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Yields of the Field Experiments 1976

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Rothamsted Experimental Station

Harpenden

Lawes Agricultural Trust

YIELDS

of the

FIELD

EXPERIMENTS

1976

This report includes only experiments conducted at Rothamsted, Woburn and Saxmundham. Only those experiments which have the determination of crop yields as an object are included. For many of these, other determinations are of equal or greater importance.

The design and supervision of the field experiments are the responsibility of the Field Plots Committee (members in 1976: F.G.W. Jones (Chairman), G.V. Dyke (Secretary), J. McEwen (Deputy Secretary), J.P. Dickinson, L. Fowden, I.J. Graham-Bryce, A.E. Johnston, E.J. Lester, T. Lewis, R. Moffitt, J.A. Nelder, C.P. Whittingham, T. Woodhead).

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CONVENTIONS 1976

For each experiment current treatments are shown, together with the factor and level names which are used in the tables. The program used for the analyses of these experiments limits level names to eight characters, and factor names similarly, though a suffix of up to 3-digits in brackets may be appended if required.

For each experiment, other than annuals, references are given to previous years. These refer to the '(Numerical)(Results) Yields of the Field Experiments' - (t) indicates a year when treatments were described. Since 1973 treatments have been described annually for all experiments and (t) is not used for these years.

For the classical and some long-term experiments reference is made to 'Details' - a separate publication, giving a full description of treatments until 1967, with full title 'Details of the Classical and Long-Term Experiments up to 1967'.

The following conventions are observed unless otherwise stated.

All areas are in hectares. All plot dimensions are in metres.

All seed rates, rates of application of fertilisers, sprays etc. are per hectare.

All yields and plant numbers are per hectare.

The following abbreviations are used in variate headings:

Wheat, barley, oats, rye, beans etc.

Grain:	Grain (at 85% dry matter)
Straw:	Straw (at 85% dry matter)

Sugar beet

Roots:	Roots (washed)
Sugar %:	Sugar percentage

All crops

Mean D.M. %:	Mean dry matter % as harvested
--------------	--------------------------------

For any other crop, details of abbreviations are given as necessary.

'Nitro-Chalk' refers to the grade containing 25% N.

Compound fertilisers indicated thus - (20:10:10) = compound fertiliser (20% N, 10% P₂O₅, 10% K₂O), granular unless otherwise stated.

The compound fertiliser (13:13:20) used in our experiments is the grade containing sulphate of potash.

Treatment of cereal seed with organomercury and gamma BHC should be assumed in this report, exceptions are noted.

Harvest areas for cereals

On most of those cereal experiments at Rothamsted and Woburn (but not Saxmundham) which are harvested by combine the 'blank-row' technique is used to distinguish the areas taken for yield from the discard areas. When seed is drilled in rows 7 in. (18 cm.) apart (the most common arrangement), appropriate coulters are prevented from sowing and 8 or 16 rows are left for yield according to the cutter-bar width of the combine to be used. If the row-spacing is other than 7 in. a similar arrangement is used but with a different number of rows.

The ends of plots are separated from each other or from headlands by 3 ft (91 cm.) fallow paths made after the crop has established.

The 'Area harvested' in the 'Yields', when the blank-row technique is used, is the product:-

number of rows harvested x distance between rows x length of rows.

A series of experiments by Widdowson at Rothamsted (68/Da/9, 68/Db/1, 69/R/W/13, 69/R/B/5, 70/R/WW/3) showed that on-average the yield of 16 rows (50 ft (15 m) long) was 7.8% greater with blank rows than without.

If no rows are left blank and the plot is wider than the combine harvester so that discards are left uncut, the 'Area harvested' is the product:-

width of cutter bar x length of rows.

If the plot is narrower than the combine so that the whole area between paths is cut, the 'Area harvested' is the product:-

number of rows x distance between rows x length of rows.

We do not apply the adjustment used by some workers who take the harvested areas as width x length where each is measured to the centre of 'paths' up to a maximum of 18 in (46 cm).

Table of means

Tables of means are presented directly from computer output. Both factor and level names are present in upper case characters. Vertical and horizontal lines are omitted e.g.:-

FACTOR C	LEVEL C1		LEVEL C2		LEVEL C3	
FACTOR B	LEVEL B1	LEVEL B2	LEVEL B1	LEVEL B2	LEVEL B1	LEVEL B2
FACTOR A						
LEVEL A1	*	*	*	*	*	*
LEVEL A2	*	*	*	*	*	*

Not as hitherto:-

FACTOR B	FACTOR C					
	Level C1		Level C2		Level C3	
	Level B1	Level B2	Level B1	Level B2	Level B1	Level B2
FACTOR A						
Level A1	*	*	*	*	*	*
Level A2	*	*	*	*	*	*

There are other minor differences from years before 1975 in the location of information and of terminology. In particular the standard errors per whole (or sub plot) are printed under the heading 'Stratum Standard Errors and Coefficients of Variation'. BLOCK.WP refers to those previously labelled 'Per plot' or 'Per whole plot', and BLOCK.WP.SP to those labelled 'Per sub plot'.

Standard errors

- NOTES: (1) This report gives standard errors of differences, not of means.
- (2) Annotations (e.g. * min rep, max-min, max rep) to S.E.Ds are only explained the first time they occur in any experiment.

76/R/BK/1

BROADBALK

Object: To study the effects of organic and inorganic manures on continuous winter wheat. Since 1968 two three-year rotations have been included: potatoes, beans, wheat and fallow, wheat, wheat.

The 133rd year, wheat, potatoes, beans. The ninth year of the revised scheme.

For previous years see 'Details' 1967, Station Report for 1966, pp.229-231, Station Report for 1968, Part 2, 68/A/1(t) and 69-75/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00434
	1	0.00798
	5, 6 and 7	0.00659
	8 and 9	0.00694
Potatoes:	2	0.00659
Beans:	4	0.00741

Treatments:

Whole plots

PLOT	Fertilisers and organic manures:-		
	Plot	Treatments until 1967	Treatments from 1968
01DN2PK	01	-	D N2 P K
21DN2	21	D	D N2
22D	22	D	D
030	03	None	None
05MIN	05	P K Na Mg	P K (Na) Mg
06N1MIN	06	N1 P K Na Mg	N1 P K (Na) Mg
07N2MIN	07	N2 P K Na Mg	N2 P K (Na) Mg
08N3MIN	08	N3 P K Na Mg	N3 P K (Na) Mg
09N4MIN	09	N*1 P K Na Mg	N4 P K (Na) Mg
10N2	10	N2	N2
11N2P	11	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg
15N3MIN	15	N2 P K Na Mg	N3 P K (Na) Mg
16N2MIN	16	N*2 P K Na Mg	N2 P K (Na) Mg
17N2MINH	17	+N2	N2 1/2(P K (Na) Mg)
18N2MINH	18	+ P K Na Mg	N2 1/2(P K (Na) Mg)
19C	19	C	C
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg

+ Alternating

76/R/BK/1

- N1, N2, N3, N4: 48, 96, 144, 192 kg N (as sulphate of ammonia until 1967, except N* which was nitrate of soda. All as 'Nitro-Chalk' from 1968).
 P: 35 kg P as single superphosphate (triple superphosphate in 1974)
 K: 90 kg K as sulphate of potash
 Na: 55 kg Na as sulphate of soda
 (Na): 16 kg Na as sulphate of soda until 1973
 Mg: 30 kg Mg annually to Plot 14, 35 kg Mg every third year to other plots since 1974. All as kieserite since 1974, previously as sulphate of magnesia annually
 D: Farmyard manure at 35 tonnes
 C: Castor meal to supply 96 kg N
 MIN: P K (Na) Mg

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing on strips of sub-plots. From 1968, ten sub-plots were started with the following cropping:-

SECTION	1968	69	70	71	72	73	74	75	76
SC0/W25	Section 0 W (last fallowed 1951)	W	W	W	W	W	W	W	W
SC1/W10	Section 1 W (last fallowed 1966)	W	W	W	W	W	W	W	W
POTATOES	Section 2 BE	W	P	BE	W	P	BE	W	P
-	Section 3 W (fallowed 1967)	W	F	W	F	W	F	W	F
BEANS	Section 4 W (fallowed 1965)	P	BE	W	P	BE	W	P	BE
SC5/W1F	Section 5 W (fallowed 1965)	F	W	W	F	W	W	F	W
SC6/W2F	Section 6 F	W	W	F	W	W	F	W	W
SC7/W1BE	Section 7 P	BE	W	P	BE	W	P	BE	W
SC8/W4	Section 8* W (fallowed 1963)	W	W	W	F	W	W	W	W
SC9/W18	Section 9 W (last fallowed 1958)	W	W	W	W	W	W	W	W

W = wheat, P = potatoes, BE = beans, F = fallow

* No weedkillers

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

Standard applications:

Winter wheat: Manures: Section 1: Chalk at 3.1 t. Weedkillers: Sections 0, 1 and 9: Glyphosate at 1.7 kg in 220 l. Sections 0, 1, 5, 6, 7 and 9: Terbutryne and related triazines ('Prebane' at 4.5 kg in 220 l). Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Insecticides: Pirimicarb at 0.14 kg in 220 l. Section 9 only: Dimethoate at 0.11 kg in 220 l.
 Potatoes: Manures: Chalk at 3.1 t. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Insecticide: Pirimicarb at 0.14 kg in 450 l.
 Fallow Section: Manures: Chalk at 3.1 t.

76/R/BK/1

Seed: Winter wheat: Cappelle, dressed with chlorfenvinphos, sown at 200 kg.
Potatoes: Pentland Crown.
Spring beans: Minden, sown at 220 kg.

Cultivations, etc.:-

ALL SECTIONS: Autumn fertilisers and castor meal applied: 30 Sept, 1975.
FYM applied: 9 Oct. Ploughed: 11 Oct.

CROPPED SECTIONS:

Winter wheat: Glyphosate applied: 24 Sept. Chalk applied: 29 Sept.
Rotary harrowed sections 5, 6, 7, 8 and 9, spring-tine cultivated
and rotary harrowed twice sections 0 and 1: 14 Oct. Seed sown: 16 Oct.
'Prebane' applied: 18 Oct. N applied: 31 Mar, 1976. Dimethoate
applied: 8 Apr. 'Banlene Plus' applied: 29 Apr. Pirimicarb-applied:
24 June. Combine harvested: 30 July.

Potatoes: Chalk applied: 29 Sept, 1975. Deep-tine cultivated: 9 Dec.
Spring-tine cultivated: 22 Mar, 1976. N applied: 25 Mar. Rotary
cultivated and potatoes machine planted: 29 Mar. Grubbed: 30 Mar.
Weedkillers applied: 5 May. Insecticide applied: 17 June. Grubbed
and rotary ridged: 21 June. Fungicide applied: 28 July. Haulm
mechanically destroyed: 13 Sept. Lifted: 24 Sept.

Spring beans: Deep-tine cultivated: 9 Dec, 1975. N applied: 27 Feb.
Heavy spring-tine cultivated: 3 Mar, 1976. Seed sown: 4 Mar.
Tractor hoed: 27 Apr, 25 May. Combine harvested: 20 July.

FALLOW SECTION: Chalk applied: 29 Sept, 1975. Deep-tine cultivated:
9 Dec. Spring-tine cultivated: 22 Mar, 1976, 20 July. Heavy
spring-tine cultivated: 20 Apr, 11 June. Ploughed: 2 June,
8 July.

- NOTES: (1) On Section 9 extensive damage by larvae of the Crambid moth,
Agriphila straminella, was caused to Plot 10. Other plots in
this section were also affected but much less severely.
Dimethoate was applied as a control measure.
- (2) All wheat sections suffered a massive invasion of cereal aphids
which was controlled by pirimicarb.

76/R/BK/1

WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC7/W1BE	SC5/W1F	SC6/W2F	SC1/W10	SC9/W18	SC0/W25	SC8/W4	MEAN
01DN2PK	4.11	4.10	4.66	*	*	*	*	4.29
21DN2	3.86	4.06	4.21	4.46	3.43	4.58	2.73	3.91
22D	4.61	4.68	4.32	4.63	4.09	4.75	2.61	4.24
030	2.34	3.06	1.10	1.61	1.12	1.85	1.34	1.77
05MIN	2.05	3.22	1.17	1.48	1.77	2.00	1.55	1.89
06N1MIN	3.64	4.05	2.82	2.61	2.68	3.42	1.65	2.98
07N2MIN	4.25	4.38	4.01	3.72	3.21	3.92	1.75	3.61
08N3MIN	3.86	4.22	4.44	4.02	3.40	4.04	2.53	3.79
09N4MIN	3.82	3.78	4.33	4.30	4.01	4.04	3.08	3.91
10N2	3.10	3.97	3.49	2.52	0.65	1.86	2.02	2.52
11N2P	3.35	3.25	3.78	2.55	2.05	2.05	1.79	2.69
12N2PNA	3.85	3.32	3.97	3.15	2.64	3.13	1.82	3.13
13N2PK	4.18	4.25	4.11	4.04	3.50	3.96	2.21	3.75
14N2PKMG	4.58	4.21	4.05	4.01	3.48	3.77	2.20	3.76
15N3MIN	4.64	3.96	4.08	4.10	3.25	4.27	2.38	3.81
16N2MIN	4.22	4.22	4.10	3.57	3.61	3.66	1.93	3.62
17N2MINH	4.49	4.41	4.03	3.42	3.46	3.53	1.90	3.61
18N2MIN	4.57	4.22	4.22	3.14	3.46	3.49	2.15	3.61
19C	4.79	4.19	4.38	3.78	3.42	4.22	2.09	3.84
20NKMG	*	*	*	2.37	*	2.92	*	2.65

GRAIN MEAN DM% 87.7

STRAW TONNES/HECTARE

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

SECTION PLOT	SC7/W1BE	SC5/W1F	SC6/W2F	SC1/W10	SC9/W18	SC0/W25	SC8/W4	MEAN
01DN2PK	6.00	4.96	5.75	*	*	*	*	5.57
21DN2	5.90	5.97	6.02	6.05	5.36	5.60	4.75	5.66
22D	6.12	6.51	5.28	5.77	5.38	5.78	5.55	5.77
030	2.13	2.51	0.74	1.20	1.02	1.48	1.24	1.47
05MIN	1.95	3.68	0.99	1.14	1.51	1.47	1.34	1.73
06N1MIN	3.98	4.22	2.79	2.08	2.22	2.97	1.72	2.86
07N2MIN	4.70	5.21	3.84	3.63	3.36	3.83	2.93	3.93
08N3MIN	4.82	5.54	5.29	4.27	3.84	4.58	3.78	4.59
09N4MIN	5.01	4.88	5.56	4.66	4.98	4.72	4.74	4.94
10N2	2.35	3.75	2.89	2.06	0.63	1.64	1.91	2.17
11N2P	2.95	2.95	3.22	2.02	2.00	2.14	1.82	2.44
12N2PNA	3.66	3.35	3.89	2.92	2.41	2.89	2.24	3.05
13N2PK	3.81	4.08	3.69	4.12	3.79	4.16	2.88	3.79
14N2PKMG	3.49	3.96	3.81	3.71	3.03	4.13	2.00	3.45
15N3MIN	4.41	4.40	4.11	4.55	3.25	5.01	3.04	4.11
16N2MIN	3.52	4.31	3.62	3.35	3.02	3.77	2.93	3.50
17N2MINH	3.67	4.29	3.35	2.90	3.13	3.14	2.90	3.34
18N2MIN	4.25	3.94	4.08	2.65	3.36	3.16	2.79	3.46
19C	4.08	4.33	4.18	3.11	2.71	3.56	2.61	3.51
20NKMG	*	*	*	1.67	*	2.50	*	2.09

STRAW MEAN DM% 92.8

76/R/BK/1

PLOT	POTATOES		SPRING BEANS
	TOTAL TUBERS: TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE	GRAIN: TONNES/ HECTARE
01DN2PK	30.3	95.0	0.95
21DN2	36.6	95.4	1.10
22D	37.5	97.8	1.20
030	11.6	93.8	0.35
05MIN	18.7	96.9	0.86
06N1MIN	25.6	97.1	0.80
07N2MIN	30.6	97.8	0.97
08N3MIN	32.0	97.2	0.89
09N4MIN	29.2	96.5	1.03
10N2	10.6	91.1	0.32
11N2P	8.3	88.3	0.44
12N2PNA	10.5	90.7	0.21
13N2PK	22.4	96.9	1.20
14N2PKMG	22.4	94.8	0.97
15N3MIN	31.8	98.0	1.40
16N2MIN	27.9	96.5	1.34
17N2MINH	25.6	98.1	1.10
18N2MINH	25.6	97.9	1.24
19	15.6	95.0	0.68
MEAN DM%			82.4

76/R/HB/2

HOOSFIELD

Object: To study the effects of organic and inorganic manures on continuous spring barley. Since 1968 a rotation of potatoes, beans and barley has been included.

The 125th year, barley, potatoes and beans. The 9th year of revised scheme.

For previous years see 'Details' 1967, Station Report for 1966, 68/A/2(t), 69/R/HB/2(t) and 70-75/R/HB/2.

Treatments to barley: All combinations of:-

1. MANURE Fertilisers, organic manures and frequency of barley cropping:-

	Form of N 1852-1966	Additional treatments 1852-1976	
--CON	None	-	Continuous
-P-CON	None	P	Continuous
--KCON	None	K (Na) Mg	Continuous
-PKCON	None	P K (Na) Mg	Continuous
A--CON	A	-	Continuous
AP-CON	A	P	Continuous
A-KCON	A	K (Na) Mg	Continuous
APKCON	A	P K (Na) Mg	Continuous
N--CON	N	-	Continuous
N--SICON	N	- Si	Continuous
N--RTN	N	-	In rotation (P, BE, B)
N--SIRTN	N	- Si	In rotation (P, BE, B)
NP-CON	N	P	Continuous
NP-SICON	N	P Si	Continuous
NP-RTN	N	P	In rotation (P, BE, B)
NP-SIRTN	N	P Si	In rotation (P, BE, B)
N-KCON	N	K (Na) Mg	Continuous
N-KSICON	N	K (Na) Mg Si	Continuous
N-KRTN	N	K (Na) Mg	In rotation (P, BE, B)
N-KSIRTN	N	K (Na) Mg Si	In rotation (P, BE, B)
NPKCON	N	P K (Na) Mg	Continuous
NPKSICON	N	P K (Na) Mg Si	Continuous
NPKRTN	N	P K (Na) Mg	In rotation (P, BE, B)
NPKSIRTN	N	P K (Na) Mg Si	In rotation (P, BE, B)
C--CON	C	-	Continuous
C--RTN	C	-	In rotation (P, BE, B)
CP-CON	C	P	Continuous
CP-RTN	C	P	In rotation (P, BE, B)
C-KCON	C	K (Na) Mg	Continuous
C-KRTN	C	K (Na) Mg	In rotation (P, BE, B)
CPKCON	C	P K (Na) Mg	Continuous
CPKRTN	C	P K (Na) Mg	In rotation (P, BE, B)
DCON	None	D	Continuous
(D)CON	(D)	-	Continuous
(A)CON	(Ashes)	-	Continuous
-CON	None	-	Continuous

76/R/HB/2

Form of N: A, sulphate of ammonia; N, nitrate of soda - each to supply 43 kg N.
 C, castor meal to supply 96 kg N.
 P: 35 kg P as single superphosphate (triple superphosphate in 1974).
 K: 90 kg K as sulphate of potash.
 (Na): 16 kg Na as sulphate of soda until 1973.
 Mg: 35 kg Mg, as kieserite every third year, since 1974 (sulphate of magnesia until 1973).
 Si: Silicate of soda at 450 kg.
 D: Farmyard manure at 35 tonnes, (D): until 1871 only.
 (Ashes): Weed ash 1852-1916, furnace ash 1917-1932. None since.

2. N Nitrogen fertiliser (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):

0	None
43	48
96	96
144	144

There are four extra plots testing all combinations of:-

1. MANURE

551AN2PK	Plot 551	A N2 P K	Continuous
561--PK	Plot 561	- P K	Continuous
571NN2--	Plot 571	N N2	Continuous
581NN2--	Plot 581	N N2	Continuous

N2: 96 kg N as 'Nitro-Chalk' since 1968. Other symbols as above.

2. MAGNESIUM Magnesium fertiliser (kg Mg) as kieserite every third year since 1974:

0	None
35	35

Treatments to potatoes and beans:- All combinations of:-

1. MANURE Fertiliser and organic manures:

	To potatoes and beans:	
	1852-1966	1852-1976
C---	C	-
CP--	C	P
C-KMG	C	K (Na) Mg
CPKMG	C	P K (Na) Mg

76/R/HB/2

2. NRESID N		Nitrogen fertiliser (kg N), as 'Nitro-Chalk':	
Beans	Potatoes	Beans (residual effects, applied to previous potatoes)	Potatoes (applied 1976)
(0)	0	None	None
(96)	96	96	96
(192)	192	192	192
(288)	288	288	288

NOTE: For a fuller record see 'Details' etc.

Standard applications:

Barley: Manures: Chalk at 2.9 t, to continuous barley plots only.
Weedkillers: Dicamba with mecoprop and MCPA ('Tetralex Plus' at 7.0 l in 220 l) to 'Form of N 1852-1966 N and C' plots. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l) to all remaining plots.

Potatoes: Manures: Chalk at 2.9 t. Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Haulm desiccant: Diquat at 0.6 kg in 220 l.

Seed: Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.
Beans: Minden, sown at 220 kg.

Cultivations, etc.:-

All plots: P and K applied: 1 Oct, 1975. Chalk applied: 2 Oct. Silicate of soda applied: 6 Oct. Heavy spring-tine cultivated: 15 Oct. FYM applied: 13 Nov. Ploughed: 17 Nov. Spring-tine cultivated: 27 Feb, 1976.

Barley: Heavy spring-tine cultivated (except 'Form of N 1852-1966 N and C' plots and 'extra' plots): 14 Oct, 1975. Seed sown: 1 Mar, 1976. N applied: 26 Mar. 'Banlene Plus' applied: 14 May. 'Tetralex Plus' applied: 25 May. Combine harvested: 22 July.

Potatoes: N applied: 26 Mar. Spike rotary cultivated, seed mechanically planted: 29 Mar. Grubbed: 30 Mar. Weedkillers applied: 5 May. Insecticide applied: 17 June. Grubbed and rotary ridged: 21 June. Fungicide applied: 28 July. Haulm mechanically destroyed: 23 Sept. Haulm desiccant applied: 28 Sept. Lifted: 21 Oct.

Beans: Seed sown: 4 Mar. Tractor hoed: 27 Apr, 24 May. Combine harvested: 21 July.

76/R/HB/2

BARLEY

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---CON	1.00	1.19	1.08	1.32	1.15
-P-CON	1.43	1.48	1.40	1.98	1.57
--KCON	1.57	1.86	1.64	2.63	1.92
-PKCON	2.03	2.99	3.92	4.12	3.27
A--CON	0.74	0.74	0.97	1.09	0.88
AP-CON	1.09	1.33	1.12	1.29	1.21
A-KCON	1.07	1.00	1.18	1.41	1.17
APKCON	2.05	3.07	3.68	3.74	3.14
N--CON	0.98	0.84	0.99	1.07	0.97
N--SICON	2.12	2.78	2.26	2.63	2.45
N--RTN	2.19	1.84	2.11	1.83	1.99
N--SIRTN	2.78	2.76	3.05	2.78	2.84
NP-CON	1.56	1.85	1.99	1.92	1.83
NP-SICON	2.34	2.56	2.98	3.50	2.84
NP-RTN	2.91	3.20	3.37	3.58	3.26
NP-SIRTN	3.20	3.49	3.49	3.41	3.40
N-KCON	1.45	1.46	1.23	1.57	1.43
N-KSICON	2.09	2.31	2.80	3.70	2.73
N-KRTN	2.30	2.15	2.39	2.62	2.37
N-KSIRTN	2.90	3.04	3.16	3.62	3.18
NPKCON	2.20	3.13	3.64	3.71	3.17
NPKSICON	2.48	3.50	3.99	3.85	3.46
NPKRTN	3.05	4.07	4.15	4.43	3.92
NPKSIRTN	3.33	3.84	4.50	4.45	4.03
C--CON	2.20	2.48	2.63	2.85	2.54
C--RTN	2.55	2.98	2.57	2.99	2.77
CP-CON	2.13	2.50	2.65	3.00	2.57
CP-RTN	2.86	2.78	3.13	3.13	2.98
C-KCON	1.89	2.63	2.69	3.13	2.59
C-KRTN	2.48	3.13	3.21	3.14	2.99
CPKCON	2.13	3.22	3.63	3.71	3.17
CPKRTN	3.32	4.16	4.45	4.49	4.10
DCON	4.65	4.25	4.44	4.47	4.45
(D)CON	1.92	3.27	2.49	2.84	2.63
(A)CON	1.86	1.81	1.81	1.56	1.76
-CON	1.39	1.80	1.55	2.01	1.69
MEAN	2.17	2.54	2.68	2.88	2.57

GRAIN MEAN DM% 86.0

76/R/HB/2

BARLEY

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---CON	0.61	0.60	0.62	0.62	0.61
-P-CON	0.61	0.62	0.82	0.81	0.71
--KCON	0.81	1.02	1.02	1.61	1.11
-PKCON	0.81	1.44	1.83	2.26	1.59
A--CON	0.41	0.42	0.42	0.63	0.47
AP-CON	0.84	0.81	0.83	0.84	0.83
A-KCON	0.63	0.81	0.82	0.80	0.76
APKCON	0.83	1.47	1.85	1.88	1.51
N--CON	0.69	0.70	0.69	0.69	0.70
N--SICON	0.72	1.08	1.06	1.06	0.98
N--RTN	1.07	1.02	1.05	1.04	1.05
N--SIRTN	1.43	1.41	1.39	1.41	1.41
NP-CON	1.74	1.74	1.35	1.71	1.64
NP-SICON	1.78	1.41	1.41	1.78	1.60
NP-RTN	1.03	1.37	1.39	1.72	1.38
NP-SIRTN	0.71	0.69	1.06	0.72	0.79
N-KCON	2.03	1.38	2.03	1.02	1.61
N-KSICON	1.75	2.10	2.11	1.07	1.76
N-KRTN	2.43	2.39	2.05	1.37	2.06
N-KSIRTN	2.78	2.37	2.03	1.71	2.22
NPKCON	1.04	0.69	1.39	1.39	1.13
NPKSICON	1.41	1.40	1.07	1.76	1.41
NPKRTN	1.40	1.39	1.38	1.04	1.30
NPKSIRTN	1.39	1.41	1.74	0.70	1.31
C--CON	1.12	1.06	1.11	0.74	1.01
C--RTN	1.83	1.47	1.09	1.47	1.47
CP-CON	1.46	1.77	2.14	2.19	1.89
CP-RTN	1.45	1.09	1.82	2.22	1.64
C-KCON	1.07	1.46	1.05	1.08	1.17
C-KRTN	1.07	1.43	1.80	1.45	1.43
CPKCON	1.08	1.43	2.17	2.18	1.71
CPKRTN	1.43	1.77	2.48	2.51	2.05
DCON	3.05	2.73	3.02	2.98	2.95
(D)CON	0.81	1.64	1.33	1.61	1.35
(A)CON	0.84	1.11	1.10	0.83	0.97
-CON	0.85	0.80	0.81	1.09	0.89
MEAN	1.25	1.32	1.43	1.39	1.35

STRAW MEAN DM% 87.5

76/R/HB/2

BARLEY

GRAIN TONNES/HECTARE

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

MANURE MAGNESIUM	551AN2PK	561--PK	571NN2-	581NN2-	MEAN
0	3.22	1.51	2.52	1.24	2.12
35	3.66	1.57	2.27	1.22	2.18
MEAN	3.44	1.54	2.39	1.23	2.15

GRAIN MEAN DM% 85.3

STRAW TONNES/HECTARE

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

MANURE MAGNESIUM	551AN2PK	561--PK	571NN2-	581NN2-	MEAN
0	1.76	0.70	1.06	0.52	1.01
35	2.11	0.68	1.05	0.70	1.13
MEAN	1.93	0.69	1.05	0.61	1.07

STRAW MEAN DM% 90.6

76/R/HB/2

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

N	0	96	192	288	MEAN
MANURE					
C---	12.3	12.3	17.3	22.3	16.0
CP--	16.8	16.3	19.0	19.1	17.8
C-KMG	28.3	32.6	35.0	36.4	33.1
CPKMG	29.8	36.1	40.3	41.7	37.0
MEAN	21.8	24.3	27.9	29.9	26.0

PERCENTAGE WARE 3.81 CM (1.5 INCH RIDDLE)

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

N	0	96	192	288	MEAN
MANURE					
C---	87.7	88.5	93.9	93.1	90.8
CP--	92.5	92.3	93.9	91.8	92.6
C-KMG	98.0	96.5	96.0	97.4	97.0
CPKMG	96.4	96.1	97.5	97.2	96.8
MEAN	93.6	93.3	95.4	94.9	94.3

PLOT AREA HARVESTED 0.00191

BEANS

GRAIN TONNES/HECTARE

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

NRESID	(0)	(96)	(192)	(288)	MEAN
MANURE					
C---	0.42	0.55	0.41	0.48	0.46
CP--	0.34	0.35	0.42	0.28	0.35
C-KMG	0.28	0.42	0.49	0.63	0.45
CPKMG	0.49	0.77	0.55	0.76	0.64
MEAN	0.38	0.52	0.47	0.54	0.48

GRAIN MEAN DM% 84.2

SUB PLOT AREA HARVESTED 0.00143

76/R/WF/3

WHEAT AND FALLOW

Object: To study the effects of fallowing for one or three years on unmanured winter wheat - Hoosfield.

The 121st year, winter wheat.

For previous years see 'Details' 1967, 68/A/3(t), 69-75/R/WF/3.

Whole plot dimensions: 9.61 x 52.1.

Treatments:

PLOT Phase of fallowing cycle (up to 1976):-

1/FALL1	Plot 1	F	W	F	F	F	W	F	W
-	Plot 2	F	F	W	F	W	F	W	F
3/FALL3	Plot 3	F	W	F	W	F	F	F	W
-	Plot 4	W	F	F	F	W	F	W	F
-	Plot 5	F	W	F	W	F	W	F	F
-	Plot 6	W	F	W	F	F	F	W	F
7/FALL1	Plot 7	F	F	F	W	F	W	F	W
-	Plot 8	W	F	W	F	W	F	F	F

W = wheat, F = fallow.

Basal applications: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: Cappelle, sown at 200 kg.

Cultivations, etc.:-

Wheat plots: Ploughed: 11 Oct, 1975. Rotary harrowed: 15 Oct. Seed sown: 17 Oct. Weedkiller applied: 29 Apr, 1976. Combine harvested: 29 July.

Fallow plots: Ploughed: 11 Oct, 1975, 2 June, 1976 and 8 July. Heavy spring-tine cultivated: 21 Apr, 11 June. Spring-tine cultivated: 22 Mar, 20 July.

GRAIN TONNES/HECTARE

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

PLOT	1/FALL1	7/FALL1	3/FALL3	MEAN
	1.81	1.56	2.02	1.80

GRAIN MEAN DM% 87.8

STRAW TONNES/HECTARE

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

PLOT	1/FALL1	7/FALL1	3/FALL3	MEAN
	1.01	0.51	0.74	0.76

STRAW MEAN DM% 92.4

PLOT AREA HARVESTED 0.01483

76/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures, applied 1856-1901, on the yield of continuous barley - Hoosfield.

The 121st year, barley.

For previous years see 'Details' 1967, 68/A/7 and 69-75/R/EX/4.

Treatments: All combinations of :-

Whole plots

1. PLOTFERT(01) Fertiliser and farmyard manure 1876-1901:-

1-	Plot 1 None
2-	Plot 2 None
3D	Plot 3 D
4D	Plot 4 D
5N	Plot 5 N
6N*	Plot 6 N*
7NMIN	Plot 7 N P K Na Mg
8N*MIN	Plot 8 N* P K Na Mg
9P	Plot 9 P
10MIN	Plot 10 P K Na Mg

N = 96 kg N as ammonium salts
N* = 96 kg N as nitrate of soda
P = 34 kg P as superphosphate
K = 137 kg K as sulphate of potash
Na = 16 kg Na as sulphate of soda
Mg = 11 kg Mg as sulphate of magnesia
D = Farmyard manure at 35 tonnes
MIN = P K Na Mg

Sub plots

2. N Nitrogen fertiliser (kg N) 1976:

0	None
48	48
96	96
144	144

NOTES: (1) For a fuller record of treatments see 'Details' 1967 etc.
(2) The whole site was bare fallowed in 1975.
(3) Exceptionally small yields were obtained from certain treatments. Examination of stubbles showed much shrivelled grain had been ejected by the combine.

Basal applications: Weedkillers: Dicamba, mecoprop and MCPA ('Tetralox Plus' at 7.0 l in 220 l).

Seed: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:- Deep-tine cultivated: 13 Nov, 1975. Spring-tine cultivated: 1 Mar, 1976. Seed sown: 3 Mar. N applied: 24 Mar. Weedkiller applied: 28 May. Harvested: 26 July.

76/R/EX/4

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.28	0.12	0.03	0.01	0.11
2-	0.07	0.05	0.12	0.23	0.12
3D	2.36	2.05	2.21	2.23	2.21
4D	2.07	2.38	2.10	1.51	2.01
5N	0.34	0.12	0.22	0.22	0.23
6N*	0.14	0.28	0.39	0.57	0.35
7NMIN	1.44	1.06	1.02	1.19	1.18
8N*MIN	1.60	1.53	1.21	1.10	1.36
9P	0.62	0.96	0.93	1.10	0.90
10MIN	1.48	1.98	1.85	1.50	1.70
MEAN	1.04	1.05	1.01	0.97	1.02

GRAIN MEAN DM% 85.0

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.19	0.19	0.03	0.05	0.12
2-	0.31	0.06	0.29	0.21	0.22
3D	1.34	1.29	1.37	1.27	1.32
4D	1.27	1.60	1.65	1.55	1.52
5N	0.15	0.15	0.23	0.15	0.17
6N*	0.07	0.22	0.15	0.36	0.20
7NMIN	0.89	0.75	0.73	0.89	0.82
8N*MIN	0.95	1.02	1.02	0.84	0.96
9P	0.74	0.75	0.90	0.84	0.81
10MIN	1.05	1.31	1.31	1.13	1.20
MEAN	0.70	0.73	0.77	0.73	0.73

STRAW MEAN DM% 91.8

SUB PLOT AREA HARVESTED 0.00728

76/R/PG/5

PARK GRASS

Object: To study the effects of organic and inorganic manures on old grass (for hay). The effects of liming are also studied.

The 121st year, hay.

For previous years see 'Details' 1967, 68/A/6(t), 69-71/R/PG/5, 72/R/PG/5(t), 73-75/R/PG/5.

Treatments:

Whole plots

MANURE Fertilisers and organic manures:-

N1	Plot 1	N1
O(D)	Plot 2	None (D until 1863)
O/PLOT3	Plot 3	None
P	Plot 4-1	P
N2P	Plot 4-2	N2 P
N1MIN	Plot 6	N1 P K Na Mg
MIN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
N2MIN	Plot 9	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MIN	Plot 11-1	N3 P K Na Mg
N3MINSI	Plot 11-2	N3 P K Na Mg Si
O/PLOT12	Plot 12	None
D/F	Plot 13	D/F
N2*MIN	Plot 14	N2* P K Na Mg
MIN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MIN	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNAMG	Plot 18	N2 K Na Mg
D	Plot 19	D
D/N*PK	Plot 20	D/N*P K

N1, N2, N3:	48, 96, 144 kg N as sulphate of ammonia
N1*, N2*:	48, 96 kg N as nitrate of soda (30 kg N to Plot 20 in years with no farmyard manure)
P:	35 kg P (15 kg P to Plot 20 in years with no farmyard manure) as single superphosphate (triple superphosphate in 1974)
:K	225 kg K (45 kg K to Plot 20 in years with no farmyard manure) as sulphate of potash
Na:	15 kg Na as sulphate of soda
Mg:	10 kg Mg as sulphate of magnesia
Si:	Silicate of soda at 450 kg
D:	Farmyard manure at 35 tonnes every fourth year
F:	Fish meal every fourth year to supply 63 kg N
MIN:	P K Na Mg

76/R/PG/5

Sub plots

LIME Liming:-

A a Ground chalk applied as necessary to achieve pH7
B b Ground chalk applied as necessary to achieve pH6
C c Ground chalk applied as necessary to achieve pH5
D d None

Chalk applied 1976 (tonnes CaCO₃):

Plot	1a	3.8
Plot	4/2a	12.6
Plot	6a	6.3
Plot	7a	3.8
Plot	9a	13.8
Plot	10a	16.3
plot	11/1a	20.7
Plot	11/2a	19.5
Plot	12a	18.2
Plot	12b	7.5
Plot	15a	6.9
Plot	16a	1.9
Plot	18a	1.9

Plots 7a, 9a, 10a chalk applied: 19 Jan. Remaining plots chalk applied:
27-29 Jan.

Additional sub plots (Plots 18, 19 and 20 only) (tonnes CaCO₃ applied
every fourth year 1920-1964):-

N2KNAMG0	18-1	None
N2KNAMG2	18-2	13.5
N2KNAMG1	18-3	7.9
D0	19-1	None
D2	19-2	6.3
D1	19-3	1.1
D/N*PK0	20-1	None
D/N*PK2	20-2	5.6
D/N*PK1	20-3	1.1

Since 1965 Plot 18-1 has been split into two for treatments 'c' and 'd' above and Plot 18-3 split into two for treatments 'a' and 'b'. The remaining sub-plots of Plots 18, 19 and 20 are treated as 'a'.

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

Cultivations, etc.:- Mineral fertilisers applied: 8 Dec, 1975. N applied:
1st dressing - 8 Apr, 2nd dressing - 10 May. Cut twice: 9 June, 9 Nov.

76/R/PG/5

1ST CUT (9/6/76) DRY MATTER TONNES/HECTARE

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

LIME MANURE	A	B	C	D	MEAN
N1	1.70	1.85	1.32	0.25	1.28
O(D)	1.36	1.41	1.17	1.26	1.30
O/PLOT3	1.35	1.38	0.93	1.06	1.18
P	2.03	2.53	2.05	2.05	2.16
N2P	2.78	3.01	2.10	1.37	2.31
N1MIN	4.17	4.54			4.36
MIN	4.87	5.29	2.71	2.20	3.77
PNAMG	2.01	2.07	2.36	2.43	2.22
N2MIN	5.83	5.56	4.49	2.37	4.56
N2PNAMG	3.04	3.11	2.40	1.47	2.51
N3MIN	5.13	4.98	5.02	3.00	4.53
N3MINS1	5.07	5.45	5.29	4.45	5.07
O/PLOT12	1.24	1.28	1.48	1.22	1.31
D/F	2.87	3.10	2.72	2.53	2.81
N2*MIN	4.00	4.43	4.78	4.95	4.54
MIN(N2*)	4.62	4.25	1.84	2.23	3.23
N1*MIN	4.74	4.56	3.99	4.02	4.33
N1*	1.89	2.22	1.82	2.40	2.08
N2KNAMG0			0.79	0.25	0.52
N2KNAMG2	2.38				2.38
N2KNAMG1	1.73	1.82			1.78
D0	2.53				2.53
D2	3.59				3.59
D1	2.98				2.98
D/N*PK0	3.79				3.79
D/N*PK2	3.91				3.91
D/N*PK1	4.35				4.35

1ST CUT MEAN DM% 30.8

76/R/PG/5

2ND CUT (9/11/76) DRY MATTER TONNES/HECTARE

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

LIME	A	B	C	D	MEAN
MANURE					
N1	0.59	0.68	0.49	0.10	0.46
O(D)	0.42	0.31	0.55	0.54	0.46
O/PLOT3	0.23	0.18	0.32	0.40	0.28
P	0.43	0.36	0.88	0.99	0.66
N2P	1.56	1.63	0.86	0.72	1.19
N1MIN	1.22	1.31			1.27
MIN	0.97	1.09	1.14	1.07	1.07
PNAMG	0.57	0.59	0.82	0.96	0.74
N2MIN	1.31	1.26	1.07	0.92	1.14
N2PNAMG	0.96	1.01	0.87	0.53	0.84
N3MIN	1.41	1.81	1.87	1.80	1.72
N3MINS I	1.90	2.89	1.92	2.17	2.22
O/PLOT12	0.88	0.92	0.94	1.04	0.95
D/F	1.16	1.43	1.11	0.94	1.16
N2*MIN	0.91	1.06	1.68	1.90	1.39
MIN(N2*)	0.90	0.95	0.75	0.81	0.85
N1*MIN	0.92	0.86	1.16	0.95	0.97
N1*	0.56	0.69	0.91	0.92	0.77
N2KNAMG0			0.28	0.06	0.17
N2KNAMG2	1.06				1.06
N2KNAMG1	0.61	0.82			0.72
D0	1.29				1.29
D2	1.03				1.03
D1	.03				1.03
D/N*PK0	1.40				1.40
D/N*PK2	1.03				1.03
D/N*PK1	1.38				1.38

2ND CUT MEAN DM% 18.5

76/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME MANURE	A	B	C	D	MEAN
N1	2.29	2.53	1.80	0.35	1.74
O(D)	1.77	1.72	1.72	1.80	1.76
O/PLOT3	1.58	1.56	1.25	1.46	1.46
P	2.46	2.89	2.92	3.04	2.83
N2P	4.35	4.64	2.96	2.09	3.51
N1MIN	5.39	5.86			5.62
MIN	5.84	6.37	3.85	3.28	4.84
PNAMG	2.58	2.66	3.18	3.39	2.96
N2MIN	7.14	6.82	5.57	3.29	5.70
N2PNAMG	4.00	4.12	3.28	2.00	3.35
N3MIN	6.54	6.79	6.89	4.80	6.25
N3MINS I	6.97	8.34	7.21	6.62	7.29
O/PLOT12	2.12	2.21	2.42	2.26	2.25
D/F	4.03	.54	3.83	3.48	3.97
N2*MIN	4.91	5.48	6.45	6.85	5.92
MIN(N2*)	5.52	5.20	2.59	3.04	4.09
N1*MIN	5.65	5.43	5.14	4.98	5.30
N1*	2.45	2.90	2.72	3.32	2.86
N2KNAMG0			1.08	0.32	0.70
N2KNAMG2	3.44				3.44
N2KNAMG1	2.34	2.64			2.49
D0	3.82				3.82
D2	4.62				4.62
D1	4.00				4.00
D/N*PK0	5.19				5.19
D/N*PK2	4.93				4.93
D/N*PK1	5.73				5.73

TOTAL OF 2 CUTS MEAN DM% 24.6

76/R/AG/6

AGDELL

Object: To study, by crop yields and soil analyses, the residual values of phosphate and potash applied in the period 1848-1951 and further dressings since 1964.

The seventh year of revised scheme, barley and potatoes.

For previous years see 'Details' 1967, 68/A/4, 69/R/AG/6, 70/R/AG/6(t), 71/R/AG/6(t), 72/R/AG/6(t) and 73-75/R/AG/6.

Treatments: All combinations of:-

Whole plots

1. OLDRESD Fertilisers and organic manures applied to roots every fourth year, in the period 1848-1948:

NONE	None
PKNAMG	P K Na Mg
NPKNAMGC	N P K Na Mg C

N: 48 kg N as sulphate of ammonia
 P: 41 kg P as superphosphate
 K: 224 kg K as sulphate of potash
 Na: 16 kg Na as sulphate of soda
 Mg: 11 kg Mg as sulphate of magnesia
 C: Castor meal at 2240 kg supplying about 112 kg N

2. OLDROTN Rotation 1848-1951:

FALLOW	With fallow: Roots (turnips or swedes), barley, fallow, wheat
LEGUME	With legume: Roots, barley, legume (clover or beans), wheat

Half plots

3. 1964RESD Residues of 1964 treatments:

P	P
K	K

Quarter plots

4. PREVCROP Previous cropping 1958-69 on P-test half plots, 1958-70 on K-test half plots:

ARABLE	Arable or fallow
GRASS	Grass

Sixteenth plots

5. P205 64 K20 64 Rates of 1964 treatments (kg):

		P205 to P-test half plots	K20 to K-test half plots
0	0	None	None
500	315	500	315
1000	630	1000	630
2000	1260	2000	1260
			30

76/R/AG/6

Sixty fourth plots

6. P205 70 2 On P-test half plots:

Residues of P205 applied 1970-72 to barley (total, kg)

0	0
375	375

On K-test half plots:

K20 73 6 K20 applied to potatoes 1976 (kg) cumulative to dressings in 1973-75:

(0) 0	(0) 0
(620) 250	(620) 250

K20 73 6 K20 applied to barley (kg):

(0) 0	(0) 0
(620) 0	(620) 0

Strips of sixty fourth plots:

7. On P-test half plots:

N 76 N (kg) to barley 1976 (cumulative to dressings 1973-1975)

63	63
94	94

On K-test half plots:

CROP Crops in 1976

POTATOES Potatoes
BARLEY Barley

Sub plot dimensions: Plots 1, 2, 3 and 4 - 6.04 x 3.02. Plots 5, 6 - 5.43 x 3.02.

Standard applications:

P-test half plots:

Barley: Manures: None. Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.26 kg in 280 l.

K-test half plots:

Barley: Manures: N at 95 kg as 'Nitro-Chalk'. P205 at 120 kg as superphosphate. Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 280 l.

Potatoes: Manures: N at 250 kg as 'Nitro-Chalk'. P205 at 190 kg as superphosphate. Weedkiller: Linuron at 0.84 kg in 280 l. Insecticides: Menazon ('Saphicol' at 0.7 l in 280 l) applied twice. Fungicide: Mancozeb at 1.3 kg in 280 l applied with second insecticide spray.

76/R/AG/6

Seed: Barley: Julia, dressed with ethirimol, sown at 190 kg.
Potatoes: King Edward.

Cultivations, etc.: - All plots: Heavy spring-tine cultivated: 23 Oct, 1975.
Ploughed: 7 Nov. Spring-tine cultivated: 8 Mar, 1976.

Barley: P applied to K-test half plots: 16 Oct, 1975. All N applied and seed sown: 11 Mar, 1976. Weedkiller applied: 7 May. Combine harvested: 15 July.

Potatoes: Standard N, P and test K applied: 29 Mar. Rotary cultivated and potatoes planted: 31 Mar. Grubbed and rotary ridged: 13 Apr.

Weedkiller applied: 6 May. Insecticide applied: 10 June. Insecticide with fungicide applied: 5 July.

Lifted: 21 Sept.

K-TEST HALF PLOTS

BARLEY

GRAIN TONNES/HECTARE

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

PREVCROP ARABLE

	OLDRES	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROT	FALLOW		FALLOW	LEGUME	FALLOW	
K20 73 6	K20 64						
(0)0	0	4.40	4.43	4.72	3.99	4.08	4.63
	315	4.84	4.56	4.37	4.66	4.69	4.57
	630	5.40	4.67	3.89	5.29	4.66	5.08
	1260	5.17	4.93	4.85	5.30	5.13	5.08
(620)0	0	4.66	4.42	4.17	5.03	4.87	5.38
	315	5.11	4.86	4.30	4.22	5.21	4.47
	630	4.92	4.51	4.58	4.58	3.85	4.42
	1260	4.11	3.97	3.94	4.18	4.42	4.84

PREVCROP GRASS

	OLDRES	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROT	FALLOW		FALLOW	LEGUME	FALLOW	
K20 73 6	K20 64						
(0)0	0	2.56	3.55	4.15	4.08	4.15	4.23
	315	4.82	5.13	3.64	4.46	4.52	4.94
	630	4.32	4.94	4.93	5.39	3.01	5.10
	1260	4.20	4.95	4.54	4.44	5.29	4.74
(620)0	0	3.24	3.43	4.03	4.30	3.71	4.35
	315	4.29	4.32	2.96	3.42	3.60	4.10
	630	4.37	4.43	4.32	4.44	3.05	3.42
	1260	3.74	3.95	4.41	4.04	4.07	4.83

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED 0.00085

76/R/AG/6

P-TEST HALF PLOTS

BARLEY

GRAIN TONNES/HECTARE

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

PREVCROP ARABLE

		OLDRES	NONE	PKNAMG	NPKNAMGC			
		OLDROT	FALLOW	FALLOW	LEGUME	FALLOW	LEGUME	
P205 70 2	P205 64	N 76						
0	0	63	3.20	2.86	3.61	3.58	3.01	3.11
		94	2.15	2.52	4.04	3.87	3.14	2.86
	500	63	3.21	3.34	3.67	3.48	3.27	3.56
		94	3.29	2.93	4.52	3.73	4.04	3.27
	1000	63	3.48	3.99	3.21	3.73	3.26	3.47
		94	3.80	4.15	4.28	4.10	3.41	3.05
	2000	63	3.63	4.04	3.86	3.98	3.48	3.39
		94	3.40	4.22	4.55	4.38	3.85	3.53
375	0	63	3.49	3.54	3.56	3.40	3.11	3.05
		94	2.85	4.05	4.13	3.85	3.80	3.35
	500	63	3.58	3.73	3.70	3.99	3.62	3.66
		94	3.80	3.91	4.40	3.71	4.22	3.52
	1000	63	3.75	3.72	3.67	4.26	3.15	3.83
		94	2.62	3.95	4.38	4.32	2.92	3.63
	2000	63	3.72	3.90	4.22	4.08	3.43	3.45
		94	3.95	4.42	4.70	4.22	4.05	3.47

PREVCROP GRASS

		OLDRES	NONE	PKNAMG	NPKNAMGC			
		OLDROT	FALLOW	FALLOW	LEGUME	FALLOW	LEGUME	
P205 70 2	P205 64	N 76						
0	0	63	1.67	1.14	1.38	2.02	3.23	2.05
		94	2.60	1.26	3.24	2.16	3.32	2.13
	500	63	3.52	3.57	4.29	2.33	3.56	2.80
		94	2.94	3.61	3.77	2.76	3.55	3.11
	1000	63	3.95	4.00	3.88	3.15	3.80	3.55
		94	3.15	3.06	4.29	3.89	4.16	3.78
	2000	63	4.52	3.95	4.63	4.25	3.95	4.00
		94	3.62	4.43	4.39	4.68	4.09	4.45
375	0	63	3.18	2.90	2.80	3.11	3.49	2.46
		94	2.87	2.73	3.58	3.33	3.74	2.89
	500	63	3.41	3.84	4.66	3.01	3.89	3.51
		94	3.01	3.48	4.44	3.90	3.93	3.84
	1000	63	3.58	4.30	4.17	3.91	3.92	3.55
		94	4.15	3.92	4.61	4.29	3.79	3.74
	2000	63	4.21	4.69	4.28	3.41	4.22	3.49
		94	4.08	4.81	4.87	4.76	4.39	4.58

GRAIN MEAN DM% 80.5

PLOT AREA HARVESTED 0.00085

76/R/AG/6

K-TEST HALF PLOTS

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

PREVCROP ARABLE

K20 73 6 (0)0	OLDRES D	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROT N	FALLOW		FALLOW	LEGUME	FALLOW	
	K20 64						
	0	6.5	8.2	18.6	17.9	10.3	16.3
	315	8.2	7.2	16.0	14.1	14.8	10.0
	630	7.5	10.0	15.2	19.9	15.1	11.4
	1260	3.2	12.0	11.6	17.3	12.3	12.2
(620)250	0	6.6	15.5	18.8	22.4	16.8	21.3
	315	10.0	14.5	26.2	16.5	23.2	16.0
	630	10.3	17.6	16.6	21.1	19.4	18.5
	1260	7.8	13.0	20.1	16.0	23.2	14.0

PREVCROP GRASS

K20 73 6 (0)0	OLDRES D	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROT N	FALLOW		FALLOW	LEGUME	FALLOW	
	K20 64						
	0	6.2	6.5	5.8	4.1	9.9	7.8
	315	4.6	6.8	16.5	7.5	11.0	12.6
	630	10.4	8.3	7.7	14.0	14.2	17.0
	1260	10.2	1.8	14.4	16.2	15.9	18.9
(620)250	0	16.3	16.8	7.3	16.2	23.7	20.7
	315	18.5	12.1	16.0	17.7	24.0	16.0
	630	12.2	14.4	12.2	14.6	21.4	22.2
	1260	11.0	11.9	20.2	14.2	25.3	20.8

76/R/AG/6

POTATOES

K-TEST HALF PLOTS

PERCENTAGE WARE 3.81 CM(1.5 INCH) RIDDLE

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

PREVCROP ARABLE

	OLDRESD	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROTN	FALLOW		FALLOW	LEGUME	FALLOW	
K20 73 6	K20 64						
(0)0	0	71.8	63.3	85.2	89.4	81.7	82.1
	315	75.5	64.4	79.1	74.2	64.0	77.5
	630	88.9	62.5	86.1	84.3	78.7	71.8
	1260	89.5	78.5	82.5	78.2	74.6	80.2
(620)250	0	77.2	82.8	84.1	89.0	86.1	79.8
	315	86.7	82.2	86.9	77.4	80.9	86.4
	630	87.1	90.6	89.5	83.1	80.1	79.5
	1260	78.7	82.7	85.5	80.0	83.0	80.7

PREVCROP GRASS

	OLDRESD	NONE	LEGUME	PKNAMG	NPKNAMGC		LEGUME
	OLDROTN	FALLOW		FALLOW	LEGUME	FALLOW	
K20 73 6	K20 64						
(0)0	0	50.7	62.8	37.5	41.1	56.6	36.4
	315	69.1	75.6	73.5	61.2	46.4	59.5
	630	68.8	56.0	66.0	67.2	68.2	62.2
	1260	73.0	54.5	79.8	82.9	76.1	69.2
(620)250	0	83.7	83.2	54.0	71.2	79.1	82.0
	315	87.4	78.1	85.5	79.0	73.3	75.5
	630	65.3	62.4	71.9	70.0	72.4	69.2
	1260	74.2	85.3	84.1	85.6	83.9	77.9

SUB PLOT AREA HARVESTED 0.00069

76/R/BN/7

BARNFIELD

Object: The experiment was designed to study the effects of organic and inorganic manures on continuous root crops. It has been progressively modified to study effects on other crops.

The tenth year of beans on Sections 1 and 2. The second year of Italian ryegrass on the rest of the experiment except for the discard of Strip 4, sown to wheat for take-all studies.

For previous years see 'Details' 1967, 68/A/5(t), 69/R/BN/7, 70/R/BN/7(t), 71/R/BN/7(t), 72/R/BN/7(t) and 73-75/R/BN/7.

Plot dimensions:

Ryegrass: 10.7 x 55.9.

Beans: Section 1: 10.7 x 55.9.

Treatments to ryegrass: All combinations (except NKMG) of:-

Whole plots

1. MANURE Fertilisers and organic manures:

DN	D	N		
DNPK	D	N	P	K
NPKMG		N	P	K (Na) Mg
NP		N	P	
NPK		N	P	K
NPMG		N	P	(Na) Mg
N		N		
NKMG		N		K (Na) Mg

N: 75 kg N per cut in 1975 only. 100 kg N before 1st cut, 75 kg N after 1st cut in 1976. All as 'Nitro-Chalk'.

P: 35 kg P as single superphosphate (triple superphosphate in 1974).

K: 225 kg K as sulphate of potash.

(Na): 90 kg Na as sodium chloride until 1973.

Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973).

D: Farmyard manure at 35 tonnes (until 1975).

Quarter plots

2. NFORMRES Residues of forms of N (each supplying 96 kg N):

NS	Nitrate of soda
SA	Sulphate of ammonia
SA/CM	Sulphate of ammonia + castor meal
CM	Castor meal

Castor meal last applied 1961, others until 1959.

NOTE: Yields were taken only from half plots cropped with sugar beet in 1973.

76/R/BN/7

Treatments to beans: All combinations of:-

Whole plots

1. MANURE Fertilisers and organic manures:

D	D
DPK	D P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
NONE	None

Rates and forms as for ryegrass but FYM applied for 1976 bean crop.

Half plots

2. PREVCROP(74) Previous crop in 1974 (after continuous beans 1967-1973):

BEANS	Beans
FALLOW	Fallow

Quarter plots

3. PREVCROP(75) Previous crop in 1975:

BEANS	Beans
FALLOW	Fallow

- NOTES: (1) Treatment MANURE D, PREVCROP(74)BEANS, PREVCROP(75)FALLOW was not sown.
(2) Treatment MANURE NONE, PREVCROP(74)FALLOW, PREVCROP(75)FALLOW suffered partial crop failure. The yield presented includes that from the area of crop failure.

Standard applications:

Spring beans: Weedkiller: Mecoprop ('Methoxone P' at 4.2 l in 220 l).

Seed: Beans, Maris Bead, sown at 220 kg.

Cultivations, etc.:- P and K applied: 7 Oct, 1975.

Ryegrass: N applied: 26 Feb, 24 May. Cut three times: 18 May, 28 June, 17 Aug.

Spring Beans: Weedkiller applied: 9 Oct. FYM applied: 5 Nov. Ploughed: 6 Nov. Spring-tine cultivated: 2 Mar, 1976. Rotary harrowed and seed sown: 8 Mar. Combine harvested: 21 July.

76/R/BN/7

RYEGRASS

1ST CUT (18/5/76) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	6.04	5.52	5.66	5.48	5.67
DNPK	5.90	6.15	6.50	6.18	6.18
NPKMG	5.68	5.66	6.04	6.28	5.92
NP	4.81	4.65	5.36	5.27	5.02
NPK	5.53	5.62	5.62	5.53	5.58
NPMG	5.14	4.68	5.55	5.59	5.24
N	3.95	3.84	5.37	5.61	4.69
MEAN	5.29	5.16	5.73	5.71	5.47

MANURE NKMG 5.30

1ST CUT MEAN DM% 23.3

2ND CUT (28/6/76) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	1.80	2.06	2.02	2.15	2.01
DNPK	1.88	1.88	1.91	2.30	1.99
NPKMG	1.44	1.15	1.36	1.60	1.39
NP	1.31	1.34	1.94	2.07	1.67
NPK	1.28	1.19	1.68	1.87	1.51
NPMG	1.14	1.00	1.53	1.68	1.34
N	1.40	1.05	1.91	1.66	1.51
MEAN	1.47	1.38	1.77	1.91	1.63

MANURE NKMG 1.29

2ND CUT MEAN DM% 35.4

3RD CUT (17/8/76) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	0.31	0.35	0.36	0.71	0.43
DNPK	0.25	0.21	0.26	0.65	0.34
NPKMG	0.26	0.12	0.23	0.40	0.25
NP	0.08	0.11	0.19	0.26	0.16
NPK	0.12	0.12	0.23	0.37	0.21
NPMG	0.17	0.13	0.25	0.25	0.20
N	0.14	0.14	0.31	0.33	0.23
MEAN	0.19	0.17	0.26	0.42	0.26

MANURE NKMG 0.20

3RD CUT MEAN DM% 44.0

38

76/R/BN/7

RYEGRASS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	8.15	7.92	8.04	8.34	8.11
DNPK	8.03	8.23	8.66	9.13	8.51
NPKMG	7.37	6.93	7.63	8.28	7.55
NP	6.20	6.10	7.49	7.60	6.85
NPK	6.93	6.94	7.54	7.77	7.29
NPMG	6.45	5.81	7.33	7.52	6.78
N	5.49	5.02	7.58	7.61	6.42
MEAN	6.95	6.71	7.75	8.04	7.36

MANURE NKMKG 6.79

TOTAL OF 3 CUTS MEAN DM% 34.2

PLOT AREA HARVESTED 0.00568

BEANS

GRAIN TONNES/HECTARE

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

PREVCROP(74) PREVCROP(75) MANURE	BEANS	FALLOW	FALLOW BEANS	FALLOW
D	0.92	*	0.91	1.32
DPK	0.94	1.18	1.36	1.37
PKMG	0.59	0.57	0.57	0.69
P	0.50	0.47	0.43	0.52
PK	0.66	0.56	0.73	0.70
PMG	0.62	0.64	0.67	0.52
NONE	0.41	0.53	0.39	0.12

* NOT SOWN

GRAIN MEAN DM% 81.5

SUB PLOT AREA HARVESTED 0.00732

76/R/GC/8

GARDEN CLOVER

Object: To study yields and pathogens of red clover grown continuously - Manor Garden.

The 123rd year, red clover.

For previous years see 'Details' 1967, 68/A/8(t) and 69-75/R/GC/8.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

1. VARIETY Varieties:

HUNGAROP Hungaropoly (resistant to Sclerotinia trifoliorum)
S.123 S.123 (susceptible to S.trifoliorum)

2. ALDICARB Aldicarb to seedbed:

0 None
10 10 kg

Basal applications: Manures: (0:14:28) at 540 kg. K20 at 75 kg, as muriate of potash, after each cut except the last. Mg at 110 kg, as Epsom salts, half in spring, half after first cut. N at 130 kg, as 'Nitro-Chalk, in spring and after each cut except the last. Irrigation: Total 87 mm.

Seed: Sown at 34 kg.

Cultivations, etc.:- Area hand dug, all plants removed: 6 Oct, 1975. Basal PK and Mg applied: 28 Jan, 1976. Area raked down to seedbed, seed sown: 11 Mar. Aldicarb applied, raked in: 12 Mar. N applied: 18 Mar. Irrigated, 10 mm: 29 Apr. Irrigated, 7 mm on each occasion: 11 May, 7 June, 2 July, 8 July, 15 July. Cut, basal N, K and Mg applied: 27 July. Irrigated, 7 mm on each occasion: 2 Aug, 10 Aug, 18 Aug, 24 Aug, 27 Aug. Cut, basal N and K applied: 7 Sept. Irrigated, 7 mm: 8 Sept. Cut: 8 Oct.

NOTE: Samples of herbage were taken for determination of N, P, K, Ca, Na and Mg.

DRY MATTER TONNES/HECTARE

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

VARIETY ALDICARB	HUNGAROP		S.123		MEAN
	0	10	0	10	
1ST CUT (27/7/76)	1.45	2.40	1.05	2.09	1.75
2ND CUT (7/9/76)	1.05	1.41	0.51	0.88	0.96
3RD CUT (8/10/76)	0.53	0.82	0.50	0.73	0.64
TOTAL OF 3 CUTS	3.03	4.62	2.06	3.71	3.35
MEAN DM% 1ST CUT:	20.2				
2ND CUT:	20.9				
3RD CUT:	13.4				
TOTAL OF 3 CUTS:	18.2				

PLOT AREA HARVESTED 0.00010

76/S/RN/1

ROTATION I

Object: To compare nutrient cycles, uptakes of nutrients and responses to fresh P and K of lucerne and grass leys. To obtain an estimate of the rate of release of nutrients, particularly K, from Saxmundham soil. The effects of lucerne and grass leys will be compared on subsequent arable crops - Saxmundham.

Sponsors: A.E. Johnston.

The 78th year, grass and lucerne.

For previous years see 'Details' 1967, 68/A/9(t), 69/S/RN/1(t), 70/S/RN/1(t) and 71-75/S/RN/1.

Whole plot dimensions (new treatments): 5.49 x 17.1.

Treatments: From 1899 to 1969 the experiment followed a four-course rotation of wheat, roots, barley, legumes. Each phase of the rotation was present each year on a separate block. From 1966 each plot was divided, a small area at the south end continued under the original treatment (OLDTREAT), on the larger sub-plots modified treatments (NEWTREAT) were applied (see below).

In 1970 the rotation was stopped and each pair of blocks was divided for lucerne and grass (the OLDTREAT sub-plots form a part of the Grass area).

TREATMENT 1899-1965	OLDTREAT Grass	NEWTREAT Lucerne	NEWTREAT Grass
	MANURE (D)	MANURE (D)	MANURE (D)N
D	(D)	(D)	(D)N
B	B	B	BN
N	N	(N)P2	(N)P2N
P	P	(P)P1	(P)P1N
K	K	(K)P2K	(K)P2KN
-	-	(-)P2	(-)P2N
PK	PK	(PK)P1K	(PK)P1KN
NK	NK	(NK)P2K	(NK)P2KN
NP	NP	(NP)P1	(NP)P1N
NPK	NPK	(NPK)P1K	(NPK)P1KN

- D: Farmyard manure at 15 tonnes
(D): Farmyard manure at 30 tonnes (1966-1969 15 tonnes on OLDTREAT), 60 tonnes in autumn 1969, none since
B: Bone meal at 0.5 tonnes
N: 1899-1965 - 33 kg N as nitrate of soda. Since 1970 - 100 kg N (33 kg N on OLDTREAT) per cut as 'Nitro-Chalk'
P: 1899-1965 40 kg P205 as single superphosphate. Since 1966 50 kg P205 as triple superphosphate
P1,P2: 50, 100 kg P205 as triple superphosphate (single superphosphate until 1965)
K: 1899-1965 63 kg K20 as muriate of potash. Since 1966 - 126 kg K20 (75 kg K20 on OLDTREAT)

- NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) On OLDTREAT grass, clover appeared naturally on some plots in 1975. To unify the plots white clover was sown on all at 33 kg.
(3) Lucerne was resown in 1976.

76/S/RN/1

Seed: Lucerne: Sabalt, sown at 30 kg.

Cultivations, etc.:-

OLDTREAT Grass: P,K and bone meal applied: 15 Mar, 1976. Cut: 8 June and 1 Sept.

NEWTREAT Grass: P,K and bone meal applied: 15 Mar. N applied: 16 Mar and 16 June. Cut: 8 June and 1 Sept.

Lucerne: Ploughed: 21 Oct, 1975. P,K and bone meal applied, seed sown: 6 Apr, 1976. Cut: 18 Aug.

