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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1983



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Rothamsted Research

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Rothamsted Experimental Station

Harpenden

Lawes Agricultural Trust

YIELDS of the FIELD EXPERIMENTS 1983

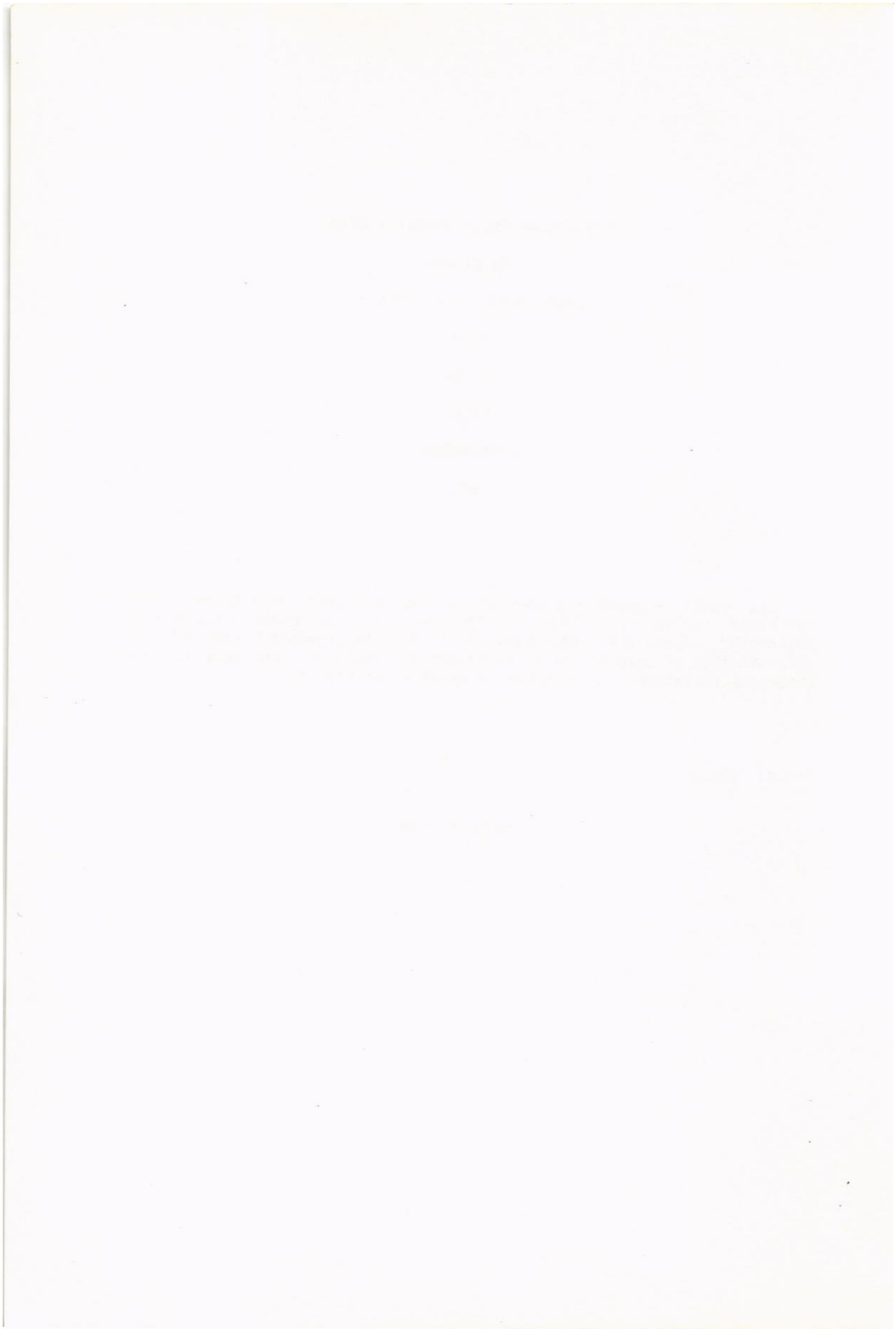
This report is produced by members of the Statistics Department and of the Field Experiments Section. It includes only experiments conducted at Rothamsted, Woburn and Saxmundham. Only those experiments which have the determination of crop yields as an object are included. For many of these, other determinations are of equal or greater importance.

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MISCELLANEOUS DATA

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CONVERSION FACTORS

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CONVENTIONS 1983

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.

