr. N applied: 31 May, 2 July, 19 Aug. Cut three times: 1 July, 15 Aug, 24 Sept.

Potatoes: Spring-tine cultivated: 30 Mar, 1974. N applied, rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 12 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 30 Sept.

Wheat: Seed sown: 15 Oct, 1973. Weedkiller applied: 5 Apr, 1974. N applied: 9 Apr. Weedkiller applied on second occasion: 14 May. Combine harvested: 30 Aug.

Barley: Spring-tine cultivated: 27 Mar, 1974. Spring-tine cultivated with crumbler: 28 Mar. Seed sown: 29 Mar. N applied: 1 Apr. Weedkiller applied: 14 May. Combine harvested: 22 Aug.

NOTE: Estimates of eyespot (Cercosporella herpotrichoides) and take-all (Gaeumannomyces graminis) were made on both cereal crops in early July.

Standard errors per sub plot.

Wheat, grain: tonnes/hectare: 0.346 or 9.7% (12 d.f.)

Barley, grain: tonnes/hectare: 0.559 or 10.8% (12 d.f.)

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74/W/RN/13

TABLES OF MEANS

LEY

WHEAT SITE

DRY MATTER: TONNES/HECTARE

NRESID

63	126	189	252	Mean
		1ST CUT		
2.82	2.82	3.16	3.05	2.96
		2ND CUT		
3.01	3.09	2.69	3.08	2.97
		3RD CUT		
2.54	2.64	2.45	2.34	2.50
		TOTAL OF 3 CUTS		
8.37	8.55	8.31	8.48	8.43

Mean D.M. % 1st cut: 17.3
2nd cut: 18.4
3rd cut: 16.7
Total of 3 cuts: 17.5

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LEY

BARLEY SITE

DRY MATTER: TONNES/HECTARE

NRESID

50	100	150	200	Mean
		1ST CUT		
2.49	2.88	2.75	2.76	2.72
		2ND CUT		
3.09	3.22	3.27	3.12	3.17
		3RD CUT		
2.47	2.42	2.69	2.70	2.57
		TOTAL OF 3 CUTS		
8.05	8.52	8.71	8.58	8.46

Mean D.M. %
1st cut: 16.0
2nd cut: 16.4
3rd cut: 14.6
Total of 3 cuts: 15.7

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POTATOES

WHEAT SITE

NRESID

63	126	189	252	Mean
TOTAL TUBERS: TONNES/HECTARE				
48.8	58.4	53.7	54.3	53.8
PERCENTAGE WARE: 3.81cm (1.5 INCH) RIDDLE				
98.2	98.2	98.6	98.9	98.5

BARLEY SITE

NRESID

50	100	150	200	Mean
TOTAL TUBERS: TONNES/HECTARE				
54.6	55.1	59.0	58.9	56.9
PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE				
99.1	98.6	99.0	99.0	98.9

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WINTER WHEAT

N

PREVCROP	63	126	189	252	Mean
		GRAIN: TONNES/HECTARE			
C/C/L/P	3.98	5.34	5.53	4.95	4.95
C/L/P/C	2.08	3.60	3.46	2.89	3.01
L/P/C/C	1.78	2.89	3.33	3.41	2.85
C/C/C/C	2.33	3.75	3.97	3.75	3.45
Mean	2.54	3.89	4.07	3.75	3.56

STANDARD ERRORS OF DIFFERENCES

N	PREVCROP* N
0.173	0.393

* Within the same level of PREVCROP only

PREVCROP					
		STRAW: TONNES/HECTARE			
C/C/L/P	4.19	4.96	5.68	5.80	5.16
C/L/P/C	2.87	3.56	4.10	3.78	3.58
L/P/C/C	2.44	2.93	3.16	3.45	2.99
C/C/C/C	3.36	3.98	3.97	4.10	3.85
Mean	3.22	3.86	4.23	4.28	3.89

Mean D.M. % Grain: 82.2
Straw: 83.7

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BARLEY

N

PREVCROP	50	100	150	200	Mean
	GRAIN: TONNES/HECTARE				
C/C/L/P	4.36	5.85	6.10	5.38	5.42
C/L/P/C	3.70	5.70	5.83	5.74	5.24
L/P/C/C	3.66	5.32	5.73	5.25	4.99
C/C/C/C	3.63	5.36	5.39	5.68	5.01
Mean	3.83	5.56	5.76	5.51	5.17