76/S/RN/1 GRASS OLDTREAT

DRY MATTER TONNES/HECTARE

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

	1ST CUT (8/6/76)	2ND CUT (1/9/76)	TOTAL OF 2 CUTS
MANURE			
(D)	3.01	0.30	3.31
B	2.23	0.06	2.29
N	3.54	0.48	4.02
P	1.59	0.06	1.65
K	1.13	0.03	1.16
-	1.37	0.00	1.37
PK	2.06	0.16	2.22
NK	3.42	0.41	3.83
NP	3.57	0.63	4.20
NPK	3.69	0.53	4.22
MEAN	2.56	0.27	2.83

1ST CUT MEAN DM% 40.5

2ND CUT MEAN DM% 32.3

TOTAL OF 2 CUTS MEAN DM% 36.4

PLOT AREA HARVESTED 0.00050

76/S/RN/1 GRASS NEWTREAT

DRY MATTER TONNES/HECTARE

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

	1ST CUT (12/6/75)	2ND CUT (1/9/76)	TOTAL OF 2 CUTS
MANURE			
(D)N	7.36	0.85	8.21
BN	5.83	0.54	6.37
(N2)P2N	5.83	0.67	6.50
(N1)P1N	5.66	0.62	6.28
(N1)P2KN	6.65	0.85	7.50
(N1)P2N	5.75	0.63	6.38
(N1)P1KN	6.76	1.00	7.77
(N2)P2KN	6.73	0.87	7.60
(N2)P1N	5.87	0.75	6.62
(N2)P1KN	6.73	0.73	7.46
MEAN	6.32	0.75	7.07
1ST CUT MEAN DM%	39.8		
2ND CUT MEAN DM%	42.2		
TOTAL OF 2 CUTS MEAN DM%	41.0		
1ST CUT PLOT AREA HARVESTED	0.00123		
2ND CUT PLOT AREA HARVESTED	0.00138		

76/S/RN/1 LUCERNE NEWTREAT

1ST AND ONLY CUT (18/8/76)

DRY MATTER TONNES/HECTARE

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

MANURE	
(D)	3.63
B	2.42
(N)P2	2.47
(P)P1	2.32
(K)P2K	2.59
(-)P2	2.47
(PK)P1K	2.78
(NK)P2K	3.00
(NP)P1	2.47
(NPK)P1K	3.09
MEAN	2.72
MEAN DM%	31.1
PLOT AREA HARVESTED	0.00134

76/S/RN/2

ROTATION II

Object: To measure, by crop yields and soil analysis, the residual value of P applied as FYM or superphosphate in the periods 1899-1964 and 1965-1967 - Saxmundham.

Sponsors: G.E.G. Mattingly, A.E. Johnston.

The eighth year of revised scheme, barley.

For previous years see 'Details' 1967, 68/A/10(t), 69/S/RN/2(t) and 70-75/S/RN/2.

Whole plot dimensions: 5.49 x 39.8.

Treatments: From 1899-1964 the experiment tested farmyard manure and nitrogen and phosphate fertilisers applied to a rotation of crops. Since 1965 the treatments have been changed to evaluate old residues of P (from FYM and superphosphate) and new residues from treatments applied 1965-1967. All crops of the rotation - potatoes, barley, sugar beet, barley - were grown until 1974. The whole experiment was sown to barley in 1975 and 1976 - and tests combinations of:

Whole plots

1. RESIDUE Residues of previous treatments:-

		Approximate total dressing 1899-1964	Total dressing 1965-1967
(O)O	Plot 1	None	None
(D)O	Plot 2	400 tonnes FYM	None
(DP)O	Plot 3	400 tonnes FYM, 2.7 tonnes P2O5	None
(DP)D2	Plot 4	400 tonnes FYM, 2.7 tonnes P2O5	100 tonnes FYM
(DP)D2P1	Plot 5	400 tonnes FYM, 2.7 tonnes P2O5	100 tonnes FYM, 0.56 tonnes P2O5
(DP)P1	Plot 6	400 tonnes FYM, 2.7 tonnes P2O5	0.56 tonnes P2O5
(DP)P2	Plot 7	400 tonnes FYM, 2.7 tonnes P2O5	1.13 tonnes P2O5
(DP52)O	Plot 8	326 tonnes FYM, 4.3 tonnes P2O5 (until 1952 only)	None

76/S/RN/2

2nd barley after potatoes or sugar beet (1974) tests in addition to 1:-

Sub plots

2. P205(72) Phosphate residues 1970-72 (total P205 applied (kg)):

(0)	None (2 sub plots/plot)
(126)	126
(252)	252
(378)	378

and some of the combinations of 2 with:-

3. P205 74-6 Phosphate in 1974, 75 and 76 (kg P205):

	1974	1975-6
(0)0	None	None
(63x2)63	63	63
(189)0	189	None

3rd barley after potatoes or sugar beet (1973) tests in addition to 1:-

Sub plots

2. P205(71) Phosphate residues 1969-71 (total P205 applied (kg)):

(0)	None (2 sub plots/plot)
(126)	126
(252)	252
(378)	378

and some of the combinations of 2 with:-

3. P205 73-6 Phosphate in 1973, 74, 75 (kg P205) None in 1976:

	1973	1974, 75
(0)0	None	None
(63x3)0	63	63
(189)0	189	None

Standard applications: All plots: Weedkillers: Dichlorprop plus MCPA ('Mephetol Plus' at 8.4 l in 340 l). Fungicide: Tridemorph at 0.53 kg applied with the weedkiller.

Second barley: Manures: (25:0:16) at 450 kg.

Third barley: Manures: K20 at 150 kg as muriate of potash.

After potatoes: N at 63 kg as 'Nitro-Chalk' (N1).

After sugar beet: N at 94 kg as 'Nitro-Chalk' (N2).

Seed: Julia, dressed with ethirimol, sown at 190 kg.

Cultivations, etc.: - K applied: 29 Sept, 1975. Ploughed: 6 Oct. Test P applied: 4 Mar, 1976. Seed sown, NK applied to second barley, N applied to third barley: 15 Mar. Weedkiller and fungicide applied: 13 May. Combine harvested: 19 July.

76/S/RN/2

BARLEY AFTER BARLEY 1975 POTATOES 1974

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

RESIDUE	P20574 6 P205(72)	GRAIN TONNES/HECTARE			STRAW TONNES/HECTARE		
		(0)0	(63X2)63	⁽¹⁸⁹⁾⁰ 189(0)	(0)0	(63X2)63	⁽¹⁸⁹⁾⁰ 189(0)
(0)0	(0)	1.83		3.05	1.09		1.52
(0)0	(126)		2.82			1.47	
(0)0	(252)			2.25			1.09
(0)0	(378)		3.30			1.38	
(D)0	(0)	2.93	2.58		1.57	1.33	
(D)0	(126)			2.81			1.71
(D)0	(252)		3.14			1.61	
(D)0	(378)			3.02			1.66
(DP)0	(0)	3.09	3.57		1.61	1.85	
(DP)0	(126)			3.12			1.95
(DP)0	(252)		3.76			1.90	
(DP)0	(378)			3.41			1.71
(DP)D2	(0)	3.53		3.69	2.09		1.99
(DP)D2	(126)		4.18			2.18	
(DP)D2	(252)			4.34			2.23
(DP)D2	(378)		4.38			2.14	
(DP)D2P1	(0)	3.91	3.94		2.18	1.95	
(DP)D2P1	(126)			3.75			2.04
(DP)D2P1	(252)		4.32			2.28	
(DP)D2P1	(378)			4.40			2.37
(DP)P1	(0)	4.91	4.40		2.66	2.33	
(DP)P1	(126)			4.25			2.04
(DP)P1	(252)		4.25			2.33	
(DP)P1	(378)			4.29			2.37
(DP)P2	(0)	4.57		4.60	2.28		2.47
(DP)P2	(126)		4.36			2.33	
(DP)P2	(252)			4.41			2.33
(DP)P2	(378)		4.25			2.23	
(DP52)0	(0)	3.61		3.30	1.71		1.95
(DP52)0	(126)		3.84			2.37	
(DP52)0	(252)			4.03			1.80
(DP52)0	(378)		4.28			1.90	

GRAIN MEAN DM% 83.3

STRAW MEAN DM% 61.8

PLOT AREA HARVESTED 0.00077

76/S/RN/2

BARLEY AFTER BARLEY 1975 SUGAR BEET 1974

GRAIN TONNES/HECTARE

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

RESIDUE	P20574 6 P205(72)	GRAIN TONNES/HECTARE			STRAW TONNES/HECTARE		
		(0)0	(63X2)63	189(0)	(0)0	(63X2)63	189(0)
(0)0	(0)	2.17	3.27		1.07	1.59	
(0)0	(126)			2.96			1.69
(0)0	(252)		2.49		0.97		
(0)0	(378)			3.19			1.68
(D)0	(0)	2.85		3.68	1.89		2.35
(D)0	(126)		3.52			1.89	
(D)0	(252)			3.65			1.84
(D)0	(378)		3.78		2.05		
(DP)0	(0)	3.61		3.47	2.15		1.84
(DP)0	(126)		4.00			2.25	
(DP)0	(252)			4.37			2.25
(DP)0	(378)		3.42		1.79		
(DP)D2	(0)	4.40	3.61		2.25	1.84	
(DP)D2	(126)			3.96			1.99
(DP)D2	(252)		3.93		2.30		
(DP)D2	(378)			3.74			2.05
(DP)D2P1	(0)	3.39		4.18	1.84		2.25
(DP)D2P1	(126)		4.32			2.35	
(DP)D2P1	(252)			4.05			2.25
(DP)D2P1	(378)		3.64		1.99		
(DP)P1	(0)	4.30		4.10	2.30		2.05
(DP)P1	(126)		4.35			2.46	
(DP)P1	(252)			4.56			2.66
(DP)P1	(378)		4.49			2.46	
(DP)P2	(0)	3.92	4.34		2.15	2.10	
(DP)P2	(126)			4.02			1.94
(DP)P2	(252)		4.36			2.40	
(DP)P2	(378)			4.19			2.40
(DP52)0	(0)	3.47	4.08		1.69	1.94	
(DP52)0	(126)			4.64			2.05
(DP52)0	(252)		3.32		1.69		
(DP52)0	(378)			3.95			1.74

GRAIN MEAN DM% 83.4

STRAW MEAN DM% 66.6

PLOT AREA HARVESTED 0.00077

76/S/RN/2

BARLEY GIVEN N1 AFTER BARLEY 1974-5 POTATOES 1973
AND
BARLEY GIVEN N2 AFTER BARLEY 1974-5 SUGARBEET 1973

GRAIN TONNES/HECTARE

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

PREVIOUS CROP 1973		POTATOES			SUGAR BEET		
	P20573 6 P205(71)	(0)0	(63X3)0	189(0)	(0)0	(63X3)0	189(0)
RESIDUE	(0)0 (0)	1.10	2.71		1.04		1.20
	(0)0 (126)			2.15		2.39	
	(0)0 (252)		2.84				2.38
	(0)0 (378)			2.71		2.99	
	(D)0 (0)	2.02		2.67	1.79	2.38	
	(D)0 (126)		2.39				2.66
	(D)0 (252)			2.52		3.27	
	(D)0 (378)		2.81				2.99
	(DP)0 (0)	3.49		3.16	3.14	3.64	
	(DP)0 (126)		3.65				3.60
	(DP)0 (252)			3.61		3.06	
	(DP)0 (378)		2.92				3.29
	(DP)D2 (0)	3.82	3.71		3.73		4.16
	(DP)D2 (126)			3.69		4.23	
	(DP)D2 (252)		3.49				4.58
	(DP)D2 (378)			3.05		4.32	
	(DP)D2P1 (0)	4.06		3.48	4.75	4.24	
	(DP)D2P1 (126)		3.89				4.18
	(DP)D2P1 (252)			3.74		4.58	
	(DP)D2P1 (378)		3.06				4.20
	(DP)P1 (0)	3.89		3.77	4.01	4.40	
	(DP)P1 (126)		3.79				4.59
	(DP)P1 (252)			3.99		4.33	
	(DP)P1 (378)		3.71				4.38
	(DP)P2 (0)	3.22	3.80		4.31		4.40
	(DP)P2 (126)			3.57		3.97	
	(DP)P2 (252)		4.06				3.61
	(DP)P2 (378)			3.68		4.52	
	(DP52)0 (0)	3.71	3.41		4.09		4.34
	(DP52)0 (126)			2.70		4.37	
	(DP52)0 (252)		3.74				4.95
	(DP52)0 (378)			3.94		4.05	

GRAIN MEAN DM% (PREVIOUS CROP 1973 POTATOES) 84.6

GRAIN MEAN DM% (PREVIOUS CROP 1973 SUGAR BEET) 84.1

PLOT AREA HARVESTED 0.00077

76/R/RN/1 and 76/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 28th year, old grass, leys, potatoes, 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 72-75/R/RN/1&2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (76/R/RN/1)

FOSTERS A site with little organic matter initially (76/R/RN/2)

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

In 1975 the barley test crop was changed to wheat.

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

76/R/RN/1 and 76/R/RN/2

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.

Since 1975 the all-grass half plots of the reseeded grass plots have been used for a new experiment (see 76/R/CS/169).

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 1976:-

CEREAL 7 Wheat, 8th test crop, 7th cereal (P,W,B,W,W,W,W,W)
CEREAL 8 Wheat, 9th test crop, 8th cereal (P,W,B,W,W,W,W,W,W)
CEREAL 9 Wheat, 11th test crop, 9th cereal (W,P,B,W,W,W,W,W,W,W)

Blocks which would have been 12th test crop 1976 were fallowed

Treatments to 8th-11th test crops wheat:-

Sub plots

N 76 Nitrogen fertiliser (kg N) in 1976:-

75	75
126	126
176	176
225	225

Treatments to 1st test crop potatoes:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:-

NONE	None
FYM	30 tonnes on each occasion

Sub plots

N 76 Nitrogen fertiliser applied to potatoes 1976 (kg N):-

0	None
80	80
160	160
240	240

Standard applications:

1st Treatment Crops:

To all: Weedkiller: Glyphosate at 1.7 kg in 220 l. Manures: Chalk at 2.9 t, Highfield only.

All-grass ley: Manures: 75 kg P205, 150 kg K20 as (0:14:28), 75 kg N as 'Nitro-Chalk'.

Clover-grass ley: Manures: 75 kg P205, 150 kg K20 as (0:14:28).

Lucerne: Manures: 75 kg P205, 75 kg K20 as (0:20:20).

Hay: Manures: 75 kg P205, 150 kg K20 as (0:14:28). N at 75 kg as 'Nitro-Chalk'.

1st Test Crop: Potatoes: Manures: 300 kg P205, 300 kg K20 as (0:20:20).

Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in

220 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide: Mancozeb at 1.3

76/R/RN/1 and 76/R/RN/2

kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 220 l.
8th, 9th and 11th Test Crops: Wheat: Manures: 75 kg P205, 75 kg K2O as (0:20:20), combine drilled. Weedkillers: Paraquat at 0.42 kg ion in 220 l applied in autumn. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l) in spring.
Reseeded Grass and Old Grass: Manures: Chalk at 8.7 t to all-grass half plots, at 2.9 t to clover-grass half plots on Highfield only. 75 kg P205, 150 kg K2O as (0:14:28).
All-grass half plots: (Excluding Reseeded grass): Manures: 75 kg N, 48 kg K2O as (25:0:16) for the first two cuts.
Clover-grass half plots: Manures: 48 kg K2O as muriate of potash for the first two cuts.

Seed: All-grass ley: Timothy S51 at 15 kg, Meadow Fescue at 19 kg. Mixture sown at 34 kg.
Clover-grass ley: Timothy S51 at 15 kg, Meadow Fescue at 19 kg. White Clover S100 at 3 kg. Mixture sown at 37 kg.
Lucerne: Europe, sown at 28 kg.
Hay: Italian RvP ryegrass, sown at 24 kg.
Potatoes: Pentland Crown.
Wheat: Cappelle, sown at 200 kg.

Cultivations, etc.:-

1st-year treatment crops:

To all: Weedkiller applied: 9 Oct, 1975. Chalk applied: 4 Dec.
All-grass ley: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK and N applied: 9 Apr. Power harrowed: 12 Apr. Seed sown: 20 Apr. Topped three times: 17 June, 9 July, 18 Aug.
Clover-grass ley: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK applied: 9 Apr. Power harrowed: 12 Apr. Seed sown: 20 Apr. Topped three times: 17 June, 9 July, 18 Aug.
Lucerne: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK applied: 9 Apr. Power harrowed and seed sown: 20 Apr. Cut twice: 16 Aug, 22 Dec.
Hay: Ploughed: 8 Dec, 1975. Spring-tine cultivated: 23 Mar, 1976. PK and N applied: 9 Apr. Power harrowed and seed sown: 12 Apr. Topped three times: 17 June, 9 July, 18 Aug.

1st Test Crop:

Potatoes: Ploughed: 8 Dec, 1975. Disced twice: 11 Mar, 1976. PK and N applied: 29 Mar. Rotary cultivated and potatoes planted: 30 Mar. Grubbed (Fosters only): 31 Mar. Weedkillers applied: 5 May. Grubbed and rotoridged: 2 June. Insecticide applied: 17 June. Fungicide applied: 28 July. Haulm mechanically destroyed: 23 Sept. Haulm desiccant applied: 28 Sept. Lifted: 12 Oct.

76/R/RN/1 and 76/R/RN/2

8th, 9th and 11th Test Crops:

Winter wheat: Autumn weedkiller applied: 7 Oct, 1975. Ploughed:
15 Oct. Heavy spring-tine cultivated: 16 Oct. Rotary harrowed:
20 Oct. Seed sown: 22 Oct. N applied: 2 Apr, 1976.

Spring weedkiller applied: 17 Apr. Combine harvested: 29 July.

Reseeded and Old Grass (Excluding all-grass half plots of reseeded grass):
Chalk applied, PK applied: 4 Dec, 1975. NK to all-grass half plots
and K to clover-grass half plots: 25 Feb, 1976, 24 May. Cut three times:
19 May, 29 June, 10 Nov.

Fallow after 11th test crop 1975: Ploughed: 28 Oct, 1975. Heavy spring-
tine cultivated: 14 Apr, 1976. Rotary cultivated: 21 Apr.
Deep-tine cultivated: 27 May. Heavy spring-tine cultivated:
16 June. Rotary cultivated: 2 July.

NOTE: There was very little growth on 1st year treatment crops clover-
grass ley, all-grass ley and 1-year seeds hay because of drought.
Yields were not taken.

76/R/RN/1 AND 76/R/RN/2

DRY MATTER: TONNES/HECTARE

OLD GRASS

TOTAL OF 3 CUTS

	C	N
HIGHFIELD		
28TH EXPTL YEAR		
BLOCKS 1 & 4	1.68	5.66
BLOCK 2	1.25	5.63
MEAN DM%	26.4	23.3

LUCERNE

TOTAL OF 2 CUTS

	HIGHFIELD	FOSTERS
1ST YEAR	2.02	1.26
MEAN DM%	24.7	24.4

RESEDED GRASS

TOTAL OF 3 CUTS

	HIGHFIELD		FOSTERS	
	BLOCKS	RC	BLOCKS	RC
28TH EXPTL YEAR	1 & 4	1.40	1 & 3	2.33
28TH EXPTL YEAR (SEEDED 1949 RESEDED 1973)	2 & 3	3.26	2 & 4	2.39
MEAN DM%		24.8		27.3

76/R/RN/1 HIGHFIELD

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

N 76	0	80	160	240	MEAN
FYMRES70					
NONE	32.2	34.8	35.7	34.1	34.2
FYM	32.6	33.9	33.3	34.5	33.6
MEAN	32.4	34.3	34.5	34.3	33.9

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	33.0	35.4	37.2	31.3	34.2
FYM	31.0	35.0	37.0	31.3	33.6
MEAN	32.0	35.2	37.1	31.3	33.9

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 76					
0	31.6	34.9	36.1	26.9	32.4
80	31.6	36.5	37.4	31.7	34.3
160	32.6	34.9	37.2	33.3	34.5
240	32.2	34.4	37.6	33.2	34.3
MEAN	32.0	35.2	37.1	31.3	33.9

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
FYMRES70				
NONE				
N 76				
0	33.4	36.4	35.0	23.9
80	31.7	38.3	37.7	31.4
160	35.6	35.3	37.5	34.4
240	31.2	31.4	38.4	35.5
FYM				
0	29.9	33.4	37.2	29.9
80	31.5	34.8	37.1	32.1
160	29.6	34.4	36.9	32.2
240	33.1	37.4	36.7	30.9

76/R/RN/1 HIGHFIELD

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

N 76	0	80	160	240	MEAN
FYMRES70					
NONE	95.0	93.9	95.4	95.6	95.0
FYM	95.1	94.8	94.9	95.3	95.0
MEAN	95.0	94.4	95.1	95.4	95.0

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	93.5	95.6	96.0	94.8	95.0
FYM	94.2	95.5	95.2	95.1	95.0
MEAN	93.9	95.5	95.6	95.0	95.0

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 76					
0	94.3	95.0	96.0	94.7	95.0
80	93.3	95.3	94.8	94.1	94.4
160	93.5	95.9	96.0	95.1	95.1
240	94.4	95.8	95.6	95.9	95.4
MEAN	93.9	95.5	95.6	95.0	95.0

FYMRES70	ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
NONE	N 76				
	0	94.4	94.9	96.5	94.0
	80	92.6	94.7	94.9	93.4
	160	93.1	96.5	96.7	95.2
FYM	240	94.1	96.1	95.9	96.5
	0	94.3	95.1	95.5	95.4
	80	94.0	95.9	94.7	94.7
	160	93.9	95.3	95.3	95.0
	240	94.7	95.6	95.3	95.4

PLOT AREA HARVESTED 0.00351

76/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

N 76	0	80	160	240	MEAN
FYMRES70					
NONE	29.0	31.0	33.8	32.1	31.5
FYM	31.7	31.0	31.3	35.9	32.5
MEAN	30.3	31.0	32.5	34.0	32.0

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	29.3	33.8	34.1	28.7	31.5
FYM	32.1	34.6	35.1	28.1	32.5
MEAN	30.7	34.2	34.6	28.4	32.0

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 76					
0	32.3	31.6	32.6	24.8	30.3
80	30.4	32.7	33.7	27.3	31.0
160	30.7	34.2	36.1	29.2	32.5
240	29.5	38.3	35.8	32.4	34.0
MEAN	30.7	34.2	34.6	28.4	32.0

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	
FYMRES70					
N 76					
NONE	0	29.7	29.0	31.9	25.3
	80	29.2	33.3	32.9	28.7
	160	31.7	34.3	38.8	30.3
	240	26.6	38.7	32.7	30.4
FYM	0	34.8	34.2	33.4	24.3
	80	31.5	32.0	34.6	25.9
	160	29.6	34.1	33.3	28.1
	240	32.4	37.9	39.0	34.3

76/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

N 76	0	80	160	240	MEAN
FYMRES70					
NONE	93.4	92.8	93.1	93.4	93.2
FYM	93.8	94.0	92.3	93.7	93.4
MEAN	93.6	93.4	92.7	93.5	93.3

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	91.2	93.3	93.9	94.2	93.2
FYM	92.0	94.1	94.5	93.1	93.4
MEAN	91.6	93.7	94.2	93.6	93.3

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
N 76					
0	93.1	93.9	94.3	93.1	93.6
80	91.8	93.0	95.2	93.6	93.4
160	90.7	93.3	93.4	93.4	92.7
240	91.0	94.7	93.9	94.5	93.5
MEAN	91.6	93.7	94.2	93.6	93.3

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE
FYMRES70				
NONE				
	0	92.0	92.1	94.6
	80	91.0	92.7	93.9
	160	91.4	92.8	94.8
	240	90.7	95.6	92.7
FYM				
	0	94.1	95.6	93.9
	80	92.7	93.2	96.8
	160	90.0	93.8	92.1
	240	91.4	93.7	95.1

PLOT AREA HARVESTED 0.00351

76/R/RN/1 HIGHFIELD

WHEAT 8TH TEST CROP CEREAL 7

GRAIN TONNES/HECTARE

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

N 76 ROTATION	76	126	176	226	MEAN
LUCERNE	4.59	5.09	4.97	5.27	4.98
CLOGRA	5.38	5.13	5.35	5.35	5.30
GRASS	4.55	4.89	4.73	4.79	4.74
ARABLE	4.67	4.90	4.82	4.68	4.77
RESEDED	4.87	4.96	5.39	5.02	5.06
OLDGRASS	5.17	5.13	5.47	5.53	5.32
MEAN	4.87	5.02	5.12	5.11	5.03

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	BLOCK	ROTATION	N 76	ROTATION N 76
SED	0.095	0.165	0.088	0.250
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
ROTATION				0.216

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.165	3.3
BLOCK.WP.SP	18	0.216	4.3

GRAIN MEAN DM% 88.3

SUB PLOT AREA HARVESTED 0.00663

76/R/RN/2 FOSTERS

WHEAT 8TH TEST CROP CEREAL 7

GRAIN TONNES/HECTARE

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

ROTATION	N 76	75	126	176	225	MEAN
LUCERNE		3.88	4.36	4.35	4.16	4.19
CLOGRA		3.91	3.84	4.12	4.03	3.98
GRASS		3.96	3.76	4.03	3.76	3.88
ARABLE		3.74	4.30	4.37	4.06	4.12
RESEEDDED		4.19	4.60	4.27	4.28	4.33
MEAN		3.93	4.17	4.23	4.06	4.10

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ROTATION	N 76	ROTATION N 76
SED	0.135	0.068	0.189
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
ROTATION			0.152

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.135	3.3
BLOCK.WP.SP	15	0.152	3.7

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00663

76/R/RN/1 HIGHFIELD

WHEAT 9TH TEST CROP CEREAL 8

GRAIN TONNES/HECTARE

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

	N 76	75	126	176	225	MEAN
ROTATION						
LUCERNE	3.80	4.55	5.13	4.44	4.48	4.48
CLOGRA	4.25	4.37	5.01	4.63	4.56	4.56
GRASS	4.06	4.51	4.43	3.98	4.24	4.24
ARABLE	4.14	4.40	4.72	4.77	4.51	4.51
RESEDED	4.50	5.31	4.94	4.80	4.89	4.89
OLDGRASS	4.63	4.78	4.95	5.06	4.85	4.85
MEAN	4.23	4.65	4.86	4.61	4.59	4.59

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	BLOCK	ROTATION	N 76	ROTATION N 76
SED	0.130	0.225	0.156	0.400
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
ROTATION				0.382

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.225	4.9
BLOCK.WP.SP	18	0.382	8.3

GRAIN MEAN DM% 87.4

SUB PLOT AREA HARVESTED 0.00663

76/R/RN/2 FOSTERS

WHEAT 9TH TEST CROP CEREAL 8

GRAIN TONNES/HECTARE

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

N 76	75	126	176	225	MEAN
ROTATION					
LUCERNE	3.73	4.26	3.90	4.05	3.99
CLOGRA	3.75	3.93	4.06	3.75	3.87
GRASS	3.11	3.00	3.78	3.67	3.39
ARABLE	3.36	3.72	4.20	3.95	3.81
RESEEDED	3.74	4.33	4.32	4.01	4.10
MEAN	3.54	3.85	4.05	3.89	3.83

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ROTATION	N 76	ROTATION N 76
SED	0.345	0.123	0.419
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
ROTATION			0.275

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.345	9.0
BLOCK.WP.SP	15	0.275	7.2

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00663

76/R/RN/1 HIGHFIELD

WHEAT 11TH TEST CROP CEREAL 9

GRAIN TONNES/HECTARE

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

N 76	75	126	176	225	MEAN
ROTATION					
LUCERNE	3.67	4.90	4.84	5.17	4.65
CLOGRA	3.55	3.50	4.63	4.64	4.08
GRASS	3.54	4.49	4.50	4.17	4.18
ARAELE	3.70	4.48	4.80	4.85	4.46
RESEDED	4.24	4.76	4.59	5.28	4.72
OLDGRASS	4.51	4.93	5.12	5.08	4.91
MEAN	3.87	4.51	4.75	4.86	4.50

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	BLOCK	ROTATION	N 76	ROTATION N 76
SED	0.281	0.486	0.142	0.571
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
ROTATION				0.347

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.486	10.8
BLOCK.WP.SP	18	0.347	7.7

GRAIN MEAN DM% 88.3

SUB PLOT AREA HARVESTED 0.00663

76/R/RN/2 FOSTERS

WHEAT 11TH TEST CROP CEREAL 9

GRAIN TONNES/HECTARE

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

	N 76	75	126	176	225	MEAN
ROTATION						
LUCERNE		3.02	3.27	3.78	3.88	3.49
CLOGRA		3.52	3.70	4.03	3.81	3.77
GRASS		3.58	4.03	3.89	3.98	3.87
ARABLE		3.09	4.01	4.03	3.82	3.74
RESEDED		3.48	3.60	3.77	3.78	3.65
MEAN		3.34	3.72	3.90	3.85	3.70

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ROTATION	N 76	ROTATION N 76
SED	0.157	0.086	0.229
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
ROTATION			0.193

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.157	4.2
BLOCK.WP.SP	15	0.193	5.2

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00663

76/W/RN/3

LEY/ARABLE

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

Sponsors: D.A. Boyd, K. Evans, A.E. Johnston, F.G.W. Jones, G.A. Salt.

The 39th year, leys, barley, oats, 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 73-75/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	Grass/clover 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 = rye, C = carrots, W = wheat, B = barley, H = hay,
L = grass/clover ley, SA = sainfoin ley, CL = red clover ley

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated (PER)

On four plots in each block arable rotations alternated each five years with ley rotations (ALT)

From 1976 all the rotations have been changed on all phases except for first and second test crops wheat in 1976:

(Previous LEY) LN, LN, LN, W, B
(Previous CLO) LC, LC, LC, W, B
(Previous A H) B, B, O, W, B
(Previous A) F, F, O, W, B

LN = Grass ley with N, LC = Clover/grass ley no N, O = Oats, F = Fallow

Previous alternating rotations have been changed to test eight-year leys:

LN, LN, LN, LN, LN, LN, LN, LN, W, B
LC, LC, LC, LC, LC, LC, LC, LC, W, B

76/W/RN/3

Treatments to first test crop wheat:

ROT CYCL Combinations of rotations and cycles defined above

LEY PER
CLO PER
A PER
A ALT
A H PER
A H ALT

Treatments to second test crop wheat:

ROTATION The four rotations defined above

Yields are taken from first and second test crops only.

Additional treatments to first test crop, wheat:-

1/2 plots

1. FYMRES66 Farmyard manure residues, last applied 1966:

NONE	None
FYM	38 tonnes on each occasion

1/8 plots

2. N Nitrogen fertiliser (kg N):

0	None
63	63
126	126
189	189

Additional treatments to second test crop, wheat:-

1/2 plots

1. FYMRES65 Farmyard manure residues, last applied 1965

NONE	None
FYM	38 tonnes on each occasion

1/4 plots

2. FUMRES75 Fumigant residues, applied 1975

NONE	None
DICHL+AL	Dichloropropene, 220 kg, plus aldicarb, 11 kg

1/8 plots

3. N Nitrogen fertiliser (kg N):

0	None
63	63
126	126
189	189

76/W/RN/3

Corrective K dressings (kg K₂O) as muriate of potash applied to first test crop wheat.

Continuous rotations	No FYM half plots	FYM half plots
Ley	238	176
Clover	0	126
Arable with hay	0	75
Arable	264	289

Alternating rotations (last two rotations in order)

Sainfoin/arable	201	151
Ley/arable with hay	188	163
Arable with hay/clover	213	238
Arable/ley	213	226

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

Standard applications:-

All grass leys: Manures: (0:14:28) at 540 kg. N at 80 kg as 'Nitro-Chalk'. Weedkiller: Paraquat at 0.56 kg ion in 280 l.

All clover/grass leys: Manures: (0:14:28) at 540 kg. Weedkiller: Paraquat at 0.56 kg ion in 280 l.

Barley: Manures: (20:14:14) at 400 kg, combine drilled. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Oats: Manures: (20:14:14) at 400 kg combine drilled. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Winter wheat: Manures: Magnesian limestone to 2nd test crop only at 5 tonnes. (0:20:20) at 300 kg combine drilled. Weedkiller:

Ioxynil at 0.63 kg plus mecoprop 1.9 kg in 280 l. Nematicide: Aldicarb to 1st test crop only at 10 kg.

Varieties: Grass ley: Timothy S51 15 kg, Meadow fescue S215 19 kg, sown at 34 kg.

Clover/grass ley: Timothy S51 20 kg, Meadow fescue S215 16 kg, White clover S100 4 kg, sown at 40 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Oats: Manod, sown at 190 kg.

Winter wheat: Cappelle, sown at 210 kg.

Cultivations, etc.: - Treatment crops:

Grass ley and Clover/grass ley, 1st year: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.

76/W/RN/3

- Grass ley and Clover/grass ley, 2nd year: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.
- Grass ley and Clover/grass ley, 3rd year: Ploughed: 3 Nov, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Power harrowed: 20 Apr.
- Grass ley and Clover/grass ley, 4th year: Rotary cultivated: 14 Oct, 1975. First half corrective K applied: 4 Nov. Rotary cultivated: 21 Nov. Second half corrective K applied: 1 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, grass ley only: 11 Mar. Power harrowed grass ley only: 20 Apr.
- All grass leys and Clover/grass leys: PK applied, N applied to grass ley only, spring-tine cultivated with crumbler attached: 21 Apr. Seeds sown: 22 Apr. Topped: 11 June. Weedkiller applied: 20 July. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.
- Barley, 1st treatment crop: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Rolled: 23 Mar. Weedkiller applied: 3 May. Combine harvested: 26 July.
- Barley, 2nd treatment crop: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Weedkiller applied: 3 May. Combine harvested: 26 July.
- Oats, 3rd treatment crop: Ploughed: 3 Nov, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached, twice: 11 Mar, 22 Mar. Seed sown: 22 Mar. Rolled: 23 Mar. Weedkiller applied: 3 May. Combine harvested: 4 Aug.
- Fallow, 1st treatment year: Subsoiled, tines 140 cm apart, 50 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed: 7 Oct. Spring-tine cultivated: 9 Mar, 1976. Spring-tine cultivated with crumbler attached: 11 Mar. Spring-tine cultivated: 18 June. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.
- Fallow, 2nd treatment year: Deep-tine cultivated: 29 Dec, 1975. Rotary cultivated: 9 Mar, 1976. Ploughed: 10 Mar. Spring-tine cultivated with crumbler attached: 11 Mar. Spring-tine cultivated: 18 June. Cultivated twice, with duck feet fitted: 23 July, 29 July. Power harrowed: 13 Aug.

Test crops:

- Winter wheat, 1st test crop: Rotary cultivated: 14 Oct, 1975. First half corrective K applied, ploughed: 4 Nov. Spring-tine cultivated with crumbler attached: 5 Nov. Aldicarb applied, rotary cultivated: 7 Nov. Seed sown: 10 Nov. Second half corrective K applied: 1 Mar, 1976. Rolled: 10 Mar. N applied: 15 Apr. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.
- Winter wheat, 2nd test crop: Magnesian limestone applied, deep-tine cultivated: 13 Oct, 1975. Spring-tine cultivated: 14 Oct. Seed sown: 15 Oct. Rolled: 10 Mar, 1976. N applied: 14 Apr. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.

NOTE: All grass leys and clover/grass leys failed to establish because of the summer drought.

76/W/RN/3

WINTER WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

ROT CYCL	LEY PER	CLO PFR	A PER	A ALT	A H PER	A H ALT	MEAN
FYMRES66							
NONE	3.14	2.77	1.69	2.91	3.26	2.64	2.74
FYM	2.41	2.76	1.78	2.95	3.54	2.80	2.71
N							
0	2.40	3.17	0.43	2.65	2.48	2.80	2.32
63	3.01	2.71	2.24	3.21	3.64	2.66	2.91
126	2.61	2.57	2.24	3.12	3.72	2.69	2.83
189	3.07	2.61	2.04	2.74	3.76	2.73	2.83
MEAN	2.77	2.76	1.74	2.93	3.40	2.72	2.72
FYMRES66							
ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	
N							
NONE	0	3.02	2.81	0.36	2.78	1.83	2.67
	63	3.24	2.89	2.65	3.11	3.02	2.71
	126	2.93	2.71	2.15	3.08	4.74	2.63
	189	3.36	2.66	1.61	2.67	3.46	2.57
FYM	0	1.79	3.53	0.49	2.53	3.14	2.93
	63	2.79	2.52	1.83	3.30	4.26	2.61
	126	2.29	2.43	2.34	3.17	2.70	2.76
	189	2.79	2.57	2.47	2.80	4.06	2.90

GRAIN MEAN DM% 87.9

STRAW TONNES/HECTARE

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

ROT CYCL	LEY PER	CLO PFR	A PER	A ALT	A H PER	A H ALT	MEAN
FYMRES66							
NONE	2.65	3.16	1.49	2.12	2.97	2.43	2.47
FYM	2.68	3.17	1.93	2.26	4.19	2.78	2.83
N							
0	1.98	2.96	1.07	1.33	2.31	2.26	1.99
63	2.86	2.89	2.03	2.48	3.84	2.28	2.73
126	2.53	3.08	2.15	2.49	4.38	3.24	2.98
189	3.27	3.73	1.59	2.45	3.79	2.63	2.91
MEAN	2.66	3.17	1.71	2.19	3.58	2.60	2.65
FYMRES66							
ROT CYCL	LEY PER	CLO PER	A PER	A ALT	A H PER	A H ALT	
N							
NONE	0	2.21	2.68	0.76	0.86	1.72	2.35
	63	2.60	3.03	1.92	2.64	2.69	2.29
	126	2.70	3.51	1.94	2.38	4.11	2.81
	189	3.08	3.43	1.35	2.59	3.36	2.26
FYM	0	1.76	3.24	1.37	1.81	2.90	2.17
	63	3.13	2.75	2.14	2.32	4.99	2.27
	126	2.36	2.65	2.37	2.61	4.66	3.68
	189	3.45	4.03	1.84	2.32	4.22	3.00

STRAW MEAN DM% 93.9 SUB PLOT AREA HARVESTED 0.00260

76/W/RN/3

WINTER WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

ROTATION	LEY	CLO	A	A H	MEAN
FYMRES65					
NONE	2.37	2.88	2.26	2.44	2.49
FYM	2.62	2.75	2.40	2.50	2.57
FUMRES75					
NONE	2.42	2.84	2.29	2.51	2.52
DICHL+AL	2.57	2.79	2.37	2.44	2.54
N					
0	2.92	3.53	2.11	2.52	2.77
63	2.62	2.88	2.75	2.52	2.69
126	2.40	2.65	2.10	2.45	2.40
189	2.04	2.20	2.36	2.41	2.25
MEAN	2.50	2.81	2.33	2.47	2.53

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

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

ROTATION	LEY	CLO	A	A H	MEAN
FYMRES65					
NONE	3.95	4.85	3.08	4.73	4.15
FYM	4.52	4.75	3.42	3.71	4.10
FUMRES75					
NONE	4.14	4.40	2.41	3.92	3.72
DICHL+AL	4.33	5.19	4.09	4.53	4.53
N					
0	4.02	4.69	3.03	3.76	3.88
63	4.42	4.82	3.32	4.19	4.19
126	4.26	4.93	3.41	4.40	4.25
189	4.24	4.75	3.22	4.54	4.19
MEAN	4.24	4.80	3.25	4.22	4.13

STRAW MEAN DM% 92.7

SUB PLOT AREA HARVESTED 0.00260

76/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 35th year, ryegrass.

For previous years see 'Details' 1967, 68/D/4(t), 69/W/RN/4, 70/W/RN/4(t), 71/W/RN/4(t), 72/W/RN/4(t) and 73-75/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: Yields were not taken and no new treatments were applied.

Basal applications: 80 kg N as 'Nitro-Chalk' in spring and after the first cut.

Seed: RvP Italian Ryegrass at 40 kg, sown 16 Sept, 1974.

Cultivations, etc.:- Both Series

Chain harrowed: 27 Feb, 1976. N applied: 29 Mar, 25 June. Cut once: 8 June.

76/R/RN/5

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 - Great Field IV.

Sponsor: F.V. Widdowson.

The 21st year of the rotation, barley, ley, potatoes, winter wheat, kale. The 17th year of the same rotation on the additional plots. The 20th 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 69-75/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: Fertilisers and farmyard manure:

MANURE

Original plots

O	None
N1	N1
P	P
N1P	N1 P
K	K
N1K	N1 K
PK	PK
N1PK	N1 PK
N2PK	N2 PK
D	D
N1PKD	N1 PK D
N2PKD	N2 PK D

N1, 2 (kg N): 19, 38 (ley): 56, 112 (barley): 75, 150 (wheat): 125, 250 (potatoes - 75, 150 until 1975): 125, 250 (kale and permanent grass) as 'Nitro-Chalk'

P: 63 kg P205 as superphosphate
K: 250 kg K2O as muriate of potash
D: 38 tonnes FYM (permanent grass): 50 tonnes (kale and potatoes): none to other crops.

NOTE: Potatoes on these plots all receive a standard dressing of 82 kg MgO as Epsom salts. Before 1976 potatoes tested 0 v 82 kg MgO on sub plots, dressing balanced-up after harvest.

76/R/RN/5

Additional plots

MANURE

O	None
F	N PK
FMGCA	N PK Mg Ca
FMGS	N PK Mg S
FCAS	N PK Ca S
FMGCAS	N PK Mg Ca S
FMGCASTE	N PK Mg Ca S TE

F: N PK

N: N applied as urea. N1 to wheat, N2 to other crops. Rates as above.

P: 126 kg P₂O₅ as potassium dihydrogen phosphate

K: 251 kg K₂O total. As potassium dihydrogen phosphate (83 kg K₂O) on all NPK plots. In addition plots without S receive 168 kg K₂O as potassium chloride, plots with S receive 92 kg K₂O as potassium sulphate plus 76 kg K₂O as potassium chloride.

Mg: 126 kg MgO as magnesium chloride

Ca: 126 kg CaO as calcium carbonate

S: 30 kg S supplied by potassium sulphate

TE: Trace element mixture including Mn, Cu, Zn, B, Mo, Ca, Fe. Test varies with crop

Standard applications:

Barley and winter wheat: Weedkillers: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.

Potatoes: Weedkiller: Linuron at 0.93 kg in 280 l. Insecticide: Menazon at 0.28 kg in 280 l on two occasions. Fungicide: Mancozeb at 1.3 kg with the second insecticide spray.

Kale: Insecticide: Menazon at 0.28 kg in 280 l on two occasions.

Seed:

Barley: Maris Mink, sown at 200 kg.

Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover.

Potatoes: Pentland Crown (King Edward on additional plots).

Winter wheat: Maris Fundin, sown at 210 kg.

Kale: Thousand Headed, sown at 7 kg.

Cultivations, etc.:-

Barley: Dug by hand: 29 Oct, 1975. P, K, Mg, Ca and S applied to additional plots: 27 Feb, 1976. P and K applied to remaining plots and seed sown: 2 Mar. N applied: 8 Apr. Weedkillers applied: 7-May. Trace elements applied: 17 May. Fungicide applied: 25 May. Harvested by hand: 19 July.

Grass-clover ley: Seed sown: 11 Aug, 1975. P, K, Ca, Mg and S applied: 12 Nov. N applied: 2 Mar, 1976. Trace elements applied: 14 Apr. Cut twice: 19 May, 12 July.

76/R/RN/5

Potatoes: FYM applied and dug by hand: 22 Oct, 1975. P, K, Ca, Mg and S applied to additional plots: 27 Feb, 1976. P, K and Mg applied to remaining plots: 2 Mar. N applied, plots rotary cultivated and planted: 8 Apr. Weedkiller applied: 6 May. Second N applied to additional plots: 3 June. Trace elements applied: 7 June. Insecticide applied: 10 June. Insecticide with fungicide applied: 29 June. Plots of the main experiment with neither K nor FYM and no fertiliser plot of additional plots lifted: 16 Aug. Remaining additional plots lifted: 8 Sept. Remaining plots lifted: 13 Sept.

Winter wheat: Balancing Mg applied: 26 Sept, 1975. Dug by hand: 30 Sept. P, K, Ca, Mg and S applied and seed sown: 3 Oct. Weedkillers applied: 5 Mar, 1976. N and trace elements applied: 14 Apr. Fungicide applied: 28 Apr. Harvested by hand: 12 July.

Kale: FYM applied and dug by hand: 21 Oct, 1975. P, K, Ca, Mg and S applied: 27 Feb, 1976. N applied and seed sown: 23 Mar. Second N applied to additional plots: 3 June. Trace elements applied: 7 June. Insecticide applied: 10 June, 17 Sept. Harvested by hand: 3 Nov.

Permanent grass: P and K applied: 12 Nov, 1975. FYM applied: 2 Mar, 1976. N applied: 2 Mar, 19 May, 16 July. Cut three times: 19 May, 16 July, 11 Oct.

76/R/RN/5

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

GREAT FIELD IV (R): ORIGINAL PLOTS

TONNES/HECTARE

	WINTER WHEAT:		KALE:	BARLEY		LEY : DRY MATTER		
	GRAIN	STRAW	FRESH WEIGHT	GRAIN	STRAW	1ST CUT	2ND CUT	TOTAL OF 2 CUTS
MANURE								
O	3.00	3.88	7.0	1.86	1.47	1.06	0.46	1.52
N1	2.75	4.10	5.2	2.04	1.88	2.22	0.60	2.82
P	2.81	4.14	21.8	1.80	1.49	1.36	0.55	1.91
N1P	1.64	3.09	35.7	1.24	1.39	2.51	0.68	3.19
K	3.89	4.67	7.8	2.11	1.63	1.41	0.52	1.93
N1K	4.31	4.42	2.6	2.17	1.95	2.78	0.63	3.41
PK	5.15	7.03	27.0	2.85	1.94	1.78	0.75	2.53
N1PK	6.11	7.76	41.0	3.64	2.59	2.84	0.78	3.62
N2PK	5.93	8.01	54.9	3.46	2.63	4.38	0.81	5.20
D	5.81	7.28	36.6	3.37	2.54	2.63	0.75	3.39
N1PKD	6.23	8.87	59.3	4.48	3.31	4.48	0.97	5.45
N2PKD	6.43	9.51	73.2	3.72	2.98	6.00	1.09	7.10
MEAN DM%	84.2	74.7	84.7	77.3	28.2	46.0	37.1	

	POTATOES:		PERMANENT GRASS:		
	TOTAL TUBERS	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE					
O	7.4	0.58	0.53	0.28	1.39
N1	7.6	1.02	0.31	0.29	1.63
P	12.6	0.50	0.39	0.16	1.05
N1P	7.6	2.21	0.53	0.75	3.49
K	21.5	0.90	0.43	0.37	1.70
N1K	20.8	2.24	0.55	0.73	3.51
PK	26.9	0.71	0.77	0.43	1.91
N1PK	26.9	2.68	0.73	1.00	4.41
N2PK	28.4	4.71	0.42	0.97	6.10
D	26.5	2.68	1.10	0.62	4.39
N1PKD	35.0	3.70	1.17	1.26	6.14
N2PKD	33.0	5.65	1.12	0.74	7.50
MEAN DM%		27.7	65.9	21.3	38.3

76/R/RN/5

GREAT FIELD IV (R) : ADDITIONAL PLOTS

TONNES/HECTARE

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

MANURE	WINTER WHEAT:		KALE:	BARLEY:	
	GRAIN	STRAW	FRESH WEIGHT	GRAIN	STRAW
O	3.51	4.48	9.6	1.68	1.51
F	5.16	8.11	64.5	3.78	3.45
FMGCA	5.11	8.56	66.3	4.11	3.96
FMGS	5.22	8.59	68.9	3.26	3.01
FCAS	5.13	8.47	68.0	4.18	3.82
FMGCAS	5.27	8.98	65.4	4.43	3.94
FMGCASTE	4.63	8.31	65.4	4.45	3.73
MEAN DM%	86.6	80.4		87.8	83.4

MANURE	LEY : DRY MATTER			POTATOES:
	1ST CUT	2ND CUT	TOTAL OF 2 CUTS	TOTAL TUBERS
O	1.79	0.66	2.45	10.4
F	5.16	1.18	6.35	26.1
FMGCA	5.20	0.93	6.12	28.6
FMGS	4.45	0.96	5.41	28.6
FCAS	5.00	0.94	5.94	27.9
FMGCAS	5.93	1.14	7.07	31.5
FMGCASTE	5.39	0.96	6.35	25.6
MEAN DM%	28.4	48.7	38.6	

76/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 17th year, oats, sugar beet, barley, ley, potatoes, 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 71-75/W/RN/6.

Design: 1 block of 12 plots for each crop.

Whole plot dimensions: 2.74 x 2.13.

Treatments: All combinations of:-

Blocks

1. CROP Crops:-
 After old grass (1960-73):
- POTATO/G Potatoes
 In arable rotation since 1960:
- BARLEY Barley
LEY Ley
POTATO/A Potatoes
SUGRBEET Sugar beet
OATS Oats
PERMGRAS Permanent grass, sown autumn 1973

Plots

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

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: P205 at 63 kg as triple superphosphate.

K: K20 at 252 kg as potassium bicarbonate.

D: Farmyard manure at 25 tonnes (permanent grass): 50 tonnes (sugar beet and potatoes): none to other crops.

76/W/RN/6

- NOTES: (1) The old grass block was dug in autumn 1973 and follows the arable rotation, the crop in 1976 being potatoes. A new block was sown to permanent grass on adjacent land.
- (2) Potatoes in the old arable rotation and sugar beet test on sub plots: - v MG (82 kg Mg 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 0.63 kg and mecoprop at 1.9 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l on two occasions the first with weedkiller.

Sugar beet: Manures: Boron at 0.92 kg B203 as borax in 1120 l. Insecticide: Menazon at 0.28 kg in 280 l on two occasions.

Barley: Weedkillers: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.

Potatoes: After old grass and in rotation: Insecticide: Menazon at 0.28 kg in 280 l on two occasions, the second with fungicide. Fungicide: Mancozeb at 1.3 kg in 280 l.

Permanent grass: Manures: MgO at 82 kg as Epsom salts.

Seed: Winter oats: Peniarth, sown at 200 kg
Sugar beet: Klein E, sown at 5.6 kg
Barley: Julia, dressed with ethirimol, sown at 160 kg
Potatoes: Maris Piper
Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover
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: 29 Sept, 1975. Plots dug by hand, P and K applied: 2 Oct. Seed sown: 6 Oct. First half N applied: 1 Mar, 1976. Weedkiller with fungicide applied: 5 Apr. Second half N applied: 22 Apr. Fungicide applied: 20 May. Harvested: 9 July.

Sugar beet: FYM applied, plots dug by hand: 21 Sept, 1975. P and K applied: 1 Mar, 1976. First half N applied, Mg applied to half plots, raked in, seed drilled: 22 Mar. Boron applied: 3 May. Second half N applied: 20 May. Singled: 25 May. Insecticide applied: 14 June, 29 June. Lifted: 7 Oct.

Barley: Balancing Mg applied: 8 Nov, 1975. Plots dug by hand: 21 Nov. P and K applied, first half N applied, rotary cultivated, raked level, seed sown, raked in: 1 Mar, 1976. Second half N applied: 22 Apr. Weedkiller applied: 3 May. Fungicide applied: 20 May. Harvested: 13 July.

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Grass-clover ley: Seed undersown in barley stubble: 12 Aug, 1975. P and K applied: 20 Nov. N applied: 9 Mar, 1976. Cut twice: 20 May, 1 July.

Potatoes: Both blocks: FYM applied, plots dug by hand: 20 Nov, 1975. P and K applied: 1 Mar, 1976. First half N applied, rotary cultivated, potatoes planted, Mg applied to half plots, ridged up by hand: 13 Apr. Second half N applied: 20 May. Insecticide applied: 14 June. Insecticide with fungicide applied: 29 June. Lifted plots with neither K nor FYM: 12 Aug. Remaining plots lifted: 6 Sept.

Permanent grass: P, K and basal Mg applied: 20 Nov, 1975. FYM applied: 1 Mar, 1976. First third N applied: 9 Mar. Second third N applied: 20 May. Third third N applied: 1 July. Cut three times: 20 May, 1 July, 5 Nov.

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

76/W/RN/6

TONNES/HECTARE

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

	OATS		ROOTS WASHED	SUGARBEET	TOTAL SUGAR	TOPS
	GRAIN	STRAW		SUGAR %		
MANURE						
O	3.24	3.19	8.4	13.2	1.11	7.5
N1	2.92	3.63	10.6	13.2	1.39	12.8
P	3.28	3.34	6.8	13.2	0.90	8.5
N1P	3.35	4.00	9.2	13.7	1.26	11.1
K	2.37	3.07	18.6	15.7	2.92	10.1
N1K	2.92	3.16	18.1	13.7	2.49	14.2
PK	2.22	2.60	14.2	15.1	2.14	9.9
N1PK	4.50	6.05	18.1	13.6	2.46	16.2
N2PK	3.34	6.46	22.9	13.7	3.13	19.1
D	3.94	4.90	28.7	15.8	4.55	16.7
N1PKD	3.47	6.05	28.4	14.4	4.09	20.8
N2PKD	3.87	7.55	32.8	14.3	4.70	25.6
MEAN DM%	87.3	77.1				

	BARLEY		-	POTATO/A	MEAN
	GRAIN	STRAW		TOTAL TUBERS MG	
MANURE					
O	1.59	1.69	6.1	4.7	5.4
N1	1.56	2.31	5.5	5.4	5.4
P	1.58	1.64	4.4	6.1	5.2
N1P	1.15	2.10	4.7	5.2	5.0
K	1.79	2.06	10.8	11.1	10.9
N1K	2.81	3.47	9.4	9.0	9.2
PK	1.97	1.70	11.1	12.1	11.6
N1PK	2.83	3.50	10.7	11.8	11.2
N2PK	3.56	4.29	10.7	11.9	11.3
D	2.69	2.91	13.7	13.0	13.4
N1PKD	3.43	4.39	11.5	11.1	11.3
N2PKD	3.67	4.97	13.6	12.4	13.0
MEAN DM%	86.8	82.8			

76/W/RN/6

TONNES/HECTARE

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

	POTATO/G TOTAL TUBERS	PERMGRAS : DRY MATTER			TOTAL OF 3 CUTS	LEY : DRY MATTER		
		1ST CUT	2ND CUT	3RD CUT		1ST CUT	2ND CUT	TOTAL OF 2 CUTS
MANURE								
O	6.4	0.90	0.25	0.36	1.51	0.90	0.26	1.16
N1	5.9	2.26	0.37	0.39	3.02	1.74	0.42	2.17
P	6.5	0.44	0.12	0.27	0.84	0.84	0.24	1.08
N1P	5.6	2.19	0.34	0.50	3.02	1.91	0.48	2.39
K	10.5	1.45	0.43	0.47	2.34	0.85	0.42	1.27
N1K	10.8	2.63	0.32	0.36	3.31	2.22	0.29	2.51
PK	7.9	1.44	0.29	0.39	2.11	1.44	0.58	2.02
N1PK	10.5	2.42	0.33	0.56	3.32	2.78	0.43	3.21
N2PK	11.5	3.96	0.59	0.45	5.00	3.39	0.48	3.87
D	12.6	1.40	0.37	0.44	2.21	2.00	0.49	2.49
N1PKD	14.2	3.30	0.51	0.51	4.31	3.38	0.57	3.95
N2PKD	13.7	3.78	0.82	0.45	5.05	4.42	0.73	5.14
MEAN DM%		24.8	61.3	18.3	34.8	27.8	47.1	37.4

76/R/RN/7

RESIDUAL PHOSPHATE

Object: Originally to study the fresh and residual effects of phosphate fertiliser on the 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 17th year, ley (Great Field IV): wheat (Sawyers I).

For previous years see 'Details' 1967, 68/B/5(t), 69/R/RN/7, 70/R/RN/7(t) and 71-75/R/RN/7.

Design: Gt. Field IV: 3 series each of 1 randomised block of 12 plots.
Sawyers I: 3 series each of 2 randomised blocks of 12 plots.

Whole plot dimensions:

Gt. Field IV: 4.27 x 18.3

Sawyers I: 4.27 x 20.1

Treatments:

P205 Rates and frequency of applying phosphate:-

NONE 0

Annual dressings, kg P205:

29 ANN	29
57 ANN	57
115 ANN	115
172 ANN	172

Triennial dressings, kg P205 (last applied 1975):

86 TRI	86
172 TRI	172

Six-yearly dressings, kg P205 (last applied 1973):

344 SIX	344
688 SIX	688
1032 SIX	1032

Single dressing, kg P205 (applied autumn 1969):

376 G(1)	376 as Gafsa rock phosphate
376 S(1)	376 as granular superphosphate

76/R/RN/7

- NOTES: (1) Since 1974 the original rotation of potatoes, barley, swedes on both fields has been changed. Blocks after barley have been sown to continuous wheat on Sawyers I, to ley on Great Field IV.
- (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) The ley sown in 1974 established poorly. It was ploughed and resown in 1975.

Standard applications:

Leys (Gt. Field IV only): Manures: K20 at 250 kg as muriate of potash
Chalk at 3.1 t (1st year ley only).

Wheat (Sawyers I only): Manures: K20 at 90 kg as muriate of potash.

'Nitro-Chalk' at 500 kg. Chalk at 3.1 t (2nd cereal only).

Weedkillers: Paraquat at 0.56 kg ion in 220 l. (2nd and 3rd cereal only). Glyphosate at 1.7 kg in 220 l (4th cereal only).

Ioxynil at 0.53 kg with mecoprop at 1.6 kg (both as the potassium salt) in 450 l in spring.

Seed: Ley mixture: Meadow fescue, S215 at 9.3 kg, Contessa meadow fescue at 5.9 kg, S48 Timothy at 5.9 kg, N.Z Huia white clover at 2.1 kg, Wild white clover at 0.38 kg. Sown at 24 kg.

Wheat: Cappelle, sown at 190 kg.

Cultivations, etc.:-

Leys: First-year only: Chalk applied: 30 Sept, 1975. Ploughed:

26 Oct. Disced: 26 Feb, 1976. Treatment P applied: 27 Feb.

Standard K applied: 9 Apr. Power harrowed and sown: 21 Apr.

Topped: 14 and 29 June, 13 July, 18 Aug.

Second and third-year Leys: Standard K applied: 30 Dec, 1975. Treatment P

applied: 27 Feb, 1976. Cut three times: 20 May, 28 June and 5 Nov.

Wheat: Glyphosate applied: 24 Sept, 1975. Chalk applied: 29 Sept.

Paraquat applied: 7 Oct. Ploughed: 19 Oct. Spring-tine cultivated, stand-

ard K and treatment P applied: 29 Oct. Power harrowed and sown:

30 Oct. N applied: 31 Mar, 1976. Spring-weedkiller applied: 28 Apr.

Combine harvested: 30 July.

NOTE: Incidence of take-all in wheat was measured in April and July.

76/R/RN/7 GREAT FIELD IV

SERIES II LEY

DRY MATTER TONNES/HECTARE

CUT 1 (20/5/76) CUT 2 (28/6/76) CUT 3(5/11/76) TOTAL OF 3 CUTS

	CUT 1 (20/5/76)	CUT 2 (28/6/76)	CUT 3(5/11/76)	TOTAL OF 3 CUTS
P205				
NONE	2.46	0.88	1.49	4.83
29 ANN	2.73	1.07	1.80	5.60
57 ANN	2.94	1.48	2.14	6.56
115 ANN	2.92	1.56	1.88	6.37
172 ANN	1.87	1.38	1.96	5.22
86 TRI	2.81	1.46	1.63	5.90
172 TRI	2.11	1.15	1.96	5.22
344 SIX	3.05	1.77	2.11	6.93
688 SIX	2.21	1.16	1.97	5.34
1032 SIX	2.12	1.34	1.51	4.97
376 G(1)	2.64	1.23	1.93	5.80
376 S(1)	2.03	1.57	1.48	5.08
MEAN	2.49	1.34	1.82	5.65
MEAN DM%	20.4	32.9	13.5	22.3

PLOT AREA HARVESTED 0.00186

SERIES III LEY

DRY MATTER TONNES/HECTARE

CUT 1 (20/5/76) CUT 2 (28/6/76) CUT 3(5/11/76) TOTAL OF 3 CUTS

	CUT 1 (20/5/76)	CUT 2 (28/6/76)	CUT 3(5/11/76)	TOTAL OF 3 CUTS
P205				
NONE	2.31	0.95	1.21	4.46
29 ANN	1.65	0.89	1.37	3.90
57 ANN	2.23	1.04	1.98	5.25
115 ANN	2.36	0.96	2.04	5.35
172 ANN	3.06	0.71	1.57	5.34
86 TRI	2.34	1.07	1.83	5.23
172 TRI	1.78	0.85	1.15	3.77
344 SIX	1.94	1.01	1.68	4.63
688 SIX	2.20	0.88	1.67	4.75
1032 SIX	2.66	1.01	1.50	5.17
376 G(1)	2.37	1.12	1.79	5.29
376 S(1)	1.84	0.66	1.52	4.02
MEAN	2.23	0.93	1.61	4.76
MEAN DM%	21.5	36.1	13.5	23.7

PLOT AREA HARVESTED 0.00186

76/R/RN/7 SAWYERS I
 SERIES I 2ND CEREAL WHEAT
 GRAIN TONNES/HECTARE

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

P205	
NONE	4.31
29 ANN	4.86
57 ANN	4.27
115 ANN	4.16
172 ANN	4.35
86 TRI	4.25
172 TRI	4.21
344 SIX	4.24
688 SIX	4.47
1032 SIX	4.57
376 G(1)	3.90
376 S(1)	3.94
MEAN	4.29

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205
-----	-----
SED	0.324

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.324	7.5
GRAIN MEAN DM%	88.1		

STRAW TONNES/HECTARE

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

P205	
NONE	3.70
29 ANN	4.41
57 ANN	4.73
115 ANN	4.43
172 ANN	4.60
86 TRI	4.21
172 TRI	4.30
344 SIX	4.10
688 SIX	4.35
1032 SIX	4.13
376 G(1)	3.92
376 S(1)	3.83
MEAN	4.23

STRAW MEAN DM% 90.4

PLOT AREA HARVESTED 0.00569

76/R/RN/7 SAWYERS I

SERIES II 3RD CEREAL WHEAT

GRAIN TONNES/HECTARE

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

P205	
NONE	2.71
29 ANN	3.34
57 ANN	3.96
115 ANN	3.79
172 ANN	4.04
86 TRI	3.92
172 TRI	3.65
344 SIX	3.64
688 SIX	4.00
1032 SIX	4.27
376 G(1)	3.07
376 S(1)	3.50
MEAN	3.66

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205
-----	-----
SED	0.431

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.431	11.8
GRAIN MEAN DM%	88.1		

STRAW TONNES/HECTARE

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

P205	
NONE	2.56
29 ANN	3.40
57 ANN	3.44
115 ANN	3.77
172 ANN	3.53
86 TRI	3.14
172 TRI	3.47
344 SIX	3.36
688 SIX	3.62
1032 SIX	3.78
376 G(1)	2.68
376 S(1)	2.86
MEAN	3.30

STRAW MEAN DM% 89.7

PLOT AREA HARVESTED 0.00569

76/R/RN/7 SAWYERS I
 SERIES III 4TH CEREAL WHEAT
 GRAIN TONNES/HECTARE

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

P205	
NONE	2.53
29 ANN	2.99
57 ANN	3.16
115 ANN	3.21
172 ANN	3.39
86 TRI	2.50
172 TRI	3.47
344 SIX	2.75
688 SIX	3.26
1032 SIX	3.11
376 G(1)	2.29
376 S(1)	2.30
MEAN	2.91

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205
-----	-----
SED	0.549

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.549	18.9
GRAIN MEAN DM%	88.0		

STRAW TONNES/HECTARE

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

P205	
NONE	2.28
29 ANN	2.79
57 ANN	2.85
115 ANN	2.63
172 ANN	2.70
86 TRI	2.22
172 TRI	2.66
344 SIX	2.62
688 SIX	2.64
1032 SIX	3.33
376 G(1)	2.00
376 S(1)	1.55
MEAN	2.52

STRAW MEAN DM% 91.0

PLOT AREA HARVESTED 0.00569

76/R/RN/8

CULTIVATION WEEDKILLER

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

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

The 16th year, spring beans.

For previous years see 'Details' 1967, 68/B/6(t), 69/R/RN/8(t), 70/R/RN/8, 71/R/RN/8(t) and 72-75/R/RN/8.

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

Whole plot dimensions: 12.8 x 15.2.

Treatments: All combinations of:-

Whole plots

1. CULTIVTN Primary cultivations annually:

PLOUGH	Ploughed: 12 Nov, 1975
ROTAVATE	Rotary cultivated: 13 Nov, 1975
DEEPTINE	Deep-tine cultivated twice: 12 Nov, 1975

2. WEEDCNTL(76) Weed control to beans 1976:

MECHANCL	Mechanical
SIMAZINE	Simazine at 1.1 kg in 220 l (duplicated)

Sub plots

3. WEEDKLLR(751) Hormone weedkiller to barley 1975:

NONE	None
DI+ME+MC	Dicamba + mecoprop + MCPA ('Tetralox Plus' at 7.0 l in 220 l).

4. WEEDKLLR(752) Paraquat weedkiller to barley stubble autumn 1975:

NONE	None
PARAQUAT	Paraquat at 0.42 kg ion in 220 l

EXTRA plus three extra treatments

SPIKE	Spike rotary cultivated: 4 Mar, 1976. Given simazine to beans 1976, with sub plot treatments 3 and 4 above.
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(SH)PLGH	Shallow ploughed: 17 Nov, 1975. Given simazine to beans 1976 and paraquat to barley stubble autumn 1975, with sub plot treatment 3 above. Barley straw spread: 2 Sept, 1975. Straw burned: 10 Sept.
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STANDARD	Standard cultivations as considered best for each crop. Ploughed: 12 Nov, 1975. Given simazine to beans 1976, with sub plot treatments 3 and 4 above.
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76/R/BN/8

- NOTES: (1) Simazine applied: 9 Mar, 1976
(2) Paraquat applied: 6 Oct, 1975.
(3) MECHANCL plots: Mechanically weeded: 29 April, 25 May, 1976.
(4) All plots, except SPIKE plots, heavy spring-tine cultivated:
3 Mar, 1976.
(5) All plots mechanically weeded: 28 May.

Basal applications: Manures: (0:14:28) at 400 kg.

Seed: Maris Bead, sown at 220 kg.

Cultivations, etc.: - Fertiliser applied: 3 Mar, 1976. Seed sown: 4 Mar.
Harvested: 20 July.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

EXTRA	SPIKE (SH)	PLGH	STANDARD
WEEDKLLR(751)			
NONE	0.31	0.95	0.75
DI+ME+MC	0.29	0.70	0.62
WEEDKLLR(752)			
NONE	0.26		0.67
PARAQUAT	0.35	0.82	0.71
MEAN	0.30	0.82	0.69

GRAIN MEAN DM% 74.8

SUB PLOT AREA HARVESTED 0.00488

76/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

CULTIVTN	PLOUGH	ROTAVATE	DEEPTINE	MEAN
WEEDCNTL(76)				
MECHANCL	0.79	0.42	0.34	0.52
SIMAZINE	0.72	0.61	0.41	0.58
WEEDKLLR(751)				
NONE	0.68	0.53	0.28	0.50
DI+ME+MC	0.81	0.57	0.49	0.62
WEEDKLLR(752)				
NONE	0.68	0.48	0.36	0.51
PARAQUAT	0.81	0.62	0.41	0.61
MEAN	0.75	0.55	0.38	0.56

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	WEEDCNTL(76)	WEEDKLLR(751)	WEEDKLLR(752)	CULTIVTN
	0.093	0.056	0.056	0.108

TABLE	CULTIVTN WEEDCNTL(76)	CULTIVTN WEEDKLLR(751)	CULTIVTN WEEDKLLR(752)	
SED	0.187	0.128	0.128	MIN-REP
	0.162			MAX-MIN
	0.132			MAX-REP

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:

CULTIVTN	0.098	0.098
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WEEDCNTL(76)
 MIN-REP WEEDCNTL(76) MECHANCL
 MAX-MIN MECHANCL SIMAZINE
 MAX-REP SIMAZINE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.187	33.4
BLOCK.WP.SP	9	0.169	30.2

GRAIN MEAN DM% 76.7

76/R/RN/11

IRRIGATION

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

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

The twelfth year, barley (Great Field I); forage maize (Great 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/11(t), 70/R/RN/11(t), 71/R/RN/11(t), 72/R/RN/11(t), and 73-75/R/RN/11.