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' - separate publications, giving full descriptions of treatments until 1967 & 1973, with full titles 'Details of the Classical and Long Term Experiments up to 1967' and 'Details of the Classical and Long Term Experiments up to 1973'.

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 fertilizers, sprays etc. are per hectare.

All yields and plant numbers are per hectare.

The following abbreviations are used in variate headings:

Wheat, barley, oats, beans etc.

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

Sugar beet

Roots:	Roots (washed)
Sugar %:	Sugar percentage of washed roots

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 26% N unless otherwise stated.

Compound fertilizers indicated thus - (20:10:10) = compound fertilizer (20% N, 10% P205, 10% K20), granular unless otherwise stated.

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

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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 (a 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 at Rothamsted showed that on average the yield of 16 rows (50 ft (15 m) long) was 7.8% greater with blank rows than without. (Experimental Husbandry 23 pp 16-20 (1972)).

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).

Tables of means

Tables of means are presented directly from computer output. Both factor and level names are presented 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	*	*	*	*	*	*

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.

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83/R/BK/1

BROADBALK

Object: To study the effects of organic and inorganic manures on continuous w. wheat. From 1968 two three-year rotations were included: potatoes, beans, w. wheat and fallow, w. wheat, w. wheat. In 1979 the first rotation was changed to fallow, potatoes, w. wheat. In 1980 the second rotation reverted to continuous w. wheat.

The 140th year, w. wheat, fallow, potatoes. The 16th year of the rotations.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-82/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00434
	1	0.00798
	3,4,5,and 6	0.00659
	8 and 9	0.00694
Potatoes:	2	0.00659

Treatments:

Whole plots

PLOT	Plot	Fertilizers and organic manures:- Treatments until 1967	Treatments from 1968	Changes from 1980
01DN2PK	01	-	D N2 P K	-
21DN2	21	D	D N2	-
22D	22	D	D	-
030	03	None	None	-
05F	05	P K Na Mg	P K (Na) Mg	-
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	-
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	-
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	-
09N4F	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	-
15N3F	15	N2 P K Na Mg	N3 P K (Na) Mg	-
16N2F	16	N*2 P K Na Mg	N2 P K (Na) Mg	-
17N0+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N0+3 1/2(PK (Na) Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK (Na) Mg)+
19C	19	C	C	-
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg	-

(A) Alternating

\+ To w. wheat only; autumn N alternates. Potatoes receive N3 1/2(PK (Na) Mg) on both plots 17 and 18.

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83/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' in spring from 1968).
NO+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring.
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
F: P K (Na) Mg H: Half rate

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	Section	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
SC0/W32	0	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W17	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
POTATOES	2	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W	F	P
SC3/W4	3	W	W	F	W	W	F	W	W	F	W	W	F	W	W	W	W
SC4/W1P	4	W	P	BE	W	P	BE	W	P	BE	W	P	P	W	F	P	W
SC5/W5	5	W	F	W	W	F	W	W	F	W	W	F	W	W	W	W	W
SC6/W6	6	F	W	W	F	W	W	F	W	W	F	W	W	W	W	W	W
-/	7	P	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W	F
SC8/W2F	8*	W	W	W	W	F	W	W	W	W	W	W	W	W	F	W	W
SC9/W25	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

W = w. wheat, P = potatoes, BE = s. beans, F = fallow

* No weedkillers

NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) Since autumn 1975 chalk is applied at 2.9 t each autumn to sets of Sections on a three-year cycle. Year 1: Sections 1,2,3. Year 2: Sections 6,7,8 and 9. Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.

Standard applications:
W. wheat: Manures: Sections 6, 8 and 9 only: Chalk at 2.9 t. Weedkillers: (not applied to section 8): Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.1 kg in 250 l. Fungicide: Propiconazole at 0.12 kg on two occasions, in 500 l on the first and in 250 l on the second.
Potatoes: Weedkillers: Linuron at 1.6 l and paraquat at 0.56 kg ion in 500 l. Fungicides: Mancozeb at 1.4 kg in 250 l. Fentin hydroxide at 0.28 kg in 250 l on five occasions with the insecticide on the first four. Insecticide: Pirimicarb at 0.14 kg.
Fallow: Manures: Chalk at 2.9 t.