STANDARD ERRORS OF DIFFERENCES

N	PREVCROP* N
0.279	0.533

* Within the same level of PREVCROP only

PREVCROP					
	STRAW: TONNES/HECTARE				
C/C/L/P	2.72	4.13	4.73	4.57	4.04
C/L/P/C	2.13	3.56	4.07	4.40	3.54
L/P/C/C	2.18	3.69	3.72	4.38	3.49
C/C/C/C	1.98	3.08	3.31	3.74	3.03
Mean	2.25	3.62	3.96	4.27	3.52

Mean D.M. % Grain: 85.5
Straw: 87.8

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74/W/RN/14

LONG TERM PHOSPHATE

Object: To study the residual effects of superphosphate on a clover/grass ley - Woburn Stackyard III.

Sponsor: G.E.G. Mattingly.

The seventh year, clover/grass ley.

For previous years see 68/B/8(t), 69/W/RN/14, 70/W/RN/14(t), 71/W/RN/14(t), 72/W/RN/14(t) and 73/W/RN/14.

Design: 6 blocks of 6 plots, split into 2.

Whole plot dimensions: 8.53 x 15.8. Sub plot area harvested: 0.00145.

Treatments: All combinations of:
Whole plots: 1. Residues of superphosphate applied autumn 1967 and spring 1973 (kg P2O5):

1967	1973	Total		P2O5RES(73)
None	None	None	(Duplicate plots)	0
188	172	360		360
376	344	720		720
753	687	1440		1440
1130	1030	2160		2160

Sub plots: 2. Residues of superphosphate applied in three equal dressings 1970-72 (kg P2O5, total):

	P2O5RES(72)
None	0
376	376

Basal applications: Manures: Ground chalk at 2.5 tonnes. K2O at 110 kg as muriate of potash. MgO at 30 kg as Epsom salts.

Cultivations, etc.:- Ground chalk applied: 26 Sept, 1973. K and Mg applied: 21 Jan, 1974. Chain harrowed: 3 Apr. Cut once: 11 June.

Standard error per plot. Dry matter: tonnes/hectare.
1st and only cut. Whole plot: 0.564 or 15.8% (26 d.f.)
Sub plot: 0.315 or 8.8% (31 d.f.)

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74/W/RN/14

TABLES OF MEAN

DRY MATTER: TONNES/HECTARE

1ST AND ONLY CUT

P205RES(73)

	0	360	720	1440	2160	Mean
P205RES(72)						
0	3.23	3.44	3.87	3.66	3.19	3.44
376	3.59	3.62	4.21	3.91	3.27	3.70
Mean	3.41	3.53	4.04	3.79	3.23	3.57

STANDARD ERRORS OF DIFFERENCES

	P205RES(72)	P205RES(73)	P205RES(72) P205RES(73)
	0.074		
0 v any of remainder		0.282	0.303
Between any of remainder		0.325	0.350
Except when comparing means with same level of P205RES(73)			
0			0.129
Between remainder			0.182

Mean D.M. % 28.8

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74/W/RN/15

ROTATION AND FUMIGATION

Object: To study different ways of using nematicides in a three-course rotation and to determine the effects on crop yield and incidence of pathogenic nematodes - Woburn Butt Close.

Sponsors: F.G.W. Jones, D.C.M. Corbett, A.G. Whitehead, T.D. Williams.

The sixth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-73/W/RN/15.

Design: 3 series each of 2 blocks of 3 plots split into 7.

Whole plot dimensions: 5.33 x 31.1. Sub plot area harvested: Potatoes - 0.00052, barley - 0.00052, sugar beet - 0.00130.

Treatments:

All phases of the rotation potatoes, barley, sugar beet are present. Each crop tests all combinations of:-

Whole plots: 1. Nitrogen fertiliser (kg N):

To potatoes and sugar beet	To barley	N: Potatoes & s.beet	N: Barley
75	38	75	38
150	75	150	75
225	113	225	113

Sub plots: 2. Chemicals:

	CHEMICAL
None	O
Dichloropropane/dichloropropene ('D-D') at 448 kg before potatoes	DD(P)
Dichloropropane/dichloropropene ('D-D') at 448 kg before sugar beet	DD(SB)
Dichloropropane/dichloropropene ('D-D') at 448 kg before barley	DD(B)
Dichloropropane/dichloropropene ('D-D') at 448 kg before all crops	DD(ALL)
Dazomet at 224 kg before all crops since 1970 only	DAZ(ALL)
Benomyl at 22 kg before all crops since 1974 only	BEN(ALL)