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

Whole plot dimensions: Barley - 15.2 x 32.0, forage maize - 15.2 x 15.2.

Treatments to barley: All combinations of:-

Whole plots

1. IRRIGTN Irrigation (by oscillating spray line), cumulative to previous years:-

NONE	None
EARLY	Early
LATE	Late
FULL	Full

Half plots

2. FUNGCIDE Fungicides:

NONE	None
E+T+B	Ethirimol seed dressing, tridemorph spray on 28 May and 7 July, benodanil spray on 7-July

Quarter plots

3. ALDICARB(75) Residuals of aldicarb applied to beans 1975:

(0)	None
(14)	14 kg

4. N TIME Time of applying nitrogen fertiliser (total dressing 50 kg N):

SEEDBED	All to seedbed, dressing divided before (6 Mar) and after (23 Mar) sowing
SB+TD	Half to seedbed (6 Mar), half top dressed (28 June)

76/R/RN/11

NOTE: Tridemorph at 0.53 kg in 220 l for first spray; with benodanil at 1.12 kg in 450 l for second spray.

Treatments to forage maize: All combinations of:-

Whole plots

1. IRRIGTN Irrigation:

NONE	None
FULL	Full

Quarter plots

2. N Nitrogen fertiliser (kg N):

50	50 to seedbed
100	100 to seedbed
150	150 to seedbed
100+50	100 to seedbed, 50 top dressed five weeks after establishment

NOTE: Seedbed N applied on 5 May, top dressed on 28 June.

Standard applications: Barley: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Forage maize: Manures: (0:20:20) at 450 kg. Weedkillers: Atrazine at 1.7 kg in 220 l. Paraquat at 0.42 kg ion in 220 l. Insecticide: Dimethoate at 0.07 kg in 450 l.

Seed: Barley: Julia, sown at 160 kg.

Forage maize: Cargill Primeur 170, sown at 100,000 seeds per hectare.

Cultivations, etc.: Barley: Ploughed: 20 Nov, 1975. Spring-tine cultivated: 3 Mar, 1976, 6 Mar. Seed sown: 8 Mar. Weedkiller applied: 7 May. Combine harvested: 26 July.

Forage maize: Paraquat applied: 27 Oct, 1975. Ploughed: 17 Oct. Spring-tine cultivated: 3 Mar, 1976. PK applied: 5 May. Atrazine applied and harrowed in: 7 May. Power harrowed: 10 May. Seed sown: 11 May. Insecticide applied: 8 June. Harvested by hand: 7 Oct.

NOTES: (1) Mildew on the barley was assessed on two occasions.

(2) Soil moisture measurements were made during the season.

76/R/RN/11

RAINFALL AND IRRIGATION: MM

Week ending	Rainfall	IRRIGATION			
		EARLY	BARLEY LATE	FULL	MAIZE FULL
May 1	0.4				
May 8	0.8				
May 15	7.2				
May 22	4.9	30		30	
May 29	5.2	25		25	
June 5	1.8				
June 12	Trace	25		25	20
June 19	16.5				
June 26	Trace		25	25	
July 3	0.1		25	20	25
July 10	0.4		30		30
July 17	39.0				
July 24	2.1				
July 31	Trace				25
Aug 7	Trace				25
Aug 14	Trace				25
Aug 21	0				
Aug 28	2.8				30
Sept 4	9.0				
Sept 11	30.6				
Sept 18	5.9				
Sept 25	36.7				
Oct 2	44.6				

Total	208.0	80	80	125	180

- NOTES: (1) BARLEY IRRIGTN FULL plots started to lodge at the beginning of July and irrigation was stopped to prevent further lodging.
- (2) Analysis of two blocks given ALDICARB(75) showed the residual effect to be negligible, therefore all four blocks were analysed together ignoring this factor.
- (3) There was a systematic difference between the yields recorded from even and odd sub plots in the order of harvesting. An adjustment has been made for this in the yields presented. An explanation is being sought.

76/R/RN/11

BARLEY

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	E+T+B	MEAN
IRRIGTN			
NONE	4.04	4.87	4.45
EARLY	4.89	5.61	5.25
LATE	5.04	5.09	5.07
FULL	4.81	5.95	5.38
MEAN	4.69	5.38	5.04
N TIME	SEEDBED	SB+TD	MEAN
IRRIGTN			
NONE	4.45	4.45	4.45
EARLY	5.26	5.23	5.25
LATE	4.98	5.16	5.07
FULL	5.42	5.35	5.38
MEAN	5.03	5.05	5.04
N TIME	SEEDBED	SB+TD	MEAN
FUNGCIDE			
NONE	4.74	4.65	4.69
E+T+B	5.32	5.44	5.38
MEAN	5.03	5.05	5.04
FUNGCIDE	NONE	E+T+B	
N TIME	SEEDBED	SB+TD	SEEDBED
IRRIGTN			SB+TD
NONE	4.08	3.99	4.83
EARLY	5.01	4.77	5.51
LATE	4.85	5.24	5.11
FULL	5.02	4.60	5.82

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	IRRIGTN	FUNGCIDE	N TIME	IRRIGTN FUNGCIDE
SED	0.205	0.079	0.074	0.233
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: IRRIGTN				0.157
TABLE	IRRIGTN N TIME	FUNGCIDE N TIME	IRRIGTN FUNGCIDE N TIME	
SED	0.235	0.110	0.281	
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: IRRIGTN	0.151		0.219	
FUNGCIDE		0.107		
IRRIGTN.FUNGCIDE			0.212	
IRRIGTN.N TIME			0.219	

76/R/RN/11

BARLEY

GRAIN TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.290	5.8
BLOCK.WP.HP	12	0.222	4.4
BLOCK.WP.HP.SP	23	0.295	5.9

GRAIN MEAN DM% 87.5

STRAW TONNES/HECTARE

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

FUNGCIDE	NONE	E+T+B	MEAN
IRRIGTN			
NONE	3.04	3.44	3.24
EARLY	4.22	4.59	4.41
LATE	3.11	3.33	3.22
FULL	4.05	4.50	4.28
MEAN	3.61	3.96	3.78

N TIME	SEEDBED	SB+TD	MEAN
IRRIGTN			
NONE	3.28	3.20	3.24
EARLY	4.61	4.20	4.41
LATE	3.30	3.13	3.22
FULL	4.38	4.18	4.28
MEAN	3.89	3.68	3.78

N TIME	SEEDBED	SB+TD	MEAN
FUNGCIDE			
NONE	3.75	3.46	3.61
E+T+B	4.03	3.90	3.96
MEAN	3.89	3.68	3.78

FUNGCIDE	NONE	SB+TD	E+T+B	SEEDBED	SB+TD
N TIME					
IRRIGTN					
NONE	3.13	2.94	3.42	3.46	3.46
EARLY	4.51	3.93	4.70	4.47	4.47
LATE	3.22	3.00	3.39	3.27	3.27
FULL	4.15	3.96	4.60	4.40	4.40

STRAW MEAN DM% 90.4

SUB PLOT AREA HARVESTED 0.00347

76/R/RN/11

FORAGE MAIZE DRY MATTER TONNES/HECTARE

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

	N	50	100	150	100+50	MEAN
IRRIGTN						
NONE		9.45	10.00	10.33	9.61	9.85
FULL		11.79	13.08	13.34	13.42	12.91
MEAN		10.62	11.54	11.84	11.51	11.38

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	IRRIGTN*
		N
-----		-----
SED	0.556	0.786

* WITHIN THE SAME LEVEL OF IRRIGTN ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	1.111	9.8

MEAN DM% 40.8

SUB PLOT AREA HARVESTED 0.00156

76/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 12th year, winter oats, barley.

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 73-75/W/RN/12.

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

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. 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, the leys were ploughed in autumn-1971 and 1972 before starting the rotation. The experiment now tests all combinations of:-

Whole plots

1. MANURE Organic manures and fertilisers in the preliminary period:

FYM	Farmyard manure
STRAW	Straw
PEAT	Peat
GREENMNR	Green manures
FERT-FYM	Fertilisers equivalent to FYM
FERT-STR	Fertilisers equivalent to straw
CLOVRLEY	Grass/lover ley, no N
GRASSLEY	Grass ley with N for each cut

Sub plots

2. N 75 N 76 Fertiliser nitrogen (kg N) (residues of treatments to barley-1975 on winter oats, fresh dressings 1976 to barley):

W. OATS	BARLEY	Winter oats	Barley
(0)	0	(0)	0
(25)	25	(25)	25
(50)	50	(50)	50
(75)	75	(75)	75
(100)	100	(100)	100
(125)	125	(125)	125
(150)	150	(150)	150
(175)	175	(175)	175

No fresh nitrogen was applied to winter oats 1976. The crop was cut green on 30 June.

76/W/RN/12

Standard applications:

Winter oats: Manures: (0:20:20) at 300 kg, combine drilled. Weedkillers: Glyphosate at 1.7 kg in 340 l. Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

Barley: Manures: (0:20:20) at 290 kg combine drilled. Weedkiller: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 280 l.

Seed: Winter oats: Peniarth, sown at 200 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Winter oats: Glyphosate applied: 5 Oct, 1975. Ploughed: 24 Oct.

Spring-tine cultivated with crumbler attached: 25 Oct. Seed

sown: 27 Oct. Ioxynil plus mecoprop applied: 20 Apr, 1976.

Harvested green: 30 June.

Barley: Ploughed in sugar beet tops: 24 Nov, 1975. Spring-tine

cultivated: 2 Mar, 1976. N applied: 4 Mar. Seed sown: 8 Mar.

Weedkiller applied: 28 Apr. Combine harvested: 27 July.

NOTE: Soil samples were taken from the blocks in barley for chemical analyses and physical measurements.

WINTER OATS

GREEN CROP DRY MATTER TONNES/HECTARE

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

	N 75	(0)	(25)	(50)	(75)	(100)	(125)	(150)	(175)	MEAN
MANURE										
FYM		2.10	2.06	1.80	2.21	2.29	3.06	2.56	3.29	2.42
STRAW		1.93	2.12	2.50	2.39	2.31	2.39	2.79	2.48	2.36
PEAT		1.58	1.56	1.78	1.67	2.16	2.36	2.42	1.97	1.94
GREENMNR		1.93	1.47	2.09	1.88	2.34	2.16	1.86	2.34	2.01
FERT FYM		1.67	1.41	1.30	1.38	1.81	1.69	1.63	2.23	1.64
FERT STR		1.18	1.51	1.72	1.98	1.85	1.55	1.79	2.00	1.70
CLOVRLEY		2.56	2.51	2.38	2.57	2.90	3.00	2.97	4.23	2.89
GRASSLEY		3.14	2.15	2.62	2.97	2.89	4.96	5.45	4.27	3.55
MEAN		2.01	1.85	2.02	2.13	2.32	2.65	2.68	2.85	2.31

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	MANURE	N 75	MANURE N 75
SED	0.524	0.166	0.684
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.470

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.524	22.7
BLOCK.WP.SP	56	0.470	20.3

GREENCROP MEAN DM% 47.6

SUB PLOT AREA HARVESTED 0.00056

76/W/RN/12

BARLEY

GRAIN TONNES/HECTARE

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

N 76 MANURE	0	25	50	75	100	125	150	175	MEAN
FYM	2.79	3.51	3.06	3.78	3.46	3.14	2.99	3.19	3.24
STRAW	2.65	3.82	4.29	3.79	3.89	3.67	4.22	3.82	3.77
PEAT	2.35	3.03	3.58	3.58	3.78	3.04	2.81	3.14	3.17
GREENMNR	2.06	3.19	2.72	2.42	2.65	3.33	2.75	3.69	2.85
FERT FYM	1.56	2.24	2.34	2.61	3.06	1.83	2.44	2.71	2.35
FERT STR	2.44	3.35	3.16	3.88	3.79	3.83	3.42	3.22	3.39
CLOVRLEY	3.12	4.22	4.19	4.29	3.61	4.01	3.78	3.54	3.85
GRASSLEY	3.15	3.65	3.07	3.39	4.23	3.42	2.98	3.39	3.41
MEAN	2.52	3.38	3.30	3.47	3.56	3.28	3.17	3.34	3.25

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	MANURE	N 76	MANURE N 76
SED	0.652	0.107	0.711
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.302

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.652	20.1
BLOCK.WP.SP	56	0.302	9.3

GRAIN MEAN DM% 88.1

STRAW TONNES/HECTARE

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

N 76 MANURE	0	25	50	75	100	125	150	175	MEAN
FYM	1.68	2.27	2.81	2.85	2.45	2.53	2.61	2.43	2.45
STRAW	1.61	2.17	2.90	2.53	2.68	2.78	2.99	2.89	2.57
PEAT	1.25	1.82	1.74	2.52	2.74	2.14	2.07	1.93	2.03
GREENMNR	1.37	2.18	1.30	1.98	2.52	2.41	2.32	2.58	2.08
FERT FYM	0.91	1.39	1.93	1.84	2.26	1.75	2.30	2.06	1.81
FERT STR	1.34	1.98	2.21	2.41	2.88	2.57	2.17	2.33	2.24
CLOVRLEY	1.85	2.66	2.60	2.90	2.77	2.90	2.92	2.84	2.68
GRASSLEY	1.93	2.62	2.37	3.29	3.08	2.69	2.82	2.63	2.68
MEAN	1.49	2.14	2.23	2.54	2.67	2.47	2.52	2.46	2.32

STRAW MEAN DM% 92.0

SUB PLOT AREA HARVESTED 0.00173

76/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.

Sponsor: D.B. Slope.

The 11th 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 72-75/W/RN/13.

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

Whole plot dimensions: 8.53 x 20.4.

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. PREVCROP

Previous crops:

	1969	1970	1971	1972	1973	1974	1975
C/C/L/P	L	P	C	C	C	L	P
C/L/P/C	P	C	C	C	L	P	C
L/P/C/C	C	C	C	L	P	C	C
P/C/C/C	C	C	L	P	C	C	C
C/C/C/L	C	L	P	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. N

Nitrogen fertiliser (kg N):

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

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

76/W/RN/13

Basal applications: All crops: P205 at 130 kg, K20 at 260 kg as (0:14:28), half ploughed in, half applied to the plough furrow.

Standard applications:

Leys: N at 60 kg as 'Nitro-Chalk' in the seedbed, repeated after sowing.

Weedkiller: Glyphosate at 1.7 kg in 340 l to wheat stubble only.

Potatoes: N at 150 kg as 'Nitro-Chalk'. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Wheat: Weedkillers: Glyphosate at 1.7 kg in 340 l. Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

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

Seed: Ley: Italian ryegrass, sown at 40 kg

Potatoes: Pentland Crown

Wheat: Cappelle sown at 210 kg

Barley: Julia, dressed with ethirimol, sown at 160 kg

Cultivations, etc.: - All plots: Half PK applied, ploughed: 24 Oct, 1975. Remaining PK applied: 27 Oct.

Leys: Weedkiller applied to wheat stubble only: 5 Oct, 1975. Spring-tine cultivated wheat blocks only: 27 Oct. Deep-tine cultivated barley blocks only: 29 Dec. Spring-tine cultivated barley blocks: 2 Mar, 1976, wheat blocks: 9 Mar. N applied: 20 Apr. Seed sown: 27 Apr. N applied: 9 June. Cut once: 20 Oct.

Potatoes: Rotary cultivated: 14 Oct, 1975. Spring-tine cultivated barley blocks: 2 Mar, 1976, wheat blocks: 9 Mar. N applied: 30 Mar. Rotary cultivated, potatoes planted: 6 Apr. Weedkiller applied: 7 May. Rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm mechanically destroyed: 15 Sept. Haulm desiccant applied: 6 Oct. Lifted: 19 Oct.

Wheat: Glyphosate applied: 5 Oct, 1975. Spring-tine cultivated, seed sown: 27 Oct. N applied: 1 Apr, 1976. Weedkiller applied: 20 Apr. Combine harvested: 2 Aug.

Barley: Deep-tine cultivated: 29 Dec, 1975. Spring-tine cultivated: 2 Mar, 1976. Seed sown: 8 Mar. N applied: 9 Mar. Weedkiller applied: 28 Apr. Combine harvested: 26 July.

NOTES: (1) Five plots of wheat N 63 were damaged by birds shortly before harvest. No yields are presented for N 63 on wheat.
(2) Four other plots of wheat were also affected by bird damage:

PREVCROP	N
C/C/L/P	189
C/L/P/C	126
C/L/P/C	189
L/P/C/C	126

Estimated values were used in the analysis.

76/W/RN/13

LEY WHEAT SITE

1ST AND ONLY CUT (20/10/76) DRY MATTER TONNES/HECTARE

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

NRESID	63	126	189	252	MEAN
	0.68	0.64	0.66	0.51	0.62

1ST CUT MEAN DM% 15.9 PLOT AREA HARVESTED 0.00089

LEY BARLEY SITE

1ST AND ONLY CUT (20/10/76) DRY MATTER TONNES/HECTARE

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

NRESID	50	100	150	200	MEAN
	0.95	0.85	0.98	1.07	0.96

1ST CUT MEAN DM% 14.0 PLOT AREA HARVESTED 0.00089

POTATOES WHEAT SITE

TOTAL TUBERS TONNES/HECTARE

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

NRESID	63	126	189	252	MEAN
	22.6	24.3	22.4	24.7	23.5

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

NRESID	63	126	189	252	MEAN
	93.6	93.7	93.3	93.3	93.5

PLOT AREA HARVESTED 0.00139

POTATOES BARLEY SITE

TOTAL TUBERS TONNES/HECTARE

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

NRESID	50	100	150	200	MEAN
	30.4	33.4	32.8	31.9	32.1

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

NRESID	50	100	150	200	MEAN
	95.3	95.7	95.0	95.8	95.7

PLOT AREA HARVESTED 0.00139

76/W/RN/13

WINTER WHEAT

GRAIN TONNES/HECTARE

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

	N	126	189	252	MEAN
PREVCROP					
C/C/L/P		2.41	1.97	1.92	2.10
C/L/P/C		2.22	1.92	1.74	1.96
L/P/C/C		1.59	2.05	1.74	1.79
C/C/C/C		1.63	1.94	1.91	1.83
MEAN		1.96	1.97	1.83	1.92

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	PREVCROP*
		N
	0.090	0.179

* WITHIN THE SAME LEVEL OF PREVCROP ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	4	0.179	9.3
GRAIN MEAN DM%			88.0

STRAW TONNES/HECTARE

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

	N	126	189	252	MEAN
PREVCROP					
C/C/L/P		3.02	2.80	2.56	2.79
C/L/P/C		2.39	2.64	2.75	2.59
L/P/C/C		1.71	2.60	2.43	2.24
C/C/C/C		2.14	2.55	2.13	2.27
MEAN		2.31	2.65	2.47	2.48

STRAW MEAN DM% 87.5

SUB PLOT AREA HARVESTED 0.00273

76/W/RN/13

BARLEY

GRAIN TONNES/HECTARE

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

N	50	100	150	200	MEAN
PREVCROP					
C/C/L/P	3.31	3.18	3.54	3.75	3.44
C/L/P/C	3.16	3.61	3.36	3.29	3.36
L/P/C/C	2.73	3.48	3.83	3.43	3.37
C/C/C/C	2.34	2.76	2.38	2.93	2.60
MEAN	2.88	3.26	3.28	3.35	3.19

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	PREVCROP*
		N

SED	0.163	0.326

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	12	0.326	10.2
GRAIN MEAN DM%	87.5		

STRAW TONNES/HECTARE

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

N	50	100	150	200	MEAN
PREVCROP					
C/C/L/P	1.83	2.11	2.52	2.62	2.27
C/L/P/C	1.55	1.74	2.21	2.05	1.89
L/P/C/C	1.36	1.91	2.48	2.27	2.00
C/C/C/C	1.00	1.54	1.48	1.59	1.40
MEAN	1.44	1.83	2.17	2.13	1.89

STRAW MEAN DM% 88.6

SUB PLOT AREA HARVESTED 0.00273

76/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 ninth 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 73-75/W/RN/14.

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

Whole plot dimensions: 8.53 x 15.8.

Treatments: All combinations of:-

Whole plots

1. P205RES(73) Residues of superphosphate applied autumn 1967 and spring 1973 (kg P205):

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

Sub plots

2. P205RES(72) Residues of superphosphate applied in three equal dressings 1970-72 (kg P205, total):

0	0
376	376

Basal applications: Manures: K2O at 110 kg as muriate of potash. MgO at 30 kg as Epsom salts. K2O at 50 kg as muriate of potash.

Cultivations, etc.: - Mg applied: 15 Dec, 1975. Chain harrowed: 27 Feb, 1976. First K applied: 19 Mar. Cut once: 11 June. Second K applied: 25 June.

76/W/RN/14

1ST AND ONLY CUT (10/6/76) DRY MATTER TONNES/HECTARE

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

P205RES(73)	0	360	720	1440	2160	MEAN
P205RES(72)						
0	1.31	1.77	2.04	1.85	1.59	1.64
376	1.78	1.67	2.08	1.83	1.71	1.81
MEAN	1.54	1.72	2.06	1.84	1.65	1.73

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205RES(72)	P205RES(73)	P205RES(72) P205RES(73)	
SED		0.215	0.232	MIN REP
	0.051	0.186	0.201	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.124	MIN REP
			0.108	MAX-MIN
			0.088	MAX REP

P205RES(73)
 MAX REP 0
 MAX-MIN 0 V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.372	21.6
BLOCK.WP.SP	31	0.215	12.5

MEAN DM% 40.3

SUB PLOT AREA HARVESTED 0.00145

76/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, A.G. Whitehead, T.D. Williams.

The eighth year, potatoes, barley, sugar beet.

For previous years see 69/W/RN/15(t), 70/W/RN/15(t) and 71-75/W/RN/15.

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

Whole plot dimensions: 5.33 x 31.1.

Treatments:

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

Whole plots

1. N Nitrogen fertiliser (kg N), applied cumulatively:

POTATOES & S.BEET	BARLEY	To potatoes and sugar beet	To barley
75	38	75	38
150	75	150	75
225	113	225	113

Sub plots

2. CHEMICAL Chemicals:

0	None
A (P)	Aldicarb at 6 kg before potatoes
A (SB)	Aldicarb at 6 kg before sugar beet
A (B)	Aldicarb at 6 kg before barley
A (ALL)	Aldicarb at 6 kg before all crops
DAZ(ALL)	Dazomet at 224 kg before all crops since 1970 only
BEN(ALL)	Benomyl at 22 kg before all crops since 1974 only

NOTE: Aldicarb first used in 1976. From 1969-75 dichloropropane/dichloropropene ('D-D') was applied at 448 kg to these treatments (before appropriate crops as above).

Standard applications:

Potatoes: Matures: (0:14:28) at 1080 kg. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

76/W/RN/15

Barley: Manures: (0:20:20) at 310 kg combine drilled. Weedkiller:
Ioxynil at 0.52 kg with 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 7.4 kg B₂O₃ (as 'Solubor') applied with insecticide.
Insecticide: Demeton-s-methyl at 0.25 kg in 390 l.

Seed: Potatoes: Pentland Crown.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Sugar beet: Klein E, sown at 6 kg.

Cultivations, etc.:-

All Series: Dazomet applied and these plots only rotary cultivated and all
plots spring-tine cultivated: 11 Nov, 1975.

Potatoes: Ploughed: 4 Nov, 1975. Spring-tine cultivated with crumbler:
5 Nov. Ploughed: 15 Jan, 1976. Spring-tine cultivated: 3 Mar.
PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated:
24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated,
potatoes planted: 1 Apr. Weedkiller applied: 5 May. Grubbed: 2 June.
Rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide with
insecticide applied: 30 June. Fungicide applied: 30 July. Haulm
mechanically destroyed: 15 Sept. Lifted: 28 Sept.

Barley: Ploughed, spring-tine cultivated with crumbler: 5 Nov, 1975.
Ploughed: 15 Jan, 1976. Aldicarb and benomyl applied, all plots
rotary cultivated: 2 Mar. N applied, spring-tine cultivated, seed
sown: 3 Mar. Weedkiller applied: 29 Apr. Combine harvested: 28 July.

Sugar beet: Subsoiled: Tines 140 cm apart and 56 cm deep: 1 Sept, 1975.
Magnesian limestone applied: 5 Sept. Spring-tine cultivated: 18 Sept.
Ploughed twice: 16 Oct and 15 Jan, 1976. Spring-tine cultivated:
3 Mar. PK applied: 15 Mar. N applied: 23 Mar. Spring-tine cultivated:
24 Mar. Aldicarb and benomyl applied, all plots rotary cultivated:
1 Apr. Spring-tine cultivated with crumbler, seed sown: 5 Apr.
Tractor hoed: 13 May. Singled: 20 May. Boron and insecticide applied:
28 May. Hoed by hand: 18 June, Lifted: 18 Nov.

NOTES: (1) Soil samples were taken after harvest for eelworm counts.
(2) Sugar beet: Because of rabbit damage the yields on three plots
with the following treatment combinations were not taken

N	CHEMICAL
75	A(B)
225	O
225	BEN(ALL)

Estimated values were used in the analysis.

76/W/RN/15

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

CHEMICAL	N	75	150	225	MEAN
0		11.4	11.7	10.5	11.2
A(P)		28.6	27.2	20.4	25.4
A(SB)		23.9	23.8	20.8	22.8
A(B)		18.1	19.1	12.0	16.4
A(ALL)		31.3	30.5	27.5	29.8
DAZ(ALL)		28.4	26.3	26.3	27.0
BEN(ALL)		23.3	12.9	11.7	15.9
MEAN		23.6	21.6	18.4	21.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CHEMICAL	CHEMICAL N*
SED	2.81	4.87

* WITHIN THE SAME LEVEL OF N ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	4.87	23.0

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

CHEMICAL	N	75	150	225	MEAN
0		74.6	78.3	77.5	76.8
A(P)		91.7	87.1	84.0	87.6
A(SB)		91.0	89.1	89.1	89.7
A(B)		83.1	82.7	79.0	81.6
A(ALL)		90.8	87.6	88.6	89.0
DAZ(ALL)		90.5	89.1	89.7	89.8
BEN(ALL)		85.1	83.0	74.8	81.0
MEAN		86.7	85.3	83.2	85.1

PLOT AREA HARVESTED 0.00052

76/W/RN/15

BARLEY

GRAIN TONNES/HECTARE

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

	N	38	75	113	MEAN
CHEMICAL					
0		2.02	1.91	2.35	2.09
A(P)		1.90	2.58	2.24	2.24
A(SE)		2.12	2.70	3.03	2.62
A(B)		2.24	2.69	3.25	2.72
A(ALL)		1.68	2.24	3.36	2.43
DAZ(ALL)		2.24	1.68	1.56	1.83
BEN(ALL)		2.13	2.13	2.57	2.28
MEAN		2.05	2.27	2.62	2.31

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CHEMICAL	CHEMICAL N*

SED	0.348	0.603

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.603	26.1
GRAIN MEAN DM%	87.3		

STRAW TONNES/HECTARE

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

	N	38	75	113	MEAN
CHEMICAL					
0		1.67	1.40	2.06	1.71
A(P)		1.59	2.16	1.57	1.77
A(SB)		1.87	2.05	2.25	2.06
A(B)		1.78	2.06	2.43	2.09
A(ALL)		1.58	1.89	2.27	1.91
DAZ(ALL)		1.95	2.19	1.50	1.88
BEN(ALL)		1.97	1.97	1.96	1.97
MEAN		1.77	1.96	2.01	1.91

STRAW MEAN DM% 91.3

PLOT AREA HARVESTED 0.00052

76/W/RN/15

SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

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

N	75	150	225	MEAN
CHEMICAL				
0	29.8	32.4	29.7	30.6
A(P)	27.7	30.9	29.8	29.5
A(SB)	31.8	36.5	37.6	35.3
A(B)	29.3	29.8	32.4	30.5
A(ALL)	33.9	37.1	36.4	35.8
DAZ(ALL)	33.3	28.0	32.4	31.3
BEN(ALL)	26.6	25.6	32.7	28.3
MEAN	30.3	31.5	33.0	31.6

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CHEMICAL	CHEMICAL N*
SED	1.45	2.52

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	15	2.52	8.0

SUGAR PERCENTAGE

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

N	75	150	225	MEAN
CHEMICAL				
0	15.2	14.7	14.0	14.7
A(P)	14.6	14.8	14.3	14.6
A(SB)	15.0	14.9	14.8	14.9
A(B)	15.0	14.3	14.5	14.6
A(ALL)	14.8	14.8	14.8	14.8
DAZ(ALL)	15.0	14.3	14.5	14.6
BEN(ALL)	15.0	14.7	14.4	14.7
MEAN	14.9	14.7	14.5	14.7

76/W/RN/15

SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

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

CHEMICAL	N	75	150	225	MEAN
O		4.54	4.78	4.15	4.49
A(P)		4.04	4.58	4.26	4.29
A(SB)		4.77	5.43	5.58	5.26
A(B)		4.45	4.28	4.69	4.47
A(ALL)		5.00	5.47	5.38	5.29
DAZ(ALL)		5.00	4.00	4.70	4.57
BEN(ALL)		3.98	3.78	4.82	4.19
MEAN		4.54	4.62	4.80	4.65

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CHEMICAL	CHEMICAL N*
SED	0.231	0.400

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	15	0.400	8.6
PLOT AREA HARVESTED	0.00130		

76/W/RN/16

EFFECTS OF DEEP PK

Object: To study the residual 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 third year, winter wheat, sugar beet, spring barley, potatoes.

For previous year see 74-75/W/RN/16.

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

Whole plot dimensions: 4.27 x 2.59.

Treatments: Extra PK and subsoil treatment (applied autumn 1973):

PK SUB	Extra PK	Subsoil (25-50 cm) treatment
- -	None	None
- SUB	None	Subsoiled
PKTOP -	To topsoil (0-25 cm)	None
- PKSUB	To subsoil	Subsoiled

- NOTES: (1) The rates of P and K were 1930 kg P2O5, as superphosphate and 460 kg K2O as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and subsoil.
- (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:

- Series III: Winter wheat: Manures: (0:20:20) at 290 kg, combine drilled. N at 75 kg as 'Nitro-Chalk'. Weedkiller: Ioxynil at 0.6 kg plus mecoprop at 1.8 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
- Series IV: Sugar beet: Manures: Magnesian limestone at 5 tonnes. (0:14:28) at 750 kg. N at 140 kg as 'Nitro-Chalk'. Insecticide: Pirimicarb at 0.14 kg in 280 l.
- Series I: Barley: Manures: (20:14:14) at 380 kg, combined drilled. Weedkiller: Ioxynil at 0.6 kg plus mecoprop at 1.8 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
- Series II: Potatoes: Manures: (13:13:20) at 1860 kg. Weedkiller: Linuron at 0.9 kg in 430 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: Winter wheat: Cappelle, sown at 210 kg.
Sugar beet: Klein E, sown at 5.6 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.

76/W/RN/16

Cultivations, etc.:-

Series III: Winter wheat: Spring-tine cultivated with crumbler, seed sown: 23 Oct, 1975. N applied: 13 Apr, 1976. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand harvested: 19 July.

Series IV: Sugar beet: Magnesian limestone applied: 5 Sept, 1975. Ploughed: 28 Oct. N and PK applied: 30 Mar, 1976. Spring-tine cultivated with crumbler twice, seed sown: 5 Apr. Singled by hand 22 May. Insecticide applied: 25 June. Hand lifted: 17 Nov.

Series I: Barley: Ploughed: 24 Nov, 1975. Spring-tine cultivated with crumbler: 8 Mar, 1976. Seed sown: 9 Mar. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand harvested: 20 July.

Series II: Potatoes: Ploughed: 28 Oct, 1975. NPK applied: 23 Mar, 1976. Rotary harrowed, potatoes planted: 31 Mar. Weedkiller applied: 30 Apr. Insecticide applied: 25 June. Hand lifted: 19 Oct.

NOTE: 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.

76/W/RN/16

WINTER WHEAT

GRAIN TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	3.48	4.06	3.18	4.17	3.72

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	0.281

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.344	9.2

GRAIN MEAN DM% 89.2

STRAW TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	4.90	5.64	4.33	6.34	5.30

STRAW MEAN DM% 90.3

PLOT AREA HARVESTED 0.00033

SUGAR BEET

ROOTS WASHED TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	35.3	36.9	33.0	39.3	36.1

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	1.62

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	1.98	5.5

76/W/RN/16

SUGAR BEET

SUGAR PERCENTAGE TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	14.9	15.0	14.8	14.9	14.9

TOTAL SUGAR TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	5.25	5.54	4.88	5.86	5.38

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	0.241

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.295	5.5

TOPS TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	23.3	24.9	24.7	25.6	25.9

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	1.32

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	1.62	6.3

PLOT AREA HARVESTED 0.00049

76/W/RN/16

BARLEY

GRAIN TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	3.43	4.46	3.77	4.51	4.04

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	0.261

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.319	7.9

GRAIN MEAN DM% 89.2

STRAW TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	3.16	4.14	3.41	4.44	3.79

STRAW MEAN DM% 92.2

PLOT AREA HARVESTED 0.00033

POTATOES

TOTAL TUBERS TONNES/HECTARE

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

PK SUB	- -	- SUB	PKTOP -	- PKSUB	MEAN
	41.3	39.7	43.0	47.1	42.8

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PK SUB
-----	-----
SED	2.34

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	2.87	6.7

PLOT AREA HARVESTED 0.00043

76/R/CS/1

LEVELS OF N AND K

Object: To study the residual effects of N, P and K fertilisers applied to grass 1958-1967 and further dressings of P and K to tillage crops 1969-71 - Harwoods Piece.

Sponsor: F,V, Widdowson.

The 19th year, potatoes.

For previous years see 58/Cg/2(t), 59/Cg/2(t), 60/Ci/1, 61/Dg/1, 62/C/11, 63/C/7, 64/C/6(t), 65/C/6(t), 66/C/5, 67/C/4, 68/C/4(t), 69/R/CS/1(t), 70/R/CS/1(t), 71/R/CS/1(t) and 72-75/R/CS/1.

Design: 4 randomised blocks of 12 plots split into 2.

Whole plot dimensions: 2.13 x 16.5.

Treatments: All combinations of:-

Whole plots

1. NPK NPK residues and fresh dressings of P and K:

	To grass 1958-67			To potatoes 1971 and 1976	
	N	P	K	P	K
(N0)P1K0	0	1	0	1	0
(N1)P1K0	1	1	0	1	0
(N1)P1K1	1	1	1	1	1
(N1)P1K2	1	1	2	1	2
(N2)P1K0	2	1	0	1	0
(N2)P1K1	2	1	1	1	1
(N2)P1K2	2	1	2	1	2
(N3)P1K0	3	1	0	1	0
(N3)P1K1	3	1	1	1	1
(N3)P1K2	3	1	2	1	2
(N3)P0K2	3	0	2	0	2
(N3)P2K2	3	2	2	2	2

To grass: N1, 2, 3 = 38, 75, 113 kg N per cut. P1, 2 = 75, 150 kg P205 per annum. K1, 2 = 38, 75 kg K20 per cut.

To potatoes 1971: P1, 2 = 125, 250 kg P205. K1, 2 = 125, 250 kg K20.

To potatoes 1976: P1, 2 = 188, 376 kg P205. K1, 2 = 188, 376 kg K20.
All tillage crops received basal N.

Sub plots

2. POTASH Muriate of potash (kg K20):

	Total 1969-71	1976
	0	None
K	376	188

76/R/CS/1

Basal applications: Manures: 310 kg N as 'Nitro-Chalk'. Weedkillers: Paraquat at 0.14 kg ion in 220 l applied in autumn. Linuron at 1.2 kg plus paraquat at 0.14 kg ion in 220 l in spring. Fungicide: Mancozeb at 1.3 kg in 450 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 450 l.

Seed: Pentland Crown.

Cultivations, etc:- Test P and K applied: 10 Sept, 1975. Autumn weedkiller applied: 22 Oct. Ploughed: 25 Nov. N applied: 30 Mar, 1976. Rotary cultivated and planted: 1 Apr. Grubbed and rotoridged: 13 Apr. Weedkillers applied: 10 May. Grubbed: 4 June. Insecticide applied: 17 June. Fungicide applied: 28 July. Haulm mechanically destroyed: 24 Sept. Haulm desiccant applied: 28 Sept. Lifted: 15 Nov.

NOTE: Leaf samples were taken on 11 August for K and Mg analysis.

76/R/CS/1

TOTAL TUBERS TONNES/HECTARE

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

POTASH NPK	0	K	MEAN
(N0)P1K0	18.5	25.6	22.0
(N1)P1K0	19.1	23.0	21.0
(N1)P1K1	21.8	26.4	24.1
(N1)P1K2	27.7	28.9	28.3
(N2)P1K0	16.3	24.7	20.5
(N2)P1K1	24.6	29.5	27.1
(N2)P1K2	25.7	26.6	26.1
(N3)P1K0	19.7	25.4	22.6
(N3)P1K1	22.8	24.7	23.8
(N3)P1K2	26.7	30.6	28.7
(N3)P0K2	26.6	27.5	27.0
(N3)P2K2	32.2	29.9	31.0
MEAN	23.5	26.9	25.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NPK	POTASH	NPK POTASH
SED	2.19	0.62	2.67
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: NPK			2.16

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	33	3.10	12.3
BLOCK.WP.SP	36	3.06	12.1

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

POTASH NPK	0	K	MEAN
(N0)P1K0	93.4	94.6	94.0
(N1)P1K0	93.9	95.7	94.8
(N1)P1K1	96.3	95.2	95.8
(N1)P1K2	96.8	96.8	96.8
(N2)P1K0	92.5	94.6	93.5
(N2)P1K1	95.3	96.4	95.8
(N2)P1K2	96.3	96.9	96.6
(N3)P1K0	94.8	96.0	95.4
(N3)P1K1	95.5	96.4	96.0
(N3)P1K2	96.3	95.7	96.0
(N3)P0K2	95.8	96.3	96.0
(N3)P2K2	95.7	96.7	96.2
MEAN	95.2	95.9	95.6

SUB PLOT AREA HARVESTED 0.00095

76/R/CS/10 and 76/W/CS/10

LONG TERM LIMING

Object: To study the effects of different amounts of lime on the yields of a sequence of crops. The effects of P, K and Mg are also studied - Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsor: J. Bolton.

The 15th year, spring oilseed rape.

For previous years see 'Details' 1967, 68/C/3(t), 69/R&W/CS/10, 70/R&W/CS/10(t) and 71-75/R&W/CS/10.

Design: 2 randomised blocks of 16 plots, split into 2.

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

Whole plots

1. LIME Ground chalk (tonnes CaCO₃) (total applied 1962-63):

R	W	Rothamsted (R)	Woburn (W)
0	0	None	None
5	5	5	5
10	12	10	12
20	19	20	19

2. P205 Phosphate, applied cumulatively to previous dressings, as superphosphate (kg P205):

0	None
63	63

3. K20 Potassium, applied cumulatively to previous dressings, as muriate of potash (kg K20):

0	None
126	126

Sub plots

4. MG Magnesium, applied cumulatively in 1974 and 1976 only, as Epsom salts (kg Mg):

0	None
112	112

Basal applications:

Sawyers I (R): Manures: N at 170 kg. Weedkillers: Paraquat at 0.56 kg ion in 220 l.

Stackyard C (W): Manures: N at 170 kg.

Seed: Sawyers I (R): Maris Haplona, sown at 5.6 kg.

Stackyard C (W): Maris Haplona, sown at 6.2 kg.

76/R/CS/10 and 76/W/CS/10

Cultivations, etc.:-

Sawyers I (R): Weedkiller applied: 7 Oct, 1975. Ploughed: 20 Oct.
 Spring-tine cultivated: 11 Mar, 1976. Treatment P, K and Mg and basal N applied: 24 Mar. Spring-tine cultivated, seed sown: 26 Mar. Harvested green: 14 July.
 Stackyard C (W): Heavy spring-tine cultivated, rotary cultivated: 2 Sept, 1975. Ploughed: 21 Oct. Spring-tine cultivated: 9 Mar, 1976. Treatment P, K and Mg applied: 26 Mar. Basal N applied: 29 Mar. Spring-tine cultivated with crumbler: 30 Mar. Rolled, seed sown: 31 Mar. Harvested green: 7 July.

NOTES: (1) Photographs were taken and growth scores made in July.
 (2) Because of crop failure no yield was harvestable on 5 plots with the following Treatment Combinations:-

LIME	P205	K20	Mg
0	0	0	0
0	0	126	0 (TWO)
0	0	126	112 (TWO)

These yields were treated as zero, missing values were not estimated.

76/R/CS/10 SAWYERS I (R)

GREENCROP DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.470	30.3
BLOCK.WP.SP	16	0.236	15.2

MEAN DM% 34.6

SUB PLOT AREA HARVESTED 0.00084

76/W/CS/10 STACKYARD C(W)

GREENCROP DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.324	28.7
BLOCK.WP.SP	16	0.234	20.7

MEAN DM% 26.6

SUB PLOT AREA HARVESTED 0.00251

76/R/CS/10 SAWYERS I (R)

GREENCROP DRY MATTER TONNES/HECTARE

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

K20	0	126	MEAN		
P205					
0	0.75	0.94	0.85		
63	1.62	2.89	2.25		
MEAN	1.19	1.91	1.55		
MG	0	112	MEAN		
P205					
0	0.90	0.79	0.85		
63	2.34	2.17	2.25		
MEAN	1.62	1.48	1.55		
MG	0	112	MEAN		
K20					
0	1.20	1.18	1.19		
126	2.05	1.78	1.91		
MEAN	1.62	1.48	1.55		
LIME	0	5	10	20	MEAN
P205					
0	0.15	0.75	1.20	1.27	0.85
63	1.13	1.95	2.74	3.19	2.25
MEAN	0.64	1.35	1.97	2.23	1.55
LIME	0	5	10	20	MEAN
K20					
0	0.51	0.99	1.66	1.60	1.19
126	0.78	1.71	2.29	2.86	1.91
MEAN	0.64	1.35	1.97	2.23	1.55
LIME	0	5	10	20	MEAN
MG					
0	0.61	1.50	2.03	2.34	1.62
112	0.68	1.20	1.92	2.12	1.48
MEAN	0.64	1.35	1.97	2.23	1.55
K20	0	126			
MG	0	112	0	112	
P205					
0	0.75	0.76	1.05	0.82	
63	1.64	1.60	3.04	2.74	
LIME	0	5	10	20	
P205					
0	0	0.31	0.81	1.08	0.82
	126	0.90	0.70	1.33	1.72
63	0	0.71	1.18	2.23	2.37
	126	1.56	2.73	3.26	4.01

76/R/CS/10 SAWYERS I (R)

GREENCROP DRY MATTER TONNES/HECTARE

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

	LIME	0	5	10	20	
P205	MG					
0	0	0.17	0.81	1.21	1.41	
63	0	1.05	2.20	2.85	3.27	
	112	1.22	1.71	2.63	3.11	
K20	LIME	0	5	10	20	
	MG					
0	0	0.50	1.02	1.59	1.67	
	112	0.52	0.97	1.72	1.52	
126	0	0.72	1.99	2.47	3.01	
	112	0.84	1.44	2.12	2.72	
P205	K20	LIME	0	5	10	20
		MG				
0	0	0	0.35	0.92	1.00	0.73
		112	0.27	0.69	1.16	0.92
	126	0	0.00	0.69	1.42	2.10
		112	0.00	0.71	1.23	1.33
63	0	0	0.65	1.11	2.19	2.62
		112	0.76	1.24	2.27	2.13
	126	0	1.44	3.28	3.52	3.92
		112	1.67	2.17	3.00	4.10

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205	K20	MG	LIME
SED	0.166	0.166	0.059	0.235
TABLE	P205	P205	K20	P205
	K20	MG	MG	LIME
SED	0.235	0.176	0.176	0.332
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205		0.083		
K20			0.083	
TABLE	K20	MG	P205	P205
	LIME	LIME	K20	K20
			MG	LIME
SED	0.332	0.249	0.249	0.470
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
LIME		0.118		
P205.K20			0.118	
TABLE	P205	K20	P205	
	MG	MG	K20	
	LIME	LIME	MG	
			LIME	
SED	0.352	0.352	0.498	
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205.LIME	0.167			
K20.LIME		0.167		
P205.K20.LIME			0.236	

76/W/CS/10 STACKYARD C(W)

GREENCROP DRY MATTER TONNES/HECTARE

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

K20	0	126	MEAN		
P205					
0	0.57	0.92	0.74		
63	0.87	2.15	1.51		
MEAN	0.72	1.54	1.13		
MG	0	112	MEAN		
P205					
0	0.66	0.83	0.74		
63	1.48	1.55	1.51		
MEAN	1.07	1.19	1.13		
MG	0	112	MEAN		
K20					
0	0.66	0.78	0.72		
126	1.48	1.59	1.54		
MEAN	1.07	1.19	1.13		
LIME	0	5	12	19	MEAN
P205					
0	0.19	0.82	0.80	1.16	0.74
63	1.03	1.47	1.75	1.81	1.51
MEAN	0.61	1.15	1.27	1.48	1.13
LIME	0	5	12	19	MEAN
K20					
0	0.45	0.61	0.85	0.97	0.72
126	0.77	1.69	1.70	1.99	1.54
MEAN	0.61	1.15	1.27	1.48	1.13
LIME	0	5	12	19	MEAN
MG					
0	0.59	1.05	1.22	1.42	1.07
112	0.64	1.24	1.33	1.55	1.19
MEAN	0.61	1.15	1.27	1.48	1.13
K20	0		126		
MG	0	112	0	112	
P205					
0	0.51	0.62	0.80	1.03	
63	0.80	0.95	2.15	2.15	
	LIME	0	5	12	19
P205	K20				
0	0	0.17	0.59	0.81	0.71
	126	0.22	1.05	0.80	1.60
63	0	0.74	0.62	0.90	1.23
	126	1.32	2.32	2.59	2.38

76/W/CS/10 STACKYARD C (W)

GREENCROP DRY MATTER TONNES/HECTARE

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

		LIME	0	5	12	19
P205	MG					
0	0	0.15	0.67	0.68	1.13	
	112	0.23	0.97	0.93	1.18	
63	0	1.02	1.42	1.77	1.70	
	112	1.05	1.52	1.72	1.91	
		LIME	0	5	12	19
K20	MG					
0	0	0.40	0.54	0.82	0.87	
	112	0.50	0.67	0.89	1.07	
126	0	0.77	1.56	1.62	1.97	
	112	0.77	1.81	1.77	2.02	
		LIME	0	5	12	19
P205	K20	MG				
0	0	0	0.13	0.46	0.71	0.77
		112	0.21	0.73	0.91	0.65
	126	0	0.18	0.89	0.64	1.50
		112	0.25	1.20	0.95	1.71
63	0	0	0.68	0.62	0.93	0.97
		112	0.80	0.62	0.87	1.50
	126	0	1.35	2.23	2.60	2.44
		112	1.29	2.42	2.58	2.33

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205	K20	MG	LIME
SED	0.114	0.114	0.058	0.162
TABLE	P205 K20	P205 MG	K20 MG	P205 LIME
SED	0.162	0.129	0.129	0.229
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205		0.083		
K20			0.083	
TABLE	K20 LIME	MG LIME	P205 K20 MG	P205 K20 LIME
SED	0.229	0.182	0.182	0.324
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
LIME		0.117		
P205.K20			0.117	
TABLE	P205 MG LIME	K20 MG LIME	P205 K20 MG LIME	
SED	0.257	0.257	0.364	
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205.LIME	0.165			
K20.LIME		0.165		
P205.K20.LIME			0.234	

75/W/CS/11

SOIL STRUCTURE

Object: To study the residual effects of peat, at a range of nitrogen levels, on the yield of ryegrass - Woburn Stackyard II.

Sponsor: A.E. Johnston.

The 13th year, ryegrass.

For previous years see 64/C/20(t), 65/C/19(t), 66/C/11(t), 67/C/8(t), 68/C/31(t), 69/W/CS/11(t), 70/W/CS/11(t), 71/W/CS/11, 72/W/CS/11(t) and 73-75/W/CS/11.

Design: Single replicate of 5 x 4. Levels of peat in 4 randomised blocks of 5 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

1. PEAT Peat (tonnes dry matter - total applied 1963-72):

0	0
8	8
55	55
110	110
165	165

2. NPERCUT Nitrogen fertiliser as ammonium nitrate (kg N per cut), cumulative to previous treatments:

0	0
30	30
60	60
90	90

Basal applications: Manures: Ground chalk at 2.5 tonnes. P at 85 kg, as triple superphosphate, K at 300 kg, as potassium bicarbonate, Mg at 55 kg, as magnesium sulphate. Weedkillers: Benazolin with 2,4-DB and MCPA ('Ley Cornox' at 8.4 l in 280 l).

Seed: RvP ryegrass, sown at 50 kg.

Cultivations, etc.:- Ground chalk, P, K and Mg applied, plots dug by hand: 11 Dec, 1975. N applied, seed sown: 22 Mar, 1976. Weedkiller applied: 25 May. Cut, N applied: 24 June. Cut: 5 Nov.

NOTES: (1) Soil samples were taken after the second cut for P and K analysis.

(2) Crop samples were taken for N, P, K and Mg analysis.

76/W/CS/11

1ST CUT (24/6/76) DRY MATTER TONNES/HECTARE

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

NPERCUT PEAT	0	30	60	90	MEAN
0	0.26	0.76	1.43	1.70	1.04
8	0.41	0.84	0.97	1.49	0.93
55	0.51	1.00	1.24	1.47	1.06
110	0.46	1.10	2.36	2.06	1.49
165	0.59	1.41	1.72	2.13	1.46
MEAN	0.45	1.02	1.54	1.77	1.20

1ST CUT MEAN DM% 34.4

1ST CUT PLOT AREA HARVESTED 0.00046

2ND CUT (5/11/76) DRY MATTER TONNES/HECTARE

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

NPERCUT PEAT	0	30	60	90	MEAN
0	0.31	0.67	0.79	0.95	0.68
8	0.47	0.74	0.84	0.78	0.71
55	0.49	0.84	0.93	1.00	0.81
110	0.58	0.76	0.96	0.84	0.78
165	0.43	0.85	0.88	1.11	0.82
MEAN	0.46	0.77	0.88	0.94	0.76

2ND CUT MEAN DM% 19.1

2ND CUT PLOT AREA HARVESTED 0.00042

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

NPERCUT PEAT	0	30	60	90	MEAN
0	0.57	1.43	2.23	2.65	1.72
8	0.89	1.58	1.81	2.28	1.64
55	1.00	1.84	2.17	2.48	1.87
110	1.04	1.85	3.31	2.89	2.27
165	1.02	2.27	2.60	3.24	2.28
MEAN	0.90	1.79	2.42	2.71	1.96

TOTAL OF 2 CUTS MEAN DM% 26.7

76/R/CS/13

N LEVELS TO OLD GRASS

Object: To study the effects of a range of nitrogen rates on yield and botanical composition of very old permanent pasture given a single dressing of P and K annually. N fixed by legumes is estimated and the effect of treatments on nutrients available in the soil is also studied - Park Grass Old Plot 6.

Sponsor: A.E. Johnston.

The 12th year, old grass.

For previous years see 65/C/33(t), 66/C/14, 67/C/10(t), 68/C/8(t), 69/R/CS/13(t), 70/R/CS/13(t), 71/R/CS/13, 72/R/CS/13(t) and 73-75/R/CS/13.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 1.83 x 10.1.

Treatments

TOTAL N	Fertiliser nitrogen (kg N-total per annum applied in four equal dressings as 25:0:16):
0(S)	0 (sprayed with 2,4-D to control legumes, two plots per block)
0	0 (two plots per block)
75	75
150	150
225	225
300	300
375	375
450	450

NOTE: 2,4-D ester applied as 'Dicotox Extra' at 2.1 l in 280 l on 28 Apr, 1976.

Basal applications: 34 kg P as superphosphate, 224 kg K as potassium sulphate, 11 kg Mg as magnesium sulphate.

Cultivations, etc.: - Basal P, K and Mg applied: 9 Dec, 1975. N applied: 18 Mar, 1976, 14 May and 6 June. Cut: 13 May, 6 June and 3 Oct.

NOTE: Because of severe drought only three cuts were taken and hence only three quarters of the usual TOTAL N rates shown above were applied.

76/R/CS/13

1ST CUT (13/5/76) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.45	1.44	1.84	2.61	3.25	4.40	4.86	4.63	2.54

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TOTAL N	
SED	0.305	MIN REP
	0.264	MAX-MIN
	0.216	MAX REP

TOTAL N
 MAX REP 0(S) V 0
 MAX-MIN 0(S) OR 0 V ANY ONE OF THE REMAINDER
 MIN-REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.431	17.0

1ST CUT MEAN DM% 22.6

2ND CUT (6/7/76) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.25	0.45	0.43	0.57	0.81	0.71	0.54	0.54	0.50

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TOTAL N	
SED	0.088	MIN REP
	0.076	MAX-MIN
	0.062	MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.125	24.9

2ND CUT MEAN DM% 42.3

76/R/CS/13

3RD CUT (5/10/76) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.45	0.57	0.98	1.09	1.58	1.68	1.64	1.53	1.06

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TOTAL N	
SED	0.102	MIN REP
	0.088	MAX-MIN
	0.072	MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.144	13.6

3RD CUT MEAN DM% 16.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	1.15	2.46	3.25	4.27	5.63	6.79	7.05	6.76	4.10

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TOTAL N	
SED	0.283	MIN REP
	0.245	MAX-MIN
	0.200	MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.400	9.8

TOTAL OF 3 CUTS MEAN DM% 27.1

PLOT AREA HARVESTED 0.00086

76/R/CS/14

NPK TO OLD GRASS

Object: To study the effects of a range of P and K levels on yields of permanent pasture on sites with much or little P and K in the soil - Park Grass Old Plots 5/1 and 5/2.

Sponsor: A.E. Johnston.

The 12th year, old grass.

For previous years see 65/C/22(t), 66/C/13(t), 67/C/9(t), 68/C/7 and 69-75/R/CS/14.

Design: On each site: A single replicate of 2 x 4 x 4 in 2 blocks of 16 plot each, with 2 x 2 additional plots in each block.

Whole plot dimensions: 1.83 x 10.1.

Treatments:

The experiment is duplicated on sites differing in previous history:-
PLOT

5/1NORES	Park Grass Plot 5/1: No P or K
5/2PKRES	Park Grass Plot 5/2: Superphosphate to supply 34 kg P, sulphate of potash to supply 224 kg K, annually 1898-1964

On each site, all combinations of:-

1. NPERCUT Nitrogen fertiliser (kg N for each cut):

33.6	33.6
67.2	67.2

2. P Phosphate (kg P) as superphosphate annually:

0.0	0.0
16.8	16.8
33.6	33.6
67.2	67.2

3. K Potassium (kg K) as potassium chloride annually:

0	0
112	112
224	224
448	448

76/R/CS/14

together with extra treatments, all combinations of:-

1. NPERCUT Nitrogen fertiliser (kg N for each cut):

33.6	33.6
67.2	67.2

2. PKRES65 Residues of PK fertilisers applied 1965 only:

34P56K	33.6 kg P, 56 kg K
34P336K	33.6 kg P, 336 kg K

NOTE: NPERCUT was not applied after the second cut.

Basal applications: Weedkiller: 24-D ester at 3.4 kg acid equivalent in 220 l.

Cultivations, etc.:- P and K applied: 9 Dec, 1975. N applied: 18 Mar, 1976, 18 May. Cut: 17 May, 23 Aug, 9 Nov. Weedkiller applied: 17 Sept.

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.33	2.29	2.38	2.59	2.15
67.2	1.29	3.08	3.34	3.15	2.72
MEAN	1.31	2.69	2.86	2.87	2.43
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.54	2.32	2.59	2.14	2.15
67.2	1.27	3.13	3.46	3.01	2.72
MEAN	1.40	2.72	3.03	2.57	2.43
K	0	112	224	448	MEAN
P					
0.0	1.16	1.65	1.35	1.07	1.31
16.8	1.45	3.15	3.51	2.63	2.69
33.6	1.28	3.16	3.66	3.34	2.86
67.2	1.71	2.93	3.58	3.25	2.87
MEAN	1.40	2.72	3.03	2.57	2.43
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	1.43	1.47	1.25	1.18
	16.8	1.62	2.69	2.50	2.36
	33.6	1.19	2.56	3.45	2.32
	67.2	1.90	2.56	3.19	2.69
67.2	0.0	0.90	1.83	1.46	0.95
	16.8	1.28	3.62	4.52	2.91
	33.6	1.37	3.76	3.87	4.36
	67.2	1.51	3.30	3.98	3.81

1ST CUT MEAN DM% 24.3

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	0.71	0.91	0.76	0.85	0.81
67.2	1.26	0.78	1.18	1.27	1.13
MEAN	0.99	0.85	0.97	1.06	0.97
K	0	112	224	448	MEAN
NPERCUT					
33.6	0.53	0.77	0.96	0.97	0.81
67.2	0.43	1.02	1.45	1.60	1.13
MEAN	0.48	0.90	1.21	1.28	0.97
K	0	112	224	448	MEAN
P					
0.0	0.69	1.14	1.18	0.93	0.99
16.8	0.34	0.83	1.17	1.06	0.85
33.6	0.50	0.63	1.23	1.53	0.97
67.2	0.40	0.98	1.25	1.61	1.06
MEAN	0.48	0.90	1.21	1.28	0.97
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.59	0.80	0.69	0.74
	16.8	0.54	0.78	1.17	1.16
	33.6	0.48	0.61	0.90	1.06
	67.2	0.51	0.89	1.09	0.91
67.2	0.0	0.78	1.48	1.67	1.13
	16.8	0.14	0.88	1.16	0.95
	33.6	0.52	0.65	1.56	2.01
	67.2	0.30	1.08	1.41	2.30

2ND CUT MEAN DM% 45.9

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN	
NPERCUT						
33.6	0.29	0.53	0.80	0.71	0.58	
67.2	0.39	0.68	0.62	0.68	0.59	
MEAN	0.34	0.60	0.71	0.70	0.59	
K	0	112	224	448	MEAN	
NPERCUT						
33.6	0.61	0.52	0.56	0.65	0.58	
67.2	0.35	0.89	0.68	0.45	0.59	
MEAN	0.48	0.70	0.62	0.55	0.59	
K	0	112	224	448	MEAN	
P						
0.0	0.31	0.29	0.39	0.38	0.34	
16.8	0.30	0.79	0.72	0.62	0.60	
33.6	0.83	1.01	0.58	0.42	0.71	
67.2	0.48	0.73	0.79	0.79	0.70	
MEAN	0.48	0.70	0.62	0.55	0.59	
	K	0	112	224	448	
NPERCUT	P					
33.6	0.0	0.28	0.20	0.16	0.54	
	16.8	0.32	0.68	0.56	0.54	
	33.6	1.34	0.73	0.68	0.46	
	67.2	0.49	0.47	0.82	1.06	
67.2	0.0	0.34	0.38	0.61	0.23	
	16.8	0.27	0.89	0.88	0.69	
	33.6	0.33	1.30	0.49	0.38	
	67.2	0.46	0.99	0.75	0.52	

3RD CUT MEAN DM% 21.4

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	2.33	3.73	3.94	4.15	3.54
67.2	2.94	4.55	5.15	5.10	4.43
MEAN	2.63	4.14	4.55	4.62	3.99
K	0	112	224	448	MEAN
NPERCUT					
33.6	2.67	3.61	4.12	3.75	3.54
67.2	2.05	5.04	5.59	5.06	4.43
MEAN	2.36	4.33	4.85	4.41	3.99
K	0	112	224	448	MEAN
P					
0.0	2.16	3.08	2.92	2.38	2.63
16.8	2.08	4.77	5.40	4.30	4.14
33.6	2.62	4.81	5.47	5.30	4.55
67.2	2.59	4.64	5.62	5.65	4.62
MEAN	2.36	4.33	4.85	4.41	3.99
NPERCUT	K	0	112	224	448
	P				
33.6	0.0	2.30	2.47	2.10	2.46
	16.8	2.48	4.16	4.23	4.05
	33.6	3.01	3.90	5.03	3.84
	67.2	2.91	3.91	5.11	4.66
67.2	0.0	2.01	3.70	3.74	2.30
	16.8	1.69	5.38	6.56	4.55
	33.6	2.22	5.72	5.92	6.75
	67.2	2.26	5.37	6.13	6.64

TOTAL OF 3 CUTS MEAN DM% 30.5

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/1 NORES

PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	1.19	1.25	1.22
67.2	1.20	0.89	1.04
MEAN	1.19	1.07	1.13

1ST CUT MEAN DM% 31.2

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.60	0.74	0.67
67.2	0.75	0.49	0.62
MEAN	0.68	0.61	0.64

2ND CUT MEAN DM% 47.2

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.41	0.40	0.41
67.2	0.37	0.22	0.29
MEAN	0.39	0.31	0.35

3RD CUT MEAN DM% 27.0

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	2.20	2.39	2.29
67.2	2.32	1.60	1.96
MEAN	2.26	1.99	2.13

TOTAL OF 3 CUTS MEAN DM% 35.2

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	2.73	2.55	2.62	2.33	2.56
67.2	4.25	4.49	4.25	4.08	4.27
MEAN	3.49	3.52	3.43	3.20	3.41
K	0	112	224	448	MEAN
NPERCUT					
33.6	2.58	2.69	2.51	2.45	2.56
67.2	4.12	4.34	4.53	4.08	4.27
MEAN	3.35	3.51	3.52	3.26	3.41
K	0	112	224	448	MEAN
P					
0.0	3.25	3.63	3.71	3.37	3.49
16.8	3.29	3.48	3.81	3.50	3.52
33.6	3.51	3.60	3.45	3.17	3.43
67.2	3.35	3.34	3.10	3.02	3.20
MEAN	3.35	3.51	3.52	3.26	3.41
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	2.53	2.74	2.98	2.67
	16.8	2.40	2.72	2.60	2.46
	33.6	2.74	2.89	2.31	2.55
	67.2	2.64	2.40	2.14	2.13
67.2	0.0	3.97	4.51	4.45	4.06
	16.8	4.17	4.23	5.01	4.54
	33.6	4.28	4.32	4.59	3.79
	67.2	4.07	4.29	4.06	3.91

1ST CUT MEAN DM% 22.5

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.35	1.06	1.16	1.06	1.16
67.2	1.50	1.53	1.43	1.97	1.61
MEAN	1.43	1.30	1.29	1.52	1.38
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.12	1.20	1.11	1.20	1.16
67.2	1.56	1.16	1.96	1.76	1.61
MEAN	1.34	1.18	1.53	1.48	1.38
K	0	112	224	448	MEAN
P					
0.0	1.24	1.03	1.61	1.82	1.43
16.8	1.13	1.15	1.52	1.40	1.30
33.6	1.28	1.20	1.67	1.02	1.29
67.2	1.71	1.33	1.34	1.70	1.52
MEAN	1.34	1.18	1.53	1.48	1.38
NPERCUT	K	0	112	224	448
	P				
33.6	0.0	1.24	1.21	1.42	1.53
	16.8	0.97	1.20	1.23	0.85
	33.6	0.96	1.41	1.05	1.21
	67.2	1.31	0.96	0.74	1.23
67.2	0.0	1.25	0.85	1.80	2.11
	16.8	1.28	1.09	1.81	1.95
	33.6	1.60	0.99	2.29	0.83
	67.2	2.11	1.69	1.93	2.16

2ND CUT MEAN DM% 41.3

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	0.36	0.38	0.47	0.48	0.42
67.2	0.73	0.75	0.70	0.67	0.71
MEAN	0.55	0.57	0.59	0.57	0.57
K	0	112	224	448	MEAN
NPERCUT					
33.6	0.48	0.41	0.41	0.39	0.42
67.2	0.97	0.52	0.76	0.61	0.71
MEAN	0.72	0.46	0.58	0.50	0.57
K	0	112	224	448	MEAN
P					
0.0	0.57	0.58	0.65	0.39	0.55
16.8	0.87	0.42	0.57	0.40	0.57
33.6	0.71	0.49	0.54	0.62	0.59
67.2	0.75	0.36	0.59	0.59	0.57
MEAN	0.72	0.46	0.58	0.50	0.57
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.30	0.43	0.42	0.30
	16.8	0.47	0.34	0.38	0.34
	33.6	0.58	0.41	0.41	0.49
	67.2	0.58	0.46	0.43	0.44
67.2	0.0	0.83	0.73	0.88	0.49
	16.8	1.27	0.51	0.76	0.47
	33.6	0.83	0.57	0.66	0.75
	67.2	0.93	0.26	0.75	0.74

3RD CUT MEAN DM% 20.1

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	4.44	3.99	4.25	3.86	4.14
67.2	6.49	6.77	6.37	6.73	6.59
MEAN	5.46	5.38	5.31	5.29	5.36
K	0	112	224	448	MEAN
NPERCUT					
3.6	4.18	4.30	4.03	4.05	4.14
67.2	6.65	6.01	7.25	6.45	6.59
MEAN	5.41	5.15	5.64	5.25	5.36
K	0	112	224	448	MEAN
P					
0.0	5.06	5.24	5.97	5.58	5.46
16.8	5.28	5.05	5.89	5.31	5.38
33.6	5.50	5.29	5.66	4.81	5.31
67.2	5.82	5.04	5.02	5.30	5.29
MEAN	5.41	5.15	5.64	5.25	5.36
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	4.06	4.38	4.82	4.49
	16.8	3.85	4.27	4.20	3.65
	33.6	4.28	4.71	3.78	4.24
	67.2	4.53	3.82	3.30	3.80
67.2	0.0	6.06	6.09	7.13	6.66
	16.8	6.72	5.82	7.58	6.97
	33.6	6.71	5.88	7.54	5.38
	67.2	7.11	6.25	6.74	6.81

TOTAL OF 3 CUTS MEAN DM% 28.0

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/2 PKRES

PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	2.56	2.68	2.62
67.2	3.84	4.14	3.99
MEAN	3.20	3.41	3.30

1ST CUT MEAN DM% 23.8

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	1.43	1.17	1.30
67.2	1.30	1.46	1.38
MEAN	1.37	1.31	1.34

2ND CUT MEAN DM% 41.6

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.43	0.38	0.40
67.2	0.76	0.72	0.74
MEAN	0.59	0.55	0.57

3RD CUT MEAN DM% 20.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	4.42	4.23	4.32
67.2	5.90	6.32	6.11
MEAN	5.16	5.27	5.21

TOTAL OF 3 CUTS MEAN DM% 28.7

PLOT AREA HARVESTED 0.00086

76/W/CS/16

IRRIGATION AND EELWORMS

Object: To study the cumulative effects of dazomet (later, aldicarb) and irrigation on the yield and incidence of *Globodera* (formerly *Heterodera*) spp. on potatoes grown continuously. The effects of growing susceptible and resistant varieties are also studied, either grown continuously or alternated. The effects of enhanced farm practice are tested from 1976 - Woburn Butt Close.