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83/R/BK/1

Seed: W. wheat: Flanders, dressed chlorfenvinphos, sown at 200 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
All Sections: Superphosphate, sulphate of potash, sulphate of soda, kieserite and castor meal applied: 16 Sept, 1982. FYM applied, ploughed: 20 Sept. Spring-tine cultivated: 28 Oct.
Cropped Sections: W. wheat: Chalk to sections 6, 8 and 9: 2 Sept, 1982. Autumn N applied to plot 18: 16 Sept. Rotary harrowed, seed sown: 4 Nov. Spring N applied: 15 Apr, 1983. Weedkillers applied: 16 Apr. Propiconazole applied: 26 May, 30 June. Combine harvested: 10 Aug.
Potatoes: Chisel ploughed: 10 Feb, 1983. N applied, heavy spring-tine cultivated: 5 May. Rotary harrowed, potatoes planted: 10 May. Rotary ridged: 26 May. Weedkillers applied: 3 June. Mancozeb applied: 22 June. Fentin hydroxide with the insecticide applied: 1 July, 8 July, 18 July, 28 July. Fentin hydroxide applied: 11 Aug. Haulm mechanically destroyed: 30 Aug. Lifted: 1 Sept.
Fallow: Chalk applied: 2 Sept, 1982. Chisel ploughed: 10 Feb, 1983. Heavy spring-tine cultivated: 27 May. Ploughed: 17 June. Spring-tine cultivated: 23 June. Ploughed: 13 July. Spring-tine cultivated: 21 July.

NOTE: The percentage weights of weed seeds in the recorded grain yields of plots in Section 8 were measured. As the maximum was only 3% (Plot 05) no adjustments have been made and the figures are not separately presented.

POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM(1.5 INCH) RIDDLE
01DN2PK	16.9	91.5
21DN2	20.3	92.8
22D	15.7	96.3
030	4.4	89.0
05F	8.4	93.5
06N1F	13.0	94.2
07N2F	15.4	93.7
08N3F	16.5	92.9
09N4F	14.8	90.6
10N2	4.6	81.1
11N2P	4.8	78.7
12N2PNA	6.2	81.2
13N2PK	9.7	90.9
14N2PKMG	11.7	89.7
15N3F	13.9	90.8
16N2F	13.3	90.8
17N3FH	9.2	89.7
18N3FH	8.9	90.5
19C	5.8	89.9

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83/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC4/W1P	SC8/W2F	SC3/W4	SC5/W5	SC6/W6	SC1/W17	SC9/W25	SC0/W32	MEAN
01DN2PK	7.69	*	7.05	7.39	7.58	*	*	*	7.43
21DN2	7.91	6.80	7.67	7.62	7.41	7.34	7.57	6.90	7.40
22D	5.41	4.82	5.24	4.90	4.43	5.24	5.28	5.22	5.07
030	1.96	2.23	1.59	1.44	1.36	1.69	1.82	2.24	1.79
05F	2.01	1.70	2.07	1.56	1.50	1.50	1.58	2.09	1.75
06N1F	5.04	3.19	4.58	4.06	3.38	3.52	4.02	4.05	3.98
07N2F	6.91	4.87	6.25	6.32	5.84	5.36	5.30	5.74	5.82
08N3F	7.37	5.77	6.97	6.37	6.32	5.78	6.09	6.01	6.34
09N4F	7.56	6.17	6.99	6.59	6.55	6.37	6.26	6.17	6.58
10N2	5.20	4.44	3.92	4.73	4.17	3.03	3.32	3.42	4.03
11N2P	5.73	4.14	4.38	4.34	4.54	3.82	3.39	3.96	4.29
12N2PNA	5.67	4.50	4.76	4.66	4.51	4.67	4.29	4.74	4.73
13N2PK	6.06	3.87	5.13	5.04	4.84	5.40	5.15	5.11	5.08
14N2PKMG	6.65	4.66	5.77	5.27	4.87	5.76	5.83	5.60	5.55
15N3F	6.93	5.23	6.20	6.11	6.29	6.17	6.18	6.20	6.16
16N2F	6.35	5.14	5.58	4.96	4.99	5.34	5.70	5.42	5.44
17N0+3FH	7.07	6.04	6.23	6.04	6.11	5.90	6.08	5.78	6.15
18N1+3FH	7.10	6.37	6.43	6.18	6.20	6.26	6.12	6.24	6.36
19C	4.41	2.55	3.10	3.27	2.38	3.56	3.25	2.96	3.19
20NKMG	*	*	*	*	*	2.80	*	3.21	3.01