Standard applications:

Potatoes: Manures: (0:14:28) at 1080 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide with insecticide: Mancozeb at 1.3 kg plus demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

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Barley: Manures: (0:20:20) at 320 kg, combine drilled. Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.
Sugar beet: Manures: Magnesian limestone at 2.5 tonnes. (0:14:28) at 1080 kg. Boron at 6.7 kg B2O3 (as 'Solubor') applied with the second application of insecticide. Insecticide: Demeton-s-methyl at 0.25 kg in 280 l followed by 0.21 kg in 390 l. Weedkiller: Phenmedipham at 1.1 kg in 340 l.

Seed: Potatoes: Pentland Crown.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Sugar beet: Klein E, sown at 8.0 kg.

Cultivations, etc.:-
All series: Dazomet and benomyl applied, and these plots only, rotary cultivated: 27 Nov, 1973. DD injected, all plots spring-tine harrowed: 17 Dec.
Potatoes: Ploughed twice: 23 Nov, 1973, 6 Mar, 1974. Spring-tine cultivated: 28 Mar. PK and N applied, spring-tine cultivated: 2 Apr. Rotary cultivated, potatoes planted: 11 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 19 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 11 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 1 Oct.
Barley: Ploughed: 12 Oct, 1973. Spring-tine cultivated: 23 Nov. Ploughed: 6 Mar, 1974. Spring-tine cultivated: 28 Mar. N applied: 29 Mar. Spring-tine cultivated with crumbler, seed sown: 1 Apr. Weedkiller applied: 17 May. Combine harvested: 12 Sept.
Sugar beet: Subsoiled, tines 140 cm apart and 50 cm deep: 18 Sept, 1973. Magnesian limestone applied: 11 Oct. Ploughed twice: 12 Oct, 6 Mar, 1974. Spring-tine cultivated: 28 Mar. PK and N applied, spring-tine cultivated: 2 Apr. Power harrowed, rolled, seed sown: 3 Apr. Weedkiller applied: 26 May. Singled: 3-4 June. Insecticide applied: 5 June. Boron and insecticide applied: 24 June. Lifted: 30 Oct - 4 Nov.

NOTE: Soil samples were taken after harvest for eelworm counts.

Standard errors per sub plot.

Potatoes, total tubers: tonnes/hectare:	7.55 or 15.8% (18 d.f.)
Barley, grain: tonnes/hectare:	0.516 or 13.6% (18 d.f.)
Sugar beet, roots (washed): tonnes/hectare:	2.73 or 14.9% (18 d.f.)
total sugar: tonnes/hectare:	0.400 or 14.5% (18 d.f.)

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74/W/RN/15

TABLES OF MEANS

POTATOES

CHEMICAL

N	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
	TOTAL TUBERS: TONNES/HECTARE							
75	32.0	32.5	36.2	35.6	38.0	40.4	42.0	36.7
150	37.2	44.1	53.0	42.6	55.5	62.6	59.7	50.7
225	39.0	53.9	50.8	57.3	65.0	71.0	56.9	56.3
Mean	36.1	43.5	46.7	45.2	52.8	58.0	52.8	47.9

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N* CHEMICAL
4.36	7.55

* Within the same level of N only

PECENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE

N								
75	98.3	97.9	98.2	97.3	98.3	98.4	97.7	98.0
150	98.1	99.5	98.5	99.5	97.7	99.0	97.9	98.6
225	98.9	98.1	98.5	98.5	98.3	97.9	99.0	98.4
Mean	98.4	98.5	98.4	98.4	98.1	98.4	98.2	98.4

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74/W/RN/15

BARLEY

CHEMICAL

N	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
	GRAIN: TONNES/HECTARE							
38	2.28	2.78	2.02	2.26	1.49	3.65	2.66	2.45
75	4.35	4.44	4.54	3.55	4.13	3.99	4.66	4.24
113	4.98	4.34	4.96	4.66	4.11	5.06	4.62	4.68
Mean	3.87	3.85	3.84	3.49	3.24	4.23	3.98	3.79