Sponsors: D.M. Parrott, F.G.W. Jones.

The 11th year, potatoes.

For previous years see 66/C/32(t), 67/C/25, 68/C/19, 69/W/CS/16(t), 70-71/W/CS/16, 72/W/CS/16(t) and 73-75/W/CS/16.

Design: 3 blocks of 4 plots, sequences of varieties on strips of 2 half plots, aldicarb on quarter plots, farm practice on pairs of eighth plots.

Whole plot dimensions: 14.5 x 15.2.

Treatments: All combinations of:-

Whole plots

1. IRRIGTN Irrigation:

NONE	None
FULL	Full

Strips of half plots

2. CROPSEQN Cropping sequences with potatoes resistant (R) and susceptible (S) to potato cyst nematode:

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
R/R/R/R	R	R	R	R	R	R	R	R	R	R	R
S/R/S/R	R	S	R	S	R	S	R	S	R	S	R
S/S/S/S	S	S	S	S	S	S	S	S	S	S	S
R/S/R/S	S	R	S	R	S	R	S	R	S	R	S

Quarter plots

3. ALDICARB Aldicarb (kg) applied cumulatively to previous dazomet treatments:

0.0	None
5.6	5.6

Pairs of eighth plots

4. FARMING Farm practice:

STANDARD	Standard.	Normal-size seed (3 cm) planted 50 cm apart in ridges 71 cm apart. Haulm destroyed mid-September
ENHANCED	Enhanced.	Ware-size seed (6 cm) planted 25 cm apart in ridges 71 cm apart. Additional N at 125 kg, as 'Nitro-Chalk' at tuber initiation. Haulm destroyed mid-October.

76/W/CS/16

NOTE: Extra sprays against blight and aphids were planned for enhanced farm practice but were omitted as unnecessary in this season.

Irrigation treatments 1976 (mm water):

7 June	25.4
16 June	25.4
23 June	25.4
2 July	25.4
9 July	25.4
14 July	25.4
28 July	25.4
9 Aug	25.4
13 Aug	25.4
25-27 Aug	50.8
8 Sept	25.4
Total	304.8

Basal applications: Manures: (13:13:20) at 1850 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticides: Pirimicarb at 0.14 kg in 450 l, demeton-s-methyl at 0.25 kg in 450 l on one occasion with fungicide. Fungicide: Mancozeb at 1.3 kg in 450 l on two occasions the first with insecticide. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Seed: Resistant, Maris Piper. Susceptible, Pentland Crown.

Cultivations, etc.: Ploughed: 28 Oct, 1975. Basal NPK applied: 22 Mar, 1976. Spring-tine cultivated: 23 Mar. Aldicarb applied and all plots rotary cultivated, potatoes planted: 2 Apr. Weedkillers applied: 7 May. Grubbed: 2 June. Rotary ridged: 3 June. Test N applied: 11 June. Pirimicarb applied: 18 June. Fungicide with demeton-s-methyl applied: 29 June. Fungicide applied: 30 July. Haulm mechanically destroyed on standard farm practice plots: 15 Sept. Haulm desiccant applied to enhanced farm practice plots: 12 Oct. Lifted: 4 Nov.

- NOTES: (1) Soil samples were taken in spring before treatments were applied for cyst and egg counts of *Globodera rostochiensis* and *G. pallida*.
 (2) Owing to water logged condition one plot was treated as missing for total tubers and six plots for percentage ware, those with treatment combinations (first named applies to both variates).

IRRIGTN	CROPSEQN	ALDICARB	FARMING
FULL	S/S/S/S	0.0	STANDARD
FULL	R/S/R/S	0.0	STANDARD
FULL	S/R/S/R	5.6	STANDARD
FULL	S/R/S/R	0.0	STANDARD
FULL	S/R/S/R	5.6	STANDARD
FULL	S/R/S/R	5.6	ENHANCED

76/W/CS/16

TOTAL TUBERS TONNES/HECTARE

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

CROPSEQN	R/R/R/R	S/R/S/R	S/S/S/S	R/S/R/S	MEAN
IRRIGTN					
NONE	17.7	18.4	22.0	21.6	19.9
FULL	37.2	37.4	48.8	49.8	43.3
MEAN	27.4	27.9	35.4	35.7	31.6
ALDICARB	0.0	5.6	MEAN		
IRRIGTN					
NONE	11.4	28.4	19.9		
FULL	28.8	57.8	43.3		
MEAN	20.1	43.1	31.6		
ALDICARB	0.0	5.6	MEAN		
CROPSEQN					
R/R/R/R	18.2	36.6	27.4		
S/R/S/R	19.5	36.3	27.9		
S/S/S/S	21.7	49.1	35.4		
R/S/R/S	21.0	50.4	35.7		
MEAN	20.1	43.1	31.6		
FARMING	STANDARD	ENHANCED	MEAN		
IRRIGTN					
NONE	16.5	23.4	19.9		
FULL	35.2	51.4	43.3		
MEAN	25.8	37.4	31.6		
FARMING	STANDARD	ENHANCED	MEAN		
CROPSEQN					
R/R/R/R	21.9	33.0	27.4		
S/R/S/R	23.2	32.7	27.9		
S/S/S/S	28.6	42.2	35.4		
R/S/R/S	29.6	41.7	35.7		
MEAN	25.8	37.4	31.6		
FARMING	STANDARD	ENHANCED	MEAN		
ALDICARB					
0.0	16.1	24.1	20.1		
5.6	35.6	50.6	43.1		
MEAN	25.8	37.4	31.6		
IRRIGTN	ALDICARB	0.0	5.6		
NONE	CROPSEQN				
	R/R/R/R	10.9	24.4		
	S/R/S/R	13.0	23.9		
	S/S/S/S	10.5	33.5		
	R/S/R/S	11.2	31.9		
FULL	R/R/R/R	25.5	48.8		
	S/R/S/R	26.1	48.7		
	S/S/S/S	32.9	64.7		
	R/S/R/S	30.8	68.9		

76/W/CS/16

TOTAL TUBERS TONNES/HECTARE

		FARMING	STANDARD	ENHANCED	
IRRIGTN	CROPSEQN				
NONE	R/R/R/R	13.4		21.9	
	S/R/S/R	15.8		21.0	
	S/S/S/S	18.3		25.6	
	R/S/R/S	18.3		24.8	
FULL	R/R/R/R	30.3		44.0	
	S/R/S/R	30.5		44.3	
	S/S/S/S	38.8		58.8	
	R/S/R/S	41.0		58.6	
ALDICARB		0.0		5.6	
FARMING		STANDARD	ENHANCED	STANDARD	ENHANCED
IRRIGTN					
NONE		10.1	12.7	22.8	34.0
FULL		22.0	35.6	48.3	67.3
ALDICARB		0.0		5.6	
FARMING		STANDARD	ENHANCED	STANDARD	ENHANCED
CROPSEQN					
R/R/R/R		14.9	21.5	28.9	44.4
S/R/S/R		16.6	22.4	29.7	42.9
S/S/S/S		15.1	28.4	42.1	56.0
R/S/R/S		17.7	24.3	41.6	59.2
ALDICARB		0.0		5.6	
FARMING		STANDARD	ENHANCED	STANDARD	ENHANCED
IRRIGTN					
NONE		8.0	13.8	18.9	30.0
		S/R/S/R	11.9	14.0	28.1
		S/S/S/S	9.6	11.4	27.0
		R/S/R/S	10.9	11.5	25.6
FULL	R/R/R/R	21.8	29.3	38.9	58.8
	S/R/S/R	21.4	30.8	39.6	57.8
	S/S/S/S	20.5	45.4	57.2	72.2
	R/S/R/S	24.5	37.0	57.5	80.3

76/W/CS/16

TOTAL TUBERS TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	IRRIGTN	CROPSEQN	ALDICARB	FARMING
SED	1.78	2.52	1.42	1.35

TABLE	IRRIGTN CROPSEQN	IRRIGTN ALDICARB	CROPSEQN ALDICARB	IRRIGTN FARMING
SED	3.57	2.28	3.23	2.24
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
IRRIGTN		2.01		1.90
CROPSEQN			2.85	

TABLE	CROPSEQN FARMING	ALDICARB FARMING	IRRIGTN CROPSEQN ALDICARB	IRRIGTN CROPSEQN FARMING
SED	3.16	1.96	4.57	4.47
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROPSEQN	2.69			
ALDICARB		1.57		
FARMING		1.64		
IRRIGTN.CROPSEQN			4.03	3.81

TABLE	IRRIGTN ALDICARB FARMING	CROPSEQN ALDICARB FARMING	IRRIGTN CROPSEQN ALDICARB FARMING
SED	2.77	3.92	5.54
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
IRRIGTN.ALDICARB	2.22		
CROPSEQN.ALDICARB		3.14	
IRRIGTN.FARMING	2.32		
CROPSEQN.FARMING		3.28	
IRRIGTN.CROPSEQN.ALDICARB			4.45
IRRIGTN.CROPSEQN.FARMING			4.64

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.ROW.HP	14	4.37	13.8
BLOCK.ROW.HP.QP	16	4.93	15.6
BLOCK.ROW.HP.EP	16	4.66	14.8
BLOCK.ROW.HP.QP.EP	15	3.98	12.6

76/W/CS/16

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

CROPSEQN	R/R/R/R	S/R/S/R	S/S/S/S	R/S/R/S	MEAN
IRRIGTN					
NONE	57.5	71.5	82.2	76.4	71.9
FULL	83.4	89.3	92.7	91.3	89.2
MEAN	70.5	80.4	87.5	83.8	80.5
ALDICARB	0.0	5.6	MEAN		
IRRIGTN					
NONE	61.7	82.1	71.9		
FULL	86.4	92.0	89.2		
MEAN	74.0	87.0	80.5		
ALDICARB	0.0	5.6	MEAN		
CROPSEQN					
R/R/R/R	58.7	82.2	70.5		
S/R/S/R	77.3	83.5	80.4		
S/S/S/S	83.6	91.3	87.5		
R/S/R/S	76.5	91.2	83.8		
MEAN	74.0	87.0	80.5		
FARMING	STANDARD	ENHANCED	MEAN		
IRRIGTN					
NONE	75.1	68.7	71.9		
FULL	90.4	87.9	89.2		
MEAN	82.8	78.3	80.5		
FARMING	STANDARD	ENHANCED	MEAN		
CROPSEQN					
R/R/R/R	71.4	69.5	70.5		
S/R/S/R	84.8	76.1	80.4		
S/S/S/S	89.2	85.7	87.5		
R/S/R/S	85.7	82.0	83.8		
MEAN	82.8	78.3	80.5		
FARMING	STANDARD	ENHANCED	MEAN		
ALDICARB					
0.0	77.0	71.1	74.0		
5.6	88.5	85.6	87.0		
MEAN	82.8	78.3	80.5		
IRRIGTN	ALDICARB	0.0	5.6		
NONE	CROPSEQN				
	R/R/R/R	38.5	76.6		
	S/R/S/R	68.6	74.5		
	S/S/S/S	74.7	89.7		
	R/S/R/S	65.1	87.7		
FULL	R/R/R/R	78.9	87.9		
	S/R/S/R	86.1	92.5		
	S/S/S/S	92.5	92.9		
	R/S/R/S	87.9	94.6		

76/W/CS/16

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

		FARMING	STANDARD	ENHANCED		
IRRIGTN	CROPSQN					
NONE	R/R/R/R	56.6		58.5		
	S/R/S/R	78.6		64.4		
	S/S/S/S	85.0		79.4		
	R/S/R/S	80.1		72.7		
FULL	R/R/R/R	86.2		80.6		
	S/R/S/R	90.9		87.8		
	S/S/S/S	93.4		92.0		
	R/S/R/S	91.2		91.3		
ALDICARB		0.0		5.6		
FARMING	STANDARD	ENHANCED	STANDARD	ENHANCED		
IRRIGTN						
NONE	65.8	57.6	84.4	79.9		
FULL	88.2	84.5	92.7	91.3		
ALDICARB		0.0		5.6		
FARMING	STANDARD	ENHANCED	STANDARD	ENHANCED		
CROPSQN						
R/R/R/R	57.9	59.6	84.9	79.5		
S/R/S/R	83.2	71.5	86.3	80.7		
S/S/S/S	86.8	80.4	91.6	91.0		
R/S/R/S	80.2	72.8	91.2	91.1		
ALDICARB		0.0		5.6		
FARMING	STANDARD	ENHANCED	STANDARD	ENHANCED		
IRRIGTN	CROPSQN					
NONE	R/R/R/R	32.0	45.0	81.1	72.0	
	S/R/S/R	78.1	59.0	79.1	69.9	
	S/S/S/S	80.3	69.2	89.8	89.6	
	R/S/R/S	72.8	57.3	87.4	88.0	
FULL	R/R/R/R	83.7	74.1	88.8	87.0	
	S/R/S/R	88.3	84.0	93.5	91.5	
	S/S/S/S	93.4	91.6	93.5	92.3	
	R/S/R/S	87.5	88.3	94.9	94.3	

EIGHTH PLOT AREA HARVESTED 0.00092

76/R/CS/24

PK AND TAKE-ALL

Object: To study the effects of different amounts of phosphate and potassium fertiliser on the yields and incidence of take-all (*Gaeumannomyces graminis*) in continuous wheat - West Barnfield II.

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

The ninth year, continuous winter wheat (after continuous barley 1968-1973).

For previous years see 68/C/16(t), 69/R/CS/24, 70/R/CS/24(t) and 71-75/R/CS/24.

Design: 4 randomised blocks of 10 plots, split into 2.

Whole plot dimensions: 5.33 x 20.1.

Treatments: All combinations of:-

Whole plots

1. P Phosphate (kg P) as superphosphate:

0	None
15 A	15 annually
60 A	60 annually
90 S	90 six-yearly, last applied autumn 1973
360 S	360 six-yearly, last applied autumn 1973

2. K Potassium (kg K) annually as muriate of potash:

30	30
120	120

Sub plots

3. N RESID Residues of nitrogen fertiliser, applied annually 1970-1973 (kg N):

37.5	37.5
75.0	75.0
113	113
150	150

Basal applications: Manures: 'Nitro-Chalk' at 500 kg. Weedkillers: Glyphosate at 1.7 kg in 220 l. Ioxynil at 0.53 with mecoprop at 1.6 kg in 220 l in spring.

Seed: Cappelle, sown at 200 kg.

Cultivations, etc.: - Glyphosate applied: 26 Sept, 1975. Ploughed: 14 Oct. Heavy spring-tine cultivated: 16 Oct. P and K applied: 3 Nov. Power harrowed and sown: 4 Nov. N applied: 5 Apr, 1976. Spring weedkiller applied: 22 Apr. Combine harvested: 30 July.

NOTE: Incidence of take-all was measured in July.

76/R/CS/24

GRAIN TONNES/HECTARE

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

N RESID	37.5	75.0	113	150	MEAN	
K20						
30	2.33	2.43	2.47	2.43	2.41	
120	3.31	2.94	3.33	3.02	3.15	
MEAN	2.82	2.68	2.90	2.73	2.78	
P205	0	15 A	60 A	90 S	360 S	MEAN
K20						
30	2.17	2.30	2.60	2.50	2.50	2.41
120	2.57	3.19	3.39	3.24	3.36	3.15
MEAN	2.37	2.75	3.00	2.87	2.93	2.78
P205	0	15 A	60 A	90 S	360 S	MEAN
N RESID						
37.5	2.54	2.79	2.98	2.94	2.85	2.82
75.0	2.03	2.75	3.00	2.82	2.81	2.68
113	2.69	2.85	2.89	2.94	3.13	2.90
150	2.21	2.60	3.11	2.77	2.93	2.73
MEAN	2.37	2.75	3.00	2.87	2.93	2.78
	P205	0	15 A	60 A	90 S	360 S
K20	N RESID					
30	37.5	2.17	2.17	2.64	2.41	2.25
	75.0	2.15	2.33	2.42	2.66	2.57
	113	2.25	2.39	2.50	2.49	2.73
	150	2.11	2.32	2.82	2.43	2.46
120	37.5	2.90	3.41	3.33	3.46	3.45
	75.0	1.92	3.17	3.57	2.99	3.06
	113	3.13	3.30	3.29	3.39	3.53
	150	2.32	2.88	3.40	3.11	3.40

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	K20	N RESID	P205	K20 N RESID
SED	0.057	0.081	0.091	0.116
TABLE	K20 P205	N RESID P205	K20 N RESID P205	
SED	0.129	0.182	0.270	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP+BLOCK.WP.SP	37	0.257	9.2
GRAIN MEAN DM%	88.2		

76/R/CS/24

STRAW TONNES/HECTARE

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

N RESID	37.5	75.0	113	150	MEAN	
K20						
30	2.42	2.32	2.49	2.45	2.42	
120	3.51	3.08	3.51	3.15	3.31	
MEAN	2.96	2.70	3.00	2.80	2.86	
P205	0	15 A	60 A	90 S	360 S	MEAN
K20						
30	2.06	2.27	2.73	2.61	2.42	2.42
120	2.33	3.22	3.83	3.40	3.76	3.31
MEAN	2.20	2.74	3.28	3.01	3.09	2.86
P205	0	15 A	60 A	90 S	360 S	MEAN
N RESID						
37.5	2.60	2.78	3.31	3.15	2.98	2.96
75.0	1.88	2.76	3.17	2.79	2.88	2.70
113	2.39	2.93	3.11	3.21	3.34	3.00
150	1.93	2.50	3.53	2.87	3.16	2.80
MEAN	2.20	2.74	3.28	3.01	3.09	2.86
P205	0	15 A	60 A	90 S	360 S	
K20						
30	37.5	2.21	2.17	2.88	2.61	2.22
	75.0	2.08	2.20	2.30	2.59	2.41
	113	1.99	2.51	2.59	2.70	2.64
	150	1.97	2.19	3.14	2.53	2.39
120	37.5	2.99	3.39	3.73	3.69	3.74
	75.0	1.68	3.32	4.04	2.99	3.35
	113	2.79	3.35	3.63	3.72	4.03
	150	1.88	2.81	3.92	3.21	3.92

STRAW MEAN DM% 93.5

SUB PLOT AREA HARVESTED 0.00270

76/W/CS/34

NEMATICIDES IN CROP SEQUENCE

Object: To study the effects of a range of nematicides on incidence of *Globodera* (formerly *Heterodera*) *rostochiensis* and yield of potatoes. Residual effects of previous treatments are studied in wheat and barley - Woburn Great Hill II and III.

Sponsor: A.G. Whitehead.

The seventh year, potatoes, wheat, barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-75/W/CS/34.

Design: 4 series of 3 blocks of 10 plots.

Whole plot dimensions: 4.27 x 9.14.

Treatments: The experiment has four series with the following cropping:-

	1969	1970	1971	1972	1973	1974	1975	1976
Series I	P	P	P*	SB	B	P	P*	W
Series II	P	P	P	P*	SB	B	P	P*
Series III	P	B	P	P	P*	SB	B	P
Series IV	P	B	P	P	P	P*	SB	B

P = potatoes, SB = sugar beet, B = barley, W = wheat

* Treatments applied to potatoes, later crops test residual effects.

Treatments to wheat (Series I): All combinations of:-

1. NEMACIDE(75) Residues of nematicides applied 1975:

DURSBAN	'Dursban'
PHOXIM	Phoxim
DACAMOX	'Dacamox'

2. RATE Rates of nematicide (kg a.i.):

SINGLE	Single (2.8 kg for 'Dursban', 'Dacamox': 5.6 kg for phoxim)
DOUBLE	Double (5.6 kg for 'Dursban' and 'Dacamox': 11.2 kg for phoxim)
QUAD	Quadruple (11.2 kg for 'Dursban' and 'Dacamox': 22.4 kg for phoxim)
NONE	plus one untreated plot per block

76/W/CS/34

Treatments to potatoes (Series II):
All combinations of:-

1. NEMACIDE(76) Nematicides applied 1976:

AC 64475	'AC 64475'
CARBOFUR	Carbofuran
PHOXIM	Phoxim

2. RATE Rates of nematicide (kg a.i.):

		'AC 64475'	Carbofuran	Phoxim
SINGLE	Single	2.2	2.8	5.6
DOUBLE	Double	4.4	5.6	11.2
QUAD	Quadruple	8.8	11.2	22.4

NONE plus one untreated plot per block

Treatments to potatoes (Series III): All combinations of:-

1. NEMACIDE(73) Residues of nematicides applied 1973:

BENOMYL	Benomyl
OXAMYL	Oxamyl
DOWCO	'Dowco 275'

2. RATE Rates of nematicide (kg a.i.):

SINGLE	Single rate (2.8 Oxamyl, 'Dowco 275': 5.6 benomyl)
DOUBLE	Double rate (5.6 Oxamyl, 'Dowco 275': 11.2 benomyl)
QUAD	Quadruple rate (11.2 Oxamyl, 'Dowco 275': 22.4-benomyl)

NONE plus one untreated plot per block

Treatments to barley (Series IV): All combinations of:-

1. NEMACIDE(74) Residues of nematicides applied 1974:

BENOMYL	Benomyl
CARBOFUR	Carbofuran
THIABEND	Thiabendazole

2. RATE Rates of nematicide (kg a.i.):

5.6	5.6
11.2	11.2
22.4	22.4

0.0 plus one untreated plot per block

76/W/CS/34

Standard applications:

Potatoes (Series II & III): Manures: (13:13:20) at 1950 kg. Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Wheat (Series I): Manures: Magnesial limestone at 5 tonnes. (10:24:24) at 250 kg. N at 80 kg as "Nitro-Chalk". Weedkiller: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

Barley (Series IV): Manures: (20:14:14) at 450 kg. Weedkiller: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Seed: Potatoes: Pentland Crown.

Wheat: Cappelle, sown at 190 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Potatoes, test crop (Series II): Deep-tine cultivated twice: 27 Oct, 28 Oct, 1975. NPK applied: 19 Mar. Spring-tine cultivated: 22 Mar. Treatments applied, all plots rotary cultivated, potatoes planted: 7 Apr, 1976. Weedkiller applied: 7 May. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 5 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 25 Oct.

Potatoes (Series III): Subsoiled, tines 140 cm apart and 60 cm deep: 1 Sept, 1975. Ploughed: 16 Oct. NPK applied: 19 Mar, 1976. Spring-tine cultivated: 22 Mar. Rotary cultivated, potatoes planted: 2 Apr. Weedkiller applied: 7 May. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 5 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 20 Oct.

Wheat (Series I): Magnesial limestone applied: 24 Oct, 1975. Deep-tine cultivated twice: 27 Oct, 28 Oct. Spring-tine cultivated, seed sown: 8 Dec. N applied: 29 Mar, 1976. Weedkiller applied: 21 Apr. Combine harvested: 30 July.

Barley (Series IV): Ploughed: 25 Nov, 1976. Spring-tine cultivated: 3 Mar, 1976. Seed sown: 9 Mar. Weedkiller applied: 29 Apr. Combine harvested: 27 July.

- NOTES (1) For Barley (Series IV). The analysis presented assumes a Fourier curve with 2 terms, a sine and a cosine to represent positional variation.
- (2) Soil samples were taken before applying treatments and after harvest for counts of cysts, eggs and larvae of *Globodera* (formerly *Heterodera*) *rostochiensis*.

76/W/CS/34

POTATOES SERIES II

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(76)	SINGLE	DOUBLE	QUAD	MEAN
AC 64475	15.2	21.8	21.0	19.3
CARBOFUR	13.1	15.9	21.2	16.7
PHOXIM	13.4	15.7	19.1	16.1
MEAN	13.9	17.8	20.4	17.4

RATE NONE 9.7

GRAND MEAN 16.6

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(76)	RATE NEMACIDE(76) RATE & RATE NONE
SED	1.43	2.47

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	3.03	18.2

PERCENTAGE 3.81CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(76)	SINGLE	DOUBLE	QUAD	MEAN
AC 64475	78.9	83.7	80.3	81.0
CARBOFUR	78.9	80.8	83.4	81.1
PHOXIM	79.9	79.3	78.4	79.2
MEAN	79.3	81.3	80.7	80.4

RATE NONE 79.7

GRAND MEAN 80.4

PLOT AREA HARVESTED 0.00130

76/W/CS/34

POTATOES SERIES III

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(73)	SINGLE	DOUBLE	QUAD	MEAN
BENOMYL	16.2	16.5	15.8	16.2
OXAMYL	19.5	3.0	21.4	21.3
DOWCO	18.3	17.0	18.8	18.1
MEAN	13.0	18.9	18.7	18.5

RATE NONE 17.0

GRAND MEAN 18.4

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(73)	RATE NEMACIDE(73) RATE & RATE NONE
SED	1.28	2.21

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	2.71	14.7

PERCENTAGE 3.81CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(73)	SINGLE	DOUBLE	QUAD	MEAN
BENOMYL	80.4	82.2	80.9	81.1
OXAMYL	2.1	83.8	84.4	83.4
DOWCO	81.2	80.2	81.2	80.9
MEAN	81.2	82.1	82.2	81.8

RATE NONE 81.4

GRAND MEAN 81.8

PLOT AREA HARVESTED 0.00130

76/W/CS/34

WINTER WHEAT

GRAIN TONNES/HECTARE

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

RATE NEMACIDE(75)	SINGLE	DOUBLE	QUAD	MEAN
DURSBAN	1.09	1.70	1.96	1.58
PHOXIM	1.60	1.84	1.39	1.61
DACAMOX	1.24	1.60	1.95	1.59
MEAN	1.31	1.71	1.77	1.59

RATE NONE 1.75

GRAND MEAN 1.61

GRAIN MEAN DM% 88.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(75)	RATE NEMACIDE(75) RATE & RATE NONE
SED	0.294	0.508

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.623	38.7

GRAIN MEAN DM% 88.2

STRAW TONNES/HECTARE

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

RATE NEMACIDE(75)	SINGLE	DOUBLE	QUAD	MEAN
DURSBAN	1.14	1.42	1.09	1.22
PHOXIM	1.48	1.48	1.14	1.37
DACAMOX	1.01	1.31	1.15	1.16
MEAN	1.21	1.41	1.13	1.25

RATE NONE 1.23

GRAND MEAN 1.25

STRAW MEAN DM% 93.5

PLOT AREA HARVESTED 0.00260

76/W/CS/34

BARLEY

GRAIN TONNES/HECTARE

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

	RATE	5.6	11.2	22.4	MEAN
NEMACIDE(74)					
BENOMYL	1.89	2.50	2.03	2.14	
CARBOFUR	2.58	1.77	2.73	2.36	
THIABEND	2.17	1.66	2.48	2.10	
MEAN	2.21	1.98	2.41	2.20	

RATE 0.0 2.57

GRAND MEAN 2.24

GRAIN MEAN DM% 89.2

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE(74)	RATE NEMACIDE(74)	RATE & RATE 0.0
SED	0.141	0.153	0.261

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.294	13.1

STRAW TONNES/HECTARE

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

	RATE	5.6	11.2	22.4	MEAN
NEMACIDE(74)					
BENOMYL	1.08	1.28	1.25	1.20	
CARBOFUR	1.16	1.11	1.27	1.18	
THIABEND	1.37	1.14	1.31	1.28	
MEAN	1.20	1.18	1.28	1.22	

RATE 0.0 1.36

GRAND MEAN 1.23

STRAW MEAN DM% 93.2

PLOT AREA HARVESTED 0.00260

76/W/CS/35

NEMATICIDES DO SAGE

Object: To study the effects of rates and methods of applying nematicides on *Globodera* (formerly *Heterodera*) *rostochiensis* and yield of potatoes, residual effects are also studied - Woburn Stackyard All.

Sponsor: A.G. Whitehead.

The fifth year, potatoes, barley.

For previous years see 72/W/CS/35(t) and 73-75/W/CS/35.

Design: 3 series of 4 replicates of 2 x 9.

Whole plot dimensions: 4.27 x 6.10.

Treatments:-

The experiment has three series with the following cropping:-

	1968-71	1972	1973	1974	1975	1976
Series I	P	P*	SB	B	P*	P
Series II	P	P	P*	SB	B	P*
Series III	P	P	P	P*	SB	B

P = Potatoes, SB = Sugar beet, B = Barley

* Treatments applied to potatoes, following two crops test residual effects.

Treatments: All combinations of:-

1. Varieties and residual effects of varieties:

VARIETY Series I only (Potatoes-Pentland Crown 1976):

	1972	1975
(PC)PC	Pentland Crown	Pentland Crown
(MPP)PC	Maris Piper	Pentland Crown

VARIETY Series II only (Potatoes-Pentland Crown 1976):

	1973
(PC)PC	Pentland Crown
(MP)PC	Maris Piper

RES VAR Series III only (Barley 1976):

	1974
(PC)	Pentland Crown
(MP)	Maris Piper

76/W/CS/35

2. Nematicides (kg) and nematicide residues (applied to Series I 1975, Series II 1976, Series III 1974):

NEM RES(75) Series I
NEMACIDE Series II
NEM RES(74) Series III

NONE	None
	Dazomet (half before, half after autumn ploughing)
DAZ2	220
DAZ3	330
DAZ4	440
DAZ6	660
DAZ2+TE2	Dazomet, 220, 'Telone', 220, all after autumn ploughing
TE4	'Telone' 450 all after autumn ploughing
OX	Oxamyl 5.6 in spring
TE2+OX	'Telone' 220, after autumn ploughing, oxamyl 5.6 a.i. in spring

Standard applications:-

Potatoes: Series I only: Magnesian limestone at 2.9 tonnes. Series I and II: Manures: (13:13:20) at 1850 kg. Weedkiller: Linuron at 1.3 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.
Barley: Series III: Manures:(20:14:14) at 450 kg, combine drilled. Weedkiller: Ioxynil at 0.53 kg with mecoprop at 1.6 kg in 280 l.

Seed: Potatoes: Pentland Crown.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Potatoes: Series I: Deep-tine cultivated: 24 Oct, 1975. Magnesian limestone applied, deep-tine cultivated: 28 Oct. NPK applied: 22 Mar, 1976. Spring-tine cultivated: 23 Mar. Rotary cultivated, potatoes planted: 6 Apr. Weedkiller applied: 6 May. Pirimicarb applied: 18 June. Fungicide with demeton-s-methyl applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 6 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 2 Nov.
Potatoes, Test crop: Series II: Subsoiled, tines 140 cm apart and 56 cm deep: 3 Sept, 1975. Deep-tine cultivated: 9 Sept. Ploughed, spring-tine cultivated: 24 Sept. Dazomet applied and these plots only rotary cultivated, 'Telone' injected, all plots spring-tine cultivated: 13 Oct. NPK applied: 22 Mar, 1976. Spring-tine cultivated: 23 Mar. Oxamyl applied, rotary cultivated, potatoes planted: 6 Apr. Weedkiller applied: 6 May. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 6 Oct. Haulm mechanically destroyed: 12 Oct. Lifted: 21 Oct.
Barley: Series III: Ploughed: 24 Nov, 1975. Spring-tine cultivated: 2 Mar, 1976. Spring-tine cultivated with crumbler, seed sown: 8 Mar. Rolled: 9 Mar. Weedkiller applied: 3 May. Combine harvested: 26 July.

NOTE: Soil samples were taken before treatments were applied and after harvest for cyst and egg counts of *Globodera* (formerly *Heterodera*) *rostochiensis*.

76/W/CS/35

POTATOES SERIES I

TOTAL TUBERS TONNES/HECTARE

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

VARIETY (PCPC)PC	(MPPC)PC	MEAN
NEM RES(75)		
NONE	10.5	12.4
DAZ2	19.1	29.1
DAZ3	28.5	29.6
DAZ4	30.5	33.0
DAZ6	30.6	30.9
DAZ2+TE2	25.2	29.0
TE4	15.3	24.9
OX	25.1	28.1
TE2+OX	32.0	31.6
MEAN	24.1	27.6

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEM RES(75)	VARIETY NEM RES(75)	VARIETY
SED	2.49	1.15	3.52

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	47	4.89	18.9

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

VARIETY (PCPC)PC	(MPPC)PC	MEAN
NEM RES(75)		
NONE	80.6	83.4
DAZ2	89.9	92.4
DAZ3	93.1	90.1
DAZ4	93.9	92.9
DAZ6	92.7	92.2
DAZ2+TE2	91.6	92.9
TE4	88.3	91.5
OX	91.7	92.0
TE2+OX	92.3	91.4
MEAN	90.5	91.0

PLOT AREA HARVESTED 0.00087

76/W/CS/35

POTATOES SERIES II

TUBERS TONNES/HECTARE

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

VARIETY	(PC)PC	(MP)PC	MEAN
NEMACIDE			
NONE	20.5	26.1	23.3
DAZ2	39.9	40.6	40.2
DAZ3	41.7	41.5	41.6
DAZ4	39.4	41.2	40.3
DAZ6	45.3	44.0	44.7
DAZ2+TE2	43.0	40.3	41.7
TE4	35.7	41.7	38.7
OX	41.3	43.2	42.3
TE2+OX	43.6	45.2	44.4
MEAN	38.9	40.4	39.7

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE	VARIETY	NEMACIDE VARIETY
SED	1.52	0.68	2.14

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	47	2.89	7.3

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

VARIETY	(PC)PC	(MP)PC	MEAN
NEMACIDE			
NONE	87.7	86.7	87.2
DAZ2	92.9	91.5	92.2
DAZ3	93.7	91.1	92.4
DAZ4	90.4	93.5	92.0
DAZ6	92.2	92.0	92.1
DAZ2+TE2	91.2	92.2	91.7
TE4	90.3	92.9	91.6
OX	92.2	92.5	92.3
TE2+OX	92.5	93.3	92.9
MEAN	91.5	91.7	91.6

PLOT AREA HARVESTED 0.00087

76/W/CS/35

BARLEY

GRAIN TONNES/HECTARE

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

RES VAR NEM RES(74)	(PC)	(MP)	MEAN
NONE	3.63	3.27	3.45
DAZ2	3.54	3.01	3.28
DAZ3	3.38	3.23	3.30
DAZ4	3.38	3.37	3.37
DAZ6	2.85	3.15	3.00
DAZ2+TE2	3.51	3.10	3.31
TE4	3.23	3.19	3.21
OX	3.37	2.95	3.16
TE2+OX	3.77	3.56	3.67
MEAN	3.40	3.20	3.30

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEM RES(74)	RES VAR NEM RES(74) RES VAR
SED	0.231	0.103 0.325

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	47	0.437	13.2

GRAIN MEAN DM% 88.1

STRAW TONNES/HECTARE

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

RES VAR NEM RES(74)	(PC)	(MP)	MEAN
NONE	2.33	1.97	2.15
DAZ2	2.33	2.15	2.24
DAZ3	2.01	2.33	2.17
DAZ4	2.21	2.36	2.28
DAZ6	2.11	1.90	2.01
DAZ2+TE2	2.47	2.30	2.38
TE4	2.05	1.94	1.99
OX	2.21	1.79	2.00
TE2+OX	2.49	2.47	2.48
MEAN	2.24	2.13	2.19

STRAW MEAN DM% 89.8

PLOT AREA HARVESTED 0.00173

76/R/CS/41

CULTIVATIONS AND SOIL INVERTEBRATES

Object: To study the effects of cultivations on yields of grass and on populations of soil animals - Road Piece.

Sponsor: C.A. Edwards.

The eighth year, old grass, new grass.

For previous years see 69/R/CS/41(t), 70/R/CS/41(t) and 71-75/R/CS/41.

Design: 4 blocks of 8 plots, randomisation restricted.

Whole plot dimensions: 6.40 x 7.32.

Treatments: Cultivations and reseeded:

CULTIVTN

- 0 No treatments to old grass (two plots per block)
Grass ploughed up:-
- SF In spring 1969, reseeded after fewest cultivations needed to produce a seedbed
- SM In spring 1969, reseeded after many seedbed cultivations
- AM In autumn 1969, reseeded spring 1970 after many seedbed cultivations
- SFR Every spring since 1969, reseeded each year after fewest cultivations needed to produce a seedbed
- SMR Every spring since 1969, reseeded each year after many seedbed cultivations
- AMR Every autumn since 1969, reseeded every following spring after many seedbed cultivations

Seeds mixture for 1976: S215 meadow fescue at 9.4 kg; Contessa meadow fescue at 6.0 kg; Pecora certified timothy at 6.0 kg; N.Z. Huia white-clover at 2.2 kg; Wild white clover at 0.4 kg. Sown at 24 kg.

Basal applications: Manures: (0:14:28) at 500 kg in winter. (25:0:16) at 440 kg in spring and at 220 kg after the first cut.

Cultivations, etc.: - Basal PK applied: 21 Nov, 1975. AMR plots ploughed: 11 Dec. SMR and SFR plots ploughed: 9 Feb, 1976. Basal NK applied, disced all plots to be reseeded: 26 Feb. Disced AMR and SMR plots four times, SFR plots twice: 13 Apr. Power harrowed and seed sown: 21 Apr. Cut (excluding AMR, SMR, SFR plots): 20 May, 29 June, 2 Nov. NK applied to all cut plots: 21 May.

NOTE: Soil cores were taken to assess total soil fauna in January, March and September. Quadrats were sampled on each plot for earthworms in December 1975, March, 1976 and September.

76/R/CS/41

1ST CUT (20/5/76) DRY MATTER TONNES/HECTARE

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

CULTIVTN	0	SF	SM	AM	MEAN
	3.74	3.40	3.00	3.71	3.52

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CULTIVTN
-----	-----
SED	0.475 MIN REP 0.412 MAX-MIN

CULTIVTN
 MAX-MIN O V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	13	0.672	19.1

1ST CUT MEAN DM% 18.8

2ND CUT (29/6/76) DRY MATTER TONNES/HECTARE

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

CULTIVTN	0	SF	SM	AM	MEAN
	0.58	0.81	1.28	1.14	0.88

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CULTIVTN
-----	-----
SED	0.246 MIN REP 0.213 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	13	0.348	39.7

2ND CUT MEAN DM% 35.2

76/R/CS/41

3RD CUT (2/11/76) DRY MATTER TONNES/HECTARE

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

CULTIVTN	0	SF	SM	AM	MEAN
	1.73	1.89	1.58	1.55	1.70

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CULTIVTN
SED	0.117 MIN REP 0.101 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	13	0.165	9.7

3RD CUT MEAN DM% 13.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

CULTIVTN	0	SF	SM	AM	MEAN
	6.05	6.11	5.86	6.39	6.09

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CULTIVTN
SED	0.561 MIN REP 0.486 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	13	0.794	13.0

TOTAL OF 3 CUTS MEAN DM% 22.5

PLOT AREA HARVESTED 0.00074

76/W/CS/66

DAZOMET AND NITROGEN

Object: To study the cumulative effects of dazomet and nitrogen on pathogens and yield of maize grown continuously - Woburn-Butt-Furlong.

Sponsors: A.J. Barnard, D. Hornby.

The sixth year, maize.

For previous years see 71/W/CS/66(t), 72/W/CS/66(t) and 73-75/W/CS/66.

Design: 4 blocks of 2 plots split into 4.

Whole plot dimensions: 2.13 x 16.5.

Treatments: All combinations of:-

Whole plots

1. DAZOMET Dazomet (kg per annum) cumulative 1971-76:

0	0
450	450

Sub plots

2. N Nitrogen fertiliser (kg N per annum) cumulative 1971-76:

50	50 to seedbed
100	100 to seedbed
150	150 to seedbed
100+50	100 to seedbed, 50 five weeks after emergence

Basal applications: Manures: (0:14:28) at 870 kg. Weedkiller: Atrazine at 1.1 kg in 280 l.

Seed: Cargill Primeur 170 sown at 124,000 seeds per ha.

Cultivations, etc.:- Ploughed: 24 Nov, 1975. Spring-tine cultivated: 1 Dec. Dazomet applied, rotary cultivated twice: 9 Dec. Ploughed: 15 Jan, 1976. PK applied: 20 Apr. Power harrowed: 21 Apr. Weedkiller applied, harrowed, rolled: 28 Apr. Seed sown by hand: 6 May. Seedbed N applied: 11 May. Late N applied: 14 July. Harvested by hand: 22-27 Sept.

- NOTES: (1) Soil samples were taken in spring before sowing and after harvest for counts of ectoparasitic nematodes.
(2) Plant samples were taken for estimates of incidence of stem and leaf pathogens.
(3) Counts were made of common smut (*Ustilago maydis*) and stalk rots (*Fusarium* spp.).

76/W/CS/66

FORAGE DRY MATTER TONNES/HECTARE

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

	N	50	100	150	100+50	MEAN
DAZOMET						
0		7.76	8.21	9.04	8.70	8.42
450		9.62	9.09	9.63	9.62	9.49
MEAN		8.69	8.65	9.34	9.16	8.96

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	DAZOMET*
		N
SED	0.724	1.024

* WITHIN THE SAME LEVEL OF DAZOMET ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	1.448	16.2

MEAN DM% 30.8

SUB PLOT AREA HARVESTED 0.00039

76/R/CS/90

CULTIVATIONS FOR CEREALS

Object: To study the engineering aspects - power requirements, rate of work, revenue and costs - of different tillage systems for continuous wheat. Effects on weeds, soil pathogens and yields are also studied - Meadow.

Sponsors: D.E. Patterson (N.I.A.E.), R. Moffitt, R.D. Prew.

The fifth year, winter wheat.

For previous years see 72-75/R/CS/90.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 13.7 x 33.8.

Treatments

TILLAGE Tillage systems:-

- 1 Three passages of the tractor (three-pass system): Ploughed* 20 cm deep (8 inches): finger-tine harrowed: drilled.
- 2 Five-pass system: Tine cultivated* 15 cm deep (6 inches): tine cultivated 15 cm: finger-tine harrowed: drilled.
- 3 Two-pass system: Ploughed* 20 cm deep: finger-tine harrowed and drilled.
- 4 Two-pass system: Ploughed* 10 cm deep: finger-tine harrowed and drilled.
- 5 Three-pass system: Tine cultivated* (N.I.A.E.) 20 cm deep: disc harrowed: finger-tine harrowed and drilled.
- 6 Three-pass system: Tine cultivated* (N.I.A.E.) 10 cm deep: disc harrowed: finger-tine harrowed and drilled.
- 7 Two-pass system (stubble of 1975 crop burnt on 4 Sept): Tine cultivated* (N.I.A.E.) 10 cm deep: finger-tine harrowed and drilled.
- 8 Two-pass system: Sprayed with paraquat (0.56 kg ion in 220 l on 14 Oct): direct drilled.
- 9 Three-pass system: Rotary digger* (N.I.A.E.) cultivated: disc harrowed: finger-tine harrowed and drilled.
- 10 Two-pass system (stubble of 1975 crop burnt on 4 Sept): Rotary digger* (N.I.A.E.) cultivated: finger-tine harrowed and drilled.

NOTE: Rotary digger (N.I.A.E) - depth of working: rotor 10 cm, tines 20 cm.

* Cultivations done on 8 Oct, 1975. All other cultivations and drilling done on 15 Oct. A disc drill was used on all treatments except 8.

Basal applications: Manures: (10:24:24) at 310 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Paraquat at 0.42 kg ion in 220 l. Difenzoquat at 1.0 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l.

76/R/CS/90

Seed: Atou, sown at 170 kg.

Cultivations, etc.:— Basal paraquat applied: 2 Oct, 1975. Seed sown: 15 Oct. N applied: 1 Apr, 1976. 'Banlene Plus' applied: 8 Apr. Difenzoquat applied: 28 Apr. Insecticide applied: 23 June. Combine harvested: 31 July.

NOTES: Observations and determinations were made as follows:—

- (1) Soil: Structure assessments, photographs for aggregate size, moisture determinations.
- (2) Implements: Depth and width of work, forward speed, wheel slip and power requirements.
- (3) Crop: Plant and tiller counts, numbers of ears and grains per ear, disease and pest assessments, aerial photographs.
- (4) On one of the blocks, plots of TILLAGE 6 and 9 were very severely infested with sterile brome grass (*Bromus sterilis*). This infestation is thought to have markedly lessened yields from these plots: the yields presented have not been adjusted.

GRAIN TONNES/HECTARE

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

TILLAGE	1	2	3	4	5	6	7	8	9	10	MEAN
	4.01	4.05	3.93	4.08	3.89	3.70	3.90	2.94	3.84	4.04	3.84

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TILLAGE
-----	-----
SED	0.285

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.349	9.1

GRAIN MEAN DM% 88.0

PLOT AREA HARVESTED 0.01031

76/W/CS/99

EFFECTS OF BREAKS ON TAKE-ALL

Object: To study the phenomenon of 'take-all' (*Gaeumannomyces graminis*) decline in barley - Woburn Butt Furlong.

Sponsor: D. Hornby.

The fifth year, barley, spring beans.

For previous years see 72/W/CS/99(t) and 73-75/W/CS/99.

Design: 2 blocks of 9 plots.

Whole plot dimensions: 5.33 x 15.2.

Treatments: Previous crops:-

PREVCROP	1968-71	1972	1973	1974	1975
B/B/B/B	B	B	B	B	B (3 plots/block)
F/B/B/B	B	F	B	B	B
F/BE/B/B	B	F	BE	B	B
B/F/BE/B	B	B	F	BE	B
B/B/F/BE	B	B	B	F	BE

B = Barley, BE = Beans, F = Fallow

Standard applications:

Barley: (20:14:14) at 420 kg combine drilled. Weedkiller: Ioxynil at 0.53 kg and mecoprop at 1.6 kg in 280 l.
Spring beans: (0:14:28) at 400 kg.

Seed: Barley: Julia, dressed with ethirimol, sown at 160 kg.
Spring beans: Minden, sown at 220 kg.

Cultivations, etc.:-

All plots: Ploughed: 6 Oct, 1975. Spring-tine cultivated: 1 Mar, 1976.
Barley: Seed sown: 3 Mar, 1976. Weedkiller applied: 29 Apr.
Combine harvested: 27 July.
Spring beans: Spring-tine cultivated: 4 Mar, 1976. Seed sown: 11 Mar.
PK applied by hand: 12 Mar. Hoed by hand three times: 28 Apr, 26 May, 22 June. Combine harvested: 20 July.
Fallow: Spring-tine cultivated: 4 Mar, 1976. Hoed by hand twice: 28 Apr, 26 May.

- NOTES: (1) Soil samples were taken before sowing and after harvest and plant samples in July for incidence of 'take-all' (*Gaeumannomyces graminis*).
(2) Yields were not taken for the spring beans.

76/W/CS/99

BARLEY

GRAIN TONNES/HECTARE

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

PREVCROP	B/B/B/B	F/B/B/B	F/BE/B/B	B/F/BE/B	B/B/F/BE	MEAN
	1.61	2.01	1.79	2.37	2.85	1.98

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PREVCROP	
SED	0.459	MIN REP
	0.375	MAX-MIN

PREVCROP
 MAX-MIN B/B/B/B V ANY OF REMAINDER
 MIN-REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.459	23.2
GRAIN MEAN DM%	89.2		
PLOT AREA HARVESTED	0.00434		

76/B/CS/109

BENOMYL AND SCLEROTINIA

Object: To study the effects of fungicides on yield and incidence of Sclerotinia rot in winter beans - Fosters O & E III.

Sponsor: J.F. Jenkyn.

The fourth year, winter beans.

For previous years see 73-75/R/CS/109.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 4.27 x 4.27.

Treatments

FUNGICIDE	Fungicide:
NONE	None (3 plots per block).
B(221)2E	Benomyl, two sprays in 1973 and 1974, one in 1975, two early sprays for 1976.
B(221)2M	Benomyl, two sprays in 1973 and 1974, one in 1975, two mid-winter sprays for 1976.
B(221)2L	Benomyl, two sprays in 1973 and 1974, one in 1975, two late sprays for 1976.
B(552)5	Benomyl, five sprays in 1973 and 1974, two in 1975, five for 1976.
BR(002)5	Benomyl + 'RP 26019' (glycophene), no sprays in 1973 and 1974, two in 1975, five for 1976.
R(002)5	'RP 26019', no sprays in 1973 and 1974, two in 1975, five for 1976.
C(052)5	Captafol, no sprays in 1973, five in 1974, two in 1975, five for 1976.

- NOTES: (1) Crop in 1973 and 1974 was red clover infected with Sclerotinia. Winter beans in 1975.
- (2) Five-spray treatments were applied on 4 Nov, 1975, 4 Dec, 12 Jan, 1976, 25 Feb and 9 Apr. B(221)2E sprays were applied on the first two dates, B(221)2M on the second and third dates, B(221)2L on the third and fourth dates.
- (3) Rates of application in 340 l:- Benomyl at 0.56 kg, 'RP 26019' at 0.56 kg a.i. and captafol at 1.34 kg. 'Spreadite' (a wetting agent) was applied at 0.75 ml/l water with each spray.

Basal applications: Manures: (0:14:28) at 850 kg. Weedkillers: Simazine at 1.1 kg in autumn and 0.84 kg in spring, both in 340 l.

Seed: Throws MS, sown at 380 kg.

Cultivations, etc.:- Fertiliser applied: 18 Sept, 1975. Ploughed: 19 Sept. Spring-tine cultivated and sown: 3 Oct. Autumn weedkiller applied: 24 Oct. Spring weedkiller applied: 8 Mar, 1976. Combine harvested: 19 July.

NOTE: Incidence of chocolate spot (*Botrytis* spp.) and *Ascochyta* were measured on one occasion. Sclerotinia was not found in significant quantity.

76/R/CS/109

GRAIN TONNES/HECTARE

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

FUNGCIDE	
NONE	2.47
B(221)2E	2.66
B(221)2M	2.59
B(221)2L	2.89
B(552)5	2.39
BR(002)5	2.45
R(002)5	2.78
C(052)5	2.59
MEAN	2.57

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	FUNGCIDE
SED	0.117 MIN REP
	0.096 MAX-MIN

FUNGCIDE
MAX-MIN NONE V ANY OF REMAINDER
MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	20	0.144	5.6

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00091

76/R/CS/110

FERTILISER AND FYM

Object: To study the residual effects of a range of rates of NPK fertiliser and FYM applied to potatoes, on the yields of subsequent crops - Stackyard.

Sponsor: F.V. Widdowson,

The fourth year, winter beans.

For previous years see 73-75/R/CS/110.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 16.2.

Treatments: All combinations of:-

1. FYM(73) Farmyard manure in 1973 (tonnes) to supply 377 kg N:

0	None
80	80

2. N(73) N and PK fertilisers in 1973 to give rates of nitrogen* (kg N):

188	188
377	377
565	565

3. PK TIME(73) Times of applying PK fertilisers in 1973:

AUTUMN	All in autumn
SPRING	All in spring
AUT/SPNG	Half in autumn, half in spring

* The ratio of N:P₂O₅:K₂O was 1:1.5:1.5 for all N treatments.

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Simazine at 1.1 kg in 220 l.

Seed: Throws M.S. sown at 220 kg.

Cultivations, etc.:- Deep-tine cultivated twice: 16 Sept, 1975. Chalk applied: 19 Sept. Ploughed: 22 Sept. Heavy spring-tine cultivated: 29 Sept. Seed sown, spring-tine cultivated: 3 Oct. Weedkiller applied: 7 Oct. Harvested: 20 July, 1976.

76/R/CS/110

GRAIN TONNES/HECTARE

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

N(73)	188	377	565	MEAN
FYM(73)				
0	3.22	3.39	3.57	3.39
80	3.59	3.70	3.64	3.64
MEAN	3.41	3.54	3.60	3.52
PK TIME(73)	AUTUMN	SPRING	AUT/SPNG	MEAN
FYM(73)				
0	3.29	3.42	3.47	3.39
80	3.64	3.67	3.62	3.64
MEAN	3.46	3.55	3.54	3.52
PK TIME(73)	AUTUMN	SPRING	AUT/SPNG	MEAN
N(73)				
188	3.41	3.39	3.41	3.41
377	3.47	3.59	3.58	3.54
565	3.51	3.66	3.63	3.60
MEAN	3.46	3.55	3.54	3.52
FYM(73)	PK TIME(73)	AUTUMN	SPRING	AUT/SPNG
	N(73)			
0	188	3.15	3.22	3.29
	377	3.31	3.40	3.45
	565	3.41	3.64	3.65
80	188	3.67	3.57	3.54
	377	3.63	3.77	3.70
	565	3.62	3.68	3.61

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	FYM(73)	N(73)	PK TIME(73)	FYM(73)
				N(73)
SED	0.049	0.060	0.060	0.085
TABLE	FYM(73)	N(73)	FYM(73)	
	PK TIME(73)	PK TIME(73)	N(73)	
			PK TIME(73)	
SED	0.085	0.104	0.147	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.180	5.1
GRAIN MEAN DM%	86.6		
PLOT AREA HARVESTED	0.00517		

76/R/CS/130

EFFECTS OF EARTHWORM INOCULATION

Object: To study the effects of different species of earthworms on yield and other characteristics of grass - Fosters O & E.

Sponsor: J.R. Lofty.

The third year, ley.

For previous years see 74-75/R/CS/130.

Design: 3 blocks of 4 plots.

Whole plot dimensions: 8.53 x 9.14.

Treatments: Inoculation with earthworm species in 1974 and 1975:

WORMSPEC

NONE	None
ALLOLOBO	Allolobophora longa at 15,000 per hectare in 1974; 5,000 in 1975
LUMBRICU	Lumbricus terrestris at 5,000 per hectare in 1974 and 1975
SIX SPEC	Six species - A. caliginosa, A. chlorotica, A. longa, A. rosea, L. rubellus, L. terrestris at a total of 35,000 per hectare in 1974, 12,000 in 1975

NOTE: The experiment was ploughed in error on 8 July after the first cut. Drought prevented resowing until September.

Basal applications: Manures: (0:14:28) at 500 kg, (25:0:16) at 440 kg in spring and at 220 kg after the first cut.

Cultivations, etc.: - PK applied: 3 Dec, 1975. NK applied: 25 Feb, 1976, 24 May. Cut: 19 May. Ploughed: 8 July.

NOTE: Earthworm populations were assessed in March.

1ST AND ONLY CUT (19/5/76) DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	2.42	2.09	2.50	2.40	2.35

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	WORMSPEC

SED	0.298

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.365	15.5
MEAN DM%	23.8		
PLOT AREA HARVESTED	0.00046		

76/R/CS/131

EFFECTS OF EARTHWORM DESTRUCTION

Object: To study the effects of eliminating earthworms on yield and soil structure of old grass - Appletree.

Sponsor: J.R. Lofty.

The third year, old grass.

For previous years see 74-75/R/CS/131.

Design: 4 blocks of 4 plots.

Whole plot dimensions: 7.62 x 7.62.

Treatments: Chemicals:-

CHEMICAL

NONE None (2 plots per block)
 BENOMYL Benomyl at 5 kg in 1974 and at 2.5 kg Sept, 1976
 CHLORDAN Chlordane at 10 kg in 1974 only

Basal applications: Manures: (0:14:28) at 500 kg in winter, (25:0:16) at 440 kg in spring and at 220 kg after the first cut. Weedkiller: Mecoprop at 2.7 l in 220 l.

Cultivations, etc.:- PK applied: 28 Nov, 1975. NK applied: 25 Feb, 1976, 21 May. Weedkiller applied: 19 Mar. Cut three times: 20 May, 5 July, 2 Nov.

NOTE: Earthworm populations were assessed in April.

1ST CUT (20/5/76) DRY MATTER TONNES/HECTARE

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

CHEMICAL	NONE	BENOMYL	CHLORDAN	MEAN
	5.34	5.56	5.19	5.36

TABLE CHEMICAL

TABLE	CHEMICAL
SED	0.294 MIN REP 0.255 MAX-MIN

CHEMICAL
 MAX-MIN NONE ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.416	7.8
1ST CUT MEAN DM%	19.8		

76/R/CS/131

2ND CUT (5/7/76) DRY MATTER TONNES/HECTARE

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

CHEMICAL	NONE	BENOMYL	CHLORDAN	MEAN
	0.99	0.98	0.86	0.96

TABLE	CHEMICAL
SED	0.168 MIN REP 0.145 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.237	24.8

2ND CUT MEAN DM% 40.7

3RD CUT (2/11/76) DRY MATTER TONNES/HECTARE

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

CHEMICAL	NONE	BENOMYL	CHLORDAN	MEAN
	2.05	1.90	1.61	1.90

TABLE	CHEMICAL
SED	0.253 MIN REP 0.219 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.357	18.8

3RD CUT MEAN DM% 14.2

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

CHEMICAL	NONE	BENOMYL	CHLORDAN	MEAN
	8.38	8.45	7.65	8.22

TABLE	CHEMICAL
SED	0.439 MIN REP 0.381 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.621	7.6

TOTAL OF 3 CUTS MEAN DM% 24.0

PLOT AREA HARVESTED 0.00046

76/R/CS/133

CONTROL OF PATHOGENS

Object: To study the effects of a range of chemicals on incidence of pathogens and yield of continuous maize - Long Hoos VI/VII 6.

Sponsors: A.J. Barnard, K.E. Fletcher, D.J. Hooper, D. Hornby, R.T. Plumb, T.D. Williams, J.C. Wilson.

The third year, maize.

For previous years see 74-75/R/CS/133.

Design: 3 randomised blocks of 9 plots split into 3.

Whole plot dimensions: 2.13 x 18.3.

Treatments: All combinations of:-

Whole plots

1. CHEMICAL	Chemicals applied annually except where stated:
NONE	None (4 plots per block)
ALDICARB	Aldicarb, 4.5 kg as granules to seedbed
BENOMYL	Benomyl, 11.2 kg as dust to seedbed
DAZOMET	Dazomet, 450 kg as granules in early spring (not applied 1975)
PHORATE	Phorate, 1.68 kg as granules drilled with the seed
BE/DA/PH	Benomyl + dazomet (not applied 1975) + phorate, at above rates and times

Sub plots

2. N Nitrogen fertiliser (kg N):

50	50
100	100
150	150

NOTE: Plots were divided for yields at forage and grain stage.

Basal applications: Manures: (0:14:28) at 850 kg. Weedkiller: Atrazine ('Vectal' at 3.4 kg in 340 l).

Seed: Cargill Primeur 170, sown at 123,000 seeds per ha.

Cultivations, etc.: - Rotary cultivated: 12 Nov, 1975. PK applied: 9 Dec. Dazomet applied, all plots rotary cultivated: 10 Dec. Ploughed: 6 Jan, 1976. Spring-tine cultivated: 24 Mar, 20, 22 Apr. Aldicarb and benomyl treatments applied and these plots only rotary cultivated: 11 May. Seed-sown: 17 May. Harrowed: 19 May. Weedkiller applied: 2 June. N applied: 6 June. Part plots harvested for forage: 20 Oct. Part plots harvested for grain: 25 Nov.

NOTES: (1) Frit fly (*Oscinella frit*) damage was assessed.
(2) Nitrogen percentages of forage and grain were determined.

76/R/CS/133

GRAIN MAIZE TONNES/HECTARE

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

CHEMICAL N	NONE	ALDICARB	BENOMYL	DAZOMET	PHDRATE	EE/DA/PH	MEAN
50	3.28	3.77	3.57	3.45	3.37	3.48	3.42
100	3.27	3.61	3.44	3.01	3.72	3.31	3.35
150	3.27	3.52	4.27	4.22	3.45	3.89	3.60
MEAN	3.27	3.63	3.76	3.56	3.51	3.56	3.46

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	CHEMICAL	N	CHEMICAL
SED		0.485	0.646	MIN REP
	0.174	0.383	0.511	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
			0.522	MIN REP
			0.413	MAX-MIN
			0.261	MAX REP

CHEMICAL
 MAX REP WITHIN NONE
 MAX-MIN NONE V REMAINDER
 MIN-REP REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	19	0.594	17.2
BLOCK.WP.SP	42	0.640	18.5

GRAIN MEAN DM% 63.1

SUB PLOT AREA HARVESTED 0.00039

76/R/CS/133

FORAGE DRY MATTER TONNES/HECTARE

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

CHEMICAL N	NONE	ALDICARB	BENOMYL	DAZOMET	PHORATE	BE/DA/PH	MEAN
50	9.61	11.32	8.56	9.79	9.34	11.23	9.85
100	10.59	9.41	12.75	9.88	9.86	9.48	10.41
150	10.90	12.91	9.72	10.47	11.30	11.46	11.05
MEAN	10.37	11.21	10.34	10.05	10.17	10.72	10.44

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	CHEMICAL	N	CHEMICAL
REP	27	UNEQUAL	UNEQUAL	
SED		0.898	1.467	MIN REP
	0.474	0.710	1.160	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CHEMICAL			1.421	MIN REP
			1.123	MAX-MIN
			0.710	MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	19	1.100	10.5
BLOCK.WP.SP	42	1.740	16.7

MEAN DM% 28.5

PLOT AREA HARVESTED 0.00020

76/W/CS/138

CONTROL OF PCN

Object: To study the fresh and residual effects of several nematicides on control of *Globodera* (formerly *Heterodera*) *rostochiensis* (PCN) and yield of potatoes - Woburn Butt Close.

Sponsor: A.G. Whitehead.

The third year, potatoes.

For previous years see 74-75/W/CS/138.

Design: 4 blocks of 7 plots (NEMRES(745) balanced over blocks).

Whole plot dimensions: 2.84 x 7.01.

Treatments: All combinations of:-

1. NEMRES(745) Residues of nematicides applied in 1974 and 75:

- | | |
|--------|---|
| D Z1 1 | Dichloropropene at 200 kg; dazomet at 100 kg to top
7.5 cm of soil |
| D Z1 2 | Dichloropropene at 200 kg; dazomet at 100 kg to top
15 cm of soil |
| D Z2 1 | Dichloropropene at 200 kg; dazomet at 200 kg to top
7.5 cm of soil |
| D Z2 2 | Dichloropropene at 200 kg; dazomet at 200 kg to top
15 cm of soil |

2. NEMACIDE(76) Nematicides in 1976:

- | | |
|------|--|
| D | Dichloropropene at 200 kg |
| D+01 | Dichloropropene at 200 kg; oxamyl at 2.8 kg |
| D+03 | Dichloropropene at 200 kg; oxamyl at 8.4 kg |
| D+04 | Dichloropropene at 200 kg; oxamyl at 11.2 kg |

NEMACIDE(746) plus three extra treatments (applied cumulatively 1974-76):

- | | |
|----------|---|
| NONE | None |
| (02)02 | Oxamyl at 5.6 kg |
| (D02)D02 | Dichloropropene at 200 kg; oxamyl at 5.6 kg |

NOTE: The dichloropropene was injected at 20 cm and the oxamyl was applied to the surface and rotary cultivated in to a depth of 15 cm.

Basal applications: Manures: (13:13:20) at 1850 kg. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 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. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

76/W/CS/138

Seed: Pentland Crown.

Cultivations, etc.:-

Deep-tine cultivated, dichloropropene injected, all plots spring-tine cultivated: 24 Oct, 1975. Ploughed: 19 Jan, 1976. NPK applied, spring-tine cultivated: 24 Mar. Oxamyl applied, all plots rotary cultivated, potatoes planted: 23 Apr. Weedkiller applied: 7 May. Pirimicarb applied: 18 June. Fungicide plus demeton-s-methyl applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 6 Oct. Haulm mechanically destroyed: 11 Oct. Lifted: 22 Oct.

NOTE: Soil samples were taken in autumn 1975 and after harvest 1976 for cyst and egg counts of *Globodera* (formerly *Heterodera*) *rostochiensis*.

76/W/CS/138

TOTAL TUBERS TONNES/HECTARE

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

NEMACIDE(76) NEMRES(745)	D	D+01	D+03	D+04	MEAN
D Z1 1	16.4	42.0	29.7	48.9	34.3
D Z1 2	4.8	36.2	30.0	34.6	26.4
D Z2 1	23.0	26.5	35.3	34.5	29.8
D Z2 2	14.2	43.3	39.8	41.7	34.7
MEAN	14.6	37.0	33.7	39.9	31.3

NEMACIDE(746)	NONE	(02)02	(D02)D02	MEAN
	6.4	25.5	35.3	22.4

GRAND MEAN 27.5

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE NEMACIDE(746)

SED 3.08

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	4.36	15.9

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

NEMACIDE(76) NEMRES(745)	D	D+01	D+03	D+04	MEAN
D Z1 1	89.0	94.6	90.9	91.2	91.4
D Z1 2	79.0	94.1	93.0	97.4	90.9
D Z2 1	96.5	87.7	93.2	95.1	93.1
D Z2 2	85.0	99.5	92.4	94.4	92.8
MEAN	87.4	94.0	92.4	94.5	92.1

NEMACIDE(746)	NONE	(02)02	(D02)D02	MEAN
	74.2	88.1	91.9	84.7

GRAND MEAN 88.9

PLOT AREA HARVESTED 0.00100

76/R/CS/140

CHEMICAL REFERENCE PLOTS

Object: To study the persistence in soil of four agricultural chemicals applied annually, singly and in combination and their effects on soil microflora and on yield of continuous barley - Long Hoos V 3.

Sponsors: G.G. Briggs, N. Walker, R. MacDonald.

The third year, barley.

For previous years see 74-75/R/CS/140.

Design: Two replicates of 2 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 4.06 x 4.57.