GRAIN MEAN DM% 86.4

STRAW TONNES/HECTARE

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

SECTION PLOT	SC4/W1P	SC1/W17	MEAN
01DN2PK	6.79	*	6.79
21DN2	7.58	7.45	7.52
22D	3.63	3.99	3.81
030	1.08	0.82	0.95
05F	1.23	0.93	1.08
06N1F	3.37	3.01	3.19
07N2F	5.92	4.86	5.39
08N3F	6.21	4.97	5.59
09N4F	6.15	5.42	5.78
10N2	2.58	2.30	2.44
11N2P	3.58	2.07	2.82
12N2PNA	3.82	2.69	3.26
13N2PK	4.76	4.40	4.58
14N2PKMG	5.05	4.48	4.76
15N3F	5.55	4.77	5.16
16N2F	4.81	4.17	4.49
17N0+3FH	5.92	4.33	5.12
18N1+3FH	6.06	4.98	5.52
19C	2.15	2.00	2.07
20NKMG	*	1.65	1.65

STRAW MEAN DM% 92.9

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83/R/HB/2

HOOSFIELD

Object: To study the effects of organic and inorganic manures on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised. The rotation was discontinued in 1979 and the experiment reverted to continuous s. barley.

The 132nd year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-82/R/HB/2.

Treatments: All combinations of:-
1. MANURE Fertilizers, organic manures and frequency of barley cropping:

	Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980	Number of barley crops since last non-cereal
---16F	None	-	-	16 after fallow
-P-16F	None	P	-	16 after fallow
--K16F	None	K(Na)Mg	-	16 after fallow
-PK16F	None	PK(Na)Mg	-	16 after fallow
A--16F	A	-	-	16 after fallow
AP-16F	A	P	-	16 after fallow
A-K16F	A	K(Na)Mg	-	16 after fallow
APK16F	A	PK(Na)Mg	-	16 after fallow
N----16F	N	-	-	16 after fallow
NP---16F	N	P	-	16 after fallow
N-K--16F	N	K(Na)Mg	-	16 after fallow
NPK--16F	N	PK(Na)Mg	-	16 after fallow
N--S-16F	N	Si	Si omitted	16 after fallow
NP-S-16F	N	P Si	"	16 after fallow
N-KS-16F	N	K(Na)MgSi	"	16 after fallow
NPKS-16F	N	PK(Na)MgSi	"	16 after fallow
N---S5BE	N	-	Si added	5 after beans
NP--S5BE	N	P	"	5 after beans
N-K-S5BE	N	K(Na)Mg	"	5 after beans
NPK-S5BE	N	PK(Na)Mg	"	5 after beans
N--SS5BE	N	Si	-	5 after beans
NP-SS5BE	N	P Si	-	5 after beans
N-KSS5BE	N	K(Na)MgSi	-	5 after beans
NPKSS5BE	N	PK(Na)MgSi	-	5 after beans
C(--)16F	C	-	PKMg omitted	16 after fallow
C(P-)16F	C	P	"	16 after fallow
C(-K)16F	C	K(Na)Mg	"	16 after fallow
C(PK)16F	C	PK(Na)Mg	"	16 after fallow
C(--)6BE	C	-	"	6 after beans
C(P-)6BE	C	P	"	6 after beans
C(-K)6BE	C	K(Na)Mg	"	6 after beans
C(PK)6BE	C	PK(Na)Mg	"	6 after beans
C(--)5BE	C	-	"	5 after beans
C(P-)5BE	C	P	"	5 after beans
C(-K)5BE	C	K(Na)Mg	"	5 after beans
C(PK)5BE	C	PK(Na)Mg	"	5 after beans
C(--)5PO	C	-	"	5 after potatoes
C(P-)5PO	C	P	"	5 after potatoes
C(-K)5PO	C	K(Na)Mg	"	5 after potatoes
C(PK)5PO	C	PK(Na)Mg	"	5 after potatoes

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83/R/HB/2

D16F	None	D	-	16 after fallow
(D)16F	(D)	-	-	16 after fallow
(A)16F	(Ashes)	-	-	16 after fallow
-16F	None	-	-	16 after fallow

Form of N: A, sulphate of ammonia: N, nitrate of soda - each to supply 48 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 annually 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 fertilizer (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):

0
48
96
144

There are four extra plots testing all combinations of:-

1. MANURE Fertilizers other than magnesium:

551AN2PK	Plot 551 AN2PK	16th barley
561--PK	Plot 561 --PK	16th barley
571NN2--	Plot 571 NN2	16th barley
581NN2--	Plot 581 NN2	16th barley

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

2. MGNESIUM Magnesium fertilizer (kg Mg) as kieserite every third year since 1974:

0
35

NOTES: (1) For a fuller record see 'Details' etc.
(2) Chalk was applied at 2.9 t to all plots in 5th barley after beans.