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N* CHEMICAL
0.298	0.516

* Within the same level of N only

Mean D.M. % 84.1

STRAW: TONNES/HECTARE

N								
38	1.49	1.78	1.84	1.72	1.48	2.61	2.05	1.85
75	2.22	2.60	2.47	2.13	2.13	2.46	2.76	2.40
113	2.64	2.26	2.77	2.52	2.06	2.79	2.53	2.51
Mean	2.12	2.21	2.36	2.13	1.89	2.62	2.44	2.25

Mean D.M. % 82.0

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74/W/RN/15

SUGAR BEET

CHEMICAL

N	O	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
	ROOTS (WASHED): TONNES/HECTARE							
75	13.0	14.4	15.1	16.0	14.2	19.0	14.0	15.1
150	17.5	21.0	18.0	20.6	20.5	20.7	18.7	19.6
225	21.6	21.0	20.2	22.6	16.2	20.8	20.6	20.4
Mean	17.4	18.8	17.8	19.7	17.0	20.2	17.7	18.4

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N* CHEMICAL
1.58	2.73

* Within the same level of N only

SUGAR PERCENTAGE

N								
75	15.8	15.4	15.3	15.0	14.8	15.6	15.5	15.4
150	15.4	15.4	15.1	15.1	14.7	14.8	15.3	15.1
225	14.8	14.7	14.3	14.3	13.9	15.1	15.0	14.6
Mean	15.3	15.2	14.9	14.8	14.5	15.2	15.3	15.0

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SUGAR BEET

TOTAL SUGAR: TONNES/HECTARE

CHEMICAL

	0	DD(P)	DD(SB)	DD(B)	DD(ALL)	DAZ(ALL)	BEN(ALL)	Mean
N								
75	2.06	2.22	2.31	2.39	2.11	2.97	2.17	2.32
150	2.70	3.24	2.71	3.11	3.01	3.08	2.86	2.96
225	3.20	3.09	2.89	3.23	2.26	3.14	3.09	2.98
Mean	2.65	2.85	2.64	2.91	2.46	3.06	2.71	2.75

STANDARD ERRORS OF DIFFERENCES

CHEMICAL	N* CHEMICAL
0.231	0.400

* Within the same level of N only

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74/W/RN/16

EFFECTS OF DEEP PK

Object: To study the effects of subsoiling, and of incorporating a large dressing of PK in either the subsoil or topsoil, on yields of a rotation of crops - Woburn Butt Furlong.

Sponsor: J. McEwen.

The first year, winter wheat, sugar beet, spring barley, potatoes.

Design: 4 series of 3 randomised blocks of 4 plots.

Whole plot dimensions: 4.27 x 2.59. Area harvested: Wheat, sugar beet, barley: 0.00033, potatoes: 0.00043.

Treatments: Extra PK and subsoil treatment:-

Extra PK	Subsoil (25-50 cm) treatment	PK SUB
None	None	- -
None	Subsoiled	- Sub
To topsoil (0-25 cm)	None	PKTop -
To subsoil	Subsoiled	- PKSub

NOTES: (1) The rates of P and K were 1930 kg P_2O_5, as superphosphate and 460 kg K_2O as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and sub soil.
(2) Subsoiling was done by spade, after removing the topsoil which was then replaced. PK to subsoil was worked in by forking.
(3) PK to topsoil was applied half before ploughing in autumn half soon after on the plough furrow.

Standard applications: All series: Manures: K_2O at 288 kg as muriate of potash.
Series I: Winter wheat: Manures: (0:20:20) at 290 kg, combine drilled. N at 100 kg as 'Nitro-Chalk'. Weedkillers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 340 l. Fungicide: Tridemorph at 0.53 kg in 340 l.
Series II: Sugar beet: Manures: (0:14:28) at 750 kg. N at 180 kg as 'Nitro-Chalk'. B_2O_3 at 6.7 kg in 340 l as 'Solubor'. Insecticide: Demeton-s-methyl at 0.25 kg in 340 l.
Series III: Barley: Manures: (20:15:15) at 450 kg combine drilled. Weed-killers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 340 l. Fungicide: Tridemorph at 0.53 kg in 340 l.
Series IV: Potatoes: Manures: (13:13:20) at 1940 kg. Weedkiller: Linuron at 1.2 kg in 360 l. Insecticide: Demeton-s-methyl at 0.25 kg in 340 l.