Treatments, applied cumulatively 1974-76 except WEEDKLLR - 1974 and 76 only:
All combinations of:-

1. FUNGCIDE Fungicide:

NONE None
BENOMYL Benomyl at 4 kg applied 9 Mar, 1976

2. INSCTCDE Insecticide:

NONE None
CHLORFEN Chlorfenvinphos at 2 kg applied 9 Mar

3. NEMACIDE Nematicide:

NONE None
ALDICARB Aldicarb at 6 kg applied 9 Mar

4. WEEDKLLR Weedkiller:

NONE None
CHLORTOL Chlortoluron at 2 kg applied 1974 and 1976 only

NOTE: Chlortoluron was applied on 24 Mar in 340 l, other chemicals applied to the seedbed.

Basal applications: Manures: (0:20:20) at 820 kg, 'Nitro-Chalk' at 450 kg. Chalk at 2.9 t.

Seed: Julia (undressed), sown at 160 kg.

Cultivations, etc.: - Spring-tine cultivated: 16 Sept, 1975. PK applied: 8 Dec. Chalk applied: 11 Dec. Ploughed: 19 Dec. Spring-tine cultivated: 8 Mar, 1976. Power harrowed: 9 Mar. Seed sown, N applied: 10 Mar. Combine harvested: 20 July.

- NOTES: (1) Mildew and aphids were assessed during the season.
(2) Residues of aldicarb were measured in soil and plants. Residues of benomyl and chlorfenvinphos were measured in soil.
(3) Yields from two plots were lost at harvest, those with treatment combinations:-

FUNGCIDE	INSCTCDE	NEMACIDE	WEEDKLLR
BENOMYL	NONE	NONE	NONE
NONE	CHLORFEN	NONE	CHLORTOL

Estimated values were used in the analysis.

76/R/CS/140

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE	CHLORFEN	MEAN	
FUNGCIDE				
NONE	3.85	3.94	3.90	
BENOMYL	4.14	3.92	4.03	
MEAN	4.00	3.93	3.96	
NEMACIDE	NONE	ALDICARB	MEAN	
FUNGCIDE				
NONE	3.75	4.04	3.90	
BENOMYL	3.87	4.20	4.03	
MEAN	3.81	4.12	3.96	
NEMACIDE	NONE	ALDICARB	MEAN	
INSCTCDE				
NONE	3.89	4.10	4.00	
CHLORFEN	3.73	4.13	3.93	
MEAN	3.81	4.12	3.96	
WEEDKLLR	NONE	CHLORTOL	MEAN	
FUNGCIDE				
NONE	3.90	3.89	3.90	
BENOMYL	4.03	4.04	4.03	
MEAN	3.96	3.96	3.96	
WEEDKLLR	NONE	CHLORTOL	MEAN	
INSCTCDE				
NONE	3.98	4.01	4.00	
CHLORFEN	3.94	3.92	3.93	
MEAN	3.96	3.96	3.96	
WEEDKLLR	NONE	CHLORTOL	MEAN	
NEMACIDE				
NONE	3.78	3.84	3.81	
ALDICARB	4.15	4.09	4.12	
MEAN	3.96	3.96	3.96	
INSCTCDE	NONE	CHLORFEN		
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE				
NONE	3.73	3.96	3.78	4.11
BENOMYL	4.05	4.24	3.68	4.16
INSCTCDE	NONE	CHLORFEN		
WEEDKLLR	NONE	CHLORTOL	NONE	CHLORTOL
FUNGCIDE				
NONE	3.91	3.79	3.90	3.99
BENOMYL	4.06	4.23	3.99	3.84

76/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE WEEDKLLR FUNGIDE	NONE		ALDICARB	
	NONE	CHLORTOL	NONE	CHLORTOL
NONE	3.76	3.75	4.04	4.03
BENOMYL	3.80	3.93	4.25	4.14

NEMACIDE WEEDKLLR INSCTCDE	NONE		ALDICARB	
	NONE	CHLORTOL	NONE	CHLORTOL
NONE	3.82	3.96	4.15	4.05
CHLORFEN	3.74	3.72	4.15	4.12

FUNGIDE INSCTCDE	NEMACIDE WEEDKLLR	NONE		ALDICARB	
		NONE	CHLORTOL	NONE	CHLORTOL
NONE	NONE	3.78	3.68	4.04	3.89
	CHLORFEN	3.74	3.82	4.05	4.17
BENOMYL	NONE	3.87	4.24	4.26	4.21
	CHLORFEN	3.74	3.61	4.24	4.07

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	FUNGIDE	INSCTCDE	NEMACIDE	WEEDKLLR
SED	0.089	0.089	0.089	0.089

TABLE	FUNGIDE INSCTCDE	FUNGIDE NEMACIDE	INSCTCDE NEMACIDE	FUNGIDE WEEDKLLR
SED	0.125	0.125	0.125	0.125

TABLE	INSCTCDE WEEDKLLR	NEMACIDE WEEDKLLR	FUNGIDE INSCTCDE NEMACIDE	FUNGIDE INSCTCDE WEEDKLLR
SED	0.125	0.125	0.177	0.177

TABLE	FUNGIDE NEMACIDE WEEDKLLR	INSCTCDE NEMACIDE WEEDKLLR	FUNGIDE INSCTCDE NEMACIDE WEEDKLLR
SED	0.177	0.177	0.251

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	14	0.251	6.3

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00075

76/R/CS/155

RAINFALL AND LEACHING

Object: To study the residual effects of leaching of nitrate nitrogen by a range of winter rainfall rates on yields of oats after spring wheat - Long Hoos VI/VII 4.

Sponsor: T.M. Addiscott.

The second year, spring oats.

For previous year see 75/R/CS/155.

Design: 2 blocks of 16 plots, randomisation restricted.

Whole plot dimensions: 2.13 x 2.13.

Treatments: All combinations of:-

1. RAINFALL(75) 'Rainfall' (mm), October 1974 - February 1975 inclusive:

(177)	177
(258)	258
(396)	396
(484)	484

2. N(75) Nitrogen fertiliser, applied 16 May, 1975 (kg N), none to oats:

(0)	None
(40)	40
(80)	80
(120)	120

NOTES: (1) Natural rainfall in the period October 1974 - February 1975 was 396 mm. Smaller rates were achieved by covering and the larger rate by supplementing natural rainfall with irrigation.

(2) The crop was harvested green on 30 June and yields of total produce recorded.

Basal applications: Manures: (0:14:28) at 880 kg. Fungicides: Tridemorph at 0.53 kg in 340 l.

Seed: Manod, sown at 190 kg.

Cultivations, etc.:- Spring-tine cultivated: 15 Sept, 1975. PK applied: 24 Sept. Ploughed: 29 Sept. Spring-tine cultivated: 3 Oct and 22 Mar, 1976. Seed sown: 23 Mar. Fungicide applied: 16 June. Harvested green: 30 June.

NOTES: (1) Concentrations of nitrate and ammonium ions at four soil depths were determined at the beginning and end of Oct-Feb period.

(2) N percentage in green crop was determined.

76/R/CS/155

GREENCROP DRY MATTER TONNES/HECTARE

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

	N(75)	(0)	(40)	(80)	(120)	MEAN
RAINFALL(75)						
(177)		1.18	1.00	1.35	1.25	1.20
(258)		1.24	1.19	1.00	2.14	1.39
(396)		1.00	1.51	1.08	1.09	1.17
(484)		1.31	1.16	0.96	1.47	1.22
MEAN		1.18	1.21	1.10	1.49	1.25

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	RAINFALL(75)	N(75)	RAINFALL(75)	N(75)
SED	0.105	0.105	0.209	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.209	16.8

MEAN DM% 30.8

PLOT AREA HARVESTED 0.00046

76/R/CS/156

LEATHERJACKET STUDY

Object: To study the effects of birds and rainfall on leatherjacket populations and yield of old grass - Road Piece.

Sponsor: C.A. Edwards.

The second year, old grass.

For previous year see 75/R/CS/156.

Design: 2 blocks of 9 plots.

Whole plot dimensions: 2.74 x 3.66.

Treatments:-

TREATMNT

None in 1976 after the following in 1975:

-(-)	None
-(CN)	Caged from birds by wire netting from November 1974
-(CF)	Caged from February 1975
-(DRY)	Protected from rain from November 1974

The following in 1976 after none in 1975:

CD(-)	Caged from December 1975
CF(-)	Caged from February 1976
CA(-)	Caged from April 1976
DRY(-)	Protected from rain from November 1975
LF(LJ)	Larvae added in June 1975 and February 1976

Basal applications: Manures: (0:14:28) at 500 kg. (25:0:16) at 440 kg in spring and at 220 kg after the first cut.

Cultivations, etc.:- PK applied: 21 Nov, 1975. NK applied: 26 Feb, 1976, 21 May.
Cut: 20 May, 29 June, 2 Nov.

NOTES: (1) Soil cores were taken to assess total soil fauna in December, 1975, January and February, 1976.
(2) Because of drought sampling was not continued throughout the season.

76/R/CS/156

1ST CUT (20/5/76) DRY MATTER TONNES/HECTARE

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

TREATMNT	-(-)	-(CN)	-(CF)	-(DRY)	CD(-)	CF(-)	CA(-)	DRY(-)	LF(LJ)	MEAN
	2.63	2.95	3.18	2.83	2.95	3.36	3.25	2.45	3.18	2.97

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREATMNT
-----	-----
SED	0.525

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.525	17.7

1ST CUT MEAN DM% 20.7

2ND CUT (29/6/76) DRY MATTER TONNES/HECTARE

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

TREATMNT	-(-)	-(CN)	-(CF)	-(DRY)	CD(-)	CF(-)	CA(-)	DRY(-)	LF(LJ)	MEAN
	0.41	0.38	0.42	0.51	0.32	0.35	0.46	0.36	0.36	0.40

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREATMNT
-----	-----
SED	0.038

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.038	9.6

2ND CUT MEAN DM% 39.9

76/R/CS/156

3RD CUT (2/11/76) DRY MATTER TONNES/HECTARE

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

TREATMNT	-(-)	-(CN)	-(CF)	-(DRY)	CD(-)	CF(-)	CA(-)	DRY(-)	LF(LJ)	MEAN
	1.58	1.62	1.28	1.45	1.27	1.78	1.45	1.48	1.78	1.52

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREATMNT
-----	-----
SED	0.212

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.212	14.0

3RD CUT MEAN DM% 15.6

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TREATMNT	-(-)	-(CN)	-(CF)	-(DRY)	CD(-)	CF(-)	CA(-)	DRY(-)	LF(LJ)	MEAN
	4.62	4.95	4.87	4.78	4.54	5.49	5.17	4.28	5.31	4.89

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREATMNT
-----	-----
SED	0.522

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.522	10.7

TOTAL OF 3 CUTS MEAN DM% 25.4

PLOT AREA HARVESTED 0.00037

76/W/CS/159

METHODS OF INCORPORATING NEMATICIDES

Object: To study the effects of several methods of incorporating three rates of aldicarb and oxamyl into the soil on the incidence of *Globodera* (formerly *Heterodera*) *rostochiensis* and yield of potatoes - Woburn Butt Close 1.

Sponsors: A.G. Whitehead, R.H. Bromilow.

The third year, potatoes.

For previous years see 74/W/P/3 and 75/W/CS/159.

Design: 2 randomised blocks of 2 plots split into 16.

Whole plot dimensions: 2.84 x 9.14.

Treatments (cumulative in 1974 and 1975): All combinations of:-

Whole plots

1. NEMACIDE Nematicide (all aldicarb 1974 and 1975):

ALDICARB	Aldicarb
OXAMYL	Oxamyl

Sub plots

2. NEM RATE Rates of nematicide (kg):

2.25	2.25
4.50	4.50
9.00	9.00

3. METHOD Methods of incorporating nematicide (all applied just before planting):

S/RR Applied to surface and then cultivated by 'Roterra' (a rotary cultivator with blades revolving around a vertical axis) to 20 cm depth

SM/RR Half applied to surface and half to 5 cm depth*, then cultivated by 'Roterra' to 20 cm depth

SMD/RR One third applied to surface, one third to 5 cm depth*, one third to 10 cm depth* then cultivated by 'Roterra' to 20 cm depth

RR/S/RV1 Soil cultivated by 'Roterra' to 20 cm depth, then all nematicide applied to surface, then rotary cultivated to 15 cm depth

RR/SD/H Soil cultivated by 'Roterra' to 20 cm depth, then half nematicide applied to surface and half to 10 cm depth*, then spring-tine harrowed

NEMACIDE plus one sub plot not treated with nematicide cultivated by 'Roterra' to 20 cm depth

0.00

*Applied with a specially made applicator.

76/W/CS/159

Basal applications: (13:13:20) at 1850 kg. Weedkiller: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 l. Fungicide with insecticide: Mancozeb at 1.3 kg with demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Seed: Pentland Crown.

Cultivations, etc.:— Subsoiled, tines 140 cm apart and 56 cm deep, deep-tine cultivated: 6 Nov, 1975. Spring-tine cultivated: 23 Mar. 1976. NPK applied, spring-tine cultivated: 24 Mar. Treatments applied: 22 Apr. Potatoes planted: 23 Apr. Weedkiller applied: 5 May. Pirimicarb applied: 15 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm desiccant applied: 6 Oct. Haulm mechanically destroyed: 11 Oct. Lifted: 21 Oct.

NOTE: Soil samples were taken in spring before treatments were applied and after harvest, for cyst and egg counts of *Globodera* (formerly *Heterodera*) *rostochiensis*.

76/W/CS/159

TUBERS TONNES/HECTARE

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

METHOD	S/RR	SM/RR	SMD/RR	RR/S/RV1	RR/SD/H	MEAN
NEMACIDE						
ALDICARB	32.0	26.7	32.8	34.0	35.0	32.1
OXAMYL	29.0	31.2	29.6	30.9	29.3	30.0
MEAN	30.5	28.9	31.2	32.4	32.2	31.0

METHOD	S/RR	SM/RR	SMD/RR	RR/S/RV1	RR/SD/H	MEAN
NEM RATE						
2.25	32.5	23.5	27.6	28.5	28.3	28.1
4.50	31.4	30.7	31.7	34.3	34.3	32.5
9.00	27.5	32.6	34.2	34.4	34.0	32.5
MEAN	30.5	28.9	31.2	32.4	32.2	31.0

NEM RATE	2.25	4.50	9.00	MEAN
NEMACIDE				
ALDICARB	29.4	35.1	31.7	32.1
OXAMYL	26.7	29.8	33.4	30.0
MEAN	28.1	32.5	32.5	31.0

METHOD	NEM RATE	2.25	4.50	9.00
S/RR	ALDICARB	32.4	34.9	28.8
	OXAMYL	32.6	28.0	26.3
SM/RR	ALDICARB	25.4	25.7	28.9
	OXAMYL	21.6	35.7	36.4
SMD/RR	ALDICARB	28.8	38.6	30.9
	OXAMYL	26.4	24.9	37.4
RR/S/RV1	ALDICARB	30.6	36.7	34.6
	OXAMYL	26.4	31.9	34.2
RR/SD/H	ALDICARB	29.9	39.9	35.2
	OXAMYL	26.6	28.7	32.7

NEMACIDE 0.00 10.9

GRAND MEAN 29.8

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEM RATE	METHOD	NEMACIDE* NEM RATE	NEMACIDE* METHOD
SED	1.80	2.32	2.54	3.28

TABLE	NEM RATE METHOD	NEMACIDE* NEM RATE METHOD
SED	4.02	5.69

* WITHIN THE SAME LEVEL OF NEMACIDE ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	30	5.69	19.1

76/W/CS/159

PERCENTAGE WARE 3.81CM(1.5 INCH)RIDDLE

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

METHOD	S/RR	SM/RR	SMD/RR	RR/S/RV1	RR/SD/H	MEAN
NEMACIDE						
ALDICARB	85.3	81.0	86.6	88.5	88.8	86.1
OXAMYL	82.9	82.8	78.9	85.3	80.8	82.1
MEAN	84.1	81.9	82.8	86.9	84.8	84.1

METHOD	S/RR	SM/RR	SMD/RR	RR/S/RV1	RR/SD/H	MEAN
NEM RATE						
2.25	87.7	76.0	80.5	84.1	81.1	81.9
4.50	84.6	85.4	79.5	88.5	85.9	84.8
9.00	80.1	84.3	88.3	88.1	87.5	85.6
MEAN	84.1	81.9	82.8	86.9	84.8	84.1

NEM RATE	2.25	4.50	9.00	MEAN
NEMACIDE				
ALDICARB	83.6	89.3	85.3	86.1
OXAMYL	80.2	80.3	86.0	82.1
MEAN	81.9	84.8	85.6	84.1

METHOD	NEM RATE	2.25	4.50	9.00
S/RR	NEMACIDE			
	ALDICARB	86.5	90.0	79.5
	OXAMYL	88.9	79.3	80.6
SM/RR	ALDICARB	76.5	83.6	82.9
	OXAMYL	75.4	87.3	85.7
SMD/RR	ALDICARB	84.9	89.5	85.5
	OXAMYL	76.2	69.5	91.0
RR/S/RV1	ALDICARB	83.3	92.5	89.6
	OXAMYL	84.9	84.4	86.6
RR/SD/H	ALDICARB	86.8	90.7	88.9
	OXAMYL	75.4	81.0	86.0

NEMACIDE 0.00 66.3

GRAND MEAN 83.0

SUB PLOT AREA HARVESTED 0.00130

76/R/CS/161

INJECTED N

Object: To study the effects of injecting aqueous urea, with or without a nitrification inhibitor, at three rates and two spacings on the yield and nitrogen uptake of old grass cut for silage - Highfield IX.

Sponsors: F.V. Widdowson, A. Penny, J. Ashworth.

The second year, old grass.

Design: 2 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 15.2.

Treatments: All combinations of:-

1. LIQUID N(76) Liquid nitrogen fertiliser in 1976:
- | | |
|----------|--|
| UREA | Aqueous solution of urea, no nitrification inhibitor |
| UREA+ATC | Aqueous solution of urea plus ammonium trithiocarbonate as a nitrification inhibitor |

2. SPACING Spacing between tines injecting liquid fertiliser, cumulative 1975 and 1976:

30 CM	30 cm
60 CM	60 cm

3. N RATE Rate of liquid fertiliser, applied as a single annual dressing, cumulative 1975 and 1976 (kg N):

250	250
375	375
500	500

SOLID N(76) plus six treatments given 'Nitro-Chalk', rates cumulative 1975 and 1976, dressing divided between cuts (kg N, total/annum):

0	0
100	100
200	200
300	300
400	400
500	500

- NOTES: (1) The whole area was grazed in 1975, yields were not taken.
(2) Ammonium trithiocarbonate was applied at 16 kg to SPACING, 30 CM and at 8 kg to SPACING, 60 CM.

Cultivations, etc.: - Aqueous urea and inhibitors injected: 26 Feb, 1976. 'Nitro-Chalk' applied: 3 Mar, 6 May, 3 June, 7 July, 13 Aug, 2 Sept. Cut: 5 May, 2 June, 10 Aug, 2 Nov.

NOTE: It was intended to make six cuts during the season but drought prevented this.

76/R/CS/161

1ST CUT (5/5/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	1.01	1.25	1.87	2.41	2.69	3.04	2.04
SPACING	30 CM	60 CM		MEAN			
LIQUID N(76)							
UREA	3.10	2.90		3.00			
UREA+ATC	2.76	2.67		2.72			
MEAN	2.93	2.79		2.86			
N RATE	250	375		500		MEAN	
LIQUID N(76)							
UREA	2.69	3.00		3.30		3.00	
UREA+ATC	2.51	2.82		2.82		2.72	
MEAN	2.60	2.91		3.06		2.86	
N RATE	250	375		500		MEAN	
SPACING							
30 CM	2.80	2.97		3.01		2.93	
60 CM	2.40	2.86		3.10		2.79	
MEAN	2.60	2.91		3.06		2.86	
LIQUID N(76)							
UREA							
UREA+ATC							
SPACING							
30 CM	250	2.94		2.66			
	375	3.07		2.87			
	500	3.28		2.74			
60 CM	250	2.44		2.36			
	375	2.94		2.78			
	500	3.31		2.89			

GRAND MEAN 2.59

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.215	0.088	0.088	0.107
TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.124	0.152	0.152	0.215

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.215	8.3

1ST CUT MEAN DM% 19.5

76/R/CS/161

2ND CUT (2/6/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	0.77	1.11	1.59	2.13	2.12	1.99	1.62

SPACING	30 CM	60 CM	MEAN
LIQUID N(76)			
UREA	1.82	1.58	1.70
UREA+ATC	1.58	1.63	1.60
MEAN	1.70	1.60	1.65

N RATE	250	375	500	MEAN
LIQUID N(76)				
UREA	1.74	1.79	1.56	1.70
UREA+ATC	1.69	1.80	1.32	1.60
MEAN	1.71	1.80	1.44	1.65

N RATE	250	375	500	MEAN
SPACING				
30 CM	1.74	1.79	1.57	1.70
60 CM	1.69	1.80	1.31	1.60
MEAN	1.71	1.80	1.44	1.65

	LIQUID N(76)	UREA	UREA+ATC
SPACING	N RATE		
30 CM	250	1.76	1.71
	375	1.90	1.68
	500	1.79	1.35
60 CM	250	1.72	1.67
	375	1.68	1.92
	500	1.34	1.29

GRAND MEAN 1.64

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.262	0.107	0.107	0.131

TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.151	0.185	0.185	0.262

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.262	16.0
2ND CUT MEAN DM%	24.3		

76/R/CS/161

3RD CUT (10/8/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	0.38	0.39	0.39	0.26	0.32	0.24	0.33

SPACING	30 CM	60 CM	MEAN
LIQUID N(76)			
UREA	0.25	0.24	0.25
UREA+ATC	0.28	0.28	0.28
MEAN	0.27	0.26	0.26

N RATE	250	375	500	MEAN
LIQUID N(76)				
UREA	0.23	0.24	0.27	0.25
UREA+ATC	0.29	0.29	0.28	0.28
MEAN	0.26	0.26	0.27	0.26

N RATE	250	375	500	MEAN
SPACING				
30 CM	0.24	0.26	0.30	0.27
60 CM	0.28	0.27	0.24	0.26
MEAN	0.26	0.26	0.27	0.26

	LIQUID N(76)	UREA	UREA+ATC
SPACING	N RATE		
30 CM	250	0.20	0.28
	375	0.26	0.26
	500	0.30	0.30
60 CM	250	0.27	0.29
	375	0.22	0.31
	500	0.23	0.25

GRAND MEAN 0.29

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.080	0.033	0.033	0.040

TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.046	0.057	0.057	0.080

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.080	28.1

3RD CUT MEAN DM% 36.2

76/R/CS/161

4TH CUT (2/11/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	1.47	2.20	2.54	2.47	2.16	1.88	2.12

SPACING 30 CM 60 CM MEAN

LIQUID N(76)

UREA 2.15 2.20 2.18

UREA+ATC 2.12 2.11 2.11

MEAN 2.14 2.15 2.14

N RATE 250 375 500 MEAN

LIQUID N(76)

UREA 2.24 2.23 2.06 2.18

UREA+ATC 2.09 2.24 2.01 2.11

MEAN 2.16 2.24 2.03 2.14

N RATE 250 375 500 MEAN

SPACING

30 CM 2.17 2.19 2.05 2.14

60 CM 2.16 2.29 2.02 2.15

MEAN 2.16 2.24 2.03 2.14

LIQUID N(76) UREA UREA+ATC

SPACING N RATE

30 CM 250 2.19 2.15

375 2.19 2.18

500 2.08 2.03

60 CM 250 2.29 2.02

375 2.27 2.31

500 2.04 1.99

GRAND MEAN 2.14

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.173	0.071	0.071	0.087

TABLE	LIQUID N(76) SPACING	LIQUID N(76) N RATE	SPACING N RATE	LIQUID N(76) SPACING N RATE
SED	0.100	0.122	0.122	0.173

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.173	8.1

4TH CUT MEAN DM% 13.7

76/R/CS/161

TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	3.62	4.95	6.39	7.27	7.28	7.15	6.11
SPACING	30 CM	60 CM	MEAN				
LIQUID N(76)							
UREA	7.32	6.92	7.12				
UREA+ATC	6.74	6.69	6.72				
MEAN	7.03	6.80	6.92				
N RATE	250	375	500	MEAN			
LIQUID N(76)							
UREA	6.90	7.26	7.18	7.12			
UREA+ATC	6.57	7.16	6.42	6.72			
MEAN	6.74	7.21	6.80	6.92			
N RATE	250	375	500	MEAN			
SPACING							
30 CM	6.95	7.20	6.93	7.03			
60 CM	6.53	7.21	6.67	6.80			
MEAN	6.74	7.21	6.80	6.92			
	LIQUID N(76)	UREA	UREA+ATC				
SPACING	N RATE						
30 CM	250	7.09	6.81				
	375	7.42	6.99				
	500	7.45	6.42				
60 CM	250	6.72	6.34				
	375	7.10	7.32				
	500	6.92	6.42				

GRAND MEAN 6.65

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.422	0.172	0.172	0.211
TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
			N RATE	
SED	0.243	0.298	0.298	0.422

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.422	6.3
TOTAL OF 4 CUTS MEAN DM%	23.4		
PLOT AREA HARVESTED	0.00282		

76/R/CS/162

TIMES OF APPLYING ACARICIDE

Object: To study the effects of applying the acaricide endosulfan, at a range of times, on the incidence of ryegrass mosaic virus and its mite vectors and on the yield of ryegrass - Claycroft.

Sponsors: R.W. Gibson, R.T. Plumb.

The second year, ryegrass.

For previous year see 75/R/CS/162.

Design: 4 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 6.10.

Treatments: All combinations of:-

- | | |
|-------------|--|
| 1. VARIETY | Varieties: |
| S 22 | Italian, S.?? |
| S 24 | Perennial, S.24 |
| 2. ACA TIME | Times of applying acaricide (cumulative to 1975 treatments): |
| NEVER | Never |
| JUNE | June (4 June, 1976) (None in 1975) (duplicated) |
| JULY | July (22 July) |
| AUGUST | August (20 August) |
| SEPTEMBER | September (28 September) |
| NOVEMBER | November (18 November) |
| MAY/NOV | May-November |
| POST CUT | After each cut |

- NOTES: (1) Endosulfan was applied at 0.35 kg in 430 l.
(2) It was intended to apply a MAY level of ACA TIME but this was postponed by weather, hence duplication of ACA TIME JUNE.
(3) VARIETY S.22 started to fail during the summer and plots of this treatment were destroyed in September and re-sown. ACA TIME SEPTEMBER was accordingly not applied to VARIETY S.22 and only two cuts were taken from this variety.
(4) ACA TIME POST CUT was applied on 4 June, 22 July, 17 Nov to both varieties.

Basal applications: Manures: (0:14:28) at 500 kg in autumn. (25:0:16) at 800 kg in February. (25:0:16) at 600 kg in May and July.

Cultivations, etc.: - PK applied: 28 Nov, 1975. NK applied: 25 Feb, 1976, 21 May, 9 July. Cut: 17 May, 5 July, 5 Nov. 2 blocks VARIETY S.22, rotary cultivated, spring-tine cultivated, harrowed: 20 Sept. Remaining blocks VARIETY S.22 heavy spring-tine cultivated twice: 21 Sept.

- NOTES: (1) Mites (*Abacarus hystrix*) were counted on 14 May, 8 June, 19 Aug and 11 Oct.
(2) Virus scores were made on 4 May, 9 May, 8 June and 11 Oct.

76/R/CS/162

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

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

VARIETY	S 22	S 24	MEAN
ACA TIME			
NEVER	5.53	4.91	5.22
JUNE	5.36	4.83	5.09
JULY	5.78	5.07	5.43
AUGUST	5.56	4.82	5.19
SEPTEMBER	5.52	5.05	5.29
NOVEMBER	5.49	4.91	5.20
MAY/NOV	5.94	5.08	5.51
POST CUT	5.64	4.60	5.12
MEAN	5.57	4.90	5.24

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ACA TIME	VARIETY	ACA TIME VARIETY
SED	0.164		0.232 MIN REP
	0.142	0.077	0.201 MAX-MIN
			0.164 MAX REP

ACA TIME
 MAX REP JUNE
 MAX-MIN JUNE V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	53	0.328	6.3

1ST CUT MEAN DM% 18.7

76/R/CS/162

2ND CUT (5/7/76) DRY MATTER TONNES/HECTARE

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

VARIETY	S 22	S 24	MEAN
ACA TIME			
NEVER	2.43	3.73	3.08
JUNE	2.40	3.87	3.13
JULY	2.29	4.20	3.25
AUGUST	2.78	3.40	3.09
SEPTEMBER	2.92	4.28	3.60
NOVEMBER	2.77	3.57	3.17
MAY/NOV	2.83	3.67	3.25
POST CUT	2.87	4.20	3.53
MEAN	2.63	3.86	3.25

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ACA TIME	VARIETY	ACA TIME VARIETY
SED	0.260		0.368 MIN REP
	0.225	0.123	0.318 MAX-MIN
			0.260 MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	53	0.520	16.0

2ND CUT MEAN DM% 34.5

76/R/CS/162

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

VARIETY	S 22	S 24	MEAN
ACA TIME			
NEVER	7.96	8.64	8.30
JUNE	7.76	8.69	8.23
JULY	8.07	9.27	8.67
AUGUST	8.34	8.22	8.28
SEPTEMBER	8.44	9.33	8.88
NOVEMBER	8.27	8.48	8.37
MAY/NOV	8.77	8.76	8.76
POST CUT	8.51	8.80	8.65
MEAN	8.21	8.77	8.49

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ACA TIME	VARIETY	ACA TIME VARIETY
SED	0.303		0.428 MIN REP
	0.262	0.143	0.371 MAX-MIN
			0.303 MAX REP

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	53	0.605	7.1
TOTAL OF 2 CUTS MEAN DM%	26.6		

76/R/CS/162

DRY MATTER TONNES/HECTARE

VARIETY S24 ONLY

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

	3RD CUT (5/11/76)	TOTAL OF 3 CUTS
ACA TIME		
NEVER	3.22	11.86
JUNE	3.33	12.03
JULY	3.86	13.13
AUGUST	3.20	11.43
SEPTEMBER	3.76	13.09
NOVEMBER	3.24	11.72
MAY/NOV	3.21	11.96
POST CUT	3.64	12.44
MEAN	3.42	12.19

3RD CUT (5/11/76) DRY MATTER TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ACA TIME
-----	-----
SED	0.255 MIN REP
	0.221 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	25	0.360	10.5

3RD CUT MEAN DM% 12.3

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ACA TIME
-----	-----
SED	0.561 MIN REP
	0.436 MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	25	0.793	6.5

TOTAL OF 3 CUTS MEAN DM% 20.6

PLOT AREA HARVESTED 0.00062

76/R/CS/166 and 76/W/CS/166

LIQUID FERTILISERS

Object: To study the residual effects on wheat of a range of rates and methods of applying liquid fertilisers to potatoes - Rothamsted (R), Long Hoos 1/II and Woburn (W), Far Field I.

Sponsors: F.V. Widdowson, A. Penny.

The second year, wheat.

For previous year see 75/R&W/CS/166.

Design: Half replicate of 4 x 4 x 2 x 4 arranged in 2 blocks of 32 plots.

Whole plot dimensions: 4.27 x 12.2.

Treatments: All combinations of:-

1. APPLICN(75) Form and method of applying fertiliser to potatoes in 1975:

GRAN B	Granules (13:13:20), broadcast over the plough furrow
LIQUID S	Liquid (7:7:10), sprayed on plough furrow
LIQUID P	Liquid, placed in bands on each side of the seed
LIQUID D	Liquid, divided, half on plough furrow, half placed

2. N IN NPK(75) Rate of nitrogen in NPK fertiliser 1975 (kg N):

126	126
188	188
251	251
314	314

3. SPACING (75) Spacing of tubers within the rows 1975 (rows all 71 cm apart) (cm):

30 CM	30
45 CM	45

4. N 76 Nitrogen fertiliser in 1976 (kg N):

0	0
30	30
60	60
90	90

Basal applications:-

Long Hoos 1/II (R): Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Growth regulator: Chlormequat at 1.7 kg in 220 l.

Far Field I (W): Weedkillers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l. Growth regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Long Hoos 1/II (R): Maris Huntsman, sown at 190 kg.

Far Field I (W): Maris Huntsman, sown at 210 kg.

76/R/CS/166 and 76/W/CS/166

Cultivations, etc.:-

Long Hoos I/II (R): Heavy spring-tine cultivated twice, seed sown: 17 Oct, 1975. N applied: 12 Apr, 1976. Weedkiller applied: 13 Apr. Chlormequat applied: 5 May. Combine harvested: 2 Aug.

Far Field I (W): Deep-tine cultivated: 9 Oct, 1975. Spring-tine cultivated: 13 Oct. Seed sown: 14 Oct. N applied: 13 Apr, 1976. Weedkiller applied: 21 Apr. Chlormequat applied: 4 May. Combine harvested: 30 July.

NOTE: Grain samples were taken for nitrogen analysis.

GRAIN TONNES/HECTARE

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

APPLICN(75) SPACING(75)	GRAN B	LIQUID S	LIQUID P	LIQUID D	MEAN
30 CM	5.84	5.64	6.03	5.89	5.85
45 CM	6.01	5.91	6.10	6.02	6.01
MEAN	5.93	5.78	6.06	5.96	5.93
N IN NPK(75) SPACING(75)	126	188	231	314	MEAN
30 CM	5.55	5.84	5.90	6.11	5.85
45 CM	5.86	5.88	6.12	6.18	6.01
N IN NPK(75) APPLICN(75)	126	188	231	314	MEAN
GRAN B	5.77	5.85	5.95	6.13	5.93
LIQUID S	5.45	5.71	5.68	6.26	5.78
LIQUID P	5.65	5.77	6.53	6.30	6.06
LIQUID D	5.95	6.12	5.86	5.90	5.96
MEAN	5.71	5.86	6.01	6.15	5.93
N 76 SPACING(75)	0	30	60	90	MEAN
30 CM	5.56	5.73	6.20	5.91	5.85
45 CM	5.56	6.05	6.20	6.23	6.01
N 76 APPLICN(75)	0	30	60	90	MEAN
GRAN B	5.41	5.92	6.37	6.01	5.93
LIQUID S	5.39	5.66	6.31	5.75	5.78
LIQUID P	5.71	5.97	6.20	6.38	6.06
LIQUID D	5.73	6.00	5.93	6.16	5.96
N 76 N IN NPK(75)	0	30	60	90	MEAN
126	5.12	5.57	6.11	6.03	5.71
188	5.58	5.69	6.02	6.17	5.86
231	5.52	6.03	6.46	6.01	6.01
314	6.02	6.26	6.23	6.08	6.15
MEAN	5.56	5.89	6.20	6.07	5.93

76/R/CS/166 LONG HOOS I/II (R)

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SPACING(75)	APPLIEN(75)	N IN NPK(75)	N 76
SED	0.106	0.150	0.150	0.150

TABLE	SPACING(75) APPLIEN(75)	SPACING(75) N IN NPK(75)	APPLIEN(75) N IN NPK(75)	SPACING(75) N 76
SED	0.213	0.213	0.301	0.213

TABLE	APPLIEN(75) N 76	N IN NPK(75) N 76
SED	0.301	0.301

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	19	0.425	7.2

GRAIN MEAN DM% 88.5

PLOT AREA HARVESTED 0.00347

76/W/CS/166 FAR FIELD I (W)

GRAIN TONNES/HECTARE

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

APPLIEN(75) SPACING(75)	GRAN B	LIQUID S	LIQUID P	LIQUID D	MEAN
30 CM	4.55	4.30	4.44	4.61	4.47
45 CM	4.51	4.95	4.45	4.44	4.59
MEAN	4.53	4.62	4.45	4.52	4.53
N IN NPK(75) SPACING(75)	126	188	231	314	MEAN
30 CM	4.47	4.60	4.50	4.33	4.47
45 CM	4.46	4.97	4.33	4.58	4.59
N IN NPK(75) APPLIEN(75)	126	188	231	314	MEAN
GRAN B	4.58	4.77	4.43	4.34	4.53
LIQUID S	4.76	4.76	4.40	4.57	4.62
LIQUID P	4.20	4.83	4.34	4.42	4.45
LIQUID D	4.32	4.78	4.50	4.50	4.52
MEAN	4.46	4.78	4.42	4.46	4.53

76/W/CS/166 FAR FIELD I (W)

GRAIN TONNES/HECTARE

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

N 76	0	30	60	90	MEAN
SPACING(75)					
30 CM	4.65	4.55	4.42	4.27	4.47
45 CM	4.60	4.73	4.47	4.55	4.59
N 76	0	30	60	90	MEAN
APPLICN(75)					
GRAN B	4.64	4.96	4.06	4.45	4.53
LIQUID S	4.65	4.71	4.85	4.27	4.62
LIQUID P	4.62	4.34	4.28	4.54	4.45
LIQUID D	4.59	4.56	4.58	4.37	4.52
N 76	0	30	60	90	MEAN
N IN NPK(75)					
126	4.34	4.50	4.77	4.25	4.46
188	4.65	4.98	4.54	4.96	4.78
231	4.63	4.69	4.24	4.11	4.42
314	4.88	4.41	4.21	4.33	4.46
MEAN	4.62	4.64	4.44	4.41	4.53

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SPACING(75)	APPLICN(75)	N IN NPK(75)	N 76
SED	0.102	0.144	0.144	0.144

TABLE	SPACING(75) APPLICN(75)	SPACING(75) N IN NPK(75)	APPLICN(75) N IN NPK(75)	SPACING(75) N 76
SED	0.204	0.204	0.288	0.204

TABLE	APPLICN(75) N 76	N IN NPK(75) N 76
SED	0.288	0.288

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	19	0.408	9.0

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00347

76/R/CS/169

ORGANIC MATTER AND RESPONSES TO N

Object: To study the effects of different amounts of organic matter in the soil on the uptake of nitrogen fertiliser by grass - Highfield and Fosters Ley Arable (see also 75/R/RN/1&2).

Sponsors: A.E. Johnston, A. Penny.

The second year, grass.

For previous year see 75/R/CS/169.

Design: On each field: 2 blocks of 6 plots for each date of sowing grass.

Whole plot dimensions: 3.50 x 8.23.

Treatments: All combinations of:-

1. FIELD Fields:

HIGHFLD	Highfield (old grass until 1949)
FOSTERS	Fosters (old arable until 1949)

2. SOW DATE Date of sowing grass:

1949	1949
1973	1973 (grass 1949-1963, arable 1964-1972)

3. N PERCUT Nitrogen fertiliser, cumulative to 1975, (kg N) per cut:

0	None (2 plots per block)
25	25
50	50
75	75
100	100

Basal applications: Manures: (0:14:28) at 500 kg. Chalk at 8.7 t.

NOTE: N PERCUT was not applied as planned after the second cut because little growth had been made in the prevailing dry conditions.

Cultivations, etc.: - PK and chalk applied: 4 Dec, 1975. N applied: 24 Mar, 1976, 24 May. Cut: 21 May, 29 June, 11 Nov.

76/R/CS/169
1ST CUT (21/5/76) DRY MATTER TONNES/HECTARE

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

SOW DATE	1949	1973	MEAN
N PERCUT			
0	0.88	0.86	0.87
25	1.59	2.00	1.79
50	2.07	2.89	2.48
75	2.94	3.52	3.23
100	3.41	4.12	3.76
MEAN	1.96	2.37	2.17

FIELD	HIGHFLD	FOSTERS	MEAN
N PERCUT			
0	1.05	0.69	0.87
25	2.08	1.50	1.79
50	2.74	2.23	2.48
75	3.60	2.86	3.23
100	4.05	3.48	3.76
MEAN	2.43	1.91	2.17

FIELD	HIGHFLD	FOSTERS	MEAN
SOW DATE			
1949	2.27	1.66	1.96
1973	2.59	2.16	2.37
MEAN	2.43	1.91	2.17

N PERCUT	SOW DATE 1949		SOW DATE 1973	
	FIELD	HIGHFLD	FOSTERS	HIGHFLD
0		1.02	0.75	1.07
25		1.93	1.25	2.24
50		2.45	1.69	3.02
75		3.46	2.43	3.75
100		3.72	3.09	4.38

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N PERCUT	N PERCUT*		N PERCUT***	
		SOW DATE	FIELD	SOW DATE	FIELD
SED	0.174	0.247	0.247	0.349	MIN REP
	0.151	0.214	0.214	0.302	MAX-MIN

* WITHIN SAME LEVEL OF SOW DATE ONLY

** WITHIN SAME LEVEL OF FIELD ONLY

*** WITHIN SAME LEVEL OF SOW DATE.FIELD ONLY

N PERCUT

MAX-MIN O V ANY OF REMAINDER

MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.349	16.1
1ST CUT MEAN DM%	23.5		215

76/R/CS/169

2ND CUT (29/6/76) DRY MATTER TONNES/HECTARE

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

SOW DATE	1949	1973	MEAN
N PERCUT			
0	0.40	0.31	0.36
25	0.70	0.63	0.67
50	0.77	0.65	0.71
75	0.71	0.67	0.69
100	0.59	0.54	0.56
MEAN	0.60	0.52	0.56

FIELD	HIGHFLD	POSTERS	MEAN
N PERCUT			
0	0.31	0.40	0.36
25	0.74	0.59	0.67
50	0.79	0.63	0.71
75	0.81	0.58	0.69
100	0.51	0.61	0.56
MEAN	0.58	0.54	0.56

FIELD	HIGHFLD	POSTERS	MEAN
SOW DATE			
1949	0.52	0.67	0.60
1973	0.64	0.40	0.52
MEAN	0.58	0.54	0.56

N PERCUT	1949		1973	
	FIELD	HIGHFLD	POSTERS	HIGHFLD
0		0.30	0.50	0.33
25		0.67	0.74	0.81
50		0.84	0.70	0.73
75		0.56	0.87	1.05
100		0.45	0.73	0.58

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N PERCUT	N PERCUT*	N PERCUT**	N PERCUT***	MIN REP	MAX-MIN
		SOW DATE	FIELD	SOW DATE		
SED	0.095	0.134	0.134	0.190		
	0.082	0.116	0.116	0.164		

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.190	34.0
2ND CUT MEAN DM%	43.1		

76/R/CS/169

3RD CUT (10/11/76) DRY MATTER TONNES/HECTARE

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

SOW DATE	1949	1973	MEAN
N PERCUT			
0	0.65	0.62	0.64
25	1.00	1.03	1.01
50	1.28	1.40	1.34
75	1.44	1.61	1.52
100	1.60	1.63	1.61
MEAN	1.10	1.15	1.13

FIELD	HIGHFLD	FOSTERS	MEAN
N PERCUT			
0	0.67	0.61	0.64
25	1.09	0.94	1.01
50	1.26	1.41	1.34
75	1.52	1.52	1.52
100	1.65	1.58	1.61
MEAN	1.15	1.11	1.13

FIELD	HIGHFLD	FOSTERS	MEAN
SOW DATE			
1949	1.18	1.03	1.10
1973	1.11	1.19	1.15
MEAN	1.15	1.11	1.13

N PERCUT	1949		1973		
	FIELD	HIGHFLD FOSTERS	HIGHFLD	FOSTERS	
0		0.71	0.59	0.62	0.63
25		1.21	0.79	0.98	1.09
50		1.25	1.30	1.28	1.52
75		1.47	1.41	1.58	1.63
100		1.73	1.47	1.57	1.68

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N PERCUT	N PERCUT*	N PERCUT**	N PERCUT***	
		SOW DATE	FIELD	SOW DATE	FIELD
SED	0.077	0.109	0.109	0.154	MIN REP
	0.067	0.094	0.094	0.133	MAX-MIN

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.154	13.7
3RD CUT MEAN DM%	15.3		

76/R/CS/169

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

SOW DATE	1949	1973	MEAN
N PERCUT			
0	1.93	1.79	1.86
25	3.29	3.66	3.48
50	4.12	4.94	4.53
75	5.09	5.80	5.45
100	5.60	6.28	5.94
MEAN	3.66	4.05	3.85

FIELD	HIGHFLD	FOSTERS	MEAN
N PERCUT			
0	2.03	1.70	1.86
25	3.92	3.03	3.48
50	4.79	4.27	4.53
75	5.94	4.96	5.45
100	6.22	5.66	5.94
MEAN	4.15	3.55	3.85

FIELD	HIGHFLD	FOSTERS	MEAN
SOW DATE			
1949	3.97	3.36	3.66
1973	4.34	3.75	4.05
MEAN	4.15	3.55	3.85

N PERCUT	SOW DATE 1949		SOW DATE 1973	
	FIELD	HIGHFLD	HIGHFLD	FOSTERS
0		2.03	1.84	1.56
25		3.81	2.77	3.30
50		4.55	3.70	4.85
75		5.48	4.70	5.22
100		5.91	5.29	6.04

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N PERCUT	N PERCUT* SOW DATE	N PERCUT** FIELD	N PERCUT*** SOW DATE FIELD	MIN REP	MAX-MIN
SED	0.233	0.329	0.329	0.466		
	0.202	0.285	0.285	0.404		

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.466	12.1
TOTAL OF 3 CUTS MEAN DM%	27.3		
SUB PLOT AREA HARVESTED	0.00075		

76/W/CS/174

SOWING DATES AND CCN

Object: To study the effects of sowing date and a nematicide on the incidence of cereal cyst-nematode (*Heterodera avenae*) (CCN) and the yield of three cereals in a soil known to contain a fungal parasite of the nematode - Woburn, Butt Close.

Sponsor: B.R. Kerry.

The second year, winter and spring wheat, barley and oats.

For previous year see 75/W/M/1.

Design: 4 randomised blocks of 12 whole plots, 6 of them split into 2.

Whole plot dimensions: 2.13 x 6.70.

Treatments: All combinations of:-

Whole plots

1. CROP Crop (cumulative to 1975):

WHEAT	Wheat
BARLEY	Barley
OATS	Oats

2. SOW DATE Sowing date (cumulative to 1975):

AUTUMN	Autumn
SPRING	Spring

3. NEMACIDE Nematicide (cumulative to 1975):

NONE	None
OXAMYL	Oxamyl at 8.8 kg

Sub plots

4. STERILNT Sterilant (1976 only):
(combinations
with SOW DATE
SPRING only)

NONE	None
FORMALIN	Formalin at 3000 l in 109000 l

Standard applications:

Autumn-sown cereals: Manures: (10:24:24) at 260 kg, combine drilled.
Winter wheat: N at 100 kg, as 'Nitro-Chalk'. Winter barley and oats:
N at 80 kg, as 'Nitro-Chalk'.

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Spring-sown cereals: Manures: (20:14:14) at 380 kg combine drilled.

Fungicide to barley only: Tridemorph at 0.53 kg in 340 l.

All cereals: Weedkiller: Ioxynil at 0.6 kg plus mecoprop at 1.8 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: Wheat: Flinor, sown at 210 kg in autumn and 200 kg in spring.

Barley: Maris Otter, sown at 190 kg in autumn and 160 kg in spring.

Oats: Peniarth, sown at 200 kg in autumn and 190 kg in spring.

Cultivations, etc.:-

All Cereals: Heavy spring-tine cultivated: 30 Aug, 1975. Rotary cultivated: 1 Sept. Ploughed: 24 Sept. Spring-tine cultivated with crumbler: 26 Sept. Weedkiller applied: 30 Apr. 1976. Insecticide applied: 29 June. Combine harvested: 28 July.

Autumn-sown Cereals: Oxamyl applied and these plots only rotary cultivated: 2 Oct, 1975. Seed sown: 15 Oct. N applied: 12 Apr, 1976.

Spring-sown Cereals: Spring-tine cultivated twice: 14 Oct, 15 Oct, 1975. Formalin applied: 1 Mar, 1976. Oxamyl applied and these plots only rotary cultivated, all plots spring-tine cultivated with crumbler: 22 Mar. Seed sown: 23 Mar. Fungicide applied to barley only: 9 June.

- NOTES: (1) Soil samples were taken before sowing in autumn and spring and after harvest for egg counts of *Heterodera avenae*.
- (2) Counts of white female *H.avenae* were made during the growing season and amounts of infection of these by *Entomophthora* spp. and *Verticillium chlamyosporium* were estimated.
- (3) Yields from SOW DATE SPRING were very small on all plots and unrecordable on some, because of drought. No yields are presented for combinations with this level.

76/W/CS/174

SOW DATE AUTUMN ONLY

GRAIN TONNES/HECTARE

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

CROP NEMACIDE	WHEAT	BARLEY	OATS	MEAN
NONE	1.58	1.09	0.73	1.13
OXAMYL	2.40	2.65	2.19	2.41
MEAN	1.99	1.87	1.46	1.77

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NEMACIDE	CROP	NEMACIDE CROP
SED	0.163	0.199	0.282

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.345	19.5
GRAIN MEAN DM%	87.0		

STRAW TONNES/HECTARE

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

CROP NEMACIDE	WHEAT	BARLEY	OATS	MEAN
NONE	1.68	1.23	0.75	1.22
OXAMYL	2.30	1.94	1.51	1.92
MEAN	1.99	1.59	1.13	1.57

STRAW MEAN DM% 85.9

PLOT AREA HARVESTED 0.00095

76/R/CS/176

STEM-EELWORM CONTROL

Object: To study the effects of rates and times of applying aldicarb on control of stem-eelworm (*Ditylenchus dipsaci*) and on the yield of winter onions - Great Field II.

Sponsor: A.G. Whitehead.

The second year, winter onions.

For previous year see 75/R/ON/1.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 1.22 x 5.18.

Treatments: Aldicarb (kg) (cumulative to 1975 except as stated):-

ALDICARB

0	None (2 plots/block)
1+1	1 in seedbed, 1 in spring
2	2 in seedbed, none in spring
2+2	2 in seedbed, 2 in spring
4	4 in seedbed, none in spring
4+4	4 in seedbed, 4 in spring
8	8 in seedbed, none in spring
(4S)0	4 kg in seedbed (2 plots/block) in 1975 to spring onions, none to winter onions 1976

Basal applications: Manures: (13:13:20) at 1040 kg. 'Nitro-Chalk' at 450 kg in January, at 250 kg in March. Irrigation: 2.5 mm.

Seed: Imai Early Yellow, dressed with dieldrin, sown at 6.7 kg.

Cultivations, etc.:- Spring-tine cultivated, rotary cultivated, rolled: 3 Sept, 1975. NPK and aldicarb applied, seed sown: 4 Sept. Irrigation applied: 11 Sept. N applied: 13 Jan. Aldicarb and N applied: 2 Mar. Lifted: 15 July.

NOTES: (1) Plots were hand weeded.
(2) Soil samples were taken for counts of *Ditylenchus dipsaci*.
(3) Onions were stored until 22 September to determine loss of weight and percentage of bulbs rotting after harvest.

76/R/CS/176

SALEABLE ONIONS TONNES/HECTARE

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

ALDICARB	1+1	2	2+2	4	4+4	8	MEAN
	20.0	18.9	20.1	18.1	24.8	22.6	20.8

ALDICARB	0	(4S)0
	2.0	4.5

NOTE ALDICARB 0 AND (4S)0 HAVE BEEN EXCLUDED FROM THE ANALYSIS

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ALDICARB
-----	-----
SED	2.99

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	10	3.66	17.6
PLOT AREA HARVESTED	0.00032		

76/R/CS/180

FACTORS AFFECTING YIELD

Object: To study the effects of a range of factors on pests, diseases and yield of field beans - Little Hoos.

Sponsors: R. Bardner, K.E. Fletcher, G.G. Briggs, A. J. Cockbain, J.M. Day, B.J. Legg, J. McEwen, G.A. Salt, H.R. Simpson, R.M. Webb, J. Witty.

The first year, field beans.

Design: Single replicate of 2 x 2 x 2 x 2 x 2 x 2 x 2 in eight blocks of 2 plots split into 8.

Whole plot dimensions: 4.27 x 13.7.

Treatments: All combinations of:-

Whole plots

1. IRRIGTN	Irrigation:
NONE	None
FULL	Full (260 mm)

Sub plots

2. N	Nitrogen fertiliser:
0	None
150+150	150 kg N to seedbed (2 Mar) and 150 kg N at flowering (5 June)
3. ALDICARB	Aldicarb to seedbed:
0	None
10	10 kg
4. DIELDRIN	Dieldrin to seedbed:
0	None
2.5	2.5 kg
5. BENOMYL	Benomyl to seedbed:
0	None
15	15 kg
6. FENITROT	Fenitrothion foliar spray:
0.00	None
0.75	0.75 kg on 28 Apr and 28 May
7. PIRIMICA	Pirimicarb foliar spray
0.00	None
0.14	0.14 kg on 26 May

NOTES: (1) a planned test of benomyl foliar spray was not applied because there was no infection with *Botrytis* spp.
(2) Sprays were applied in 340 l.

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(3) Irrigation treatments (mm water):

18 May	20
21 May	14
7 June	25
10 June	25
17 June	25
28 June	25
7 July	51
10 July	25
13 July	25
31 July	25

Total	260

Basal applications: Manures: Chalk at 7.5 t. FYM at 25 t. Weedkillers: Simazine at 1.1 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.:— Chalk applied: 19 Sept, 1975. Heavy spring-tine cultivated: 14 Oct. FYM applied: 23 Oct. Ploughed: 28 Oct. Spring-tine cultivated: 27 Feb, 1976. Rotary cultivated: 4 Mar. Seed sown: 5 Mar. Weedkiller applied: 9 Mar. Combine harvested IRRIGTN NONE plots: 21 July. Combine harvested IRRIGTN FULL plots: 11 Aug. Previous crops: Winter wheat 1974, barley 1975.

NOTES: (1) Unirrigated and irrigated plots were analysed separately.

(2) Plant counts were made after establishment and before harvest. Total above-ground dry matter and nitrogen percentages were measured on four occasions. Components of yield were measured before harvest. Amounts of nodular material and nitrogenase activity were measured on four occasions. Ectoparasitic nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. Amounts of aldicarb and benomyl in soil and plants were determined at intervals. Nitrogen percentages of grain were measured.

76/R/CS/180 NON IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

ALDICARB	0	10	MEAN
N			
0	1.40	1.89	1.64
150+150	1.37	1.94	1.65
MEAN	1.38	1.91	1.65
DIELDRIN	0.0	2.5	MEAN
N			
0	1.57	1.72	1.64
150+150	1.62	1.69	1.65
MEAN	1.59	1.70	1.65
DIELDRIN	0.0	2.5	MEAN
ALDICARB			
0	1.30	1.46	1.38
10	1.88	1.95	1.91
MEAN	1.59	1.70	1.65
BENOMYL	0	15	MEAN
N			
0	1.62	1.67	1.64
150+150	1.66	1.64	1.65
MEAN	1.64	1.66	1.65
BENOMYL	0	15	MEAN
ALDICARB			
0	1.35	1.42	1.38
10	1.93	1.90	1.91
MEAN	1.64	1.66	1.65
BENOMYL	0	15	MEAN
DIELDRIN			
0.0	1.57	1.61	1.59
2.5	1.70	1.71	1.70
MEAN	1.64	1.66	1.65
FENITROT	0.00	0.78	MEAN
N			
0	1.65	1.63	1.64
150+150	1.59	1.71	1.65
MEAN	1.62	1.67	1.65
FENITROT	0.00	0.78	MEAN
ALDICARB			
0	1.34	1.42	1.38
10	1.90	1.93	1.91
MEAN	1.62	1.67	1.65

76/R/CS/180 NON IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

FENITROT	0.00	0.78	MEAN	
DIELDRIN				
0.0	1.56	1.62	1.59	
2.5	1.68	1.73	1.70	
MEAN	1.62	1.67	1.65	
FENITROT	0.00	0.78	MEAN	
BENOMYL				
0	1.61	1.66	1.64	
15	1.63	1.69	1.66	
MEAN	1.62	1.67	1.65	
PIRIMICA	0.00	0.14	MEAN	
N				
0	1.69	1.59	1.64	
150+150	1.63	1.67	1.65	
MEAN	1.66	1.63	1.65	
PIRIMICA	0.00	0.14	MEAN	
ALDICARB				
0	1.38	1.38	1.38	
10	1.94	1.89	1.91	
MEAN	1.66	1.63	1.65	
PIRIMICA	0.00	0.14	MEAN	
DIELDRIN				
0.0	1.59	1.59	1.59	
2.5	1.73	1.68	1.70	
MEAN	1.66	1.63	1.65	
PIRIMICA	0.00	0.14	MEAN	
BENOMYL				
0	1.64	1.63	1.64	
15	1.68	1.63	1.66	
MEAN	1.66	1.63	1.65	
PIRIMICA	0.00	0.14	MEAN	
FENITROT				
0.00	1.62	1.62	1.62	
0.78	1.70	1.64	1.67	
MEAN	1.66	1.63	1.65	
ALDICARB	0		10	
DIELDRIN	0.0	2.5	0.0	2.5
N				
0	1.35	1.45	1.78	1.99
150+150	1.26	1.47	1.98	1.90

76/R/CS/180 NON IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

ALDICARB	0		10	
BENOMYL	0	15	0	15
N				
0	1.33	1.47	1.90	1.87
150+150	1.37	1.36	1.96	1.93
DIELDRIN	0.0		2.5	
BENOMYL	0	15	0	15
ALDICARB				
0	1.25	1.35	1.44	1.48
10	1.89	1.87	1.96	1.93
DIELDRIN	0.0		2.5	
FENITROT	0.00	0.78	0.00	0.78
N				
0	1.56	1.57	1.74	1.70
150+150	1.56	1.68	1.62	1.75
DIELDRIN	0.0		2.5	
FENITROT	0.00	0.78	0.00	0.78
ALDICARB				
0	1.26	1.34	1.42	1.50
10	1.86	1.90	1.95	1.95
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
N				
0	1.61	1.62	1.69	1.65
150+150	1.62	1.70	1.56	1.72
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
ALDICARB				
0	1.32	1.38	1.36	1.47
10	1.91	1.94	1.89	1.91
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
DIELDRIN				
0.0	1.57	1.58	1.55	1.67
2.5	1.66	1.74	1.71	1.71
ALDICARB	0		10	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	1.43	1.36	1.95	1.82
150+150	1.33	1.40	1.92	1.95
DIELDRIN	0.0		2.5	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	1.61	1.52	1.78	1.67
150+150	1.58	1.66	1.68	1.69

76/R/GS/180 NON IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	1.63	1.60	1.76	1.58
150+150	1.65	1.66	1.60	1.69
BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	1.31	1.38	1.46	1.38
10	1.97	1.88	1.90	1.89
BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
DIELDRIN				
0.0	1.58	1.57	1.60	1.61
2.5	1.70	1.70	1.76	1.66
FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	1.66	1.64	1.72	1.55
150+150	1.57	1.61	1.68	1.74
FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	1.28	1.40	1.49	1.36
10	1.96	1.85	1.92	1.93
FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
DIELDRIN				
0.0	1.55	1.57	1.63	1.61
2.5	1.69	1.68	1.77	1.68

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE		N	ALDICARB	DIELDRIN

SED		0.028	0.028	0.028
TABLE	BENOMYL	FENITROT	PIRIMICA	N ALDICARB

SED	0.028	0.028	0.028	0.040
TABLE	N DIELDRIN	ALDICARB DIELDRIN	N BENOMYL	ALDICARB BENOMYL

SED	0.040	0.040	0.040	0.040
TABLE	DIELDRIN BENOMYL	N FENITROT	ALDICARB FENITROT	DIELDRIN FENITROT

SED	0.040	0.040	0.040	0.040

76/R/CS/180 NON IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCE OF MEANS *****

TABLE	BENOMYL FENITROT	N PIRIMICA	ALDICARB PIRIMICA	DIELDRIN PIRIMICA
SED	0.040	0.040	0.040	0.040

TABLE	BENOMYL PIRIMICA	FENITROT PIRIMICA	N ALDICARB DIELDRIN	N ALDICARB BENOMYL
SED	0.040	0.040	0.056	0.056

TABLE	ALDICARB DIELDRIN BENOMYL	N DIELDRIN FENITROT	ALDICARB DIELDRIN FENITROT	N BENOMYL FENITROT
SED	0.056	0.056	0.056	0.056

TABLE	ALDICARB BENOMYL FENITROT	DIELDRIN BENOMYL FENITROT	N ALDICARB PIRIMICA	N DIELDRIN PIRIMICA
SED	0.056	0.056	0.056	0.056

TABLE	N BENOMYL PIRIMICA	ALDICARB BENOMYL PIRIMICA	DIELDRIN BENOMYL PIRIMICA	N FENITROT PIRIMICA
SED	0.056	0.056	0.056	0.056

TABLE	ALDICARB FENITROT PIRIMICA	DIELDRIN FENITROT PIRIMICA
SED	0.056	0.056

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	19	0.112	6.8
GRAIN MEAN DM%	85.4		

76/R/CS/180 IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

ALDICARB	0	10	MEAN
N			
0	2.98	3.33	3.15
150+150	2.67	3.23	2.95
MEAN	2.83	3.28	3.05
DIELDRIN	0.0	2.5	MEAN
N			
0	3.12	3.18	3.15
150+150	2.92	2.99	2.95
MEAN	3.02	3.08	3.05
DIELDRIN	0.0	2.5	MEAN
ALDICARB			
0	2.83	2.82	2.83
10	3.21	3.35	3.28
MEAN	3.02	3.08	3.05
BENOMYL	0	15	MEAN
N			
0	3.11	3.19	3.15
150+150	2.98	2.93	2.95
MEAN	3.04	3.06	3.05
BENOMYL	0	15	MEAN
ALDICARB			
0	2.82	2.83	2.83
10	3.26	3.29	3.28
MEAN	3.04	3.06	3.05
BENOMYL	0	15	MEAN
DIELDRIN			
0.0	2.96	3.08	3.02
2.5	3.13	3.04	3.08
MEAN	3.04	3.06	3.05
FENITROT	0.00	0.78	MEAN
N			
0	3.20	3.10	3.15
150+150	2.95	2.95	2.95
MEAN	3.08	3.03	3.05
FENITROT	0.00	0.78	MEAN
ALDICARB			
0	2.87	2.78	2.83
10	3.28	3.27	3.28
MEAN	3.08	3.03	3.05

76/R/CS/180 IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

FENITROT	0.00	0.78	MEAN	
DIELDRIN				
0.0	3.13	2.91	3.02	
2.5	3.03	3.14	3.08	
MEAN	3.08	3.03	3.05	
FENITROT	0.00	0.78	MEAN	
BENOMYL				
0	3.03	3.05	3.04	
15	3.12	3.00	3.06	
MEAN	3.08	3.03	3.05	
PIRIMICA	0.00	0.14	MEAN	
N				
0	3.15	3.15	3.15	
150+150	2.93	2.97	2.95	
MEAN	3.04	3.06	3.05	
PIRIMICA	0.00	0.14	MEAN	
ALDICARB				
0	2.73	2.92	2.83	
10	3.34	3.21	3.28	
MEAN	3.04	3.06	3.05	
PIRIMICA	0.00	0.14	MEAN	
DIELDRIN				
0.0	2.95	3.09	3.02	
2.5	3.13	3.04	3.08	
MEAN	3.04	3.06	3.05	
PIRIMICA	0.00	0.14	MEAN	
BENOMYL				
0	3.02	3.06	3.04	
15	3.06	3.06	3.06	
MEAN	3.04	3.06	3.05	
PIRIMICA	0.00	0.14	MEAN	
FENITROT				
0.00	3.02	3.13	3.08	
0.78	3.06	3.00	3.03	
MEAN	3.04	3.06	3.05	
ALDICARB	0		10	
DIELDRIN	0.0	2.5	0.0	2.5
N				
0	2.99	2.97	3.25	3.40
150+150	2.67	2.68	3.16	3.30

76/R/CS/180 IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

ALDICARB	0		10	
BENOMYL	0	15	0	15
N				
0	2.93	3.03	3.30	3.36
150+150	2.72	2.63	3.23	3.22
DIELDRIN	0.0		2.5	
BENOMYL	0	15	0	15
ALDICARB				
0	2.78	2.88	2.86	2.78
10	3.13	3.28	3.40	3.30
DIELDRIN	0.0		2.5	
FENITROT	0.00	0.78	0.00	0.78
N				
0	3.24	3.00	3.17	3.20
150+150	3.01	2.82	2.88	3.09
DIELDRIN	0.0		2.5	
FENITROT	0.00	0.78	0.00	0.78
ALDICARB				
0	3.04	2.62	2.71	2.94
10	3.22	3.20	3.35	3.35
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
N				
0	3.07	3.15	3.33	3.05
150+150	2.99	2.96	2.90	2.96
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
ALDICARB				
0	2.89	2.75	2.85	2.81
10	3.17	3.36	3.39	3.19
BENOMYL	0		15	
FENITROT	0.00	0.78	0.00	0.78
DIELDRIN				
0.0	2.92	2.99	3.33	2.83
2.5	3.14	3.11	2.91	3.17
ALDICARB	0		10	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	2.92	3.04	3.38	3.27
150+150	2.55	2.80	3.31	3.15
DIELDRIN	0.0		2.5	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	3.03	3.22	3.28	3.09
150+150	2.87	2.96	2.98	2.99

76/R/CS/180 IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

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

BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	3.11	3.11	3.20	3.19
150+150	2.93	3.02	2.92	2.93

BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	2.76	2.88	2.71	2.95
10	3.28	3.25	3.41	3.17

BENOMYL	0		15	
PIRIMICA	0.00	0.14	0.00	0.14
DIELDRIN				
0.0	2.85	3.06	3.05	3.11
2.5	3.19	3.06	3.06	3.01

FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
N				
0	3.22	3.19	3.08	3.12
150+150	2.82	3.08	3.04	2.87

FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	2.81	2.93	2.66	2.90
10	3.23	3.33	3.46	3.09

FENITROT	0.00		0.78	
PIRIMICA	0.00	0.14	0.00	0.14
DIELDRIN				
0.0	3.00	3.25	2.90	2.93
2.5	3.04	3.02	3.22	3.06

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	ALDICARB	DIELDRIN
SED	0.117	0.117	0.117

TABLE	BENOMYL	FENITROT	PIRIMICA	N ALDICARB
SED	0.117	0.117	0.117	0.166

TABLE	N DIELDRIN	ALDICARB DIELDRIN	N BENOMYL	ALDICARB BENOMYL
SED	0.166	0.166	0.166	0.166

TABLE	DIELDRIN BENOMYL	N FENITROT	ALDICARB FENITROT	DIELDRIN FENITROT
SED	0.166	0.166	0.166	0.166

76/R/CS/180 IRRIGATED PLOTS ONLY

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	BENOMYL FENITROT	N PIRIMICA	ALDICARB PIRIMICA	DIELDRIN PIRIMICA
SED	0.166	0.166	0.166	0.166

TABLE	BENOMYL PIRIMICA	FENITROT PIRIMICA	N ALDICARB DIELDRIN	N ALDICARB BENOMYL
SED	0.166	0.166	0.235	0.235

TABLE	ALDICARB DIELDRIN BENOMYL	N DIELDRIN FENITROT	ALDICARB DIELDRIN FENITROT	N BENOMYL FENITROT
SED	0.235	0.235	0.235	0.235

TABLE	ALDICARB BENOMYL FENITROT	DIELDRIN BENOMYL FENITROT	N ALDICARB PIRIMICA	N DIELDRIN PIRIMICA
SED	0.235	0.235	0.235	0.235

TABLE	N BENOMYL PIRIMICA	ALDICARB BENOMYL PIRIMICA	DIELDRIN BENOMYL PIRIMICA	N FENITROT PIRIMICA
SED	0.235	0.235	0.235	0.235

TABLE	ALDICARB FENITROT PIRIMICA	DIELDRIN FENITROT PIRIMICA
SED	0.235	0.235

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	19	0.469	15.4

GRAIN MEAN DM% 83.1

SUB PLOT AREA HARVESTED 0.00293

76/W/CS/181

GREEN MANURE

Object: To study the effects of a green manure sown at different dates and interactions with fertiliser nitrogen to the following crop - Woburn Gt. Hill III, Lansome III.