Basal applications: Weedkillers: Glyphosate at 1.4 kg in 120 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Georgie, dressed ethirimol, sown at 160 kg.

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83/R/HB/2

Cultivations, etc.:- Glyphosate applied: 27 Oct, 1982. P, K, Mg and silicate of soda applied: 8 Nov. Chalk and FYM applied: 24 Nov. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Seed sown: 9 Mar. N applied: 23 May. Weedkillers applied: 24 May. Fungicide applied: 21 June. Combine harvested: 9 Aug.

BARLEY

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---16F	0.19	0.18	0.38	0.39	0.29
-P-16F	0.35	0.38	0.77	1.56	0.76
--K16F	0.19	0.38	0.56	0.19	0.33
-PK16F	0.19	1.14	1.52	1.53	1.09
A--16F	0.20	0.19	0.39	0.39	0.29
AP-16F	0.59	0.78	0.95	1.16	0.87
A-K16F	0.19	0.39	0.59	0.39	0.39
APK16F	0.38	1.35	1.73	1.73	1.30
D16F	3.09	2.84	3.60	2.82	3.09
(D)16F	0.24	1.26	0.77	0.77	0.76
(A)16F	0.26	0.51	0.52	0.78	0.52
-16F	0.25	0.25	0.52	0.51	0.38
MEAN	0.51	0.80	1.02	1.02	0.84

STRAW MEAN DM% 90.8

PLOT AREA HARVESTED 0.00007

BARLEY

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	MEAN
MGNESIUM					
0	3.20	0.33	1.28	1.30	1.53
35	3.04	0.40	1.66	1.49	1.65
MEAN	3.12	0.37	1.47	1.40	1.59

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00327

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83/R/HB/2

BARLEY

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---16F	0.47	0.89	1.24	1.03	0.91
-P-16F	0.95	1.49	2.15	3.11	1.92
--K16F	0.32	0.92	1.42	1.03	0.92
-PK16F	0.78	1.99	2.68	2.82	2.07
A--16F	0.68	0.97	0.79	1.51	0.99
AP-16F	1.47	2.56	2.58	2.63	2.31
A-K16F	0.47	0.86	1.10	1.19	0.90
APK16F	0.78	1.60	1.78	3.28	1.86
N----16F	0.87	0.80	1.39	1.12	1.04
NP---16F	1.18	2.69	2.92	3.27	2.51
N-K--16F	0.66	1.12	0.72	1.24	0.93
NPK--16F	1.04	2.16	3.62	3.93	2.69
N--S-16F	1.39	1.12	1.64	1.46	1.40
NP-S-16F	0.96	2.58	3.25	3.44	2.56
N-KS-16F	1.17	1.43	2.07	2.83	1.88
NPKS-16F	1.30	1.91	3.61	4.91	2.93
N---S5BE	1.06	1.53	1.32	2.51	1.60
NP--S5BE	1.30	2.65	3.59	3.40	2.73
N-K-S5BE	0.40	1.12	1.91	1.24	1.16
NPK-S5BE	1.03	2.39	3.09	4.10	2.65
N--SS5BE	0.79	1.66	2.05	1.77	1.57
NP-SS5BE	1.30	2.59	3.98	3.79	2.91
N-KSS5BE	1.17	1.37	1.96	2.54	1.76
NPKSS5BE	0.84	2.66	3.21	4.28	2.75
C(--)16F	0.72	1.85	2.44	3.39	2.10
C(P-)16F	1.17	2.25	2.94	3.71	2.52
C(-K)16F	1.12	2.01	2.79	3.46	2.34
C(PK)16F	1.06	2.44	3.46	3.89	2.71
C(--)6BE	1.20	2.32	2.23	2.04	1.95
C(P-)6BE	0.96	2.43	2.56	3.09	2.26
C(-K)6BE	0.91	1.44	2.28	2.41	1.76
C(PK)6BE	1.50	2.70	2.90	3.37	2.62
C(--)5BE	0.79	1.58	2.63	2.37	1.84
C(P-)5BE	1.38	2.24	3.39	3.54	2.64
C(-K)5BE	0.72	2.06	2.24	2.28	1.82
C(PK)5BE	1.17	2.11	4.04	4.30	2.90
C(--)5PO	0.91	1.77	1.96	2.37	1.75
C(P-)5PO	1.25	2.38	3.13	3.40	2.54
C(-K)5PO	0.79	1.79	2.71	2.39	1.92
C(PK)5PO	0.84	2.73	3.75	3.59	2.73
D16F	2.06	3.51	2.79	4.91	3.31
(D)16F	0.29	1.83	1.98	1.47	1.39
(A)16F	0.96	1.43	1.42	1.77	1.39
-16F	0.91	0.94	1.33	1.35	1.13
MEAN	0.98	1.88	2.43	2.76	2.01