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Seed: Winter wheat: Cappelle, sown at 190 kg.
Sugar beet: Klein E, sown at 8 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:- All crops: Deep-tine cultivated: 2 June, 1973. Basal K applied: 8 Aug. Spring-tine cultivated: 9 Aug. Ploughed: 11 Aug. Applied half PK to plots for PK applied to topsoil: 5 Oct. Ploughed: 12 Oct. Applied second half PK to plots for PK applied to topsoil: 18 Oct.

Series I: Winter wheat: Hand dug and PK applied to subsoil plots: 13-23 Aug, 1973. Seed sown: 22 Oct. N applied: 9 Apr, 1974. Weedkiller applied: 29 Apr. Fungicide applied: 4 June. Hand harvested: 21 Aug.

Series II: Sugar beet: Hand dug and PK applied to subsoil plots: 29 Aug - 7 Sept, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. N and PK applied: 1 Apr. Spring-tine cultivated and power harrowed: 2 Apr. Seed sown: 3 Apr. Singled: 30 May. Insecticide applied twice: 4 June, 11 July. 'Solubor' applied with insecticide: 11 July. Hand lifted: 22 Oct.

Series III: Barley: Hand dug and PK applied to subsoil plots: 17-26 Sept, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. Seed sown: 27 Mar. Rolled: 1 Apr. Weedkiller applied: 8 May. Fungicide applied: 4 June. Hand harvested: 20 Aug.

Series IV: Potatoes: Hand dug and PK applied to subsoil plots: 1-5 Oct, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. Spring-tine cultivated: 1 Apr. NPK applied, spring-tine cultivated: 8 Apr. Rotary cultivated, potatoes planted: 9 Apr. Ridges rolled: 18 Apr. Weedkiller applied: 29 Apr. Insecticide applied twice: 4 June, 11 July. Hand lifted: 9 Oct.
Previous crops: Fallow 1972, 1973.

NOTES: (1) Samples of wheat and barley grain, potato tubers and sugar beet roots and tops were taken for analysis of N, P, K, Na, Ca and Mg.
(2) Spring barley. 4 plots, PKSub --, - Sub, and PKTop - (two) were badly damaged by birds. No yields were taken and estimated values were used in the analysis. As the standard error per plot was estimated from only 2 d.f. it is not presented.

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74/W/RN/16

Standard errors per plot.

Winter wheat, grain, tonnes/hectare:	1.062 or 18.3% (6 d.f.)
Sugar beet, Roots (washed): tonnes/hectare:	2.14 or 6.5% (6 d.f.)
Total sugar: tonnes/hectare:	0.347 or 6.8% (6 d.f.)
Tops: tonnes/hectare:	5.08 or 15.9% (6 d.f.)
Spring barley, grain, tonnes/hectare:	not presented (2 d.f.)
Potatoes, total tubers, tonnes/hectare:	1.68 or 2.4% (6 d.f.)

TABLES OF MEANS

PK SUB

- -	- Sub	PKTop -	- PKSub	Mean
	WINTER WHEAT. GRAIN: TONNES/HECTARE			
5.56	6.52	5.23	5.85	5.79
	WINTER WHEAT. STRAW: TONNES/HECTARE			
9.03	10.84	10.89	11.04	10.45
Mean D.M. %	Grain: 81.6 Straw: 54.2			
	SUGAR BEET. ROOTS (WASHED): TONNES/HECTARE			
31.2	32.6	32.0	35.6	32.8
	SUGAR BEET. SUGAR PERCENTAGE			
15.9	15.4	15.8	15.4	15.6
	SUGAR BEET. TOTAL SUGAR: TONNES/HECTARE			
4.95	5.03	5.07	5.49	5.14
	SUGAR BEET. TOPS: TONNES/HECTARE			
29.2	32.6	27.1	39.0	32.0

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PK SUB

- -	- Sub	PKTop -	- PKSub	Mean
	SPRING BARLEY. GRAIN: TONNES/HECTARE			
4.89	5.23	4.53	6.21	5.22
	SPRING BARLEY. STRAW: TONNES/HECTARE			
4.91	5.43	4.89	5.30	5.13

Mean D.M. % Grain: 77.7
Straw: 58.8

	POTATOES. TOTAL TUBERS: TONNES/HECTARE			
68.8	65.1	72.1	78.5	71.1

STANDARD ERRORS OF DIFFERENCES

	PK SUB
Winter wheat. Grain	0.867
Sugar beet. Roots (washed)	1.75
Sugar beet. Total sugar	0.283
Sugar beet. Tops	4.15
Potatoes. Total tubers	1.37

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