Sponsors: G.V. Dyke, G.E.G. Mattingly.

The first year, barley.

Design: 4 series (for future additional tests) each of 24 plots. All sown to barley in 1976:
Series I and II Each 12 replicates of 2 plots, fully randomised.
Series III No treatments in 1976.
Series IV 2 replicates of 2 x 6 fully randomised.

Whole plot dimensions: 4.26 x 6.10.

Treatments: Series I and II:-

TREFOIL	Methods of sowing trefoil:
NONE	Not sown (12 plots)
U SOWN	Undersown in spring (12 plots)

Series IV: All combinations of:-

1. TREFOIL	Methods of sowing trefoil:
NONE	Not sown (duplicated)
U SOWN	Undersown in spring (duplicated)

2. N Nitrogen fertiliser (kg N):

0	None
30	30
60	60
90	90
120	120
150	150

NOTE: Trefoil was also sown on certain plots on 20 July. This treatment has been ignored in the analysis because it could not affect yield of mature barley.

Standard applications: Manures: Gt. Hill III, Series I & II: (20:14:14) at 450 kg combine drilled. Lansome III, Series IV: Magnesian limestone at 7.5 t, (0:20:20) at 350 combine drilled. Weedkiller: All Series: Dinoseb amine at 2.1 kg in 560 l.

Seed: Julia, dressed with ethirimol, sown at 160 kg.
English trefoil, inoculated with Rhizobium, sown at 27 kg.

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Cultivations, etc.:-

Gt. Hill III, Series I & II: Deep-tine cultivated twice: 16 Sept, 17 Sept, 1975. Ploughed: 6 Nov. Spring-tine cultivated: 1 Mar, 1976. Seed sown: 5 Mar.

Lansome III, Series IV: Magnesian limestone applied: 2 Sept, 1975. Ploughed: 9 Oct. Spring-tine cultivated with crumbler and barley sown: 22 Mar, 1976. N applied: 23 Mar.

All Series: Weedkiller applied: 4 May. Trefoil undersown and harrowed in: 10 May. Combine harvested: 28 July.

NOTE: Series III had no treatments, receiving basal instead of test N in error. This series has since been abandoned. Series IV was sown and treated in place of Series III.

SERIES I

GRAIN TONNES/HECTARE

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

TREFOIL	NONE	U SOWN	MEAN
	2.63	2.95	2.79

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREFOIL
-----	-----
SED	0.288

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	22	0.706	25.3

GRAIN MEAN DM% 89.4

STRAW TONNES/HECTARE

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

TREFOIL	NONE	U SOWN	MEAN
	1.52	1.89	1.70

STRAW MEAN DM% 90.7

PLOT AREA HARVESTED 0.00186

76/W/CS/181

SERIES II

GRAIN TONNES/HECTARE

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

TREFOIL	NONE	U SOWN	MEAN
	3.59	3.70	3.64

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREFOIL

SED	0.189

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	22	0.464	12.7

GRAIN MEAN DM% 88.4

STRAW TONNES/HECTARE

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

TREFOIL	NONE	U SOWN	MEAN
	2.29	2.39	2.34

STRAW MEAN DM% 91.9

PLOT AREA HARVESTED 0.00186

SERIES III

GRAIN TONNES/HECTARE

GRAND MEAN 3.38

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

GRAND MEAN 2.14

STRAW MEAN DM% 93.7

PLOT AREA HARVESTED 0.00186

76/W/CS/181

SERIES IV

GRAIN TONNES/HECTARE

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

	N	0	30	60	90	120	150	MEAN
TREFOIL								
NONE		0.23	0.57	0.56	0.79	0.53	0.80	0.58
U SOWN		0.27	0.47	0.63	0.56	0.63	0.50	0.51
MEAN		0.25	0.52	0.60	0.68	0.58	0.65	0.55

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREFOIL	N	TREFOIL N
SED	0.146	0.253	0.358

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	12	0.358	65.6

GRAIN MEAN DM% 86.4

STRAW TONNES/HECTARE

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

	N	0	30	60	90	120	150	MEAN
TREFOIL								
NONE		0.20	0.47	0.69	0.67	0.75	0.84	0.60
U SOWN		0.17	0.53	0.78	0.67	0.70	0.86	0.62
MEAN		0.18	0.50	0.74	0.67	0.72	0.85	0.61

STRAW MEAN DM% 90.6

PLOT AREA HARVESTED 0.00173

76/W/CS/183

FACTORS AFFECTING YIELD AND PCN CONTROL

Object: To study the effects of fertiliser, plant density and date of haulm destruction on yield and incidence of *Globodera* (formerly *Heterodera*) *rostochiensis* (PCN) and its control by oxamyl - Woburn Long Mead.

Sponsor: A.G. Whitehead.

The first year, potatoes.

Design: 2 randomised blocks of 32 plots.

Whole plot dimensions: 2.84 x 6.10.

Treatments: All combinations of:-

1. SPACING Spacing of setts within the ridge (ridges 71 cm (28 inches) apart):

25 CM	25 cm (10 inches)
50 CM	50 cm (20 inches)

2. FERTILISER Fertiliser:

STANDARD	Standard, (13:13:20) at 1850 kg to seedbed
EXTRA	Standard, (13:13:20) at 1850 kg to seedbed + 119 kg P205 as superphosphate and 377 kg K20 as sulphate of potash in February + 125 kg N in June

3. OXAMYL Oxamyl (kg):

0	None (duplicated)
10	10 (duplicated)

4. HLM KILL Date of haulm destruction:

STANDARD	Standard (16 September)
LATE	Late (6 October)

Basal applications: Weedkiller: Linuron at 1.3 kg plus paraquat at 0.42 kg ion in 280 l. Insecticide: Pirimicarb at 0.14 kg in 450 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. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Seed: Pentland Crown.

Cultivations, etc.: - Ploughed: 20 Oct, 1975. Treatment PK applied: 5 Mar, 1976. Spring-tine cultivated: 12 Mar. NPK applied, Spring-tine cultivated: 23 Mar. Oxamyl applied, all plots rotary cultivated, potatoes planted: 7 Apr. Weedkiller applied: 5 May. N treatment applied: 7 June. Pirimicarb applied: 18 June. Fungicide with insecticide applied: 30 June. Fungicide applied: 30 July. Haulm mechanically destroyed on HLM KILL STANDARD plots: 16 Sept. Haulm desiccant applied to HLM KILL LATE plots: 6 Oct. Lifted: 22 Oct.

NOTE: Soil samples were taken before treatments were applied in autumn 1975 and after harvest 1976 for cyst and egg counts of *Globodera* (formerly *Heterodera*) *rostochiensis*.

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TOTAL TUBERS TONNES/HECTARE

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

FERTLSER	STANDARD	EXTRA	MEAN	
SPACING				
25 CM	25.2	27.3	26.2	
50 CM	21.3	22.0	21.7	
MEAN	23.3	24.6	24.0	
OXAMYL	0	10	MEAN	
SPACING				
25 CM	14.0	38.5	26.2	
50 CM	10.8	32.6	21.7	
MEAN	12.4	35.5	24.0	
OXAMYL	0	10	MEAN	
FERTLSER				
STANDARD	11.7	34.8	23.3	
EXTRA	13.1	36.2	24.6	
MEAN	12.4	35.5	24.0	
HLM KILL	STANDARD	LATE	MEAN	
SPACING				
25 CM	25.7	26.8	26.2	
50 CM	19.3	24.1	21.7	
MEAN	22.5	25.4	24.0	
HLM KILL	STANDARD	LATE	MEAN	
FERTLSER				
STANDARD	22.3	24.2	23.3	
EXTRA	22.6	26.7	24.6	
MEAN	22.5	25.4	24.0	
HLM KILL	STANDARD	LATE	MEAN	
OXAMYL				
0	12.2	12.6	12.4	
10	32.8	38.3	35.5	
MEAN	22.5	25.4	24.0	
FERTLSER	STANDARD	EXTRA		
OXAMYL	0	10	0	10
SPACING				
25 CM	12.4	38.0	15.6	38.9
50 CM	11.0	31.6	10.5	33.5
FERTLSER	STANDARD	EXTRA		
HLM KILL	STANDARD	LATE	STANDARD	LATE
SPACING				
25 CM	25.0	25.5	26.4	28.2
50 CM	19.6	23.0	18.9	25.1

76/W/CS/183

TOTAL TUBERS TONNES/HECTARE

OXAMYL	0	10		
HLM KILL STANDARD			LATE STANDARD	LATE
SPACING				
25 CM	14.3	13.7	37.0	40.0
50 CM	10.1	11.5	28.5	36.7

OXAMYL	0	10		
HLM KILL STANDARD			LATE STANDARD	LATE
FERTLSER				
STANDARD	11.3	12.1	33.3	36.3
EXTRA	13.1	13.0	32.2	40.3

OXAMYL	0	10			
HLM KILL STANDARD			LATE STANDARD	LATE	
SPACING FERTLSER					
25 CM STANDARD		12.3	12.6	37.7	38.3
EXTRA		16.4	14.8	36.3	41.6
50 CM STANDARD		10.4	11.7	28.9	34.3
EXTRA		9.8	11.3	28.0	39.0

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SPACING	FERTLSER	OXAMYL	HLM KILL
SED	1.22	1.22	1.22	1.22

TABLE	SPACING FERTLSER	SPACING OXAMYL	FERTLSER OXAMYL	SPACING HLM KILL
SED	1.73	1.73	1.73	1.73

TABLE	FERTLSER HLM KILL	OXAMYL HLM KILL	SPACING FERTLSER OXAMYL	SPACING FERTLSER HLM KILL
SED	1.73	1.73	2.44	2.44

TABLE	SPACING OXAMYL HLM KILL	FERTLSER OXAMYL HLM KILL	SPACING FERTLSER OXAMYL HLM KILL
SED	2.44	2.44	3.46

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	47	4.89	20.4

76/W/CS/183

TOTAL TUBERS TONNES/HECTARE

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

FERTLSER	STANDARD	EXTRA	MEAN
SPACING			
25 CM	85.4	88.0	86.7
50 CM	91.5	90.4	91.0
MEAN	88.5	89.2	88.8
OKAMYL	0	10	MEAN
SPACING			
25 CM	81.2	92.2	86.7
50 CM	89.1	92.8	91.0
MEAN	85.2	92.5	88.8
OKAMYL	0	10	MEAN
FERTLSER			
STANDARD	84.2	92.7	88.5
EXTRA	86.1	92.3	89.2
MEAN	85.2	92.5	88.8
HLM KILL	STANDARD	LATE	MEAN
SPACING			
25 CM	85.5	87.9	86.7
50 CM	89.6	92.4	91.0
MEAN	87.5	90.1	88.8
HLM KILL	STANDARD	LATE	MEAN
FERTLSER			
STANDARD	87.3	89.6	88.5
EXTRA	87.8	90.6	89.2
MEAN	87.5	90.1	88.8
HLM KILL	STANDARD	LATE	MEAN
OKAMYL			
0	83.7	86.6	85.2
10	91.4	93.6	92.5
MEAN	87.5	90.1	88.8

76/W/CS/183

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

FERTLSER	STANDARD			EXTRA	
OXAMYL	0	10		0	10
SPACING					
25 CM	78.6	92.2		83.9	92.1
50 CM	89.9	93.1		88.4	92.5
FERTLSER	STANDARD			EXTRA	
HLM KILL	STANDARD	LATE	STANDARD	LATE	
SPACING					
25 CM	85.1	85.8		85.9	90.0
50 CM	89.5	93.4		89.6	91.3
OXAMYL	0			10	
HLM KILL	STANDARD	LATE	STANDARD	LATE	
SPACING					
25 CM	80.3	82.2		90.8	93.6
50 CM	87.2	91.1		92.0	93.7
OXAMYL	0			10	
HLM KILL	STANDARD	LATE	STANDARD	LATE	
FERTLSER					
STANDARD	82.0	86.5		92.7	92.7
EXTRA	85.5	86.8		90.1	94.5
OXAMYL	0			10	
HLM KILL	STANDARD	LATE	STANDARD	LATE	
SPACING FERTLSER					
25 CM STANDARD	77.6	79.6		92.5	91.9
EXTRA	82.9	84.8		89.0	95.2
50 CM STANDARD	86.3	93.4		92.8	93.5
EXTRA	88.1	88.7		91.1	93.9

PLOT AREA HARVESTED 0.00087

76/W/CS/184

CEREAL CYST NEMATODE STUDY

Object: To study the effects of formalin on cereal cyst nematode (*Heterodera avenae*) and the fungus *Entomophthora* - Woburn Butt Close.

Sponsor: T.D. Williams.

The first year, oats.

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

Whole plot dimensions: 2.13 x 21.0.

Treatments:

Whole plots: None (for treatment in 1977)

Sub plots

FORMALIN Formalin:

0	None
3000 L	3000 l

NOTE: Because of severe drought the crop was almost a total failure and yields were not taken.

Basal applications: Manures: (20:14:14) at 380 kg combine drilled.
Weedkiller: Ioxynil at 0.58 kg with mecoprop at 1.7 kg in 340 l

Seed: Manod, sown at 190 kg.

Cultivations, etc.: - Heavy-tine cultivated: 30 Aug, 1975. Rotary cultivated: 1 Sept. Ploughed: 24 Sept. Spring-tine cultivated: 19 Jan, 1976.
Formalin applied: 1 Mar. Spring-tine cultivated with crumbler attached, seed sown: 22 Mar. Weedkiller applied: 30 Apr. Combine harvested: 4 Aug. Previous crops: Wheat 1974, oats 1975.

NOTE: Soil samples were taken before treatments were applied, during the season and after harvest for cyst and egg counts of *Heterodera avenae*.

76/R/CS/185

LATE N

Object: To study the effects of a range of fertilisers which release nitrogen later in the growing season than traditional forms on the growth, nitrogen uptake and yield of potatoes - Gt. Knott III.

Sponsors: T.M. Addiscott, J. Ashworth, A. Penny, F.V. Widdowson.

The first year, potatoes.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 12.19.

Treatments: All combinations of:-

1. N FORM Forms of nitrogen fertiliser:

AA	Aqueous ammonia
AA+NITRA	Aqueous ammonia + nitrapyrin ('N-Serve') at 1.1 kg
AA+ATC	Aqueous ammonia + ammonium trithiocarbonate at 18 kg
IB SMALL	IBDU (isobutylidene diurea), small granules
IB LARGE	IBDU, large granules
AN E+L	Ammonium nitrate half in seedbed, half in mid-June
AN E	Ammonium nitrate all in seedbed

2. N RATE(1) Rates of nitrogen fertiliser (kg N):

200	200
300	300

N RATE(2) plus four extra treatments given ammonium nitrate, all in the seedbed (kg N):

AN E 150	150
AN E 250	250
AN E 350	350
AN E 400	400

NOTES: (1) Aqueous ammonia injected on 24 Mar, 1976
(2) IBDU broadcast 26 Mar.
(3) Ammonium nitrate broadcast 26 Mar, 17 June.

Basal applications: Manures: (0:14:28) at 1900 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l applied three times. Haulm desiccant: Diquat at 0.59 kg ion in 220 l. Irrigation: Total 125 mm.

Seed: Pentland Crown.

Cultivations, etc.:- Heavy spring-tine cultivated: 20 Oct, 1975.
Ploughed: 31 Oct. Heavy spring-tine cultivated: 10 Mar, 1976. PK applied: 22 Mar. Spike rotary cultivated and potatoes planted: 30 Mar. Grubbed: 31 Mar. Weedkillers applied: 5 May. Grubbed and rotoridged: 7 June. Irrigated, 25 mm: 18 June. Fungicide applied: 25 June, 28 July, 1 Sept. Irrigated, 50 mm on each occasion: 4 July, 26 Aug. Haulm mechanically destroyed: 23 Sept. Haulm desiccant applied: 28 Sept. Lifted: 13 Oct. Previous crops: Winter wheat 1974, winter oats 1975.

NOTE: An adjustment has been made by covariance for differences between rows of plots, which run in the direction of a valley across the site.

76/R/CS/185

TOTAL TUBERS TONNES/HECTARE

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

N RATE(1)	200	300	MEAN
N FORM			
AA	46.7	50.4	48.5
AA+NITRA	47.0	47.8	47.4
AA+ATC	45.8	50.9	48.3
IB SMALL	45.1	50.7	47.9
IB LARGE	43.0	51.8	47.4
AN E+L	53.5	51.2	52.3
AN E	51.5	47.4	49.5
MEAN	47.5	50.0	48.8

N RATE(2)	AN E 150	AN E 250	AN E 350	AN E 400	MEAN
	46.5	52.1	47.4	49.6	48.9

GRAND MEAN 48.8

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N RATE(2)	N FORM	N RATE(1)	N FORM N RATE(1)
SED	3.13	2.16	1.10	3.02

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	29	3.38	6.9

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

N RATE(1)	200	300	MEAN
N FORM			
AA	96.1	94.5	95.3
AA+NITRA	94.7	92.7	93.7
AA+ATC	94.5	93.6	94.1
IB SMALL	95.0	94.1	94.6
IB LARGE	94.3	95.5	94.9
AN E+L	94.0	94.4	94.2
AN E	93.8	93.9	93.8
MEAN	94.6	94.1	94.4

N RATE(2)	AN E 150	AN E 250	AN E 350	AN E 400	MEAN
	95.3	95.2	94.4	94.8	94.9

GRAND MEAN 94.5

PLOT AREA HARVESTED 0.00260

76/S/CS/1

VARIETIES, N AND CCC

Object: To study the effects of nitrogen fertiliser, at a range of rates and times, and chlormequat (CCC) on the yield of two varieties of winter wheat - Saxmundham, Oldershaw's and Garner's plots.

Sponsors: F.V. Widdowson, A.E. Johnston.

The 11th year, winter wheat.

For previous years see 66/C/30(t), 67/C/23(t), 68/C/39, 69-70/S/CS/1, 71/S/CS/1(t), 72/S/CS/1(t) and 73-75/S/CS/1.

Design: A single replicate of 4 x 2 x 2 x 2 in 4 blocks of 4 plots, each split lengthways into 2, plus one additional plot per block. Additionally all the plots are split breadthways into 3.

Whole plot dimensions: 5.49 x 40.2.

Treatments: All combinations of:-

Whole plots (All sown at a seed rate of 170 kg with 13 cm (5 inches) between the rows):

1. PREVCROP Number of previous continuous wheat crops:

7 WHEAT	7
8 WHEAT	8
9 WHEAT	9
10 WHEAT	10

2. CCC Chlormequat (kg):

0.0	None
1.7	1.7 in 340 l

Half plots

3. N TIME Times of applying nitrogen fertiliser:

SINGLE	Single dressing (21 Apr)
DIVIDED	Divided dressing (Half 21 Apr, half 18 May)

4. VARIETY Varieties:

CAPPELLE	Cappelle
HUNTSMAN	Maris Huntsman

Pairs of sixth plots

5. N RATE Rates of nitrogen fertiliser in addition to 62 kg N in autumn (14 Oct) (kg N):

50	50
100	100
150	150

76/S/CS/1

EXTRA Together with one extra plot per block which had 6 previous wheat crops and was sown with Cappelle at a seed rate of 180 kg with 20 cm (8 inches) between the rows and tested all combinations of:-

Half plots

1. AUT N Autumn nitrogen fertiliser (kg N):

0	0
62	62

Pairs of sixth plots

2. N RATE Rate of nitrogen fertiliser (kg N):

50	50
100	100
150	150

NOTES: (1) AUT N 0 plots received a dressing of (0:20:20) at 160 kg.
All other plots received a dressing of (20:10:10) at 310 kg.
All broadcast at drilling.
(2) Chlormequat was applied on 4 May.
(3) N was applied to N RATE plots on 21 Apr.

Basal applications: Manures: (0:20:20) at 1260 kg applied to stubble before ploughing. Weedkillers: Methabenzthiazuron at 3.1 kg in 340 l in autumn. Isoproturon at 2.2 kg with mecoprop at 0.63 kg plus ioxynil at 0.21 kg in 340 l in spring.

Cultivations, etc.: - Basal PK applied: 29 Sept, 1975. Seed sown: 14 Oct.
Autumn weedkiller applied: 15 Oct. Spring weedkillers applied: 25 Mar, 1976. Combine harvested: 27 July.

76/S/CS/1

GRAIN TONNES/HECTARE

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

PREVCROP	7 WHEAT	8 WHEAT	9 WHEAT	10 WHEAT	MEAN
CCC					
0.0	4.49	4.66	4.32	4.67	4.54
1.7	5.08	4.73	4.88	4.44	4.78
N TIME					
SINGLE	4.82	4.69	4.60	4.59	4.68
DIVIDED	4.75	4.70	4.61	4.51	4.64
VARIETY					
CAPPELLE	4.64	4.61	4.53	4.43	4.56
HUNTSMAN	4.93	4.78	4.67	4.68	4.76
N RATE					
50	3.98	4.04	3.85	4.01	3.97
100	4.68	4.97	4.61	4.42	4.67
150	5.69	5.09	5.35	5.23	5.34
MEAN	4.79	4.70	4.60	4.55	4.66

GRAIN MEAN DM% 82.9

SUB PLOT AREA HARVESTED 0.00355

EXTRA

GRAIN TONNES/HECTARE

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

N RATE	50	100	150	MEAN
AUT N				
0	2.93	3.52	4.04	3.50
62	3.56	4.32	4.82	4.23
MEAN	3.24	3.92	4.43	3.87

GRAIN MEAN DM% 82.2

STRAW TONNES/HECTARE

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

N RATE	50	100	150	MEAN
AUT N				
0	2.18	2.59	3.20	2.65
62	3.03	3.68	4.32	3.68
MEAN	2.60	3.14	3.76	3.17

STRAW MEAN DM% 82.3

SUBPLOT AREA HARVESTED 0.00355

76/R/WW/1 and 76/W/WW/1

WINTER WHEAT

VARIETIES, N, CCC AND FUNGICIDES

Object: To study the yields and flour quality of a selection of the newer varieties of winter wheat and the effects of nitrogen, growth regulator, fungicides and aphicide on land in rotation (pathogen free) and after-cereal (pathogen infected) - Rothamsted Long Hoos I/II (pathogen free RH) and Long Hoos III (pathogen infected RD), Woburn Far-Field I (pathogen free WH).

Sponsors: R. Moffitt, J.F. Jenkyn, D.B. Slope.

Design: 4 randomised blocks of 8 plots split into 4 with confounding.

Whole plot dimensions: Long Hoos I/II (RH) & Long Hoos III (RD): 4.27 x 27.1
Far Field (WH): 4.27 x 25.9

Treatments: Combinations of:-

Whole plots

1. VARIETY	Varieties:
AT	Atou
BO	Bouquet
CA	Cappelle
FL	Flinor (W only)
HO	Hobbit
FR	Maris Freeman
FU	Maris Fundin (R only)
HU	Maris Huntsman
ME	Mega

Sub plots

- | | |
|----------------|---|
| 2. N | Nitrogen fertiliser (kg N): |
| (RH) (RD)&(WH) | Long Hoos I/II (RH) Long Hoos III (RD) & Far Field I (WH) |
| 0 63 | None 63 in spring |
| 63 126 | 63 in spring 126 in spring |
| 126 189 | 126 in spring 189 in spring |
| 63+63 126+63 | 63 in spring + 126 in spring +
63 at flowering 63 at flowering |
-
- | | |
|-------------|--|
| 3. GRWTHREG | Growth regulator, applied to (RH) & (RD) only: |
| NONE | None |
| CHLORMEQ | Chlormequat (CCC) at 2.02 kg in 430 l |
-
- | | |
|-----------------|---|
| 4. FUNGICIDE(1) | Fungicide to control eyespot, applied to (RD) only: |
| NONE | None |
| CARBENDA | Carbendazim at 0.2 kg in 430 l on 21 May |
-
- | | |
|-----------------|--|
| 5. FUNGICIDE(2) | Fungicide to control foliar diseases: |
| NONE | None |
| C+C+T | Carbendazim at 0.15 kg + captafol at 1.0 kg + tridemorph at 0.26 kg on 11 June |

76/R/WW/1 and 76/W/WW/1

6. APHICIDE Aphicide at flowering, applied to (RH) only:

NONE None
 PIRIMICA Pirimicarb at 0.14 kg on 17 June

NOTE: Chloromequat was applied to 3 blocks on Long Hoos I/II (RH) on 7 May; and to the remaining block and Long Hoos III (RD) on 14 May.

Basal applications: Manures:

Long Hoos I/II (RH) and Long Hoos III (RD): (0:20:20) at 310 kg, combine drilled.

Far Field I (WH): (0:20:20) at 260 kg, combine drilled.

Weedkillers:

Long Hoos I/II (RH): Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Long Hoos III (RD): Paraquat at 0.42 kg ion in 220 l. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Far Field I (WH): Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

Seed: Long Hoos I/II (RH) and Long Hoos III (RD): Varieties sown at 200 kg.
 Far Field I (WH): Varieties sown at 210 kg.

NOTE: The variety Bouquet was resown at 190 kg on Far Field I, because the first sowing was damaged by birds.

Cultivations, etc.:-

Long Hoos I/II (RH): Heavy spring-tine cultivated twice: 17 Oct, 1975.

Seed sown: 24 Oct. Spring N applied: 6 Apr, 1976. Weedkiller applied: 13 Apr. Late N applied: 3 June. Combine harvested: 2 Aug. Previous crops: Beans 1974, potatoes 1975.

Long Hoos III (RD): Paraquat applied: 7 Oct, 1975. Ploughed: 11 Oct.

Heavy spring-tine cultivated: 16 Oct. Rotary harrowed: 21 Oct. Seed sown: 24 Oct. Spring N applied: 5 Apr, 1976. 'Banlene Plus' applied: 13 Apr. Late N applied: 3 June. Combine harvested: 3 Aug. Previous crops: Winter oats 1974, winter wheat 1975.

Far Field I: Deep-tine cultivated twice: 14 Oct, 20 Oct, 1975. Spring-tine cultivated, seed sown: 22 Oct. Plots sown to Bouquet spring-tine cultivated and resown: 8 Dec. Spring N applied: 1-5 Apr, 1976. Weedkiller applied: 21 Apr. Late N applied: 9 June. Combine harvested: 2 Aug. Previous crops: Beans 1974, potatoes 1975.

- NOTES: (1) Samples were taken in spring and summer, on Long Hoos III (RD) only, for estimates of eyespot (*Cercospora herpotrichoides*).
 (2) On Long Hoos III (RD) two plots with the following treatment combinations

VARIETY	BO	BO
N	126+63	126
GRWTH REG	NONE	CHLORMEQ
FUNGCIDE(1)	CARBENDA	NONE
FUNGCIDE(2)	NONE	NONE

were treated as missing because of a combine blockage at harvest. Estimated values were used in the analysis.

76/R/WW/1 LONG HOOS 1/11 (RH) PATHOGEN FREE

GRAIN TONNES/HECTARE

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

VARIETY	AT	BO	CA	HD	FR	FU	HU	ME	MEAN
N									
0	5.79	5.16	5.34	6.26	5.31	6.58	5.90	5.34	5.71
63	6.23	4.89	4.90	6.61	5.67	6.65	5.75	5.58	5.79
126	5.38	5.21	5.15	6.39	5.99	6.16	6.60	5.93	5.85
63+63	6.01	5.26	5.07	6.42	5.17	6.39	6.06	6.18	5.82
GRWTHREG									
NONE	5.78	5.40	4.98	6.37	5.61	6.60	6.15	5.69	5.82
CHLORMEQ	5.92	4.86	5.25	6.47	5.46	6.30	6.01	5.82	5.76
FUNGCIDE(2)									
NONE	5.89	5.15	5.22	6.76	5.82	6.51	6.11	6.00	5.93
C+C+T	5.81	5.11	5.00	6.08	5.26	6.38	6.05	5.52	5.65
APHICIDE									
NONE	5.68	5.03	5.05	6.21	5.65	6.35	5.91	5.82	5.71
PIRIMICA	6.02	5.23	5.18	6.64	5.42	6.55	6.25	5.69	5.87
MEAN	5.85	5.13	5.11	6.42	5.54	6.45	6.08	5.76	5.79

TABLE	N	GRWTHREG	FUNGCIDE(2)	APHICIDE
SED	0.168	0.119	0.119	0.119

TABLE	VARIETY	N	GRWTHREG	FUNGCIDE(2)
		VARIETY	VARIETY	VARIETY
SED	0.154	0.439	0.283	0.283
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
VARIETY		0.475	0.336	0.336

TABLE	APHICIDE
	VARIETY
SED	0.283
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:	
VARIETY	0.336

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.218	3.8
BLOCK.WP.SP	40	0.672	11.6

GRAIN MEAN DM% 88.5

SUB PLOT AREA HARVESTED 0.00173

76/R/WW/1 LONG HOOS III (RD) PATHOGEN INFECTED

GRAIN TONNES/HECTARE

VARIETY	AT	BO	CA	HD	FR	FU	HU	ME	MEAN
N									
63	3.40	2.60	3.35	4.41	3.22	3.70	3.76	3.28	3.46
126	3.85	3.34	4.01	4.43	3.76	4.01	3.80	4.04	3.90
189	4.39	3.36	3.94	4.96	4.26	4.73	5.04	4.41	4.39
126+63	4.11	3.75	3.75	4.10	4.07	3.54	4.17	3.95	3.93
GRWTHREG									
NONE	3.91	3.18	3.92	4.34	3.62	4.13	4.22	3.85	3.90
CHLORMEQ	3.96	3.35	3.60	4.60	4.04	3.86	4.16	3.99	3.94
FUNGCIDE(1)									
NONE	3.98	3.11	3.75	4.45	4.09	3.92	4.12	3.82	3.91
CARBENDA	3.89	3.41	3.77	4.50	3.56	4.07	4.27	4.02	3.94
FUNGCIDE(2)									
NONE	3.93	3.29	3.64	4.59	3.86	4.07	4.15	3.84	3.92
C+C+T	3.94	3.24	3.88	4.36	3.79	3.92	4.23	4.00	3.92
MEAN	3.94	3.26	3.76	4.47	3.83	3.99	4.19	3.92	3.92

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	GRWTHREG	FUNGCIDE(1)	FUNGCIDE(2)
SED	0.124	0.088	0.088	0.088

TABLE	VARIETY	N	GRWTHREG	FUNGCIDE(1)
		VARIETY	VARIETY	VARIETY
SED	0.233	0.382	0.291	0.291
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
VARIETY		0.350	0.248	0.248

TABLE	FUNGCIDE(2)
	VARIETY
SED	0.291
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:	
VARIETY	0.248

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.329	8.4
BLOCK.WP.SP	38	0.496	12.6

GRAIN MEAN DM% 87.7

SUB PLOT AREA HARVESTED 0.00171

76/W/WW/1 FAR FIELD 1 (WH) PATHOGEN FREE

GRAIN TONNES/HECTARE

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

VARIETY	AT	BO	CA	FL	HD	FR	HU	ME	MEAN
N									
63	3.07	2.08	2.82	3.69	3.58	3.13	4.00	2.69	3.13
126	2.78	1.96	2.73	3.28	3.26	3.03	3.66	2.75	2.93
189	2.84	2.02	2.67	3.02	3.23	3.12	3.54	2.85	2.91
126+63	3.03	2.19	2.72	3.35	3.19	2.89	3.88	3.02	3.03
FUNGICIDE(2)									
NONE	2.99	2.10	2.70	3.47	3.38	2.98	3.78	2.83	3.03
C+C+T	2.86	2.02	2.77	3.19	3.25	3.10	3.75	2.83	2.97
MEAN	2.93	2.06	2.74	3.33	3.31	3.04	3.77	2.83	3.00

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N FUNGICIDE(2)	VARIETY
SED	0.071	0.378

TABLE	N FUNGICIDE(2)	
	VARIETY	VARIETY
SED	0.416	0.391
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:		
VARIETY	0.202	0.143

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.534	17.8
BLOCK.WP.SP	48	0.285	9.5

GRAIN MEAN DM% 88.8

SUB PLOT AREA HARVESTED 0.00165

76/R/WW/2 and 76/W/WW/2

WINTER WHEAT

AQUEOUS N AND NITRIFICATION INHIBITORS

Object: To study the effects of adding a range of nitrification inhibitors to aqueous urea and aqueous ammonia on the yield and nitrogen uptake of winter wheat - Rothamsted (R), Gt. Knott III and Woburn (W) Horsepool.

Sponsors: F.V. Widdowson, J. Ashworth, A. Penny, G.G. Briggs.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 2.44 x 12.2.

Treatments: All combinations of:-

1. N FORM Form of aqueous nitrogen:

AMMONIA	Aqueous ammonia 26% N
UREA	Aqueous urea 18% N

2. N RATE Rate of nitrogen (kg N):

(R)	(W)	(R)	(W)
70	60	70	60
100	90	100	90

3. NIT INHB Nitrification inhibitors added to aqueous fertiliser:

NONE	None
CS2	Carbon disulphide at 11 kg
NITRAPYR	Nitrapyrin ('N-Serve') at 1.25 kg
AMM TRI	Ammonium trithiocarbonate at 16 kg

plus eight extra treatments given solid fertiliser, 'Nitro-Chalk', (kg N):-

NITRO CH

0	0
50	50 (Woburn only)
60	60
70	70
80	80
90	90
100	100
110	110
120	120 (Rothamsted only)

NOTE: Aqueous nitrogen was applied by injectors spaced 30 cm apart 10.2 cm deep.

76/R/WW/2 and 76/W/WW/2

Basal applications:-

Gt Knott III (R): Manures: (0:20:20) at 310 kg, combine drilled.
Weedkillers: Paraquat at 0.42 kg ion in 220 l. Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l. Growth regulator: Chlormequat at 1.7 kg in 220 l.

Horsepool (W): Manures: (0:20:20) at 250 kg, combine drilled.
Weedkillers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.
Growth regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Gt Knott III (R): Maris Huntsman, sown at 200 kg.

Horsepool (W): Maris Huntsman, sown at 190 kg.

Cultivations, etc.:-

Gt Knott (R): Heavy spring-tine cultivated: 25 Sept, 1975. Paraquat applied: 6 Oct. Ploughed, rotary cultivated: 13 Oct. Seed sown: 14 Oct. Aqueous urea injected: 8 Mar, 1976. Aqueous ammonia injected: 9 Mar. Solid N treatments applied: 14 Apr. Ioxynil plus mecoprop applied: 22 Apr. Chlormequat applied: 7 May. Combine harvested: 22 July. Previous crops: Barley 1974, winter oats 1975.

Horsepool (W): Heavy spring-tine cultivated twice: 30, 31 Aug, 1975. Spring-tine cultivated: 3 Oct. Seed sown: 4 Oct. Aqueous urea and ammonia injected: 10 Mar, 1976. Solid N treatments applied: 13 Apr. Weedkiller applied: 21 Apr. Chlormequat applied: 4 May. Combine harvested: 23 July. Previous crops: Winter wheat 1974, beans 1975.

- NOTES: (1) Soil samples were taken during the growing season to estimate rates of nitrification.
- (2) Horsepool (W) after harvest the grain from one plot:- NITRO CH 70 was spilt, an estimated value was used in the analysis.

76/R/WW/2 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

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

N RATE	70	100	MEAN						
N FORM									
AMMONIA	4.78	5.08	4.93						
UREA	4.99	5.27	5.13						
MEAN	4.89	5.18	5.03						
NIT INHB	NONE	CS2	NITRAPYR	AMM TRI	MEAN				
N FORM									
AMMONIA	4.92	4.93	4.99	4.88	4.93				
UREA	5.06	5.06	5.02	5.39	5.13				
MEAN	4.99	5.00	5.00	5.14	5.03				
NIT INHB	NONE	CS2	NITRAPYR	AMM TRI	MEAN				
N RATE									
70	4.92	4.87	4.78	4.98	4.89				
100	5.06	5.12	5.23	5.30	5.18				
MEAN	4.99	5.00	5.00	5.14	5.03				
N FORM	NIT INHB	NONE	CS2	NITRAPYR	AMM TRI				
AMMONIA	N RATE								
	70	4.80	4.83	4.78	4.72				
	100	5.04	5.03	5.21	5.04				
UREA	70	5.05	4.91	4.78	5.23				
	100	5.07	5.21	5.25	5.55				
NITRO CH	0	60	70	80	90	100	110	120	MEAN
	3.30	4.47	4.65	5.02	4.93	5.11	5.30	5.18	4.74

GRAND MEAN 4.94

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NITRO CH	N FORM	N RATE	NIT INHB
SD	0.197	0.070	0.070	0.099
TABLE	N FORM N RATE	N FORM NIT INHB	N RATE NIT INHB	N FORM N RATE NIT INHB
SD	0.099	0.139	0.139	0.197

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.197	4.0
GRAIN MEAN DM%	85.4		
PLOT AREA HARVESTED	0.00186		

76/W/WW/2 HORSEPOOL (W)

GRAIN TONNES/HECTARE

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

N RATE	60	90	MEAN						
N FORM									
AMMONIA	3.90	3.86	3.88						
UREA	4.15	3.97	4.06						
MEAN	4.02	3.91	3.97						
NIT INHB	NONE	CS2	NITRAPYR	AMM TRI	MEAN				
N FORM									
AMMONIA	3.81	3.84	4.06	3.79	3.88				
UREA	3.99	3.97	3.94	4.35	4.06				
MEAN	3.90	3.90	4.00	4.07	3.97				
NIT INHB	NONE	CS2	NITRAPYR	AMM TRI	MEAN				
N RATE									
60	3.98	3.95	3.98	4.19	4.02				
90	3.82	3.86	4.02	3.95	3.91				
MEAN	3.90	3.90	4.00	4.07	3.97				
N FORM	NIT INHB	NONE	CS2	NITRAPYR	AMM TRI				
AMMONIA	N RATE								
	60	3.64	3.84	4.06	4.05				
	90	3.99	3.84	4.06	3.53				
UREA	60	4.32	4.05	3.90	4.33				
	90	3.66	3.88	3.99	4.37				
NITRO CH	0	50	60	70	80	90	100	110	MEAN
	3.63	3.88	3.92	4.66	3.81	3.92	4.12	4.40	4.04

GRAND MEAN 3.99

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	NITRO CH	N FORM	N RATE	NIT INHB
SED	0.340	0.120	0.120	0.170
TABLE	N FORM N RATE	N FORM NIT INHB	N RATE NIT INHB	N FORM N RATE NIT INHB
SED	0.170	0.240	0.240	0.340

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	22	0.340	8.5
GRAIN MEAN DM%	84.7		
PLOT AREA HARVESTED	0.00136		

76/R/WW/3 and 76/W/WW/3

WINTER WHEAT

GROWTH AND YIELD ON CONTRASTED SITES

Object: To study the growth and yield of wheat on sites at Rothamsted and Woburn. The effects of rates and times of application of nitrogen and irrigation are also studied - Rothamsted (R) Gt Knott I and Woburn (W) Butt Close III.

Sponsors: P.J. Welbank, F.V. Widdowson.

Design: Single replicate of 2 x 6 x 2 arranged as 12 whole plots split into 2.

Whole plot dimensio: Gt Knott I (R): 13.4 x 15.2.
Butt Close III (W): 14.3 x 14.5.

Treatments: All combinations of:-

Whole plots

1. IRRIGTN Irrigation:

NONE	None
FULL	Full irrigation

NOTE: Because of practical difficulties the amounts of water applied (see below) were less than intended.

2. N RATE Nitrogen fertiliser (kg N):

	R	W
0	0	0
25	25	-
50	50	50
75	75	75
100	100	100
125	125	125
150	-	150

3. N TIME Times of applying nitrogen fertiliser:

SINGLE	Single dressing in spring
DIVIDED	Half in spring, quarter four and eight weeks later

Irrigation treatments (mm water):

Gt Knott I (R):	2 June	25.4
	15 June	25.4
	7 July	19.0
	----	----
	Total	69.8

76/R/WW/3 and 76/W/WW/3

Butt Close III (W):

18 May	19.0	22 June	12.7
26-27 May	19.0	28-29 June	25.4
2-3 June	19.0	5-8 July	25.4
8-9 June	25.4	14-15 July	25.4
14-15 June	25.4		

Total 196.7

Basal applications:

Gt Knott I (R): Manures: (0:14:28) at 500 kg, combine drilled. Weed-killers: Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l.

Growth Regulator: Chlormequat at 2.8 kg in 220 l.

Butt Close III (W): Manures: (0:14:28) at 520 kg, combine drilled.

Weedkiller: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.

Growth Regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Both sites: Maris Huntsman, sown at 190 kg.

Cultivations, etc.:-

Gt Knott I (R): Ploughed: 17 Sept, 1975. Spring-tine cultivated three times: 16 Sept, 17 Sept, 10 Oct. Seed sown: 31 Oct. Weedkiller applied, first N treatment applied: 22 Apr, 1976. Chlormequat applied: 5 May. Second N treatment applied: 17 May. Third N treatment applied: 23 June. Combine harvested: 3 Aug. Previous crops: Barley 1974, beans 1975.

Butt Close III (W): Heavy spring-tine cultivated: 2 Sept, 1975. Deep-tine cultivated: 24 Sept. Rotary cultivated: 25 Oct. Spring-tine cultivated twice: 28 Oct, 30 Oct. Seed sown: 30 Oct. Weed-killer applied: 21 Apr, 1976. First N treatment applied: 23 Apr. Chlormequat applied: 4 May. Second N treatment applied: 19 May. Third N treatment applied: 14 June. Combine harvested: 30 July. Previous crops: Barley 1974, beans 1975.

- NOTES: (1) Estimates were made of leaf areas and number of tillers and spikelets during the season. Root samples were taken on one occasion.
- (2) Stomatal resistance and measurements of photosynthetic rates were made on Gt Knott I (R) only.
- (3) Shoot samples were taken for N determinations.
- (4) Soil water measurements were made weekly from April to July.
- (5) The percentages of N, P and K in grain were measured.
- (6) 1000 grain weights were determined.

76/R/WW/3 GREAT KNOTT 1(R)

GRAIN TONNES/HECTARE

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

N RATE	0	25	50	75	100	125	MEAN
IRRIGTN							
NONE	4.49	4.00	4.82	4.74	5.05	4.80	4.65
FULL	3.87	4.95	5.29	4.59	5.19	5.49	4.90
MEAN	4.18	4.48	5.05	4.66	5.12	5.14	4.77

EXCLUDING N RATE 0

N TIME	SINGLE	DIVIDED	MEAN
IRRIGTN			
NONE	4.51	4.86	4.68
FULL	5.59	4.62	5.10
MEAN	5.05	4.74	4.89

N TIME	SINGLE	DIVIDED	MEAN
N RATE			
25	4.42	4.54	4.48
50	5.11	5.00	5.05
75	4.26	5.07	4.66
100	5.63	4.61	5.12
125	5.82	4.47	5.14
MEAN	5.05	4.74	4.89

N RATE	IRRIGTN	NONE	FULL
25	SINGLE	3.28	5.55
	DIVIDED	4.73	4.35
50	SINGLE	4.50	5.72
	DIVIDED	5.13	4.86
75	SINGLE	3.77	4.74
	DIVIDED	5.71	4.44
100	SINGLE	5.50	5.76
	DIVIDED	4.60	4.63
125	SINGLE	5.47	6.16
	DIVIDED	4.13	4.81

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00434

76/R/WW/3 GREAT KNOTT I(R)

STRAW TONNES/HECTARE

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

N RATE	0	25	50	75	100	125	MEAN
IRRIGTN							
NONE	2.71	2.77	3.18	2.86	2.98	3.59	3.02
FULL	2.79	3.51	3.28	3.17	3.84	3.54	3.36
MEAN	2.75	3.14	3.23	3.01	3.41	3.56	3.19

EXCLUDING N RATE 0

N TIME	SINGLE	DIVIDED	MEAN
IRRIGTN			
NONE	3.09	3.07	3.08
FULL	3.54	3.40	3.47
MEAN	3.31	3.23	3.27

N TIME	SINGLE	DIVIDED	MEAN
N RATE			
25	2.80	3.48	3.14
50	3.26	3.20	3.23
75	3.13	2.90	3.01
100	3.60	3.22	3.41
125	3.77	3.36	3.56
MEAN	3.31	3.23	3.27

N RATE	IRRIGTN	NONE	FULL
25	N TIME		
	SINGLE	2.28	3.32
50	DIVIDED	3.26	3.70
	SINGLE	3.40	3.12
75	DIVIDED	2.96	3.44
	SINGLE	2.86	3.40
100	DIVIDED	2.86	2.94
	SINGLE	3.03	4.17
125	DIVIDED	2.93	3.51
	SINGLE	3.85	3.68
	DIVIDED	3.32	3.40

STRAW MEAN DM% 93.3

PLOT AREA HARVESTED 0.00434

76/W/WW/3 BUTT CLOSE III(W)

GRAIN TONNES/HECTARE

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

N RATE	0	50	75	100	125	150	MEAN
IRRIGTN							
NONE	1.13	2.25	2.02	2.61	1.87	1.96	1.97
FULL	3.07	4.32	4.20	4.96	4.42	3.64	4.10
MEAN	2.10	3.29	3.11	3.78	3.14	2.80	3.04

EXCLUDING N RATE 0

N TIME	SINGLE	DIVIDED	MEAN
IRRIGTN			
NONE	2.03	2.25	2.14
FULL	4.56	4.06	4.31
MEAN	3.29	3.16	3.23

N RATE	SINGLE	DIVIDED	MEAN
50	2.53	4.05	3.29
75	3.11	3.11	3.11
100	3.98	3.59	3.78
125	3.99	2.29	3.14
150	2.86	2.75	2.80
MEAN	3.29	3.16	3.23

N RATE	IRRIGTN	NONE	FULL
50	SINGLE	1.35	3.71
	DIVIDED	3.16	4.94
75	SINGLE	1.95	4.27
	DIVIDED	2.09	4.13
100	SINGLE	3.35	4.61
	DIVIDED	1.87	5.31
125	SINGLE	2.25	5.74
	DIVIDED	1.49	3.10
150	SINGLE	1.26	4.46
	DIVIDED	2.67	2.83

GRAIN MEAN DM% 85.5

PLOT AREA HARVESTED 0.00408

75/W/WW/3 BUTT CLOSE III(W)

STRAW TONNES/HECTARE

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

	MEAN						
N RATE	0	50	75	100	125	150	MEAN
IRRIGTN							
NONE	0.54	1.24	1.36	1.41	1.31	1.38	1.21
FULL	1.85	3.35	2.77	3.88	4.36	3.40	3.27
MEAN	1.20	2.30	2.07	2.65	2.83	2.39	2.24

EXCLUDING N RATE 0

N TIME	SINGLE	DIVIDED	MEAN
IRRIGTN			
NONE	1.39	1.29	1.34
FULL	3.50	3.60	3.55
MEAN	2.45	2.45	2.45

N TIME	SINGLE	DIVIDED	MEAN
N RATE			
50	2.07	2.52	2.30
75	2.13	2.01	2.07
100	2.27	3.03	2.65
125	3.47	2.20	2.83
150	2.29	2.49	2.39
MEAN	2.45	2.45	2.45

N RATE	IRRIGTN	NONE	FULL
	N TIME		
50	SINGLE	1.09	3.05
	DIVIDED	1.39	3.65
75	SINGLE	1.34	2.91
	DIVIDED	1.37	2.64
100	SINGLE	1.62	2.91
	DIVIDED	1.20	4.85
125	SINGLE	1.61	5.34
	DIVIDED	1.02	3.37
150	SINGLE	1.29	3.30
	DIVIDED	1.48	3.50

STRAW MEAN DM% 93.4

PLOT AREA HARVESTED 0.00408

76/B/WW/4

WINTER WHEAT

SOWING DATES AND INSECTICIDES

Object: To study the effects of dates of sowing and times of applying insecticides on the incidence of cereal aphids, barley yellow dwarf virus (BYDV) and yield of winter wheat - Great Knott I.

Sponsor: R.T. Plumb.

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: 6.40 x 22.9.

Treatments: All combinations of:-

1. SOW DATE Dates of sowing:

26 SEPT	26 September 1975
20 OCT	20 October
24 NOV	24 November

2. INSECTICIDE(1) Phorate granules to seedbed:

NONE	None
PHORATE	Phorate at 5 kg

3. INSECTICIDE(2) Menazon spray:

NONE	None
MENAZON	Menazon (0.7 l 'Saphi-Col' in 220 l on 14 May, 1976)

Basal applications: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkillers: Ioxynil at 0.53 kg with mecoprop at 1.6 kg (both as the potassium salt) in 220 l.

Seed: Cappelle, sown at 190 kg.

Cultivations, etc.: - Ploughed: 7 Sept, 1975. Spring-tine cultivated twice: 17 Sept. Phorate applied to early-sown plots: 19 Sept. Power harrowed these plots only: 22 Sept. Early plots sown: 26 Sept. Phorate to middle-sown plots and these plots only rotary cultivated and sown: 20 Oct. Phorate to late-sown plots, rotary cultivated and sown: 24 Nov. N applied to all plots: 9 Apr, 1976. Weedkiller applied: 10 Apr. Combine harvested: 30 July. Previous crops: Barley 1974, beans 1975.

NOTE: Emergence counts were made. Aphids were counted on six occasions from May to July. Ladybirds were counted in June and tiller numbers in late July.

76/R/WW/4

GRAIN TONNES/HECTARE

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

INSCTCDE(2)	NONE	MENAZON	MEAN
INSCTCDE(1)			
NONE	4.25	4.33	4.29
PHORATE	4.55	4.52	4.53
MEAN	4.40	4.42	4.41

SOW DATE	26 SEPT	20 OCT	24 NOV	MEAN
INSCTCDE(1)				
NONE	4.30	4.73	3.84	4.29
PHORATE	4.56	5.05	4.00	4.53
MEAN	4.43	4.89	3.92	4.41

SOW DATE	26 SEPT	20 OCT	24 NOV	MEAN
INSCTCDE(2)				
NONE	4.41	4.87	3.92	4.40
MENAZON	4.44	4.91	3.92	4.42
MEAN	4.43	4.89	3.92	4.41

INSCTCDE(2)	NONE	MENAZON				
SOW DATE	26 SEPT	20 OCT	24 NOV	26 SEPT	20 OCT	24 NOV
INSCTCDE(1)						
NONE	4.23	4.67	3.86	4.36	4.79	3.83
PHORATE	4.60	5.07	3.99	4.52	5.03	4.01

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	INSCTCDE(1)	INSCTCDE(2)	SOW DATE	INSCTCDE(1)	INSCTCDE(2)
SED	0.054	0.054	0.066	0.076	

TABLE	INSCTCDE(1)	INSCTCDE(2)	INSCTCDE(1)	INSCTCDE(2)
	SOW DATE	SOW DATE	SOW DATE	SOW DATE
SED	0.093	0.093	0.132	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	33	0.186	4.2

GRAIN MEAN DM% 88.1

PLOT AREA HARVESTED 0.00358

76/R/WW/5

WINTER WHEAT

FUNGICIDES

Object: To study the effects of a range of fungicides on control of foliar and root diseases and on yield of winter wheat - Long Heos III.

Sponsors: J.F. Jenkyn, R.D. Prew.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 2.13 x 13.4.

Treatments: All combinations of:-

1. F FORM Fungicides, applied as foliar sprays:

ME 125	'ME 125' at 0.37 l a.i.
MEB 6447	'MEB-6447' (Triadimefon at 0.25 kg)
S	Wettable sulphur at 2.4 kg

2. F TIME Times of applying foliar fungicides:

E	Early (14 May, 1976, growth stage 6-7)
L	Late (15 June, growth stage 10.5.2)
E+L	Early plus late

EXTRA Plus two extra treatments:

NONE	None (2 plots/block)
U 34910	Seed dressed with 'U-34,910' at 2.23 g a.i. per kg seed

NOTE: Sprays were applied in 340 l.

Basal applications: Manures: (10:24:24) at 250 kg, combine drilled, 'Nitro-Chalk' at 380 kg. Weedkillers: Paraquat at 0.42 kg ion in 220 l. Chlortoluron at 2.7 kg in 220 l. Dicamba with mecoprop and MCPA. ('Banlene Plus' at 5.6 l in 220 l).

Seed: Cama, sown at 190 kg.

Cultivations, etc.:- Paraquat applied to stubble: 7 Oct, 1975. Ploughed: 11 Oct. Heavy spring-tine cultivated: 16 Oct. Seed sown: 6 Nov. Chlortoluron applied: 23 Mar, 1976. N applied to all plots: 6-Apr. 'Banlene Plus' applied: 13 Apr. Combine harvested: 2 Aug. Previous crops: Oats 1974, wheat 1975.

NOTE: Mildew was assessed twice and samples were taken for root disease assessments.

76/R/WW/5

WINTER WHEAT

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

F TIME F FORM	E	L	E+L	MEAN
ME 125	3.41	2.72	3.04	3.05
MEB 6447	3.12	2.92	3.66	3.23
S	2.87	2.94	2.87	2.89
MEAN	3.13	2.86	3.19	3.06
EXTRA	NONE	U 34910	MEAN	
	2.73	2.38	2.64	

GRAND MEAN 2.96

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	F FORM	F TIME	F FORM F TIME
SED	0.204	0.136	0.136	0.235
SED OF F FORM.F TIME v EXTRA NONE			0.204	
SED OF F FORM.F TIME v EXTRA U 34910			0.235	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.288	9.8
GRAIN MEAN DM%	89.0		
PLOT AREA HARVESTED	0.00195		

75/R/WW/6

WINTER WHEAT

VARIETIES AND RATES OF N

Object: To study the physiological basis of the response of three varieties of winter wheat to a wide range of nitrogen rates - Long Hoos VI/VII 5.

Sponsor: G.N. Thorne.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 1.65 x 9.14.

Treatments: All combinations of:-

1. VARIETY Varieties:

CAPPELLE	Cappelle
HOBBIT	Hobbit
HUNTSMAN	Maris Huntsman

2. N Nitrogen fertiliser (kg N):

0	None
30	30
60	60
90	90
120	120
150	150
180	180
210	210

Basal applications: Manures: (0:14:28) at 880 kg. Weedkiller: Terbutryne at 2.2 kg in 340 l. Fungicide: Tridemorph at 0.53 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 340 l.

Seed: Varieties sown at 200 kg.

Cultivations, etc.: - Spring-tine cultivated: 15 Sept, 1975. PK applied: 24 Sept. Ploughed: 29 Sept. Power harrowed and seed sown: 20 Oct. Weedkiller applied: 24 Oct. Test N applied: 6 May, 1976. Fungicide applied: 10 June. Insecticide applied: 22 June. Harvested by hand: 21 July. Previous crops: Maize 1974, oats 1975.

NOTE: Plant counts were made after germination and shoot counts throughout the season. Dry weights and leaf areas were determined on five occasions in June and July. Soil moisture was measured from February to July. Light penetration of the canopy was measured in June and July. Rates of photosynthesis and translocation were measured once in May, June and July. Photorespiration was measured ten times from May to July and dark-respiration of shoots and ears in June and July. The N contents of the green crop at flowering and of the grain and straw at maturity were measured.

76/R/WW/6

GRAIN TONNES/HECTARE

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

	N	0	30	60	90	120	150	180	210	MEAN
VARIETY										
CAPPELLE	2.85	3.55	3.96	3.89	4.03	4.28	4.39	4.51	4.51	3.93
HOBBIT	3.54	3.99	4.66	4.75	4.94	5.07	5.81	4.95	4.95	4.71
HUNTSMAN	3.85	3.60	3.83	4.67	4.53	4.50	4.83	4.57	4.57	4.30
MEAN	3.41	3.71	4.15	4.44	4.50	4.62	5.01	4.68	4.68	4.32

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	VARIETY	N	VARIETY N
SED	0.104	0.170	0.295

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.295	6.8

GRAIN MEAN DM% 90.4

PLOT AREA HARVESTED 0.00023

76/R/WW/7

WINTER WHEAT

RATES AND TIMES OF N AND K

Object: To study the effects of a range of rates and times of applying nitrogen and potassium on nutrient uptake and yield of winter wheat - Gt. Knott III.

Sponsors: O. Talibudeen, A. Penny, M. Page.

Design: Single replicate of 4 x 4 x 2 x 3 fully randomised plus 3 randomised blocks of 8 plots.

Whole plot dimensions: 2.67 x 4.57.

Treatments: All combinations of:-

1. N METHOD Rates, forms and times of applying nitrogen (kg N):

	'Nitro-Chalk' at G.S.2 (9 Apr)		Urea spray at G.S.6 (11-13 May)		Urea spray at G.S.11 (28-30 June)
120 0 30	120	+	0	+	30
120 0 60	120	+	0	+	60
120 0 90	120	+	0	+	90
120 30 0	120	+	30	+	0
120 30 30	120	+	30	+	30
120 30 60	120	+	30	+	60
120 30 90	120	+	30	+	90
120 60 0	120	+	60	+	0
120 60 30	120	+	60	+	30
120 60 60	120	+	60	+	60
120 60 90	120	+	60	+	90
120 90 0	120	+	90	+	0
120 90 30	120	+	90	+	30
120 90 60	120	+	90	+	60
120 90 90	120	+	90	+	90

2. N CONC Concentration of nitrogen in urea spray:-

2.5	2.5%
5.0	5.0%

3. K CONC Concentration of potassium in urea spray, K:N atom ratio:

0	None
5	5%
10	10%

EXTRA plus nine extra treatments given 'Nitro-Chalk' only, in spring at Growth Stage 2 (kg N) (9 Apr):

0	None
30	30
60	60
90	90
120 (duplicated)	120
150	150
180	180
240	240
300	300

76/R/WW/7

NOTE: Urea sprays were applied in 600 l to provide 30 kg N at N CONC 5.0 and in 1200 l to provide N CONC 2.5. The larger rates of urea were obtained by proportionate increases in volume.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled.

Weedkillers: Paraquat at 0.42 kg ion in 220 l. Ioxynil at 0.53 kg with mecoprop at 1.6 kg (both as the potassium salt) in 220 l in spring.

Fungicides: Tridemorph at 0.53 kg in 280 l. Benomyl at 0.28 kg with mancozeb plus maneb ('Kascade' at 2.2 kg) in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: Cappelle, sown at 200 kg.

Cultivations, etc.:- Heavy spring-tine cultivated: 24 Sept, 1975. Paraquat applied: 6 Oct. Ploughed and rotary harrowed: 13 Oct. Seed sown: 14 Oct. Spring weedkiller applied: 22 Apr, 1976. Tridemorph applied: 29 Apr, 11 May. Benomyl with 'Kascade' applied, pirimicarb applied: 21 June. Combine harvested: 22 July. Previous crops: Barley 1974, winter oats 1975.

GRAIN TONNES/HECTARE

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

N CONC	2.5	5.0	MEAN
N METHOD			
120 0 30	4.90	4.76	4.83
120 0 60	4.70	4.73	4.71
120 0 90	4.88	4.66	4.77
120 30 0	4.88	4.77	4.83
120 30 30	5.09	4.98	5.03
120 30 60	4.86	5.06	4.96
120 30 90	4.86	4.91	4.88
120 60 0	5.11	5.15	5.13
120 60 30	5.13	5.02	5.07
120 60 60	5.28	4.74	5.01
120 60 90	5.07	5.09	5.08
120 90 0	5.24	5.15	5.19
120 90 30	5.00	4.96	4.98
120 90 60	5.20	5.01	5.11
120 90 90	4.87	5.13	5.00
MEAN	5.00	4.94	4.97

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GRAIN TONNES/HECTARE

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

K CONC	0	5	10	MEAN
N METHOD				
120 0 30	4.53	4.79	5.10	4.83
120 0 60	4.53	4.75	4.86	4.71
120 0 90	4.86	4.87	4.53	4.77
120 30 0	4.88	4.91	4.69	4.83
120 30 30	5.14	5.12	4.84	5.03
120 30 60	5.05	5.04	4.78	4.96
120 30 90	4.86	4.93	4.81	4.88
120 60 0	5.26	5.11	5.01	5.13
120 60 30	4.90	5.03	5.24	5.07
120 60 60	5.09	5.09	4.85	5.01
120 60 90	5.13	4.96	5.15	5.08
120 90 0	5.48	4.88	5.22	5.19
120 90 30	4.65	5.25	5.03	4.98
120 90 60	4.94	5.36	5.01	5.11
120 90 90	5.15	4.86	4.97	5.00

MEAN 4.97 5.00 4.94 4.97

K CONC	0	5	10	MEAN
N CONC				
2.5	5.02	5.03	4.96	5.00
5.0	4.92	4.98	4.92	4.94
MEAN	4.97	5.00	4.94	4.97

EXTRA	0	30	60	90	120	150	180	240	300	MEAN
	3.25	3.45	4.30	4.47	4.89	5.22	4.79	5.29	5.06	4.56

GRAND MEAN 4.87

TABLE	N METHOD	N CONC	K CONC	EXTRA
SED	0.152	0.056	0.068	0.215 MIN REP 0.187 MAX-MIN
TABLE	N METHOD N CONC	N METHOD K CONC	N CONC K CONC	
SED	0.215	0.263	0.096	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	47	0.264	5.4

EXTRA
MAX-MIN 120 V ANY OF REMAINDER
MIN REP ANY OF REMAINDER

GRAIN MEAN DM% 82.5

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STRAW TONNES/HECTARE

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

N CONC	2.5	5.0	MEAN
N METHOD			
120 0 30	5.99	5.92	5.95
120 0 60	5.48	5.62	5.55
120 0 90	6.09	5.85	5.97
120 30 0	5.56	6.04	5.80
120 30 30	6.08	6.07	6.08
120 30 60	5.98	6.05	6.01
120 30 90	5.88	5.75	5.82
120 60 0	6.07	6.31	6.19
120 60 30	6.01	6.12	6.07
120 60 60	6.07	5.82	5.95
120 60 90	6.36	6.35	6.35
120 90 0	6.52	6.19	6.35
120 90 30	6.20	5.96	6.08
120 90 60	6.23	5.74	5.99
120 90 90	6.10	5.96	6.03

MEAN 6.04 5.98 6.01

K CONC	0	5	10	MEAN
N METHOD				
120 0 30	5.51	6.14	6.21	5.95
120 0 60	5.30	5.84	5.51	5.55
120 0 90	6.00	6.58	5.33	5.97
120 30 0	5.91	5.78	5.71	5.80
120 30 30	6.04	6.24	5.96	6.08
120 30 60	6.12	5.99	5.93	6.01
120 30 90	5.87	5.52	6.06	5.82
120 60 0	6.49	6.12	5.96	6.19
120 60 30	6.24	5.99	5.98	6.07
120 60 60	6.16	5.85	5.83	5.95
120 60 90	6.54	6.24	6.27	6.35
120 90 0	6.30	6.14	6.62	6.35
120 90 30	5.58	6.35	6.31	6.08
120 90 60	5.72	5.98	6.26	5.99
120 90 90	6.19	5.64	6.27	6.03

MEAN 6.00 6.03 6.01 6.01

K CONC	0	5	10	MEAN
N CONC				
2.5	5.95	6.09	6.09	6.04
5.0	6.05	5.97	5.94	5.98

MEAN 6.00 6.03 6.01 6.01

EXTRA	0	30	60	90	120	150	180	240	300	MEAN
	4.05	4.50	4.89	5.40	5.99	5.92	6.40	6.21	6.99	5.63

GRAND MEAN 5.92

STRAW MEAN DM% 89.6

PLOT AREA HARVESTED 0.00073

76/R/WW/8

WINTER WHEAT

FUNGICIDES AND GRAIN MICROFLORA

Object: To study the effects of a range of fungicides applied at a range of times on the yield, quality and grain microflora of winter wheat - Long Hoos IV 4.

Sponsor: R.A. Hill.

Design: Single replicate of 2 x 3 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 2.41 x 8.23.

Treatments: All combinations of:-

1. SPECFUNG Specific fungicides for foliar pathogen control:

NONE	None
T+B	Tridemorph at 0.53 kg plus benodanil at 1.4 kg mixed and applied on 14 and 27 May

2. B S FUNG Broad spectrum fungicides:

BENOMYL	Benomyl at 0.28 kg
CAPTAFOL	Captafol at 1.4 kg
BEN+CAP	Benomyl and captafol at above rates applied separately

3. APP TIME Application of broad spectrum fungicides:

	3 June	24 June	8 July
NONE	None	None	None
E	Sprayed	None	None
M	None	Sprayed	None
L	None	None	Sprayed
E+M	Sprayed	Sprayed	None
E+L	Sprayed	None	Sprayed
M+L	None	Sprayed	Sprayed
E+M+L	Sprayed	Sprayed	Sprayed

NOTE: All sprays were applied in 340 l.

Basal applications: Manures: (0:14:28) at 880 kg. 'Nitro-Chalk' at 450 kg.

Seed: Cama, sown at 200 kg.

Cultivations, etc.:- PK applied: 23 Sept, 1975. Ploughed: 26 Sept. Power harrowed and sown: 14 Oct. N applied: 10 May, 1976. Combine harvested: 28 July. Previous crops: Spring wheat 1974, fallow 1975.

NOTE: Grain microflora were assessed at fortnightly intervals from late May to harvest. Mildew and rust were assessed on several occasions. Eyespot and glume blotch were assessed before harvest.