GRAIN MEAN DM% 85.2

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83/R/WF/3

WHEAT AND FALLOW

Object: To study the effects of fallowing on unmanured w. wheat - Hoosfield.

The 128th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-82/R/WF/3.

Whole plot dimensions: 9.60 x 211.

Treatments:
Each year there are two plots, one is sown to w. wheat, one is fallow; they alternate in successive years. The comparison of effects of three-year and one-year fallow, started in 1932, was made for the last time in 1982.

Standard applications:
Wheat plot: Weedkillers: Isoproturon at 2.1 kg and mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.

Seed: Flanders, dressed chlorfenvinphos, sown at 210 kg.

Cultivations, etc:-
Wheat plot: Ploughed: 7 Sept, 1982. Spring-tine cultivated: 29 Oct. Heavy spring-tine cultivated, spring-tine cultivated, rotary harrowed, seed sown: 18 Jan, 1983. Weedkillers applied: 16 Apr. Combine harvested: 10 Aug.
Fallow plot: Ploughed: 7 Sept, 1982. Heavy spring-tine cultivated: 25 May, 1983. Ploughed: 16 June. Spring-tine cultivated: 23 June. Ploughed: 14 July. Spring-tine cultivated: 21 July.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.73	0.69
MEAN DM%	77.0	93.3
PLOT AREA HARVESTED	0.06009	

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83/R/EX/4

EXHAUSTION LAND

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

The 128th year, s. barley.

For previous years see 'Details' 1967, 1973 and 74-82/R/EX/4.

Treatments: All combinations of:-

Whole plots

1. PLOTFERT(01) Plot numbers and manuring 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 fertilizer (kg N) as 'Nitro-Chalk' (basal until 1975, on a cyclic system since 1976):

0
48
96
144

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

Basal applications: Weedkillers: Glyphosate at 1.4 kg in 250 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 500 l applied with the fungicide. Fungicide: Tridemorph at 0.52 kg.

Seed: Georgie, dressed ethirimol, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 28 Oct, 1982. Ploughed: 1 Dec. Rotary harrowed, seed sown: 10 Mar, 1983. N treatments applied: 5 May. 'Herrisol' with the fungicide applied: 8 June. Combine harvested: 8 Aug.

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83/R/EX/4

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.97	1.65	1.32	1.68	1.40
2-	0.63	1.32	1.28	1.70	1.23
3D	2.00	3.46	4.50	4.51	3.62
4D	0.99	3.01	3.66	4.01	2.92
5N	0.80	1.94	1.46	1.99	1.55
6N*	0.49	1.18	0.36	0.58	0.65
7NMIN	1.67	2.92	4.05	3.79	3.11
8N*MIN	0.56	2.14	2.10	2.54	1.83
9P	2.77	2.76	3.24	4.56	3.33
10MIN	0.99	2.01	1.79	2.67	1.87
MEAN	1.19	2.24	2.38	2.80	2.15

GRAIN MEAN DM% 85.1

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.21	0.58	0.59	0.81	0.55
2-	0.22	0.40	0.43	0.59	0.41
3D	0.22	0.94	2.01	2.73	1.47
4D	0.42	0.90	1.12	2.41	1.21
5N	0.15	0.51	0.55	0.80	0.50
6N*	0.14	0.48	0.14	0.27	0.26
7NMIN	0.49	1.10	1.56	2.71	1.47
8N*MIN	0.15	0.93	0.61	0.87	0.64
9P	0.36	1.03	1.48	3.01	1.47
10MIN	0.14	0.76	0.58	0.96	0.61
MEAN	0.25	0.76	0.91	1.52	0.86

STRAW MEAN DM% 88.7

SUB PLOT AREA HARVESTED 0.00728

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83/R/PG/5

PARK GRASS

Object: To study the effects of organic and inorganic manures and lime on old grass (for hay).