76/R/WW/8

GRAIN TONNES/HECTARE

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

ALL PLOTS

APP TIME	NONE	E	M	L	E+M	E+L	M+L	E+M+L	MEAN
SPECFUNG									
NONE	5.84	5.83	5.89	5.93	5.84	6.03	5.54	5.58	5.82
T+B	5.68	5.93	6.19	5.72	5.65	6.00	5.87	5.87	5.86
MEAN	5.76	5.88	6.04	5.82	5.75	6.04	5.70	5.73	5.84

EXCLUDING APP TIME NONE

APP TIME	E	M	L	E+M	E+L	M+L	E+M+L	MEAN
B S FUNG								
BENOMYL	5.76	6.21	5.99	5.71	6.30	5.53	5.68	5.88
CAPTAFOL	5.98	5.60	6.26	5.54	5.83	5.73	5.57	5.79
BEN+CAP	5.90	6.31	5.21	5.98	6.01	5.85	5.93	5.89
MEAN	5.88	6.04	5.82	5.75	6.04	5.70	5.73	5.85

B S FUNG	BENOMYL	CAPTAFOL	BEN+CAP	MEAN
SPECFUNG				
NONE	5.76	5.69	5.98	5.81
T+B	6.00	5.88	5.79	5.89
MEAN	5.88	5.79	5.89	5.85

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SPECFUNG	B S FUNG	APP TIME	SPECFUNG B S FUNG
SED	0.130 0.139*	0.170	0.260	0.241

TABLE	SPECFUNG APP TIME	B S FUNG APP TIME
SED	0.368	0.451

* USE ONLY WITH TABLES EXCLUDING APP TIME NONE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	16	0.451	7.7

GRAIN MEAN DM% 87.8

PLOT AREA HARVESTED 0.00111

76/R/WW/14

WINTER WHEAT

SEED RATES AND DIVIDED N DRESSINGS

Object: To study the separate and combined effects of a range of treatments on the growth and yield of winter wheat - White Horse II.

Sponsors: G.V. Dyke, J. McEwen, R. Moffitt, D.B. Slope.

Design: Single replicate of 2 x 2 x 2 x 2 x 6 plus 4 extra plots.

Whole plot dimensions: 2.67 x 8.53.

Treatments: All combinations of:-

1. VARIETY Varieties:

CAPPELLE	Cappelle
HOBBIT	Hobbit

 2. SEEDRATE Seed rates:

HALF	Half standard (100 kg Cappelle; 83 kg Hobbit) (1.86 million/ha)
STANDARD	Standard (200 kg Cappelle; 166 kg Hobbit) (3.72 million/ha)

 3. CCC Chlormequat:

0.0	None
1.7	1.7 kg on 14 May

 4. FUNGICIDE Fungicide:

0	None
T+C+M	Tridemorph at 0.26 kg + carbendazim at 0.15 kg + maneb at 1.6 kg on 16 June

 5. N Nitrogen fertiliser, times and rates (kg N):

	1 March	13 April	27 May
1 1 1	25	25	25
1 2 1	25	50	25
0 2 0	0	50	0
0 3 0	0	75	0
0 4 0	0	100	0
0 2 1	0	50	25
- EXTRA plus four extra plots all sown at half standard seed rate, receiving chlormequat and the fungicidal mixture plus wettable sulphur at 2.66 kg a.i. in 340 l on 4 June:
- | | |
|---------|-----------------------|
| C 111 S | Cappelle with N 1 1 1 |
| C 121 S | Cappelle with N 1 2 1 |
| H 111 S | Hobbit with N 1 1 1 |
| H 121 S | Hobbit with N 1 2 1 |

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- NOTES: (1) All sprays were applied in 340 l.
(2) One plot VARIETY CAPPELLE, SEEDRATE STANDARD, CCC 0.0, FUNGCIDE O, N 0 2 1 received CCC 1.7 in error. An estimated value was used in the analysis.

Basal applications: Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Cultivations, etc.: - Deep-tine cultivated and heavy spring-tine cultivated: 7 Oct, 1975. Heavy spring-tine cultivated: 15 Oct. Rotary harrowed: 17 Oct. Heavy spring-tine cultivated: 23 Oct. Seed sown: 28 Oct. Weedkiller applied: 20 Apr, 1976. Combine harvested: 3 Aug. Previous crops: Beans 1974 and 1975.

NOTE: Plant counts were made in late autumn and spring. Samples were taken for leaf area index, tiller numbers and dry weights in June. Samples were taken for grain weights, straw weights, 1000 grain weights and spikelet counts in late July.

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GRAIN TONNES/HECTARE

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

SEEDRATE	HALFSTANDARD							MEAN
VARIETY								
CAPPELLE	3.99	4.75						4.37
HOBBIT	3.99	4.77						4.38
MEAN	3.99	4.76						4.37
CCC	0.0	1.7						MEAN
VARIETY								
CAPPELLE	4.41	4.33						4.37
HOBBIT	4.35	4.40						4.38
MEAN	4.38	4.37						4.37
CCC	0.0	1.7						MEAN
SEEDRATE								
HALF	4.05	3.93						3.99
STANDARD	4.71	4.81						4.76
MEAN	4.38	4.37						4.37
FUNGCIDE	0	T+C+M						MEAN
VARIETY								
CAPPELLE	4.24	4.50						4.37
HOBBIT	4.30	4.45						4.38
MEAN	4.27	4.48						4.37
FUNGCIDE	0	T+C+M						MEAN
SEEDRATE								
HALF	3.83	4.14						3.99
STANDARD	4.71	4.81						4.76
MEAN	4.27	4.48						4.37
FUNGCIDE	0	T+C+M						MEAN
CCC								
0.0	4.30	4.47						4.38
1.7	4.25	4.48						4.37
MEAN	4.27	4.48						4.37
N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1	MEAN	
VARIETY								
CAPPELLE	4.23	4.27	4.59	4.37	4.30	4.49	4.37	
HOBBIT	4.67	4.75	4.22	4.28	4.39	3.94	4.38	
MEAN	4.45	4.51	4.41	4.32	4.34	4.22	4.37	

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GRAIN TONNES/HECTARE

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

N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1	MEAN
SEEDRATE							
HALF	4.21	3.96	3.84	3.90	4.16	3.86	3.99
STANDARD	4.69	5.06	4.97	4.74	4.53	4.57	4.76
MEAN	4.45	4.51	4.41	4.32	4.34	4.22	4.37
N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1	MEAN
CCC							
0.0	4.50	4.41	4.48	4.42	4.22	4.26	4.38
0.7	4.41	4.60	4.34	4.23	4.47	4.17	4.37
MEAN	4.45	4.51	4.41	4.32	4.34	4.22	4.37
N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1	MEAN
FUNGCIDE							
0	4.31	4.39	4.62	4.20	4.23	3.90	4.27
T+C+M	4.59	4.62	4.20	4.45	4.46	4.53	4.48
MEAN	4.45	4.51	4.41	4.32	4.34	4.22	4.37
SEEDRATE	HALF		STANDARD				
CCC	0.0	1.7	0.0	1.7			
VARIETY							
CAPPELLE	3.99	3.99	4.84	4.67			
HOBBIT	4.10	3.87	4.59	4.94			
SEEDRATE	HALF		STANDARD				
FUNGCIDE	0	T+C+M	0	T+C+M			
VARIETY							
CAPPELLE	3.75	4.23	4.73	4.78			
HOBBIT	3.92	4.05	4.69	4.84			
CCC	0.0		1.7				
FUNGCIDE	0	T+C+M	0	T+C+M			
VARIETY							
CAPPELLE	4.40	4.43	4.08	4.58			
HOBBIT	4.19	4.51	4.42	4.39			
CCC	0.0		1.7				
FUNGCIDE	0	T+C+M	0	T+C+M			
SEEDRATE							
HALF	3.93	4.16	3.74	4.12			
STANDARD	4.66	4.77	4.77	4.85			

76/R/WW/14

GRAIN TONNES/HECTARE

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

		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
VARIETY	SEEDRATE							
CAPPELLE	HALF		3.93	3.67	4.22	3.80	4.09	4.24
	STANDARD		4.53	4.86	4.97	4.93	4.50	4.74
HOBBIT	HALF		4.49	4.24	3.47	4.01	4.22	3.49
	STANDARD		4.86	5.25	4.97	4.55	4.56	4.40
		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
VARIETY	CCC							
CAPPELLE	0.0		4.44	4.24	4.61	4.48	4.09	4.63
	1.7		4.02	4.29	4.58	4.26	4.50	4.35
HOBBIT	0.0		4.55	4.58	4.35	4.36	4.35	3.89
	1.7		4.80	4.91	4.09	4.20	4.43	4.00
		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
SEEDRATE	CCC							
HALF	0.0		4.23	3.90	3.92	4.21	3.96	4.07
	1.7		4.19	4.01	3.77	3.59	4.35	3.66
STANDARD	0.0		4.76	4.93	5.04	4.62	4.48	4.45
	1.7		4.62	5.19	4.90	4.86	4.58	4.69
		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
VARIETY	FUNGCIDE							
CAPPELLE	0		4.29	3.98	4.79	4.18	4.19	4.03
	T+C+M		4.16	4.55	4.39	4.55	4.40	4.96
HOBBIT	0		4.33	4.80	4.44	4.22	4.26	3.78
	T+C+M		5.02	4.70	4.00	4.34	4.52	4.11
		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
SEEDRATE	FUNGCIDE							
HALF	0		4.14	3.82	4.09	3.91	3.81	3.24
	T+C+M		4.28	4.09	3.60	3.89	4.51	4.49
STANDARD	0		4.48	4.96	5.15	4.48	4.65	4.56
	T+C+M		4.91	5.16	4.79	5.00	4.41	4.58
		N	1 1 1	1 2 1	0 2 0	0 3 0	0 4 0	0 2 1
CCC	FUNGCIDE							
0.0	0		4.41	4.47	4.53	4.49	4.09	3.78
	T+C+M		4.58	4.35	4.43	4.34	4.36	4.75
1.7	0		4.21	4.30	4.71	3.90	4.36	4.03
	T+C+M		4.60	4.90	3.96	4.55	4.57	4.32
EXTRA	C 111 S	C 121 S	H 111 S	H 121 S	MEAN			
	4.50	4.09	3.66	4.32	4.15			

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GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	VARIETY	SEEDRATE	CCC	FUNGCIDE
SED	0.134	0.134	0.134	0.134
TABLE	N	VARIETY SEEDRATE	VARIETY CCC	SEEDRATE CCC
SED	0.233	0.190	0.190	0.190
TABLE	VARIETY FUNGCIDE	SEEDRATE FUNGCIDE	CCC FUNGCIDE	VARIETY N
SED	0.190	0.190	0.190	0.329
TABLE	SEEDRATE N	CCC N	FUNGCIDE N	VARIETY SEEDRATE CCC
SED	0.329	0.329	0.329	0.269
TABLE	VARIETY SEEDRATE FUNGCIDE	VARIETY CCC FUNGCIDE	SEEDRATE CCC FUNGCIDE	VARIETY SEEDRATE N
SED	0.269	0.269	0.269	0.466
TABLE	VARIETY CCC N	SEEDRATE CCC N	VARIETY FUNGCIDE N	SEEDRATE FUNGCIDE N
SED	0.466	0.466	0.466	0.466
TABLE	CCC FUNGCIDE N			
SED	0.466			

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	25	0.658	15.1

GRAIN MEAN DM% 37.3

PLOT AREA HARVESTED 0.00098

76/R/WW/15

WINTER WHEAT

EFFECTS OF AUTUMN N ON BROADBALK

Object: To study the effects of applying nitrogen fertiliser in autumn, in addition to the classical treatments, on some of the Broadbalk plots - Broadbalk discards (see also 76/R/BK/1).

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

Design: Systematic 7 x 4 randomly split into 2.

Whole plot dimensions: 2.84 x 4.57.

Treatments: All combinations of:-

Whole plots

1. PLOT Fertiliser and organic manures:

	Plot	Treatments until 1967	Treatments from 1968
21DN2	21	D	DN2
22D	22	D	D
05MIN	05	PK Na Mg	PK (Na) Mg
06N1MIN	06	N1 PK Na Mg	N1 PK (Na) Mg
07N2MIN	07	N2 PK Na Mg	N2 PK (Na) Mg
08N3MIN	08	N3 PK Na Mg	N3 PK (Na) Mg
09N4MIN	09	N*1 PK Na Mg	N4 PK (Na) Mg

For explanation of symbols, basal applications and cultivations, etc. see 76/R/BK/1.

2. SEC CROP Section and previous crop:

0/1 W	Discards between Sections 0 and 1 - after wheat
5/6 F	Discards between Sections 5 and 6 - after fallow
6/7 F	Discards between Sections 6 and 7 - after fallow
9/ W	Discard on eastern end of Section 9 - after wheat

Sub plots

3. AUT N 'Nitro-Chalk' applied on 18 Nov, 1975 (kg N):

0	None
48(N2)	-48

NOTES: (1) Harvested by hand: 22 July, 1976.
(2) Estimates of nitrate in stem tissues were made.

76/R/WW/15

GRAIN TONNES/HECTARE

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

SEC CROP PLOT	0/1 W	5/6 F	6/7 F	9/ W	MEAN
21DN2	3.59	4.06	4.63	3.42	3.92
22D	4.02	3.90	4.37	3.46	3.94
05MIN	1.72	2.78	2.66	1.60	2.19
06N1MIN	2.24	3.69	3.60	2.91	3.11
07N2MIN	3.32	4.07	3.37	3.28	3.51
08N3MIN	3.37	3.38	3.75	3.21	3.43
09N4MIN	2.95	3.25	2.78	3.10	3.02
MEAN	3.03	3.59	3.59	2.99	3.30

AUT N PLOT	0	48(N2)	MEAN
21DN2	3.83	4.02	3.92
22D	3.78	4.10	3.94
05MIN	1.96	2.42	2.19
06N1MIN	2.94	3.28	3.11
07N2MIN	3.56	3.47	3.51
08N3MIN	3.47	3.38	3.43
09N4MIN	3.33	2.71	3.02
MEAN	3.27	3.34	3.30

AUT N SEC CROP	0	48(N2)	MEAN
0/1 W	2.95	3.11	3.03
5/6 F	3.44	3.74	3.59
6/7 F	3.69	3.49	3.59
9/ W	2.98	3.01	2.99
MEAN	3.27	3.34	3.30

SEC CROP PLOT	AUT N	0/1 W	5/6 F	6/7 F	9/ W
21DN2	0	3.64	4.19	4.05	3.43
	48(N2)	3.54	3.93	5.21	3.40
22D	0	3.94	3.31	4.61	3.26
	48(N2)	4.09	4.49	4.14	3.66
05MIN	0	1.42	2.54	2.48	1.39
	48(N2)	2.02	3.03	2.84	1.81
06N1MIN	0	2.08	3.54	3.51	2.65
	48(N2)	2.40	3.84	3.70	3.17
07N2MIN	0	3.09	4.08	3.57	3.49
	48(N2)	3.56	4.07	3.17	3.07
08N3MIN	0	3.38	3.14	4.06	3.29
	48(N2)	3.36	3.62	3.43	3.12
09N4MIN	0	3.13	3.26	3.58	3.34
	48(N2)	2.78	3.24	1.98	2.86

GRAIN MEAN DM% 89.0

76/R/WW/15

STRAW TONNES/HECTARE

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

SEC CROP	0/1 W	5/6 F	6/7 F	9/ W	MEAN
PLOT					
21DN2	7.14	8.28	7.79	7.47	7.67
22D	8.43	8.80	9.01	7.27	8.38
05MIN	3.02	5.15	5.06	2.80	4.01
06N1MIN	4.44	6.74	5.91	4.80	5.47
07N2MIN	5.32	7.67	5.75	6.13	6.22
08N3MIN	6.13	6.87	5.99	6.25	6.31
09N4MIN	5.61	6.93	6.20	6.54	6.32
MEAN	5.73	7.21	6.53	5.89	6.34

AUT N	0	48(N2)	MEAN
PLOT			
21DN2	7.82	7.52	7.67
22D	8.30	8.45	8.38
05MIN	3.39	4.63	4.01
06N1MIN	5.06	5.88	5.47
07N2MIN	6.11	6.33	6.22
08N3MIN	6.41	6.21	6.31
09N4MIN	6.14	6.51	6.32
MEAN	6.18	6.50	6.34

AUT N	0	48(N2)	MEAN
SEC CROP			
0/1 W	5.40	6.05	5.73
5/6 F	7.21	7.21	7.21
6/7 F	6.42	6.64	6.53
9/ W	5.68	6.11	5.89
MEAN	6.18	6.50	6.34

SEC CROP	0/1 W	5/6 F	6/7 F	9/ W
PLOT				
21DN2	7.04	8.29	8.31	7.64
	48(N2)	7.24	8.27	7.31
22D	7.98	9.66	9.00	6.57
	48(N2)	8.87	7.95	7.96
05MIN	2.24	4.64	4.36	2.30
	48(N2)	3.81	5.67	3.30
06N1MIN	4.00	6.28	5.58	4.39
	48(N2)	4.88	7.21	5.20
07N2MIN	4.69	7.77	5.75	6.21
	48(N2)	5.95	7.57	6.04
08N3MIN	6.12	7.04	6.23	6.26
	48(N2)	6.13	6.71	6.24
09N4MIN	5.71	6.76	5.68	6.39
	48(N2)	5.52	7.11	6.69

STRAW MEAN DM% 88.5

SUB PLOT AREA HARVESTED 0.00039

76/R/WW/16

WINTER WHEAT

FACTORS LIMITING YIELD

Object: To study the effects of precision sowing and removal of factors liable to limit yield of wheat - Long Hoos 1/11.

Sponsors: P.J. Welbank, F.V. Widdowson, J.F. Jenkyn.

Design: Single replicate of 4 x 3 plots fully randomised.

Whole plot dimensions: 2.67 x 9.14.

Treatments: All combinations of:-

1. TREATMNT Sowing method, seed rate, pathogen control:
- | | |
|---------|--|
| P 120 C | Precision sown by hand, seeds spaced 6.3 cm x 6.3 cm (2.5 x 2.5 inches) (120 kg seed/ha), full pathogen control applied. |
| D 120 C | Sown by standard farm drill at 120 kg/ha in rows 17.8 cm (7 inches) apart, full pathogen control applied. |
| D 200 C | Sown by standard farm drill at 200 kg/ha in rows 17.8 cm (7 inches) apart, full pathogen control applied. |
| D 200 - | Sown by standard farm drill at 200 kg/ha in rows 17.8 cm (7 inches) apart, no pathogen control other than standard seed dressings. |

NOTE: Full pathogen control included: Aldicarb to seedbed at 11.2 kg. Carbendazim at 0.15 kg with captafol at 1.0 kg and tridemorph at 0.26 kg in 340 l and pirimicarb at 0.14 kg in 340 l, applied on 15 June.

2. N Nitrogen fertiliser (kg N) on 27 Apr:

40	40
80	80
120	120

Basal applications: Manures: (0:14:28) at 500 kg. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Growth regulator: Chlormequat at 1.7 kg in 220 l.

Seed: Maris Huntsman.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 17 Oct, 1975. PK applied: 20 Oct. Rotary cultivated: 22 Oct. Seed sown: 23 Oct. Weedkiller applied: 17 Apr, 1976. Growth regulator applied: 7 May. Combine harvested: 29 July. Previous crops: Beans 1974, potatoes 1975.

NOTE: Plant establishment counts were made. Shoot counts were made in May and June. Shoot numbers and components of yield were measured before harvest. Leaf diseases were assessed on one occasion.

76/R/WW/16

GRAIN TONNES/HECTARE

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

TREATMNT N	P 120 C	D 120 C	D 200 C	D 200 -	MEAN
40	6.30	5.88	6.05	6.20	6.11
80	7.64	5.91	6.33	5.70	6.40
120	6.35	5.96	6.69	5.16	6.04
MEAN	6.77	5.92	6.36	5.69	6.18

GRAIN MEAN DM% 87.8

STRAW TONNES/HECTARE

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

TREATMNT N	P 120 C	D 120 C	D 200 C	D 200 -	MEAN
40	5.39	6.77	5.49	5.80	5.86
80	7.39	5.05	5.34	5.21	5.75
120	4.87	3.82	7.62	6.39	5.67
MEAN	5.88	5.21	6.15	5.80	5.76

STRAW MEAN DM% 88.6

PLOT AREA HARVESTED 0.00154

76/S/WW/1

WINTER WHEAT

RATES AND TIMES OF N AND FUNGICIDE

Object: To study the effects of rates and times of solid and liquid nitrogen fertilisers and foliar pathogen control on foliar disease incidence and yield of winter wheat - Saxmundham, Grove Plot.

Sponsors: F.V. Widdowson, A. Penny.

Design: Single replicate of 4 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 6.10 x 3.04.

Treatments: All combinations of:-

1. S N RATE Rates of solid nitrogen fertiliser ('Nitro-Chalk') (kg N):

0	None
50	50
100	100
150	150

2. S N TIME Times of applying solid nitrogen fertiliser:

APRIL	21 April
MAY	18 May

3. L N RATE Rates of liquid nitrogen fertiliser ('Agsol N26' - Urea + NH₄ NO₃) (kg N):

0	None
25+25	25 on 15 June + 25 on 8 July

4. FUNGICIDE Fungicides:

NONE	None
BE+MZ+MB	Benomyl + mancozeb + maneb on 18 May and 15 June

NOTE: Benomyl applied at 0.28 kg with mancozeb plus maneb ('Kascade' at 2.24 kg) in 380 l.

Basal applications: Manures: (20:10:10) at 310 kg. Weedkillers: Methabenzthiazuron at 3.1 kg in 380 l in autumn. Isoproturon at 2.2 kg with mecoprop at 0.63 kg plus ioxynil at 0.21 kg in 340-l in spring. Growth regulator: Chlormequat at 1.7 kg in 340 l.

Seed: Maris Huntsman, sown at 190 kg.

Cultivations, etc.: - Ploughed: 2 Oct, 1975. Seed sown and fertiliser applied: 14 Oct. Autumn weedkiller applied: 15 Oct. Spring weedkiller applied: 25 Mar, 1976. Growth regulator applied: 4 May. Combine harvested: 20 July. Previous crops: Beans 1975, barley 1974.

76/S/WW/1

GRAIN TONNES/HECTARE

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

ALL PLOTS

S N RATE	0	50	100	150	MEAN
L N RATE					
0	6.15	6.46	6.68	6.86	6.54
25+25	6.27	6.69	6.36	6.73	6.51
MEAN	6.21	6.58	6.52	6.80	6.53

S N RATE	0	50	100	150	MEAN
FUNGCIDE					
NONE	6.33	6.52	6.60	6.61	6.51
BE+MZ+MB	6.10	6.63	6.45	6.99	6.54
MEAN	6.21	6.58	6.52	6.80	6.53

FUNGCIDE	NONE	BE+MZ+MB	MEAN
L N RATE			
0	6.63	6.45	6.54
25+25	6.39	6.64	6.51
MEAN	6.51	6.54	6.53

EXCLUDING S N RATE 0

S N RATE	50	100	150	MEAN
S N TIME				
APRIL	6.89	6.45	7.17	6.84
MAY	6.26	6.59	6.43	6.43
MEAN	6.58	6.52	6.80	6.63

L N RATE	0	25+25	MEAN
S N TIME			
APRIL	6.78	6.89	6.84
MAY	6.56	6.30	6.43
MEAN	6.67	6.59	6.63

FUNGCIDE	NONE	BE+MZ+MB	MEAN
S N TIME			
APRIL	6.61	7.06	6.84
MAY	6.54	6.32	6.43
MEAN	6.57	6.69	6.63

76/S/WW/1

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	L N RATE	FUNGCIDE	S N RATE	S N TIME
SED	0.138 0.160*	0.138 0.160*	0.196	0.160

TABLE	L N RATE FUNGCIDE	S N RATE S N TIME	S N RATE L N RATE	S N TIME L N RATE
SED	0.196	0.276	0.276	0.226

TABLE	S N RATE FUNGCIDE	S N TIME FUNGCIDE
SED	0.276	0.226

* USE ONLY WITH TABLES EXCLUDING S N RATE 0

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	13	0.391	6.0

GRAIN MEAN DM% 78.8

PLOT AREA HARVESTED 0.00089

76/R/WS/1

SPRING WHEAT

FUNGICIDES AND GRAIN MICROFLORA

Object: To study the effects of a range of fungicides applied at a range of times on the yield, quality and grain microflora of spring wheat - Long Hoos V 1.

Sponsor: R.A. Hill.

Design: Single replicate of 2 x 3 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 2.41 x 8.23.

Treatments: All combinations of:-

1. SPECFUNG Specific fungicides for foliar pathogen control:

NONE	None
T+B	Tridemorph at 0.53 kg plus benodanil at 1.4 kg, mixed and applied on 27 May

2. B S FUNG Broad spectrum fungicides:

BENOMYL	Benomyl at 0.28 kg
CAPTAFOL	Captafol at 1.4 kg
BAYER	'Bayer 6447' (Triadimefon) at 0.25 kg a.i.

3. APP TIME Application of broad spectrum fungicides:

	10 June	5 July	22 July
NONE	None	None	None
E	Sprayed	None	None
M	None	Sprayed	None
L	None	None	Sprayed
E+M	Sprayed	Sprayed	None
E+L	Sprayed	None	Sprayed
M+L	None	Sprayed	Sprayed
E+M+L	Sprayed	Sprayed	Sprayed

NOTE: All sprays were applied in 340 l.

Basal applications: Manures: (0:20:20) at 820 kg. 'Nitro-Chalk' at 450 kg.

Seed: Sappo, sown at 170 kg.

Cultivations, etc.: - PK applied: 8 Dec, 1975. Ploughed: 19 Dec. Spring-tine cultivated: 8 Mar, 1976. Seed sown, N applied: 9 Mar. Combine harvested: 30 July. Previous crops: Barley 1974, potatoes 1975.

NOTES: Grain microflora were assessed at fortnightly intervals from early June to harvest. Mildew and rust were assessed on several occasions.

76/R/WS/1

GRAIN TONNES/HECTARE

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

ALL PLOTS

APP TIME SPECFUNG	NONE	E	M	L	E+M	E+L	M+L	E+M+L	MEAN
NONE	2.76	2.77	2.83	3.34	2.90	3.03	3.10	3.25	3.00
T+B	3.06	3.19	2.86	2.97	3.10	2.86	3.01	3.03	3.01
MEAN	2.91	2.98	2.85	3.15	3.00	2.95	3.05	3.14	3.00

EXCLUDING APP TIME NONE

B S FUNG SPECFUNG	BENOMYL	CAPTAFOL	BAYER	MEAN
NONE	3.03	3.07	2.99	3.03
T+B	2.96	3.01	3.04	3.00
MEAN	3.00	3.04	3.01	3.02

APP TIME B S FUNG	E	M	L	E+M	E+L	M+L	E+M+L	MEAN
BENOMYL	2.99	2.74	3.48	3.20	2.76	2.86	2.94	3.00
CAPTAFOL	3.00	2.89	3.03	2.87	2.91	3.29	3.30	3.04
BAYER	2.95	2.90	2.96	2.91	3.17	3.01	3.18	3.01
MEAN	2.98	2.85	3.15	3.00	2.95	3.05	3.14	3.02

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SPECFUNG	B S FUNG	APP TIME	SPECFUNG B S FUNG
SED	0.090 0.096*	0.118	0.180	0.166

TABLE	SPECFUNG APP TIME	B S FUNG APP TIME
SED	0.254	0.311

* USE ONLY WITH TABLES EXCLUDING APP TIME NONE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	16	0.311	10.4

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00111

76/R/B/1

WINTER BARLEY

FACTORS AFFECTING MILDEW CONTROL AND YIELD

Object: To study the effects and interactions of sowing date, seed rate, mildew control and timing of spring nitrogen on the incidence of mildew and yield of winter barley - Gt. Knott I.

Sponsors: A. Bainbridge, M.E. Finney, J.F. Jenkyn.

Design: Single replicate of 2 x 2 x 2 x 2 x 2 x 2.

Whole plot dimensions: 2.13 x 6.10.

Treatments: All combinations of:-

1. SOW DATE Sowing Dates:

24 SEPT	24 September
6 NOV	6 November

2. SEEDRATE Seed Rates (kg):

78	78
156	156

3. TRIDEMOR(1) Tridemorph foliar spray to early growth:

NONE	None
SPRAYED	Sprayed (14 Nov to SOW DATE 24 SEPT, 25 Feb to SOW DATE 6 NOV)

4. TRIDEMOR(2) Tridemorph foliar spray in April:

NONE	None
SPRAYED	Sprayed (9 Apr)

5. TRIDEMOR(3) Tridemorph foliar spray in May:

NONE	None
SPRAYED	Sprayed (13 May)

6. N TIME Time of applying nitrogen (at 75 kg):

MARCH	Early March (9 Mar)
APRIL	Late April (27 Apr)

NOTE: Tridemorph applied at 0.53 kg in 340 l.

Basal applications: Weedkillers: Mecoprop at 1.7 kg in 340 l.

Seed: Astrix.

Cultivations, etc.: - Ploughed: 16 Sept, 1975. Spring-tine cultivated twice: 16, 17 Sept. Rotary harrowed for early sowing: 22 Sept. Power harrowed for late sowing: 6 Nov. Weedkiller applied: 13 Nov. Combine harvested: 8 July, 1976. Previous crops: Winter wheat 1974, beans 1975.

NOTE: Seedling emergence counts were made. Leaf diseases were assessed on six occasions. Ear counts were made in early July.

76/R/B/1

GRAIN TONNES/HECTARE

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

SEEDRATE	78	156	MEAN
SOW DATE			
24 SEPT	7.78	8.02	7.90
6 NOV	4.41	4.44	4.42
MEAN	6.09	6.23	6.16
TRIDEMOR(1)	NONE	SPRAYED	MEAN
SOW DATE			
24 SEPT	7.66	8.14	7.90
6 NOV	4.27	4.57	4.42
MEAN	5.97	6.35	6.16
TRIDEMOR(1)	NONE	SPRAYED	MEAN
SEEDRATE			
78	5.90	6.28	6.09
156	6.03	6.43	6.23
MEAN	5.97	6.35	6.16
TRIDEMOR(2)	NONE	SPRAYED	MEAN
SOW DATE			
24 SEPT	7.66	8.14	7.90
6 NOV	4.25	4.60	4.42
MEAN	5.95	6.37	6.16
TRIDEMOR(2)	NONE	SPRAYED	MEAN
SEEDRATE			
78	5.98	6.20	6.09
156	5.93	6.54	6.23
MEAN	5.95	6.37	6.16
TRIDEMOR(2)	NONE	SPRAYED	MEAN
TRIDEMOR(1)			
NONE	5.78	6.15	5.97
SPRAYED	6.12	6.59	6.35
MEAN	5.95	6.37	6.16
TRIDEMOR(3)	NONE	SPRAYED	MEAN
SOW DATE			
24 SEPT	7.80	8.00	7.90
6 NOV	4.35	4.49	4.42
MEAN	6.08	6.24	6.16
TRIDEMOR(3)	NONE	SPRAYED	MEAN
SEEDRATE			
78	5.99	6.19	6.09
156	6.17	6.29	6.23
MEAN	6.08	6.24	6.16

76/R/B/1

GRAIN TONNES/HECTARE

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

TRIDEMOR(3)	NONE	SPRAYED	MEAN
TRIDEMOR(1)			
NONE	5.96	5.98	5.97
SPRAYED	6.20	6.51	6.35
MEAN	6.08	6.24	6.16
TRIDEMOR(3)	NONE	SPRAYED	MEAN
TRIDEMOR(2)			
NONE	5.78	6.13	5.95
SPRAYED	6.38	6.36	6.37
MEAN	6.08	6.24	6.16
N TIME	MARCH	APRIL	MEAN
SOW DATE			
24 SEPT	7.69	8.11	7.90
6 NOV	4.25	4.59	4.42
MEAN	5.97	6.35	6.16
N TIME	MARCH	APRIL	MEAN
SEEDRATE			
78	5.88	6.31	6.09
156	6.06	6.40	6.23
MEAN	5.97	6.35	6.16
N TIME	MARCH	APRIL	MEAN
TRIDEMOR(1)			
NONE	5.78	6.16	5.97
SPRAYED	6.16	6.54	6.35
MEAN	5.97	6.35	6.16
N TIME	MARCH	APRIL	MEAN
TRIDEMOR(2)			
NONE	5.84	6.07	5.95
SPRAYED	6.10	6.63	6.37
MEAN	5.97	6.35	6.16
N TIME	MARCH	APRIL	MEAN
TRIDEMOR(3)			
NONE	5.86	6.29	6.08
SPRAYED	6.08	6.41	6.24
MEAN	5.97	6.35	6.16

76/R/B/1

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOW DATE	SEEDRATE	TRIDEMOR(1)	TRIDEMOR(2)
SED	0.124	0.124	0.124	0.124

TABLE	TRIDEMOR(3)	N TIME	SOW DATE SEEDRATE	SOW DATE TRIDEMOR(1)
SED	0.124	0.124	0.175	0.175

TABLE	SEEDRATE TRIDEMOR(1)	SOW DATE TRIDEMOR(2)	SEEDRATE TRIDEMOR(2)	TRIDEMOR(1) TRIDEMOR(2)
SED	0.175	0.175	0.175	0.175

TABLE	SOW DATE TRIDEMOR(3)	SEEDRATE TRIDEMOR(3)	TRIDEMOR(1) TRIDEMOR(3)	TRIDEMOR(2) TRIDEMOR(3)
SED	0.175	0.175	0.175	0.175

TABLE	SOW DATE N TIME	SEEDRATE N TIME	TRIDEMOR(1) N TIME	TRIDEMOR(2) N TIME
SED	0.175	0.175	0.175	0.175

TABLE	TRIDEMOR(3) N TIME
SED	0.175

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	22	0.495	8.0

GRAIN MEAN DM% 89.0

PLOT AREA HARVESTED 0.00130

76/R/B/3 and 76/W/B/3

SPRING BARLEY

VARIETIES AND N

Object: To study the yields of some of the newer varieties of barley. Three nitrogen rates are included and on one variety the effects of mildew control are also studied - Rothamsted (R) Pastures and Woburn (W) Horsepool Lane Close E.

Sponsors: R. Moffitt, J.F. Jenkyn.

Design: 4 randomised blocks of 11 plots split into 3.

Whole plot dimensions: Pastures (R): 4.27 x 24.7.
Horsepool Lane Close (W): 4.27 x 20.1.

Treatments: All combinations of:-

Whole plots

1. VARIETY Varieties and mildew control:

JU H -	Julia, home-grown seed, no fungicide	
JU H E	Julia, home-grown seed, dressed ethirimol	
JU H T	Julia, home-grown seed, crop sprayed tridemorph (2 plots/block)	
JU M T	Julia, multiplication stock, crop sprayed tridemorph	
AM T	Aramir)
AR T	Ark Royal)
GE T	Georgie) crop sprayed tridemorph
LA T	Lofa Abed)
PO T	Porthos)
SU T	Sundance)

Sub plots

2. N Nitrogen fertiliser (kg N):

38	38
75	75
113	113

- NOTES: (1) Pastures (R): Tridemorph applied at 0.53 kg in 450 l: 27 May.
(2) Horsepool Lane Close (W): Tridemorph applied at 0.53 kg in 280 l: 27 May.
(3) On Pastures (R) all sub plots of one plot of (JU H -) received tridemorph in error. Estimated values were used in the analysis.

Basal applications: Pastures (R): Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Paraquat at 0.42 kg ion in 220 l. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).
Horsepool Lane Close (W): Manures: (0:20:20) at 310 kg, combine drilled. Weedkiller: Ioxynil at 0.5³ kg and mecoprop at 1.6 kg in 280 l. Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l.

NOTE: The second application of weedkiller on Horsepool Lane Close was applied with tridemorph where this was applied as a treatment, and separately to remaining plots.

Seed: Pastures (R): Varieties sown at 150 kg.
Horsepool Lane Close (W): Varieties sown at 160 kg.

76/R/B/3 and 76/W/B/3

Cultivations, etc.:-

Pastures (R): Paraquat applied: 6 Nov, 1975. Ploughed: 24 Nov. Spring-tine cultivated twice: 2 Mar, 12 Mar, 1976. Seed sown: 22 Mar. N applied: 1 Apr. 'Banlene Plus' applied: 14 May. Combine harvested: 27 July. Previous crops: Potatoes 1974, winter wheat 1975.

Horsepool Lane Close (W): Deep-tine cultivated four times: 21 Sept, 22 Sept, 23 Oct, 18 Dec, 1975. Spring-tine cultivated: 27 Feb, 1976. Spring-tine cultivated with crumbler: 22 Mar. Seed sown: 24 Mar. N applied: 29 Mar. Weedkiller applied to all plots: 3 May. Tridemorph treatment applied with weedkiller: 27 May. Combine harvested: 29 July. Previous crops: Beans 1974, winter wheat 1975.

76/R/B/3 PASTURES (R)

GRAIN TONNES/HECTARE

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

VARIETY	N	38	75	113	MEAN
JU H -		4.58	4.55	4.45	4.53
JU H E		4.63	4.71	4.79	4.71
JU H T		4.65	4.95	5.15	4.92
JU M T		4.48	4.62	4.74	4.61
AM T		4.68	5.02	5.14	4.95
AR T		4.90	5.31	5.20	5.14
GE T		5.05	5.41	5.59	5.35
LA T		4.67	5.22	5.16	5.02
PO T		4.90	5.46	5.33	5.23
SU T		5.19	5.32	5.58	5.36
MEAN		4.76	5.05	5.12	4.98

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	VARIETY	N	VARIETY	N
SED	0.123		0.187	MIN REP
	0.107	0.052	0.162	MAX-MIN

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:

VARIETY	0.172	MIN REP
	0.149	MAX-MIN
	0.121	MAX REP

VARIETY
 MAX REP JU H T
 MAX-MIN JU H T V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.174	3.5
BLOCK.WP.SP	66	0.243	4.9

GRAIN MEAN DM% 87.1

SUB PLOT AREA HARVESTED 0.00163

76/R/B/4

SPRING BARLEY

N AND FOLIAR DISEASES

Object: To study the effects of mildew and brown rust on response to a range of nitrogen rates applied at different times - Pastures.-

Sponsors: J.F. Jenkyn, M.E. Finney.

Design: Single replicate of 6 x 3 x 2 x 2.

Whole plot dimensions: 4.27 x 9.14.

Treatments: All combinations of:-

1. N RATE Amounts of nitrogen fertiliser (kg N):

25	25
50	50
70	70
90	90
110	110
135	135

2. N TIME Times of applying N:

SB	Seedbed (1 Apr, 1976)
TD	Top dressed (21 May)
SB/TD	Half to seedbed, half top dressed

3. MILDEW F Mildew fungicide:

NONE	None
TRIDEMOR	Tridemorph on 21 May and 7 June

4. RUST F Rust fungicide:

NONE	None
BENODANI	Benodanil on 17 June

NOTE: Fungicides were applied in 340 l:-

- (a) Tridemorph at 0.53 kg
- (b) Benodanil at 1.12 kg with 175 ml 'Citowett'

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled.

Weedkillers: Paraquat at 0.42 kg ion in 220 l in autumn. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l) in spring.

Seed: Zephyr, sown at 160 kg.

Cultivations, etc.: Autumn weedkiller applied: 6 Nov, 1975.

Ploughed: 18-24 Nov. Spring-tine cultivated: 2, 12 Mar, 1976.

Seed sown: 22 Mar. Spring weedkiller applied: 11 May. Combine harvested: 26 July. Previous crops: Potatoes 1974, wheat 1975.

NOTE: Seedling emergence counts were made. Leaf diseases were assessed on three occasions and ear counts made in early July.

75/R/B/4

GRAIN TONNES/HECTARE

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

MILDEW F	NONE	TRIDEMOR					MEAN
N TIME							
SB	4.04	4.85					4.45
TD	3.93	4.47					4.20
SB/TD	4.11	4.81					4.46
MEAN	4.03	4.71					4.37
RUST F	NONE	BENODANI					MEAN
N TIME							
SB	4.43	4.46					4.45
TD	4.21	4.19					4.20
SB/TD	4.41	4.51					4.46
MEAN	4.35	4.39					4.37
RUST F	NONE	BENODANI					MEAN
MILDEW F							
NONE	3.99	4.06					4.03
TRIDEMOR	4.70	4.72					4.71
MEAN	4.35	4.39					4.37
N RATE	25	50	70	90	110	135	MEAN
N TIME							
SB	3.85	4.38	4.25	4.64	4.79	4.77	4.45
TD	3.96	4.01	4.09	4.46	4.41	4.27	4.20
SB/TD	4.18	4.41	4.59	4.50	4.62	4.45	4.46
MEAN	4.00	4.26	4.31	4.53	4.61	4.50	4.37
N RATE	25	50	70	90	110	135	MEAN
MILDEW F							
NONE	3.77	3.96	3.91	4.02	4.24	4.25	4.03
TRIDEMOR	4.22	4.56	4.71	5.05	4.97	4.75	4.71
MEAN	4.00	4.26	4.31	4.53	4.61	4.50	4.37
N RATE	25	50	70	90	110	135	MEAN
RUST F							
NONE	3.90	4.29	4.25	4.59	4.56	4.50	4.35
BENODANI	4.10	4.23	4.37	4.48	4.65	4.50	4.39
MEAN	4.00	4.26	4.31	4.53	4.61	4.50	4.37
N RATE	25	50	70	90	110	135	MEAN
MILDEW F							
NONE	3.65	3.96	4.06	4.04	4.31	4.22	
TRIDEMOR	4.06	4.79	4.44	5.23	5.27	5.31	
TD	3.72	4.02	3.62	4.01	3.96	4.27	
TRIDEMOR	4.21	4.00	4.56	4.91	4.86	4.28	
SB/TD	3.95	3.91	4.05	4.01	4.46	4.26	
TRIDEMOR	4.41	4.90	5.13	4.99	4.79	4.65	

76/R/B/4 GRAIN TONNES/HECTARE

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

		N RATE	25	50	70	90	110	135
N TIME	RUST F							
	SB NONE		3.82	4.28	4.11	4.54	4.78	5.04
TD	BENODANI		3.89	4.47	4.39	4.73	4.81	4.50
	NONE		3.77	4.18	3.99	4.63	4.55	4.12
SB/TD	BENODANI		4.15	3.83	4.18	4.29	4.26	4.43
	NONE		4.10	4.42	4.65	4.59	4.36	4.35
	BENODANI		4.26	4.39	4.53	4.41	4.88	4.56
		N RATE	25	50	70	90	110	135
MILDEW F	RUST F							
	NONE		3.59	3.85	3.85	4.05	4.33	4.29
TRIDEMOR	BENODANI		3.96	4.07	3.98	3.99	4.15	4.20
	NONE		4.21	4.74	4.66	5.13	4.79	4.70
	BENODANI		4.24	4.39	4.76	4.96	5.15	4.79

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N TIME	MILDEW F	RUST F	N RATE
SED	0.076	0.062	0.062	0.108

TABLE	N TIME MILDEW F	N TIME RUST F	MILDEW F RUST F	N TIME N RATE
SED	0.108	0.108	0.088	0.187

TABLE	MILDEW F N RATE	RUST F N RATE	N TIME MILDEW F RUST F	N TIME MILDEW F N RATE
SED	0.153	0.153	0.153	0.264

TABLE	N TIME RUST F N RATE	MILDEW F RUST F N RATE
SED	0.264	0.216

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	10	0.264	6.1

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00195

76/R/E/5

SPRING BARLEY

SOWING DATES AND PATHOGEN CONTROL

Object: To study the effects of aphid, virus and fungus control on pathogens and yield of barley sown on two dates - Gt. Harpenden II.

Sponsors: R.T. Plumb, J.F. Jenkyn.

Design: 3 blocks of 2 x 2 x 2 x 2, randomisation restricted.

Whole plot dimensions: 6.40 x 15.2.

Treatments: All combinations of:-

1. SOW DATE Dates of sowing:

4 MAR	4 March, 1976
13 APR	13 April

2. FUNGCIDE Fungicide:

NONE	None
E+T+B	Ethirimol seed dressing; tridemorph and benodanil sprays

3. APHCIDE(1) Aphicide to seedbed:

NONE	None
PHORATE	Phorate at 5 kg as granules

4. APHCIDE(2) Aphicide on 4 June:

NONE	None
MENAZON	Merazon ('Saphi-col' at 0.7 l in 450 l)

NOTES: (1) Fungicides applied:-

Tridemorph at 0.53 kg in 450 l on 27 May and with benodanil on 7 July. Benodanil at 1.12 kg with 175 ml 'Citowett' in 450-l.

(2) The second application of fungicides was applied to SOW DATE 13 APR only.

Basal applications: Manures: (20:14:14) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: Julia, sown at 160 kg.

Cultivations, etc.: Heavy spring-tine cultivated twice: 4 Nov, 1975. Deep-tine cultivated twice: 13, 14 Nov. Heavy spring-tine cultivated: 1 Mar, 1976. Power harrowed for early sowing: 4 Mar. Power harrowed for late sowing: 13 Apr. Weedkiller applied: 10 May. Combine harvested: 23 July. Previous crops: Beans 1974, potatoes 1975.

NOTE: Emergence counts were made for both sowings. Mildew was assessed on two occasions, aphids on five and viruses once. Tiller counts were made on two occasions in July.

76/R/B/5

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	E+T+B	MEAN	
SOW DATE				
4 MAR	4.82	5.47	5.15	
13 APR	3.06	3.55	3.30	
MEAN	3.94	4.51	4.23	
APHICIDE(1)	NONE	PHORATE	MEAN	
SOW DATE				
4 MAR	4.87	5.42	5.15	
13 APR	3.17	3.44	3.30	
MEAN	4.02	4.43	4.23	
APHICIDE(1)	NONE	PHORATE	MEAN	
FUNGCIDE				
NONE	3.71	4.17	3.94	
E+T+B	4.33	4.69	4.51	
MEAN	4.02	4.43	4.23	
APHICIDE(2)	NONE	MENAZON	MEAN	
SOW DATE				
4 MAR	4.98	5.31	5.15	
13 APR	3.06	3.55	3.30	
MEAN	4.02	4.43	4.23	
APHICIDE(2)	NONE	MENAZON	MEAN	
FUNGCIDE				
NONE	3.70	4.18	3.94	
E+T+B	4.34	4.68	4.51	
MEAN	4.02	4.43	4.23	
APHICIDE(2)	NONE	MENAZON	MEAN	
APHICIDE(1)				
NONE	3.76	4.28	4.02	
PHORATE	4.28	4.58	4.43	
MEAN	4.02	4.43	4.23	
FUNGCIDE	NONE		E+T+B	
APHICIDE(1)	NONE	PHORATE	NONE	PHORATE
SOW DATE				
4 MAR	4.55	5.09	5.19	5.75
13 APR	2.86	3.25	3.47	3.63
FUNGCIDE	NONE		E+T+B	
APHICIDE(2)	NONE	MENAZON	NONE	MENAZON
SOW DATE				
4 MAR	4.61	5.03	5.35	5.59
13 APR	2.78	3.33	3.33	3.77

76/R/B/5

GRAIN TONNES/HECTARE

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

APHICIDE(1)	NONE		PHORATE	
APHICIDE(2)	NONE	MENAZON	NONE	MENAZON
SOW DATE				
4 MAR	4.63	5.12	5.34	5.51
13 APR	2.90	3.44	3.22	3.66

APHICIDE(1)	NONE		PHORATE	
APHICIDE(2)	NONE	MENAZON	NONE	MENAZON
FUNGCIDE				
NONE	3.44	3.98	3.96	4.39
E+T+B	4.09	4.58	4.60	4.78

APHICIDE(1)	NONE		PHORATE		
APHICIDE(2)	NONE	MENAZON	NONE	MENAZON	
SOW DATE FUNGCIDE					
4 MAR	NONE	4.31	4.80	4.92	5.27
	E+T+B	4.95	5.44	5.75	5.74
13 APR	NONE	2.57	3.15	2.99	3.51
	E+T+B	3.22	3.72	3.45	3.81

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SOW DATE	FUNGCIDE	APHICIDE(1)	APHICIDE(2)
SED	0.075	0.075	0.075	0.075

TABLE	SOW DATE FUNGCIDE	SOW DATE APHICIDE(1)	FUNGCIDE APHICIDE(1)	SOW DATE APHICIDE(2)
SED	0.106	0.106	0.106	0.106

TABLE	FUNGCIDE APHICIDE(2)	APHICIDE(1) APHICIDE(2)	SOW DATE FUNGCIDE APHICIDE(1)	SOW DATE FUNGCIDE APHICIDE(2)
SED	0.106	0.106	0.150	0.150

TABLE	SOW DATE APHICIDE(1) APHICIDE(2)	FUNGCIDE APHICIDE(1) APHICIDE(2)	SOW DATE FUNGCIDE APHICIDE(1) APHICIDE(2)
SED	0.150	0.150	0.212

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.260	6.2
GRAIN MEAN DM%	85.0		
PLOT AREA HARVESTED	0.00260		

76/R/B/6

SPRING BARLEY

EFFECTS OF MILDEW SOURCES ON DISEASE CONTROL

Object: To study the effects of nearby sources of mildew on control by fungicides applied at a range of times - Drapers.

Sponsors: J.F. Jenkyn, A. Bainbridge.

Design: 3 randomised blocks of 3 plots split into 6.

Whole plot dimensions: 22.9 x 29.9.

Treatments: All combinations of:-

Whole plots

1. MILDSRCE Mildew source:

NONE	None (seed treated ethirimol, crop sprayed tridemorph, on 27 May, 1976, 7 June,
EARLY	Early (tridemorph only on 27 May, 7 June)
FULL	Full (no mildew control)

Sub plots

2. MILDCONT Times of applying mildew control:

ED	Ethirimol seed dressing Tridemorph spray on:
T S 1	18 May
T S 2	21 May
T S 3	27 May
T S 4	2 June
T S 5	7 June

NOTE: The whole plot treatments were applied to a strip of crop 6.5 m wide at the ends of all sub plots. There were no discards between sub plots (0.6 m fallow paths only). Whole plots and the sides of sets of six sub plots were separated by strips of crop 17 m wide, seed treated ethirimol, crop sprayed tridemorph at 0.53 kg in 450 l on 27 May.

Basal applications: Manures: Chalk at 7.5 t. (20:14:14) at 380 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: Julia, sown at 160 kg.

Cultivations, etc.: - Chalk applied: 16 Sept, 1975. Heavy spring-tine cultivated: 20 Oct. Ploughed: 12 Nov. Spring-tine cultivated: 9 Mar, 1976. Seed sown: 11 Mar. Weedkiller applied: 11 May. Combine harvested: 22 July. Previous crops: Potatoes 1974, barley 1975.

NOTES: (1) Seedling counts were made and mildew assessed on two occasions.
(2) Five plots in one block were affected by gravel bands, those with treatment combinations

MILDSRCE	EARLY	EARLY	FULL	FULL	FULL
MILDCONT	T S 5	T S 4	E D	T S 3	T S 5

Estimated values were used in the analysis.

76/R/B/6

GRAIN TONNES/HECTARE

SUB PLOTS

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

MILDCONT MILDSRCE	E D	T S 1	T S 2	T S 3	T S 4	T S 5	MEAN
NONE	4.72	5.16	4.87	4.56	4.46	4.53	4.71
EARLY	3.66	3.94	3.75	3.94	3.62	3.77	3.78
FULL	4.11	4.66	4.66	4.50	4.13	4.24	4.38
MEAN	4.16	4.58	4.42	4.33	4.07	4.18	4.29

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	MILDSRCE	MILDCONT	MILDSRCE MILDCONT
SED	0.309	0.173	0.413
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MILDSRCE			0.300

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.378	8.8
BLOCK.WP.SP	25	0.368	8.6

GRAIN MEAN DM% 85.8

SUB PLOT AREA HARVESTED 0.00163

WHOLE PLOTS

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

MILDSRCE	NONE	EARLY	FULL	MEAN
	5.00	3.54	3.66	4.07

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	MILDSRCE
SED	0.398

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.487	12.0

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00624

76/R/B/7

SPRING BARLEY

MILDEW CONTROL IN SYSTEMATIC AND BALANCED DESIGNS

Object: To study the effects of tridemorph sprays, applied at different times, in systematic and balanced designs and to assess the magnitude of interference between plots - Little Hoos.

Sponsors: J.F. Jenkyn, A. Bainbridge, G.V. Dyke.

Designs: Systematic: 4 'blocks' of 7 plots.
Serially balanced: 9 'blocks' of 4 plots (+ 2 flanking plots).

Whole plot dimensions: 4.27 x 9.14.

Treatments:

TRIDEMOR To systematic design: Times of applying tridemorph:

0	None
1	Once, on 18 May
2	Once, on 21 May
3	Once, on 27 May
4	Once, on 2 June
R	Repeated, 3 times 18 May, 27 May, 7 June

Plots arranged in linear sequence:

ROR1234 ROR4321 1234ROR 4321ROR

Serially balanced design:

Fungicide sprays as above but omitting levels 2 and 4. These were applied to 38 plots in one line on the field in an order such that each of the 36 possible sets of 3 adjacent treatments occurred exactly once (but omitting sets with the same treatment on 2 successive plots). The effects of treatments to neighbouring plots (lefthand neighbour - LHN, righthand neighbour - RHN) are estimated in the analysis.

In this experiment, 'left' was west, 'right' was east.

The analysis presented assumes a Fourier curve with 4 terms, 2 sine and 2 cosine to represent positional variation.

NOTE: Tridemorph applied at 0.53 kg in 340 l.

Basal applications: Manures: (20:14:14) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: Julia, sown at 160 kg.

Cultivations, etc.: - Heavy spring-tine cultivated: 4 Nov, 1975. Deep-tine cultivated twice: 13, 14 Nov. Heavy spring-tine cultivated: 1 Mar, 1976. Seed sown: 5 Mar. Weedkiller applied: 11 May. Combine harvested: 23 July. Previous crops: Beans 1974, potatoes 1975.

NOTE: Seedling emergence counts were made. Mildew was assessed on two occasions.

76/R/B/7

SYSTEMATIC DESIGN

GRAIN TONNES/HECTARE

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

TRIDEMOR	0	1	2	3	4	R	MEAN
	4.61	5.22	5.17	5.10	5.03	5.09	5.05

GRAIN MEAN DM% 87.0

SERIALLY BALANCED DESIGN

GRAIN TONNES/HECTARE

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

GRAND MEAN 4.62

TRIDEMOR	0	1	3	R
	4.22	4.78	4.58	4.89

LHN	0	1	3	R
TRIDEMOR				
0		4.25	4.15	4.25
1	4.74		4.82	4.79
3	4.28	4.72		4.73
R	4.86	5.01	4.80	

BHN	0	1	3	R
TRIDEMOR				
0		4.20	4.26	4.20
1	4.48		4.77	5.10
3	4.40	4.72		4.61
R	4.67	5.00	4.99	

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TRIDEMOR	TRIDEMOR LHN	TRIDEMOR BHN
SED	0.061	0.166	0.165

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	12	0.125	2.7

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00195

76/R/B/8

SPRING BARLEY

MIXED VARIETIES AND MILDEW

Object: To study the effects of mixing varieties on the incidence of mildew and the yield of spring barley - Whittlocks.

Sponsor: J.F. Jenkyn.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 8.53 x 11.0.

Treatments

VARIETY	Varieties:
HASSAN	Hassan
LOFAABED	Lofa Abed
MIDAS	Midas
WING	Wing
MIXED	Equal mixture of the above four varieties (2 plots/block)

NOTES: (1) All varieties were separated and surrounded by 18 m of variety Proctor, seed dressed ethirimol, sprayed tridemorph at 0.53 kg in 450 l on 27 May. Yields were taken from this crop, adjacent to treatment plots, for covariance analysis.

(2) There was also a systematic difference between the yields recorded from even and odd plots in the order of harvesting; an adjustment-by-covariance analysis has also been made for this in the yields presented. An explanation is being sought.

Basal applications: Manures: (20:14:14) at 380 kg combine drilled.
Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: All varieties sown at 160 kg.

Cultivations, etc.: - Ploughed: 6 Nov, 1975. Spring-tine cultivated: 1 Mar, 1976. Seed sown: 10 Mar. Weedkiller applied: 7 May. Combine harvested: 28 July. Previous crops: Beans and oats 1974, wheat 1975.

NOTE: Seedling emergence counts were made. Mildew was assessed on three occasions and ear counts were made in July.

76/R/B/3

GRAIN TONNES/HECTARE

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

VARIETY	HASSAN	LOFAABED	MIDAS	WING	MIXED	MEAN
	3.74	3.71	3.89	3.95	4.01	3.88

***** STANDARD ERRORS OF DIFFERENCES OF MEAN *****

TABLE	VARIETY	
SED	0.159	MIN REP
	0.137	MAX-MIN

VARIETY	
MAX-MIN	MIXED V ANY OF REMAINDER
MIN REP	ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.193	5.0

MEAN DM% 87.0

PLOT AREA HARVESTED 0.00312

76/B/E/9

SPRING BARLEY

INSECTICIDES AND BENEFICIAL INSECTS

Object: To study the effects of different rates of a selective and a non-selective aphicide on pests, beneficial insects and yield of barley-Whittlocks.

Sponsor: J.H. Stevenson.

Design: 5 randomised blocks of 7 plots.

Whole plot dimensions: 18.7 x 18.3.

Treatments:

INS RATE Insecticides and rates:-

NONE	None
DEM 1	Demeton-s-methyl (non-selective) at 25.7 g
DEM 3	Demeton-s-methyl (non-selective) at 77.1 g
DEM 9	Demeton-s-methyl (non-selective) at 231 g
PIR 1	Pirimicarb (selective) at 15.6 g
PIR 3	Pirimicarb (selective) at 46.7 g
PIR 9	Pirimicarb (selective) at 140 g

NOTE: Treatments were applied in 450 l on 25 June 1976.

Basal applications: Manures: (20:14:14) at 380 kg combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l).

Seed: Julia, dressed ethirimol, sown at 160 kg.

Cultivations, etc.:- Ploughed: 6 Nov, 1975. Spring-tine cultivated: 1 Mar, 1976. Seed sown: 10 Mar. Weedkiller applied: 7 May. Combine harvested: 23 July. Previous crops: Beans and oats 1974, winter wheat 1975.

NOTE: Aphid counts were made on plants. Other insects were sampled by sweep nets, water traps and pitfall traps.

GRAIN TONNES/HECTARE

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

INS RATE	NONE	DEM 1	DEM 3	DEM 9	PIR 1	PIR 3	PIR 9	MEAN
	3.96	3.96	3.92	4.07	4.09	4.00	4.02	4.00

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	INS RATE
SED	0.118

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.186	4.7

GRAIN MEAN DM% 86.1 PLOT AREA HARVESTED 0.00195

76/R/B/10

SPRING BARLEY

COMPARISON OF SPRAYERS

Object: To study the performance of an electrostatic spraying system on distribution of spray material and on yield of barley - Pastures.

Sponsor: A.J. Arnold.

Design: 3 blocks of 9 plots (DATE 14 MAY on 1 block; DATE 27 MAY on 2 blocks).

Whole plot dimensions: 2.13 x 9.14.

Treatments: All combinations of:-

1. SPRAYER Sprayer:

EC	Electrostatic sprayer with charged particles
EU	Electrostatic sprayer with uncharged particles

2. TRI RATE Rate of applying tridemorph (in 38 l):

0.02	0.02 kg
0.04	0.04 kg
0.17	0.17 kg

3. DATE Dates of spraying:

14 MAY	14 May
27 MAY	27 May

EXTRA plus two extra treatments:

F Standard farm sprayer applying 0.17 kg tridemorph in 340 l on 27 May (1 plot/block)
- Untreated (2 plots/block on 2 blocks, 1 plot on 1 block)

Basal applications: Manures: (20:14:14) at 380 kg, combine drilled.
Weedkillers: Paraquat at 0.42 kg ion in 220 l to barley stubble autumn 1975. Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l), in spring.

Seed: Julia, sown at 160 kg.

Cultivations, etc.:- Autumn weedkiller applied: 6 Nov, 1975. Ploughed: 24 Nov. Spring-tine cultivated: 2 Mar, 1976. Seed sown: 12 Mar. Spring weedkiller applied: 11 May. Combine harvested: 27 July. Previous crops: Potatoes 1974, barley 1975.

NOTE: Mildew was assessed once. Observations were made on patterns of spray deposition.

76/R/B/10

GRAIN TONNES/HECTARE

DATE 14 MAY

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

SPRAYER TRI RATE	EC	EU	MEAN
0.02	4.51	4.77	4.64
0.04	5.06	4.69	4.87
0.17	5.51	5.03	5.27
MEAN	5.02	4.83	4.93

DATE 27 MAY AND EXTRA

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

SPRAYER TRI RATE	EC	EU	MEAN
0.02	4.95	4.58	4.77
0.04	4.72	4.73	4.73
0.17	4.64	4.59	4.62
MEAN	4.77	4.64	4.70
EXTRA	F 4.77	- 4.58	MEAN 4.65

GRAND MEAN 4.68

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	SPRAYER	TRI RATE	SPRAYER TRI RATE
SED	0.176	0.133	0.163	0.231

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.231	4.9

GRAIN MEAN DM% 87.2

PLOT AREA HARVESTED 0.00130

76/R/B/11

SPRING BARLEY

MILDEW TOLERANCE TO ETHIRIMOL

Object: To study the effects of a range of rates of ethirimol seed dressing on mildew tolerance and yield of barley - Long-Hoos VI/VII 3.

Sponsor: D.W. Hollomon.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 2.40 x 5.18.

Treatments:

ETHIRIMO Ethirimol seed dressing (g/kg of seed):

0	None
1	0.92
2	4.80
3	17.9

NOTE: Surrounds sown to Proctor sprayed with tridemorph at 0.53 kg in 340 l on 14 May and 21 June.

Basal applications: Manures: (0:14:28) at 850 kg. 'Nitro-Chalk' at 450 kg.

Seed: Proctor, sown at 160 kg.

Cultivations, etc.: - PK applied: 9 Dec, 1975. Ploughed: 16-23 Dec. Spring-tine cultivated twice: 10 Mar, 1976. Seed sown, N applied: 11 Mar. Combine harvested: 26 July. Previous crops: Barley 1974, potatoes 1975.

NOTES: (1) Plots were inoculated with an ethirimol-sensitive strain of powdery mildew on two occasions.
 (2) Mildew was assessed at four growth stages. The race composition and ethirimol tolerance of mildew on the plots was assessed.

GRAIN TONNES/HECTARE

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

ETHIRIMO	0	1	2	3	MEAN
	2.92	3.49	3.39	3.67	3.37

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ETHIRIMO
-----	-----
SED	0.407

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.498	14.8

GRAIN MEAN DM% 87.8

PLOT AREA HARVESTED 0.00050

76/S/B/1

SPRING BARLEY

VARIETIES, N AND FUNGICIDES

Object: To study the effects of rates, times and forms of nitrogen and of fungicides on the incidence of foliar diseases and yields of two varieties of barley - Saxmundham, Grove Plot.

Sponsors: F.V. Widdowson, J.F. Jenkyn, A. Penny.

Design: Single replicate of 32 plots split into 2.

Whole plot dimensions: 2.43 x 12.2.

Treatments: All combinations of:-

Whole plots

1. VARIETY Varieties:

JULIA	Julia
WING	Wing

2. S N Solid nitrogen fertiliser (kg N):

50	50
100	100

3. S N TIME Time of applying solid nitrogen fertiliser:

SEEDBED	Seedbed on 16 Mar
TOPDRESS	Top dressed on 18 May

4. L N Liquid nitrogen fertiliser (kg N):

0	None
50	50, half on 15 June, half on 8 July

5. MILD CON Mildew control:

NONE	None
ETH/TRID	Seed dressed eithirimol, crop sprayed tridemorph at 0.53 kg in 280 l on 18 May

Sub plots

6. RUST CON Rust control:

NONE	None
BENODANI	Crop sprayed benodanil at 1.12 kg in 280 l on 15 June, 8 July

NOTE: 'Nitro-Chalk' was used as solid fertiliser, 'Agsol N26' as liquid fertiliser in 75.

76/S/B/1

Basal applications: Manures: (0:20:20) at 315 kg. Weedkillers: Dichlorprop plus MCPA ('Mephetol Plus' at 8.4 l in 340 l).

Seed: Varieties sown at 190 kg.

Cultivations, etc.: - PK applied: 29 Sept, 1975. Ploughed: 20 Oct. Seed sown: 15 Mar, 1976. Weedkillers applied: 18 May. Combine harvested: 19 July. Previous crops: Barley 1974 and 1975.

NOTE: Brown rust and mildew were assessed in early July.

GRAIN TONNES/HECTARE

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

S N	50	100	MEAN
VARIETY			
JULIA	3.40	3.31	3.35
WING	3.44	3.59	3.51
MEAN	3.42	3.45	3.43
S N TIME	SEEDBED	TOPDRESS	MEAN
VARIETY			
JULIA	3.51	3.19	3.35
WING	3.42	3.61	3.51
MEAN	3.46	3.40	3.43
S N TIME	SEEDBED	TOPDRESS	MEAN
S N			
50	3.34	3.49	3.42
100	3.59	3.31	3.45
MEAN	3.46	3.40	3.43
L N	0	50	MEAN
VARIETY			
JULIA	3.19	3.51	3.35
WING	3.40	3.63	3.51
MEAN	3.29	3.57	3.43
L N	0	50	MEAN
S N			
50	3.28	3.55	3.42
100	3.30	3.59	3.45
MEAN	3.29	3.57	3.43
L N	0	50	MEAN
S N TIME			
SEEDBED	3.14	3.78	3.46
TOPDRESS	3.44	3.36	3.40
MEAN	3.29	3.57	3.43

76/S/B/1

GRAIN TONNES/HECTARE

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

MILD CON	NONE	ETH/TRID	MEAN
VARIETY			
JULIA	3.48	3.22	3.35
WING	3.55	3.48	3.51
MEAN	3.51	3.35	3.43
MILD CON	NONE	ETH/TRID	MEAN
S N			
50	3.43	3.40	3.42
100	3.60	3.30	3.45
MEAN	3.51	3.35	3.43
MILD CON	NONE	ETH/TRID	MEAN
S N TIME			
SEEDBED	3.55	3.38	3.46
TOPDRESS	3.48	3.33	3.40
MEAN	3.51	3.35	3.43
MILD CON	NONE	ETH/TRID	MEAN
L N			
0	3.44	3.14	3.29
50	3.59	3.56	3.57
MEAN	3.51	3.35	3.43
RUST CON	NONE	BENODANI	MEAN
VARIETY			
JULIA	3.33	3.37	3.35
WING	3.44	3.58	3.51
MEAN	3.39	3.48	3.43
RUST CON	NONE	BENODANI	MEAN
S N			
50	3.43	3.40	3.42
100	3.34	3.56	3.45
MEAN	3.39	3.48	3.43
RUST CON	NONE	BENODANI	MEAN
S N TIME			
SEEDBED	3.41	3.51	3.46
TOPDRESS	3.36	3.44	3.40
MEAN	3.39	3.48	3.43
RUST CON	NONE	BENODANI	MEAN
L N			
0	3.26	3.32	3.29
50	3.51	3.63	3.57
MEAN	3.39	3.48	3.43

76/S/B/1

GRAIN TONNES/HECTARE

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

RUST CON	NONE	BENODANI	MEAN
MILD CON			
NONE	3.37	3.65	3.51
ETH/TRID	3.40	3.30	3.35
MEAN	3.39	3.48	3.43

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	VARIETY	S N	S N TIME	L N
SED	0.126	0.126	0.126	0.126

TABLE	MILD CON	RUST CON	VARIETY S N	VARIETY S N TIME
SED	0.126	0.113	0.179	0.179

TABLE	S N S N TIME	VARIETY L N	S N L N	S N TIME L N
SED	0.179	0.179	0.179	0.179

TABLE	VARIETY MILD CON	S N MILD CON	S N TIME MILD CON	L N MILD CON
SED	0.179	0.179	0.179	0.179

TABLE	VARIETY RUST CON	S N RUST CON	S N TIME RUST CON	L N RUST CON
SED	0.170	0.170	0.170	0.170

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:
 VARIETY 0.160
 S N 0.160
 S N TIME 0.160
 L N 0.160

TABLE	MILD CON RUST CON
SED	0.170
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:	
MILD CON	0.160

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	6	0.357	10.4
WP.SP	16	0.454	13.2

GRAIN MEAN DM% 84.0

SUB PLOT AREA HARVESTED 0.00089

76/R/O/1

WINTER OATS

SOWING DATES AND INSECTICIDES

Object: To study the effects of dates of sowing and times of applying insecticides on the incidence of cereal aphids, barley yellow dwarf virus (BYDV) and yield of winter oats - Gt. Harpenden 1.

Sponsor: R.T. Plumb.

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: 6.40 x 22.9.

Treatments: All combinations of:-

1. SOW DATE Sowing dates:

22 SEP	22 September, 1975
20 OCT	20 October, 1975
24 NOV	24 November, 1975

2. INSECTICIDE(1) Phorate granules to seedbed:

NONE	None
PHORATE	Phorate at 5 kg

3. INSECTICIDE(2) Menazon spray:

NONE	None
MENAZON	Menazon (0.7 l 'Saphi-Col' in 450 l on 14 May, 1976)

NOTE: Because of an error INSECTICIDE(1) PHORATE was also applied to SOW DATE 20 OCT and 24 NOV on 22 Sept, 1975. Phorate was re-applied to these treatments to appropriate seedbeds.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 310 kg. Weedkillers: Ioxynil at 0.53 kg with mecoprop at 1.6 kg (both as the potassium salt) in 220 l.

Seed: Peniarth, sown at 190 kg.

Cultivations, etc.: - Deep-tine cultivated three times: 11, 12, 15 Sept, 1975. Heavy spring-tine cultivated: 15 Sept. Power harrowed for first sowing: 22 Sept. Spring-tine cultivated for second and third sowings: 10 Oct. N applied: 30 Mar, 1976. Weed-killer applied: 13 Apr. Combine harvested: 15 July. Previous crops: Winter wheat 1974, winter wheat and barley 1975.

NOTE: Seedling emergence counts were made. Aphid and virus counts were made on three occasions. Tiller counts were made twice and floret numbers once.

76/R/0/1

GRAIN TONNES/HECTARE

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

INSCTCDE(1)	NONE	PHORATE	MEAN
SOW DATE			
22 SEP	4.73	4.61	4.67
20 OCT	4.87	5.18	5.02
24 NOV	3.98	4.32	4.15
MEAN	4.52	4.70	4.61

INSCTCDE(2)	NONE	MENAZON	MEAN
SOW DATE			
22 SEP	4.68	4.66	4.67
20 OCT	5.05	4.99	5.02
24 NOV	4.12	4.19	4.15
MEAN	4.62	4.61	4.61

INSCTCDE(2)	NONE	MENAZON	MEAN
INSCTCDE(1)			
NONE	4.54	4.50	4.52
PHORATE	4.69	4.72	4.70
MEAN	4.62	4.61	4.61

INSCTCDE(2)	NONE			MENAZON		
SOW DATE	22 SEP	20 OCT	24 NOV	22 SEP	20 OCT	24 NOV
INSCTCDE(1)						
NONE	4.74	4.89	4.00	4.72	4.84	3.96
PHORATE	4.63	5.20	4.23	4.60	5.15	4.42

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	INSCTCDE(1)	INSCTCDE(2)	SOW DATE	INSCTCDE(1)	INSCTCDE(2)
SED	0.058	0.058	0.071	0.082	

TABLE	INSCTCDE(1)	INSCTCDE(2)	INSCTCDE(1)	INSCTCDE(2)
	SOW DATE	SOW DATE	SOW DATE	SOW DATE
SED	0.101	0.101	0.142	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	33	0.201	4.4

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00358

76/R/BE/1

WINTER BEANS

CROP DENSITY AND CHOCOLATE SPOT

Object: To study the effects of plant density and fungicide on Chocolate Spot (*Botrytis* spp.) and yield of winter beans - Stackyard.

Sponsor: A. Bainbridge.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments: All combinations of:-

1. FUNGCIDE Fungicide:

NONE	None
BENOMYL	Benomyl (0.56 kg in 340 l) applied 2 June 1976 (duplicated)

2. SEEDRATE Seed rates (kg):

126	126
378	378

3. SPACING Spacing between rows:

18 CM	18 cm (7 inches)
53 CM	53 cm (21 inches)

NOTE: It was intended to compare applications of benomyl on one and two occasions. Because of exceptionally dry weather and failure of Chocolate Spot to develop, only one application was made.

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Simazine at 1.1 kg in 220 l.

Seed: Throws MS.

Cultivations, etc.: - Deep-tine cultivated twice: 16 Sept, 1975. Chalk applied: 19 Sept. Ploughed: 22 Sept. Heavy spring-tine cultivated: 29 Sept. Seed sown: 2 Oct. Weedkiller applied: 7 Oct. Combine harvested: 20 July, 1976. Previous crops: Winter wheat 1974, barley 1975.

NOTES: (1) Emergence counts were made.

(2) Chocolate Spot assessments were made throughout the season.

Grain mean DM%: 86.5

Plot area harvested close rows 0.00279

Plot area harvested wide rows 0.00244

76/R/BE/1

GRAIN TONNES/HECTARE

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

SEEDRATE	126	378	MEAN
FUNGCIDE			
NONE	3.54	4.07	3.81
BENOMYL	3.54	4.19	3.87
MEAN	3.54	4.11	3.83

SPACING	18 CM	53 CM	MEAN
FUNGCIDE			
NONE	3.61	4.00	3.81
BENOMYL	3.72	4.01	3.87
MEAN	3.65	4.01	3.83

SPACING	18 CM	53 CM	MEAN
SEEDRATE			
126	3.44	3.64	3.54
378	3.85	4.37	4.11
MEAN	3.65	4.01	3.83

	SEEDRATE	126	378	
	SPACING	18 CM	53 CM	53 CM
FUNGCIDE				
NONE		3.43	3.65	3.79
BENOMYL		3.46	3.62	3.99
				4.35
				4.40

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	FUNGCIDE	SEEDRATE	SPACING	FUNGCIDE SEEDRATE
SED	0.141	0.133	0.133	0.230 MIN REP 0.199 MAX-MIN 0.162 MAX REP

TABLE	FUNGCIDE SPACING	SEEDRATE SPACING	FUNGCIDE SEEDRATE SPACING
SED	0.230 0.199 0.162	0.187	0.325 MIN REP 0.281 MAX-MIN 0.230 MAX REP

FUNGCIDE
MIN REP BENOMYL
MAX-MIN NONE V BENOMYL
MAX REP NONE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.325	8.5

76/R/BE/5

SPRING BEANS

APHIDS AND ENTOMOPHTHORA

Object: To study the effects of the fungus *Entomophthora* on aphid populations and yield of field beans - Little Hoos.

Sponsor: N. Wilding.

Design: 5 randomised blocks of 5 plots.

Whole plot dimensions: 9.14 x 9.22.

TREATMNT Treatments:

NONE None (3 plots/block)
 INSCTCDE Insecticide: Pirimicarb at 0.14 kg in 340 l on 22 June
 ENTAPHID *Entomophthora* spp. applied in live infected aphids on 17 June

NOTE: Two additional treatments were planned - application of maneb fungicide and of *E. virulenta* as resting spores. Because of exceptionally dry weather these were not applied.

Basal applications: Manures: Chalk at 7.5 t. FYM at 25 t. Weedkillers: Simazine at 1.1 kg in 220 l.

Seed: Minden, sown at 224 kg.

Cultivations, etc.: - Chalk applied: 19 Sept, 1975. Heavy spring-tine cultivated: 14 Oct. FYM applied: 23 Oct. Ploughed: 28 Oct. Spring-tine cultivated: 27 Feb, 1976. Seed sown: 5 Mar. Weedkiller applied: 9 Mar. Mechanically weeded: 27 May. Combine harvested: 20 July. Previous crops: Winter wheat 1974, barley 1975.

NOTE: Seedling emergence counts were made. Aphid numbers and the proportion infected by *Entomophthora* spp. Were measured during June and July.

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	INSCTCDE	ENTAPHID	MEAN
	1.67	1.59	1.37	1.59

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	TREATMNT	
SED	0.138	MIN REP
	0.113	MAX-MIN
	TREATMNT	
MAX-MIN	NONE	V ANY OF REMAINDER
MIN-REP	ANY OF REMAINDER	

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.219	13.7
GRAIN MEAN DM%	83.3	PLOT AREA HARVESTED	0.00244

76/R/EE/6

SPRING BEANS

CONTROL OF SITONA LARVAE

Object: To study the effects of a range of insecticides on the control of Sitona larvae and on the yield of field beans - Little Hoos.

Sponsor: R. Bardner.

Design: 3 randomised blocks of 19 plots.

Whole plot dimensions: 2.13 X 4.27.

Treatments

INSCTCDE	Insecticides:
NONE	None (2 plots/block)
CHLORF 1	Chlorfenvinphos at 2.24 kg, as granules
CHLORF 2	Chlorfenvinphos at 4.48 kg, as granules
CHLORM 1	Chlormephos at 2.24 kg, as granules
CHLORM 2	Chlormephos at 4.48 kg, as granules
CHLORP 1	Chlorpyrifos at 2.24 kg, as wettable powder
CHLORP 2	Chlorpyrifos at 4.48 kg, as wettable powder
DIELDR 1	Dieldrin at 2.24 kg, as emulsifiable liquid (2 plots/block)
DIELDR 2	Dieldrin at 4.48 kg, as emulsifiable liquid (2 plots/block)
FENITROT	Fenitrothion at 0.75 kg, as spray, repeated four times
FONOF 1	Fonofos at 2.24 kg, as granules
FONOF 2	Fonofos at 4.48 kg, as granules
ISOFEN 1	Isofenphos at 2.24 kg, as granules
ISOFEN 2	Isofenphos at 4.48 kg, as granules
PERMET 1	Permethrin at 2.24 kg, as granules
PERMET 2	Permethrin at 4.48 kg, as granules

NOTE: Sprays applied in 10,000 l. Fenitrothion applied on 12, 28 Apr, 1976, 17 May, 7 June. All other treatments were applied on 4 Mar and rotated in.

Basal applications: Manures: Chalk at 7.5 t. FYM at 25 t. Weedkillers: Simazine at 1.1 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.: Chalk applied: 19 Sept, 1975. Heavy spring-tine cultivated: 14 Oct. FYM applied: 23 Oct. Ploughed: 28 Oct. Spring-tine cultivated: 27 Feb, 1976. Seed sown: 5 Mar. Weedkiller applied: 9 Mar. Harvested by hand: 21 July. Previous crops: Wheat 1974, barley 1975.

NOTE: Samples were taken to assess numbers of Sitona larvae per root and root nodule damage. Leaf notches per plant and plant height were assessed.

76/R/BE/6

GRAIN TONNES/HECTARE

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

INSCTCDE	
NONE	1.62
CHLORF 1	1.64
CHLORF 2	1.44
CHLORM 1	1.50
CHLORM 2	1.61
CHLORP 1	1.51
CHLORP 2	1.38
DIELDR 1	1.66
DIELDR 2	1.73
FENITROT	1.64
FONOF 1	1.53
FONOF 2	1.74
ISOFEN 1	1.51
ISOFEN 2	1.53
PERMET 1	1.62
PERMET 2	1.49
MEAN	1.59

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	INSCTCDE
SED	0.101 MIN REP
	0.088 MAX-MIN
	0.072 MAX REP

INSCTCDE
 MAX REP WITHIN NONE DIELDR 1 DIELDR 2
 MAX-MIN NONE DIELDR 1 DIELDR 2 V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	39	0.124	7.8
GRAIN MEAN DM%	90.8		
PLOT AREA HARVESTED	0.00046		

76/R/P/1

POTATOES

IRRIGATION AND SEED SOURCES

Object: To study the effects of irrigation on the yield and incidence of bacterial and fungal infections of tubers on stocks of potatoes from a range of sources - Gt. Knott III.

Sponsors: D.H. Lapwood, G.A. Hide.

Design: 2 randomised blocks of 3 plots split into 12.

Whole plot dimensions: 15.65 x 31.62.

Treatments: All combinations of:-

Whole plots

1. IRRIGTN	Irrigation:
NONE	None
MODERATE	Moderate (equal to average rainfall) (100 mm)
MUCH	Much (greater than average rainfall) (175 mm)

Sub plots

2. SEEDSRCE	Seed sources:
FS 1(1)	Rothamsted 'bought in' seed FS1 in 1975
FS 1(1)B	Rothamsted 'bought in' seed FS1 in 1975 inoculated with blackleg
FS 1(2)	Seed from Kings Lynn area FS1 in 1975
FS 2(1)	Seed from Kings Lynn area FS2 in 1975
FS 2(2)	Seed from Kings Lynn area FS2 in 1975
FS 3	Seed from Kings Lynn area FS3 in 1975
FS	Seed from Kings Lynn area FS in 1975
A	Seed from Kings Lynn area A in 1975
OG(1)	Seed from Kings Lynn area OG in 1975
OG(2)	Seed from Kings Lynn area OG in 1975
OG(3)	Seed from Kings Lynn area OG in 1975
OG(4)	Seed from Kings Lynn area OG in 1975

NOTE: 25 mm irrigation was applied to IRRIGTN MODERATE plots on each of the following dates:- 14 June, 11 July, 5 Aug, 31 Aug; and to IRRIGTN MUCH plots on:- 4 June, 14 June, 11 July, 22 July, 5 Aug, 19 Aug, 31 Aug.

Basal applications: Manures: (13:13:20) at 1500 kg. Weedkillers: Linuron at 1.2 kg with paraquat at 0.42 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l applied three times. Insecticide: Pirimicarb at 0.14 kg in 450 l. Haulm desiccant: Diquat at 0.59 kg ion in 220 l.

76/R/P/1

Seed: King Edward.

Cultivations, etc.: - Heavy spring-tine cultivated: 20 Oct, 1975. Ploughed: 31 Oct. Heavy spring-tine cultivated: 10 Mar, 1976. Fertiliser applied: 22 Mar. Rotary cultivated and planted: 1 Apr. Grubbed: 2 Apr. Weedkillers applied: 7 May. Grubbed and rotoridged: 3 June. Insecticide applied: 17 June. Fungicide applied: 25 June, 28 July, 1 Sept. Haulm desiccant applied: 28 Sept. Lifted: 10 Nov. Previous crops: Winter wheat 1974, winter oats 1975.

- NOTES: (1) Bacterial soft rots and gangrene were assessed during the season.
(2) Tubers were stored to study the development of storage diseases.
(3) SEEDSRCE FS 1(1)B. The inoculation technique with the blackleg organism, although satisfactory in the past, was too severe in 1976 and many plants failed to emerge. Yields for this level were therefore not taken.

76/R/P/1 GT KNOTT III

TOTAL TUBERS TONNES/HECTARE

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

IRRIGTN SEEDSRCE	NONE	MODERATE	MUCH	MEAN
FS 1(1)	35.3	38.1	47.8	40.4
FS 1(2)	27.3	34.1	44.5	35.3
FS 2(1)	29.3	40.0	44.5	37.9
FS 2(2)	25.8	39.1	39.5	34.5
FS 3	26.1	34.9	44.2	35.1
FS	29.3	40.1	44.4	37.9
A	22.7	34.3	43.0	33.3
OG(1)	14.3	21.5	27.3	21.0
OG(2)	14.9	20.2	27.2	20.8
OG(3)	16.2	25.6	26.5	22.8
OG(4)	19.8	23.5	35.1	26.1
MEAN	23.7	31.8	38.6	31.4

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	SEEDSRCE	IRRIGTN* SEEDSRCE

SED	2.79	4.83

* WITHIN THE SAME LEVEL OF IRRIGTN ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP	30	4.83	15.4

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

IRRIGTN SEEDSRCE	NONE	MODERATE	MUCH	MEAN
FS 1(1)	37.2	56.1	41.0	44.8
FS 1(2)	35.4	56.4	54.3	48.7
FS 2(1)	47.0	57.7	67.4	57.4
FS 2(2)	34.7	53.8	49.8	46.1
FS 3	43.3	59.2	63.1	55.2
FS	47.8	58.7	56.5	54.4
A	40.4	44.5	36.8	40.6
OG(1)	28.5	42.5	42.3	37.7
OG(2)	27.0	39.2	42.0	36.1
OG(3)	28.3	42.8	40.3	37.2
OG(4)	23.0	43.1	48.1	38.1
MEAN	35.7	50.4	49.2	45.1

PLOT AREA HARVESTED 0.00076

76/W/P/1

POTATOES

NUTRIENTS AND CONTROL OF PCN

Object: To study the effects of N, P, K and Mg on two potato varieties with or without a nematicide to control *Globodera* (formerly *Heterodera*) *rostochiensis* - Woburn Great Hill III.

Sponsors: K. Evans, T.M. Addiscott.

Design: Half replicate of 2 x 2 x 2 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 2.84 x 9.14.

Treatments: All combinations of:-

1. N Nitrogen fertiliser (kg N):

160	160 in basal NPK
240	160 in basal NPK + 80 as 'Nitro-Chalk'

2. P2O5 Phosphate fertiliser (kg P2O5):

160	160 in basal NPK
240	160 in basal NPK + 80 as superphosphate

3. K2O Potassium fertiliser (kg K2O):

250	250 in basal NPK
375	250 in basal NPK + 125 as sulphate of potash

4. MG Magnesium fertiliser (kg Mg):

0	None
100	100 as Epsom salts

5. VARIETY Varieties:

CROWN	Pentland Crown
RECORD	Record

6. ALDICARB Aldicarb (kg):

0	None
10	10

Basal applications: (13:13:20) at 1240 kg. Weedkiller: Linuron at 1.3 kg plus paraquat at 0.42 kg ion in 280 l. Insecticides: Pirimicarb at 0.14 kg in 450 l. Demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

76/W/P/1

Cultivations, etc.:— Deep-tine cultivated twice: 16 Sept, 17 Sept, 1975.
Ploughed: 6 Nov. Spring-tine cultivated: 1 Mar, 1976. Basal NPK applied, spring-tine cultivated: 24 Mar. Treatment N, P, K and Mg applied: 8 Apr. Aldicarb applied, rotary cultivated, potatoes planted: 13 Apr. Weedkiller applied: 7 May. Grubbed, rotary ridged: 3 June. Pirimicarb applied: 18 June. Fungicide and demeton-s-methyl applied: 30 June. Fungicide applied: 30 July. Haulm mechanically destroyed: 15 Sept. Lifted: 28 Sept. Previous crops: Potatoes 1974, barley 1975.

- NOTES: (1) Leaf samples were taken on two occasions for N, P, K, Mg and Ca analyses.
(2) Ground cover measurements were made on two occasions.
(3) Soil samples were taken before planting and after harvest for cyst counts of *Globodera rostochiensis*.

75/W/P/1

TOTAL TUBERS TONNES/HECTARE

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

P205	160	240	MEAN
N			
160	20.0	20.2	20.1
240	20.9	21.8	21.4
MEAN	20.4	21.0	20.7
K20	250	375	MEAN
N			
160	18.6	21.6	20.1
240	22.9	19.8	21.4
MEAN	20.7	20.7	20.7
K20	250	375	MEAN
P205			
160	20.6	20.3	20.4
240	20.9	21.2	21.0
MEAN	20.7	20.7	20.7
MG	0	100	MEAN
N			
160	21.1	19.1	20.1
240	20.8	21.9	21.4
MEAN	21.0	20.5	20.7
MG	0	100	MEAN
P205			
160	21.5	19.3	20.4
240	20.4	21.7	21.0
MEAN	21.0	20.5	20.7
MG	0	100	MEAN
K20			
250	20.8	20.7	20.7
375	21.2	20.3	20.7
MEAN	21.0	20.5	20.7
VARIETY	CROWN	RECORD	MEAN
N			
160	22.1	18.1	20.1
240	23.5	19.3	21.4
MEAN	22.8	18.7	20.7
VARIETY	CROWN	RECORD	MEAN
P205			
160	22.4	18.5	20.4
240	23.2	18.9	21.0
MEAN	22.8	18.7	20.7

76/W/P/1

TOTAL TUBERS TONNES/HECTARE

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

VARIETY	CROWN	RECORD	MEAN
K20			
250	21.9	19.6	20.7
375	23.7	17.8	20.7
MEAN	22.8	18.7	20.7
VARIETY	CROWN	RECORD	MEAN
MG			
0	22.8	19.1	21.0
100	22.8	18.2	20.5
MEAN	22.8	18.7	20.7
ALDICARB	0	10	MEAN
N			
160	13.8	26.4	20.1
240	14.8	28.0	21.4
MEAN	14.3	27.2	20.7
ALDICARB	0	10	MEAN
P205			
160	14.6	26.3	20.4
240	14.0	28.1	21.0
MEAN	14.3	27.2	20.7
ALDICARB	0	10	MEAN
K20			
250	13.4	28.1	20.7
375	15.1	26.4	20.7
MEAN	14.3	27.2	20.7
ALDICARB	0	10	MEAN
MG			
0	13.7	28.2	21.0
100	14.8	26.2	20.5
MEAN	14.3	27.2	20.7
ALDICARB	0	10	MEAN
VARIETY			
CROWN	16.9	28.7	22.8
RECORD	11.6	25.7	18.7
MEAN	14.3	27.2	20.7

76/W/P/1

TOTAL TUBERS TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N	P205	K20	MG
SED	1.07	1.07	1.07	1.07

TABLE	VARIETY	ALDICARB	N P205	N K20
SED	1.07	1.07	1.52	1.52

TABLE	P205 K20	N MG	P205 MG	K20 MG
SED	1.52	1.52	1.52	1.52

TABLE	N VARIETY	P205 VARIETY	K20 VARIETY	MG VARIETY
SED	1.52	1.52	1.52	1.52

TABLE	N ALDICARB	P205 ALDICARB	K20 ALDICARB	MG ALDICARB
SED	1.52	1.52	1.52	1.52

TABLE	VARIETY ALDICARB
SED	1.52

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	10	3.04	14.7

76/W/P/1

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

P205	160	240	MEAN
N			
160	76.7	76.5	76.6
240	79.0	79.9	79.5
MEAN	77.8	78.2	78.0
K20	250	375	MEAN
N			
160	73.4	79.8	76.6
240	80.7	78.2	79.5
MEAN	77.0	79.0	78.0
K20	250	375	MEAN
P205			
160	76.6	79.0	77.8
240	77.4	79.0	78.2
MEAN	77.0	79.0	78.0
MG	0	100	MEAN
N			
160	76.8	76.3	76.6
240	77.6	81.3	79.5
MEAN	77.2	78.8	78.0
MG	0	100	MEAN
P205			
160	78.4	77.3	77.8
240	76.0	80.4	78.2
MEAN	77.2	78.8	78.0
MG	0	100	MEAN
K20			
250	76.5	77.5	77.0
375	77.9	80.1	79.0
MEAN	77.2	78.8	78.0
VARIETY	CROWN	RECORD	MEAN
N			
160	88.7	64.5	76.6
240	90.1	68.8	79.5
MEAN	89.4	66.7	78.0

76/W/P/1

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

VARIETY	CROWN	RECORD	MEAN
P205			
160	89.8	65.9	77.8
240	89.0	67.4	78.2
MEAN	89.4	66.7	78.0
VARIETY	CROWN	RECORD	MEAN
K20			
250	88.7	65.4	77.0
375	90.1	67.9	79.0
MEAN	89.4	66.7	78.0
VARIETY	CROWN	RECORD	MEAN
MG			
0	89.1	65.4	77.2
100	89.7	67.9	78.8
MEAN	89.4	66.7	78.0
ALDICARB	0	10	MEAN
N			
160	67.7	85.4	76.6
240	73.5	85.4	79.5
MEAN	70.6	85.4	78.0
ALDICARB	0	10	MEAN
P205			
160	70.3	85.4	77.8
240	70.9	85.5	78.2
MEAN	70.6	85.4	78.0
ALDICARB	0	10	MEAN
K20			
250	68.8	85.3	77.0
375	72.4	85.6	79.0
MEAN	70.6	85.4	78.0
ALDICARB	0	10	MEAN
MG			
0	68.5	86.0	77.2
100	72.8	84.9	78.8
MEAN	70.6	85.4	78.0
ALDICARB	0	10	MEAN
VARIETY			
CROWN	86.2	92.6	89.4
RECORD	55.0	78.3	66.7
MEAN	70.6	85.4	78.0

PLOT AREA HARVESTED 0.00130

76/R/ON/1

ONIONS

SINGLE AND DIVIDED APPLICATIONS OF ALDICARB

Object: To study the effects of single and divided applications of aldicarb on control of stem-eelworm (*Ditylenchus dipsaci*) and on the yield of spring-sown onions - Gt. Field I.

Sponsor: A.G. Whitehead.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 1.52 x 6.10.

Treatments: All combinations of:-

1. ALD RATE Rates of aldicarb (kg):

2.17	2.17
4.35	4.35
8.70	8.70

2. ALD TIME Times of applying aldicarb:

SINGLE	All to seedbed (3 Mar)
DIVIDED	Half to seedbed, half in June (3 Mar, 23 June)

EXTRA plus one extra treatment

NONE No aldicarb

Basal applications: Manures: (13:13:20) at 1840 kg. Weedkiller: Propachlor ('Ramrod' at 8.4 l) in 400 l.

Seed: Robusta, dressed with dieldrin, sown at 6.7 kg.

Cultivations, etc.:- Ploughed: 20 Nov, 1975. Power harrowed, fertiliser applied, power harrowed, seed sown, weedkiller applied: 3 Mar, 1976. Harvested by hand: 21 Sept. Previous crops: Fallow 1974, beans 1975.

76/R/ON/1

SALEABLE ONIONS TONNES/HECTARE

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

ALD TIME ALD RATE	SINGLE	DIVIDED	MEAN
2.17	14.6	14.2	14.4
4.35	13.5	14.5	14.0
8.70	8.8	13.8	11.3
MEAN	12.3	14.2	13.2

EXTRA 8.4

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ALD RATE	ALD TIME	ALD RATE ALD TIME AND EXTRA

SED	0.55	0.45	0.78

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	1.10	8.8
PLOT AREA HARVESTED	0.00046		

76/R/SW/1

SWEDES

EFFECTS OF FUNGICIDES AND INSECTICIDES

Object: To study the effects of pesticides on mildew, aphids, viruses and yield of swedes sown early or late - Long Hoos IV 6.

Sponsors: J.F. Jenkyn, C.J. Rawlinson.

Design: 3 randomised blocks of 14 plots.

Whole plot dimensions: 1.91 x 5.49.

Treatments: All combinations of:-

1. SOW DATE Sowing date:
EARLY Early, 22 March
LATE Late, 29 June
2. CHEMICAL Chemicals and times of application:
NONE None
T/E Tridemorph to early growth
T/L Tridemorph to late growth
T/EL Tridemorph to early and late growth
T+D/EL Tridemorph and demeton-s-methyl to early and late growth
A+T+D/EL Aldicarb to seedbed, tridemorph and demeton-s-methyl to early and late growth
B/EL Benomyl to early and late growth

- NOTES: (1) Due to drought SOW DATE LATE failed.
(2) Dates of spraying tridemorph and benomyl:
To early growth: 22 July, 12 Aug.
To late growth: 3 Sept, 23 Sept.
Dates of spraying demeton-s-methyl:
27 May, 11 June, 25 June, 9 July, 22 July, 6 Aug, 20 Aug,
3 Sept, 23 Sept.
(3) Chemicals were applied in 340 l:-
Tridemorph at 0.53 kg, benomyl at 1.12 kg, demeton-s-methyl at 0.25 kg. "Manoxol" (a wetting agent) was used with tridemorph and benomyl at 4.1 ml per litre of spray.
(4) Aldicarb was applied at 6 kg.

Basal applications: Manures: (0:14:28) at 880 kg. 'Nitro-Chalk' at 500 kg.
Weedkiller: Trifluralin at 1.1 kg in 340 l.

Seed: Wilhelmsburger, sown at 4.5 kg.

Cultivations, etc.:- (To SOW DATE EARLY only). Spring-tine cultivated: 16 Sept, 1975. PK applied: 23 Sept. Ploughed: 25 Sept. Spring-tine cultivated: 24 Mar. 1976. Spring-tine cultivated twice: 13 Apr. Weedkiller applied, spring-tine cultivated, aldicarb applied, all plots power harrowed: 21 Mar. Seed sown and rolled: 22 Mar. Plots thinned by hand: 8 June. Lifted: 15 Nov. Previous crops: Oats 1974, winter wheat 1975.

- NOTES: (1) Mildew was assessed throughout the season.
(2) Virus scores, aphid counts and leaf size assessments were made throughout the season.
(3) Numbers of roots per plot were counted at harvest.

76/R/SW/1

ROOTS TONNES/HECTARE

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

CHEMICAL	NONE	T/E	T/L	T/EL	T+D/EL	A+T+D/EL	B/EL	MEAN
	26.2	36.0	25.8	38.1	41.5	38.3	37.5	34.8

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	CHEMICAL
-----	-----
SED	2.91

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATIONS *****

STRATUM	DF	SE	CV%
BLOCK.WP	12	3.56	10.2

PLOT AREA HARVESTED 0.00063

76/R/RA/1

WINTER OILSEED RAPE

EFFECTS OF PATHOGENS

Object: To study the effects and interactions of several factors on yield and pathogens of winter oilseed rape - Summerdells I.

Sponsor: C.J. Rawlinson.

Design: Two replicates of 3 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 4.27 x 9.14.

Treatments: All combinations of:-

1. WEEDKLLR Weedkillers:
 NONE None
 CARBETAM Carbetamide
 DALAPON Dalapon
2. NEMACIDE Nematicide:
 NONE None
 ALDICARB Alidicarb at 8.74 kg on 3 Sept, 1975
3. FUNGCIDE Fungicide:
 NONE None
 BENOMYL Benomyl seed dressing at 0.5 per kg of seed
4. VARIETY Varieties:
 EURORA Eurora (low erucic acid)
 VICTOR Victor (high erucic acid)

- NOTES: (1) Weedkillers were applied in 340 l. Carbetamide was applied at 1.4 kg and dalapon at 3.4 kg on 4 Nov, 1975. These applications were repeated at half these rates on 18 Dec.
- (2) The experiment was severely damaged by pigeon grazing during autumn and winter and many plots were infested with barley volunteers, consequently planned tests of benomyl and HCH foliar sprays were not applied.
- (3) Only 23 of 48 plots produced a measurable yield at harvest, consequently yields are not presented.

Basal applications: Manures: (10:24:24) at 310 kg, 'Nitro-Chalk' at 800 kg dressing divided.

Seed: Varieties sown at 8 kg.

Cultivations, etc.: - Deep-tine cultivated three times: 20, 27 Aug, 1975.
NPK applied: 1 Sept. Power harrowed: 4 Sept. Seed sown: 5 Sept.
Half N applied: 27 Feb, 1976. Second half N applied: 13 Apr.
Combine harvested: 19 July. Previous crops: Barley 1974, barley 1975.

76/R/LP/2 and 76/W/LP/2

LUPINS

CONTROL OF PATHOGENS

Object: To study the effects of a range of pesticides on yield and incidence of pathogens of grain lupins - Rothamsted (R) Long Hoos V6, Woburn (W) Far Field II.

Sponsors: J.C. Wilson, A.J. Cockbain.

Design: 3 blocks of 2 x 2 x 2 (duplicated in each block).

Whole plot dimensions: 2.41 x 6.10.

Treatments: All combinations of:-

1. ALDICARB Aldicarb to seedbed (kg):

0	None
10	10

2. FENITROT Fenitrothion foliar spray (kg):

0.00	None
0.75	0.75

3. PIRIMICA Pirimicarb foliar spray (kg):

0.00	None
0.14	0.14

NOTES: (1) An intended test of benomyl foliar spray was not applied.
(2) Sprays applied in 340 l.

Basal applications: Manures: (0:14:28) at 810 kg to (R) Long Hoos V6, 530 kg to (W) Far Field II. Chalk at 2.8 t to (R) Long Hoos V6 only.
Weedkiller: Trifluralin at 0.9 kg in 340 l. Irrigation: 50 mm to (R) Long Hoos V6 only.

Seed: Kievsky, sown at 220 kg.

Cultivations, etc.:-

(R) Long Hoos V6: Rotary cultivated: 10 Sept, 1975. Fertiliser applied: 8 Dec. Chalk applied: 11 Dec. Ploughed: 19 Dec. Spring-tine cultivated: 24 Mar, 1976. Weedkiller applied: 30 Mar. Aldicarb applied, spring-tine cultivated and seed sown: 31 Mar. Fenitrothion applied: 27 May. Pirimicarb applied: 15 June. 25 mm irrigation applied: 22 June. 25 mm irrigation applied: 6 July. Harvested by hand: 6 Sept. Previous crops: Fallow 1974 and 1975.

(W) Far Field II: Deep-tine cultivated: 19 Sept, 1975, 20 Sept, 24 Oct. Spring-tine cultivated: 27 Feb, 1976. Fertiliser applied, weedkiller applied, spring-tine cultivated twice, seed sown: 1 Apr, 1976. Fenitrothion applied: 28 May. Pirimicarb applied: 16 June. Harvested by hand: 17 Aug. Previous crops: Barley 1974 and 1975.

NOTE: Plant emergence, weevil damage, aphid infestation, diseases and pod numbers were assessed at both sites.

76/R/LP/2 LONG HOOS V 6 (R)

GRAIN TONNES/HECTARE

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

FENITROT	0.00	0.75	MEAN	
ALDICARB				
0	0.90	0.88	0.89	
10	0.92	1.05	0.98	
MEAN	0.91	0.96	0.94	
PIRIMICA	0.00	0.14	MEAN	
ALDICARB				
0	0.92	0.86	0.89	
10	1.01	0.96	0.98	
MEAN	0.96	0.91	0.94	
PIRIMICA	0.00	0.14	MEAN	
FENITROT				
0.00	0.93	0.88	0.91	
0.75	0.99	0.94	0.96	
MEAN	0.96	0.91	0.94	
FENITROT	0.00		0.75	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	0.95	0.85	0.89	0.87
10	0.92	0.91	1.09	1.01

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ALDICARB	FENITROT	PIRIMICA	ALDICARB FENITROT
SED	0.048	0.048	0.048	0.067

TABLE	ALDICARB PIRIMICA	FENITROT PIRIMICA	ALDICARB FENITROT PIRIMICA
SED	0.067	0.067	0.095

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.165	17.6

GRAIN MEAN DM% 87.4

PLOT AREA HARVESTED 0.00108

76/W/LP/2 FAR FIELD 11 (W)

GRAIN TONNES/HECTARE

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

FENITROT	0.00	0.75	MEAN	
ALDICARB				
0	1.70	1.70	1.70	
10	2.02	1.96	1.99	
MEAN	1.86	1.83	1.85	
PIRIMICA	0.00	0.14	MEAN	
ALDICARB				
0	1.63	1.77	1.70	
10	1.98	2.01	1.99	
MEAN	1.80	1.89	1.85	
PIRIMICA	0.00	0.14	MEAN	
FENITROT				
0.00	1.83	1.90	1.86	
0.75	1.77	1.88	1.83	
MEAN	1.80	1.89	1.85	
FENITROT	0.00		0.75	
PIRIMICA	0.00	0.14	0.00	0.14
ALDICARB				
0	1.60	1.80	1.65	1.74
10	2.05	1.99	1.90	2.03

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	ALDICARB	FENITROT	PIRIMICA	ALDICARB FENITROT
SED	0.059	0.059	0.059	0.083

TABLE	ALDICARB PIRIMICA	FENITROT PIRIMICA	ALDICARB FENITROT PIRIMICA
SED	0.083	0.083	0.117

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.203	11.0

GRAIN MEAN DM% 90.2

PLOT AREA HARVESTED 0.00108

76/R/MA/1

MAIZE

NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to aqueous urea/ammonium nitrate on the yield and nitrogen uptake of maize grown for forage - Hoosfield.

Sponsors: J. Ashworth, A.J. Barnard.

Design: 3 randomised blocks of 10 plots split systematically into 2.

Whole plot dimensions: 4.57 x 13.4.

Treatments: All combinations of:-

Whole plots

1. N TREAT Nitrogen forms, rates and nitrification inhibitors:

Aqueous urea/ammonium nitrate injected to seedbed (26 Apr) at 120 kg N:-

AQ3 -	Alone
AQ3 ATC1	With ammonium trithiocarbonate at 10 kg
AQ3 ATC2	With ammonium trithiocarbonate at 25 kg
AQ3 NIT1	With nitrapyrin ('N-Serve') at 1.25 kg
AQ3 NIT2	With nitrapyrin at 2.5 kg

'Nitro-chalk' applied to seedbed (27 Apr) (kg N):-

NC1	40
NC2	80
NC3	120
NC4	160

'Nitro-Chalk' dressing divided (kg N):-

NC1+1+1 40 to seedbed (27 Apr), 40 in July (13 July), 40 at tasselling (6 Aug)

Sub plots

2. POPULATN Plant population:

100000	100,000
150000	150,000

Basal applications: Manures: (0:20:20) at 450 kg. Weedkiller: Atrazine at 1.7 kg in 220 l, harrowed in. Insecticide: Dimethoate at 0.07 kg in 450 l. Irrigation: 25 mm.

Seed: Caldera 535.

76/R/MA/1

Cultivations, etc.:- Heavy spring-tine cultivated: 15 Oct, 1975. Ploughed: 21 Nov. Spring-tine cultivated: 22 Mar, 1976. PK applied, spring-tine cultivated: 22 Apr. Weedkiller applied: 7 May. Seed sown: 10 May. Irrigation applied: 25 May. Insecticide applied: 8 June. Harvested by hand: 5 Oct. Previous crops: Barley 1974 and 1975.

- NOTES: (1) Traps were placed over the injected sites to measure ammonia evaporation, and soil samples were taken for N analysis.
 (2) Assessments of plant populations were made after emergence and at harvest.
 (3) Estimates were made of numbers of plants infected by smut (*Ustilago maydis*) and stem rots (*Fusarium* spp.).
 (4) Determination of N percentage in crop dry matter were made.

FORAGE DRY MATTER TONNES/HECTARE

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

POPULATN N TREAT	100000	150000	MEAN
AQ3 -	9.83	9.43	9.63
AQ3 ATC1	9.86	8.70	9.28
AQ3 ATC2	8.60	8.70	8.65
AQ3 NIT1	9.22	8.40	8.81
AQ3 NIT2	9.33	8.57	8.95
NC1	9.00	8.50	8.75
NC2	9.13	8.40	8.76
NC3	9.10	8.89	9.00
NC4	8.39	8.72	8.56
NC1+1+1	9.00	9.00	9.00
MEAN	9.14	8.73	8.94

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	N TREAT	N TREAT PO PULATN
SED	0.412	0.599* 0.871**

* WITHIN SAME LEVEL OF POPULATN
 ** INTERACTION COMPARISON ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.504	5.6
BLOCK.WP.SP	20	0.754	8.4

FORAGE MEAN DM% 25.5

SUB PLOT AREA HARVESTED 0.00085

76/R/G/1 and 76/W/G/1

GRASS

AQUEOUS AMMONIA AND NITRIFICATION INHIBITORS

Object: To study the effects of adding a range of nitrification inhibitors to aqueous ammonia on the yield and nitrogen uptake of grass cut for-silage. Rothamsted (R) Bones Close and Woburn (W) Lower Field.

Sponsors: J. Ashworth, G.G. Briggs, A. Penny.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 2.43 x 9.14.

Treatments: All combinations of:-

1. NI INHIB Nitrification inhibitors added to aqueous ammonia applied at 375 kg N, as a single application, injection tines spaced 30 cm apart:

CS2	Carbon disulphide
NITRAPYR	Nitrapyrin ('N-Serve')

2. NI RATE Rates of nitrification inhibitors:

1	1 (5 kg (R), 2 kg (W) carbon disulphide; 0.5 kg (R) and (W) nitrapyrin)
2	2 (12.5 kg (R), 7 kg (W) carbon disulphide; 1.25 kg (R) and (W) nitrapyrin)
3	3 (25 kg (R), 20 kg (W) carbon disulphide; 2.5 kg (R) and (W) nitrapyrin)

3. NI TIME Times of applying aqueous ammonia and nitrification inhibitors:

AUTUMN	Autumn
SPRING	Spring

plus twelve extra treatments:

EXTRA Aqueous ammonia applied as above:-

AQ/A	Alone, in autumn
AQ/S	Alone, in spring
AQ+CN1/A	With a mixture of carbon disulphide (12.5 kg (R) and (W)) and nitrapyrin (0.5 kg (R) and (W)) in autumn
AQ+CN2/A	With a mixture of carbon disulphide (12.5 kg (R) and (W)) and nitrapyrin (1.25 kg (R) and (W)) in autumn
AQ+AT1/S	With ammonium trithiocarbonate (4 kg (R) and (W)) in spring
AQ+AT2/S	With ammonium trithiocarbonate (10 kg (R) and (W)) in spring
AQ+AT3/S	With ammonium trithiocarbonate (20 kg (R) and (W)) in spring
AQ+ST/A	With sodium trithiocarbonate (25 kg (R) and (W)) in autumn

'Nitro-Chalk', dressing divided between cuts (kg N, total):-

0	None
NC 250	250
NC 375	375
NC 500	500

76/R/G/1 and 76/W/G/1

Basal applications:

Bones Close (R): Manures: (0:14:28) at 500 kg. Weedkiller: Mecoprop at 2.7 kg in 220 l.

Lower Field (W): Manures: (0:14:28) at 500 kg.

Cultivations, etc.:-

Bones Close (R): Aqueous ammonia autumn treatments injected: 14 Nov, 1975.

PK applied: 3 Dec. Aqueous ammonia spring treatments injected:

24 Feb, 1976. 'Nitro-Chalk' applied in three equal applications:

8 Mar, 26 May, 13 Aug. Weedkiller applied: 19 Mar. Cut three times:

24 May, 9 Aug, 26 Oct. Previous crops: Grass since 1952.

Lower Field (W): Aqueous ammonia autumn treatments injected: 17 Nov, 1975.

PK applied: 18 Nov. Aqueous ammonia spring treatments injected:

25 Feb, 1976. 'Nitro-Chalk' applied in three equal applications:

9 Mar, 18 June, 20 Aug. Cut once: 9 June. Previous crops: Permanent grass.

NOTES: (1) Grass samples were taken for N determinations.

(2) N in the injected soil profile was measured at regular intervals from November, 1975 to June, 1976 and ammonia evaporation measured.

76/R/G/1 BONES CLOSE (R)

1ST CUT (24/5/76) DRY MATTER TONNES/HECTARE

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

NI RATE	1	2	3	MEAN
NI INHIB				
CS2	5.01	5.25	5.00	5.09
NITRAPYR	5.07	5.22	5.18	5.15
MEAN	5.04	5.23	5.09	5.12

NI RATE	1	2	3	MEAN
NI TIME				
AUTUMN	5.48	5.49	5.59	5.52
SPRING	4.60	4.98	4.59	4.72
MEAN	5.04	5.23	5.09	5.12

NI TIME	AUTUMN	SPRING	MEAN
NI INHIB			
CS2	5.51	4.66	5.09
NITRAPYR	5.53	4.78	5.15
MEAN	5.52	4.72	5.12

NI INHIB	NI RATE	1	2	3
CS2	AUTUMN	5.68	5.36	5.49
	SPRING	4.34	5.13	4.52
NITRAPYR	AUTUMN	5.28	5.61	5.69
	SPRING	4.86	4.82	4.67

EXTRA	
AQ/A	5.82
AQ/S	4.82
AQ+CN1/A	5.91
AQ+CN2/A	5.58
AQ+AT1/S	4.64
AQ+AT2/S	4.85
AT+AT3/S	5.29
AQ+ST/A	5.42
0	2.60
NC 250	4.27
NC 375	4.63
NC 500	5.65
MEAN	4.96

GRAND MEAN 5.04

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	NI INHIB	NI RATE	NI TIME
SED	0.348	0.142	0.174	0.142

TABLE	NI INHIB	NI INHIB	NI RATE	NI INHIB
	NI RATE	NI TIME	NI TIME	NI RATE
				NI TIME
SED	0.246	0.201	0.246	0.348

76/R/G/1 BONES CLOSE (R)

2ND CUT (9/8/76) DRY MATTER TONNES/HECTARE

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

NI RATE	1	2	3	MEAN
NI INHIB				
CS2	0.64	0.73	0.64	0.67
NITRAPYR	0.81	0.72	0.56	0.70
MEAN	0.73	0.73	0.60	0.68

NI RATE	1	2	3	MEAN
NI TIME				
AUTUMN	0.77	0.71	0.58	0.68
SPRING	0.69	0.75	0.62	0.69
MEAN	0.73	0.73	0.60	0.68

NI TIME	AUTUMN	SPRING	MEAN
NI INHIB			
CS2	0.71	0.64	0.67
NITRAPYR	0.66	0.74	0.70
MEAN	0.68	0.69	0.68

NI INHIB	NI RATE	1	2	3
CS2	AUTUMN	0.75	0.75	0.62
	SPRING	0.54	0.72	0.66
NITRAPYR	AUTUMN	0.79	0.66	0.53
	SPRING	0.84	0.78	0.59

EXTRA	
AQ/A	0.66
AQ/S	0.70
AQ+CN1/A	0.76
AQ+CN2/A	0.93
AQ+AT1/S	0.86
AQ+AT2/S	0.65
AT+AT3/S	0.93
AQ+ST/A	0.86
0	0.46
NC 250	0.78
NC 375	0.67
NC 500	0.89
MEAN	0.76

GRAND MEAN 0.72

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	NI INHIB	NI RATE	NI TIME
SED	0.200	0.082	0.100	0.082

TABLE	NI INHIB	NI INHIB	NI RATE	NI INHIB
	NI RATE	NI TIME	NI TIME	NI RATE
				NI TIME
SED	0.142	0.116	0.142	0.200

76/R/G/1 BONES CLOSE (R)

3RD CUT (26/10/76) DRY MATTER TONNES/HECTARE

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

	1	2	3	MEAN
NI RATE				
NI INHIB				
CS2	1.34	1.44	1.26	1.34
NITRAPYR	1.46	1.29	1.32	1.36
MEAN	1.40	1.37	1.29	1.35

	1	2	3	MEAN
NI RATE				
NI TIME				
AUTUMN	1.28	1.11	1.20	1.20
SPRING	1.52	1.62	1.37	1.50
MEAN	1.40	1.37	1.29	1.35

	AUTUMN	SPRING	MEAN
NI TIME			
NI INHIB			
CS2	1.11	1.57	1.34
NITRAPYR	1.28	1.43	1.36
MEAN	1.20	1.50	1.35

	NI RATE	1	2	3
NI INHIB	NI TIME			
CS2	AUTUMN	1.08	1.13	1.13
	SPRING	1.60	1.75	1.38
NITRAPYR	AUTUMN	1.48	1.10	1.26
	SPRING	1.44	1.49	1.37

EXTRA	
AQ/A	1.15
AQ/S	1.58
AQ+CN1/A	1.21
AQ+CN2/A	1.53
AQ+AT1/S	1.44
AQ+AT2/S	1.66
AT+AT3/S	1.78
AQ+ST/A	1.72
0	0.80
NC 250	1.66
NC 375	1.76
NC 500	1.58
MEAN	1.49

GRAND MEAN 1.42

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	NI INHIB	NI RATE	NI TIME
SED	0.229	0.093	0.114	0.093

TABLE	NI INHIB NI RATE	NI INHIB NI TIME	NI RATE NI TIME	NI INHIB NI RATE NI TIME
SED	0.162	0.132	0.162	0.229

76/R/G/1 BONES CLOSE (R)

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTAHE

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

NI RATE	1	2	3	MEAN
NI INHIB				
CS2	6.99	7.42	6.90	7.10
NITRAPYR	7.35	7.23	7.05	7.21
MEAN	7.17	7.32	6.98	7.16

NI RATE	1	2	3	MEAN
NI TIME				
AUTUMN	7.53	7.31	7.36	7.40
SPRING	6.81	7.34	6.59	6.91
MEAN	7.17	7.32	6.98	7.16

NI TIME	AUTUMN	SPRING	MEAN
NI INHIB			
CS2	7.33	6.87	7.10
NITRAPYR	7.47	6.95	7.21
MEAN	7.40	6.91	7.16

NI INHIB	NI RATE	1	2	3
CS2	AUTUMN	7.51	7.24	7.25
	SPRING	6.47	7.60	6.56
NITRAPYR	AUTUMN	7.56	7.37	7.48
	SPRING	7.14	7.09	6.62

EXTRA	
AQ/A	7.63
AQ/S	7.11
AQ+CN1/A	7.87
AQ+CN2/A	8.03
AQ+AT1/S	6.94
AQ+AT2/S	7.16
AT+AT3/S	7.99
AQ+ST/A	8.00
0	3.86
NC 250	6.72
NC 375	7.07
NC 500	8.12
MEAN	7.21
GRAND MEAN	7.18

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	NI INHIB	NI RATE	NI TIME
SED	0.585	0.239	0.292	0.239
TABLE	NI INHIB	NI INHIB	NI RATE	NI INHIB
	NI RATE	NI TIME	NI TIME	NI RATE
				NI TIME
SED	0.413	0.338	0.413	0.585

76/W/G/1 LOWER FIELD (W)

1ST AND ONLY CUT (9/6/76) DRY MATTER TONNES/HECTARE

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

NI RATE	1	2	3	MEAN
NI INHIB				
CS2	5.11	4.96	4.24	4.77
NITRAPYR	5.95	4.69	5.19	5.28
MEAN	5.53	4.83	4.71	5.02

NI RATE	1	2	3	MEAN
NI TIME				
AUTUMN	5.30	4.78	4.93	5.00
SPRING	5.76	4.87	4.50	5.05
MEAN	5.53	4.83	4.71	5.02

NI TIME	AUTUMN	SPRING	MEAN
NI INHIB			
CS2	5.00	4.54	4.77
NITRAPYR	5.00	5.55	5.28
MEAN	5.00	5.05	5.02

	NI RATE	1	2	3
NI INHIB	NI TIME			
CS2	AUTUMN	5.13	5.25	4.62
	SPRING	5.09	4.67	3.87
NITRAPYR	AUTUMN	5.47	4.31	5.24
	SPRING	6.43	5.08	5.13

EXTRA	
AQ/A	5.18
AQ/S	4.67
AQ+CN1/A	3.49
AQ+CN2/A	5.17
AQ+AT1/S	5.55
AQ+AT2/S	6.24
AT+AT3/S	3.81
AQ+ST/A	5.22
0	4.36
NC 250	3.45
NC 375	4.93
NC 500	5.48
MEAN	4.80
GRAND MEAN	4.91

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	NI INHIB	NI RATE	NI TIME
SED	0.967	0.395	0.484	0.395
TABLE	NI INHIB	NI INHIB	NI RATE	NI INHIB
	NI RATE	NI TIME	NI TIME	NI RATE
				NI TIME
SED	0.684	0.559	0.684	0.967

76/R/G/1 BONES CLOSE (R)

1ST CUT (24/5/76) DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.348	6.9

1ST CUT MEAN DM% 24.5

2ND CUT (9/8/76) DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.200	27.7

2ND CUT MEAN DM% 43.2

3RD CUT (26/10/76) DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.229	16.1

3RD CUT MEAN DM% 13.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.585	8.1

TOTAL OF 3 CUTS MEAN DM% 27.1

PLOT AREA HARVESTED 0.00104

76/W/G/1 LOWER FIELD (W)

1ST AND ONLY CUT (9/6/76) DRY MATTER TONNES/HECTARE

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.967	19.7

MEAN DM% 39.3

PLOT AREA HARVESTED 0.00078

76/E/1

METEOROLOGICAL RECORDS 1976 - WOBURN

(Departure from long-period means in brackets)

Month	Total sunshine: hours	Mean temperature:C					Ground(2) frosts	Total rainfall:mm		Wind(4) km per hour
		Air(1)	Dew point	In ground under grass 30 cm	100 cm	12.7 cm gauge		Rain(3) days		
Jan	49 (- 2)	5.3 (+2.1)	3.1	6.3	7.9	11	24 (-30)	11	13.8	
Feb	42 (-24)	4.2 (+0.8)	2.5	4.4	6.4	15	17 (-22)	13	8.2	
Mar	106 (-10)	4.5 (-0.9)	2.1	5.2	6.4	18	19 (-24)	7	9.8	
Apr	143 (+ 1)	7.8 (-0.3)	4.0	7.6	7.3	14	16 (-30)	6	8.3	
May	161 (-23)	12.3 (+1.2)	7.9	12.0	9.4	4	28 (-27)	15	9.2	
June	262 (+62)	17.3 (+3.1)	11.1	16.8	12.3	1	14 (-36)	3	7.0	
July	233 (+53)	18.3 (+2.3)	12.1	19.3	15.4	3	24 (-31)	5	6.3	
Aug	227 (+55)	16.9 (+1.0)	11.5	17.8	15.5	5	7 (-54)	3	5.6	
Sept	105 (-31)	13.5 (-0.1)	10.3	14.3	14.1	4	93 (+40)	14	6.1	
Oct	46 (-57)	10.7 (+0.8)	9.0	12.1	13.4	2	108 (+55)	25	7.1	
Nov	59 (- 1)	5.9 (-0.3)	4.2	7.6	10.6	16	50 (-14)	17	6.8	
Dec	59 (+14)	1.6 (-2.5)	0.3	3.7	7.6	25	98 (+47)	14	6.4	
Year*	1492 (+37)	9.9 (+0.6)	6.5	10.6	10.5	118	498 (-126)	133	7.9	

METEOROLOGICAL RECORDS 1976 - SAXMUNDHAM

Month	Mean temperature: C				Ground(2) frosts	Total rainfall :mm		Wind(4) km per hour
	Air(1)	Dew point	In ground under bare soil 30 cm	12.7 cm gauge		Rain(3) days		
Jan	5.2	3.9	5.3	10	1.39	10	15.9	
Feb	4.3	3.3	3.8	16	0.87	8	9.8	
Mar	4.6	2.2	4.7	15	0.60	8	12.4	
Apr	7.8	3.9	8.7	9	0.46	6	11.5	
May	12.5	7.8	12.5	3	0.85	9	10.3	
June	16.9	12.2	17.8	2	0.36	3	7.6	
July	18.1	13.9	19.7	0	2.54	6	8.2	
Aug	17.1	14.4	19.0	0	2.06	7	8.6	
Sept	14.0	12.2	14.4	0	5.04	18	8.4	
Oct	11.3	10.6	12.4	1	4.30	19	10.5	
Nov	6.9	5.5	7.7	12	2.76	16	10.0	
Dec	2.7	1.7	3.9	16	1.82	13	11.2	
Year*	10.1	7.6	10.8	84	1.92	123	10.4	

(1) Mean of maximum and minimum

(2) Number of nights grass min. was below 0.0 C

(3) Number of days rainfall
was 0.2-mm or more

(4) At 2 metres-above ground level

*Mean or total

Woburn (Stackyard C)

75/W/RN/6

1975

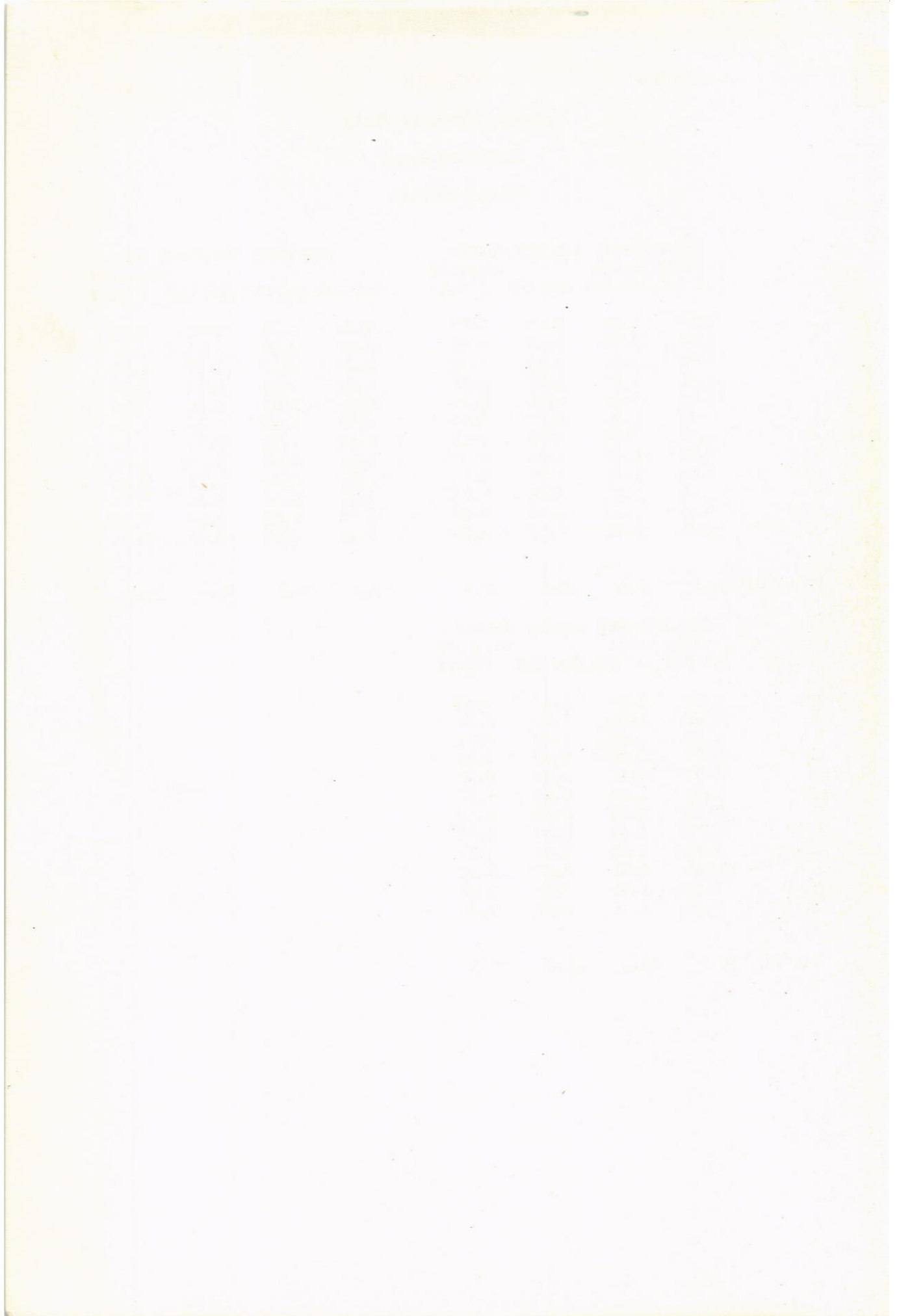
Arable Reference Plots

Tables of Means

Tonnes/hectare

Manure	Grass-Clover Ley: Dry Matter after Arable				Permanent Grass: Dry Matter			
	1st Cut	2nd Cut	3rd Cut	Total of 3 cuts	1st Cut	2nd Cut	3rd Cut	Total of 3 cuts
O	2.37	0.80	0.60	3.77	4.23	1.28	0.23	5.74
N1	3.85	0.70	0.42	4.97	4.60	0.36	0.52	5.48
P	2.72	1.01	0.58	4.31	3.27	0.53	0.27	4.07
N1P	3.81	0.82	0.51	5.14	4.65	0.63	0.44	5.72
K	4.14	1.91	0.69	6.74	5.56	1.63	0.16	7.35
N1K	5.04	1.21	0.77	7.02	5.02	0.43	0.43	5.88
PK	4.32	2.04	0.79	7.15	5.62	1.31	0.31	7.24
N1PK	5.76	1.70	0.54	8.00	5.51	0.58	0.49	6.58
N2PK	6.05	1.49	0.76	8.30	6.62	0.44	0.28	7.34
D	4.85	1.96	0.98	7.79	6.47	0.97	0.30	7.74
N1PKD	6.13	1.59	0.75	8.47	6.73	0.53	0.69	7.95
N2PKD	6.70	1.71	0.88	9.29	7.94	0.50	0.46	8.90
Mean DM%	24.0	28.9	26.3	26.4	23.8	71.8	21.6	39.1

Manure	Grass-Clover Ley: Dry Matter after Grass			
	1st Cut	2nd Cut	3rd Cut	Total of 3 cuts
O	4.61	1.30	0.42	6.33
N1	5.09	1.03	0.52	6.64
P	5.18	1.46	0.38	7.02
N1P	5.71	0.95	0.42	7.08
K	5.01	1.40	0.52	6.93
N1K	5.91	1.54	0.92	8.37
PK	5.60	2.04	0.68	8.32
N1PK	5.89	1.64	0.58	8.11
N2PK	7.53	1.53	0.51	9.57
D	6.30	1.56	0.67	8.53
N1PKD	7.49	1.52	0.56	9.57
N2PKD	7.49	1.74	0.57	9.80
Mean DM%	25.5	31.4	25.9	27.6



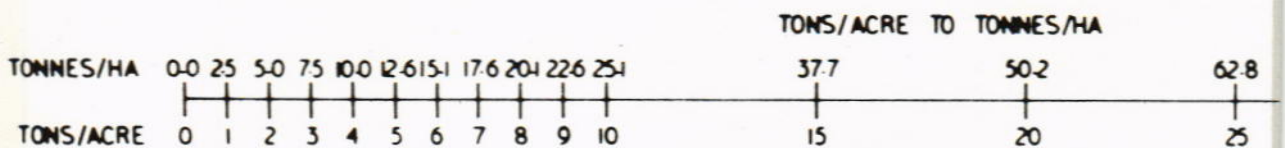
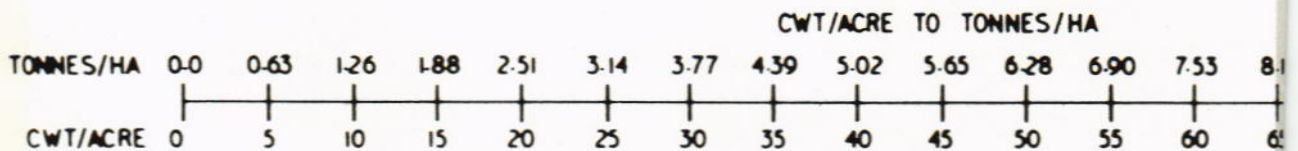
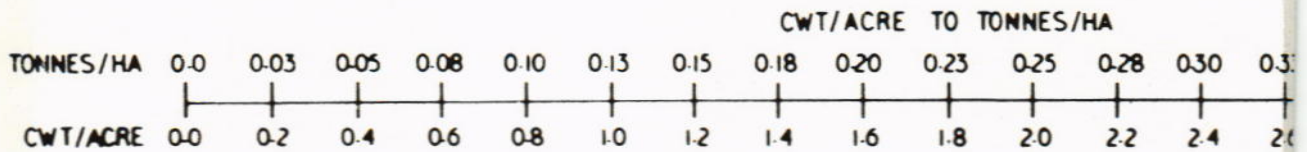
CONVERSION FACTORS

Factors for the Conversion of Imperial to Metric Units

1 inch (in.)	= 2.540 centimetres (cm)
1 foot (ft) (= 12 in.)	= 30.48 cm
1 yard (yd) (= 3 ft)	= 0.9144 metre (m)
1 square yard (sq yd)	= 0.8361 sq m
1 acre (= 4840 sq yd)	= 0.4047 hectare (ha)
1 ounce (oz)	= 28.35 grams (g)
1 pound (lb)	= 0.4536 kilogram (kg)
1 hundredweight (cwt) (= 112 lb)	= 50.80 kg
1 ton (= 2240 lb)	= 1016 kg = 1.016 metric tons (tonnes)
1 pint	= 0.5682 litre
1 gallon (gal) (= 8 pints)	= 4.546 litre
1 fluid ounce = 1/20 pint	= 0.02841 litre = 28.41 ml
1 cubic foot	= 28.32 litre

<i>To convert</i>	<i>Multiply by</i>
oz/acre to g/ha	70.06
lb/acre to kg/ha	1.121
cwt/acre to kg/ha	125.5
cwt/acre to tonnes/ha	0.1255
tons/acre to kg/ha	2511
tons/acre to tonnes/ha	2.511
gal/acre to litre/ha	11.23

CONVERSION SCALES



Factors for the Conversion of Metric to Imperial Units

1 centimetre (cm)	=	0.3937 inch (in.) = 0.03281 ft
1 metre (m)	=	1.094 yards (yd)
1 square metre (sq m)	=	1.196 square yards (sq yd)
1 hectare (ha)	=	2.471 acres
1 gram (g)	=	0.03527 ounce (oz)
1 kilogram (kg)	=	2.205 pounds (lb)
1 kg	=	0.01968 hundredweight (cwt) = 0.0009842 ton
1 metric ton (tonne)	=	0.9842 ton
1 litre	=	1.760 pints = 0.2200 gallon (gal)
1 litre = 1000 millilitres (ml)	=	35.20 fluid ounces = 0.03531 cubic foot

<i>To convert</i>	<i>Multiply by</i>
g/ha to oz/acre	0.01427
kg/ha to lb/acre	0.8921
kg/ha to cwt/acre	0.007966
tonnes/ha to cwt/acre	7.966
kg/ha to tons/acre	0.0003983
tonnes/ha to tons/acre	0.3983
litre/ha to gal/acre	0.08902

Temperatures

To convert °F into °C subtract 32 and multiply by $\frac{5}{9}$ (0.5556)

To convert °C into °F multiply by $\frac{9}{5}$ (1.8) and add 32