The 128th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-82/R/PG/5.

Treatments:

Whole plots

MANURE	Fertilizers 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, only in years with no farmyard manure)
P:	35 kg P (15 kg P to Plot 20, only in years with no farmyard manure) as single superphosphate (triple superphosphate in 1974)
K:	225 kg K (45 kg K to Plot 20, only 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

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83/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

NOTE: Lime was applied regularly, and at the same rate, to all a and b sub plots of Plots 1 to 17 (except 12) from 1924. Differential liming started in 1965 on certain b and c sub plots (except on Plot 12) and in 1976 on certain a sub plots (including Plot 12) and 12b.

Additional sub plots (Plots 18, 19 and 20 only) (tonnes $CaCO_3$ 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.:- Superphosphate applied: 22 Dec, 1982. Other mineral fertilizers applied: 20 Jan, 1983. N treatments applied: 4 May. Cut: 15 June, 2 Nov.

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83/R/PG/5

1ST CUT (15/6/83) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	2.16	1.84	1.56	0.66	1.55
0(D)	2.10	2.70	1.25	0.88	1.73
0/PLOT3	2.09	2.54	1.04	0.99	1.66
P	2.08	2.94	1.99	1.86	2.22
N2P	2.99	3.39	2.58	2.69	2.91
N1MIN	4.42	5.08			4.75
MIN	4.62	4.99	2.86	2.31	3.70
PNAMG	1.80	2.14	2.15	1.96	2.01
N2MIN	5.39	5.31	5.05	3.51	4.82
N2PNAMG	2.97	3.49	3.24	2.67	3.09
N3MIN	6.19	5.19	5.73	4.04	5.29
N3MINSI	5.84	6.08	5.96	3.95	5.46
0/PLOT12	1.74	1.30	0.91	0.84	1.20
D/F	5.93	6.30	5.31	4.70	5.56
N2*MIN	4.78	5.22	5.45	4.91	5.09
MIN(N2*)	4.83	4.62	2.80	2.31	3.64
N1*MIN	5.08	5.15	4.69	3.64	4.64
N1*	2.36	2.25	1.64	1.12	1.84
N2KNAMG0			0.79	1.56	1.17
N2KNAMG2	1.64				1.64
N2KNAMG1	1.17	1.49			1.33
D0	3.11				3.11
D2	3.71				3.71
D1	3.19				3.19
D/N*PK0	4.04				4.04
D/N*PK2	5.36				5.36
D/N*PK1	4.71				4.71

1ST CUT MEAN DM% 22.7

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83/R/PG/5

2ND CUT (2/11/83) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	1.56	1.55	0.98	0.47	1.14
0(D)	1.30	1.78	1.11	0.98	1.29
0/PLOT3	1.06	1.19	0.77	0.64	0.91
P	1.21	1.43	1.16	0.86	1.16
N2P	1.02	1.76	1.22	1.98	1.50
N1MIN	1.76	1.54			1.65
MIN	1.66	1.84	1.18	0.91	1.40
PNAMG	1.01	1.18	1.30	1.33	1.20
N2MIN	1.91	2.24	1.29	2.15	1.90
N2PNAMG	1.16	1.60	1.03	1.93	1.43
N3MIN	2.05	1.60	1.26	2.47	1.84
N3MINSI	2.28	1.96	1.27	2.59	2.03
0/PLOT12	1.10	1.00	1.09	1.13	1.08
D/F	2.67	2.10	1.79	1.94	2.13
N2*MIN	1.72	2.31	2.47	1.67	2.04
MIN(N2*)	1.57	1.73	1.04	1.08	1.35
N1*MIN	1.89	1.99	1.90	1.55	1.83
N1*	1.21	1.56	2.36	1.81	1.74
N2KNAMG0			0.44	0.33	0.39
N2KNAMG2	1.43				1.43
N2KNAMG1	1.14	1.23			1.18
D0	1.91				1.91
D2	1.81				1.81
D1	2.07				2.07
D/N*PK0	2.20				2.20
D/N*PK2	2.20				2.20
D/N*PK1	2.33				2.33

2ND CUT MEAN DM% 21.9

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83/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	3.72	3.39	2.53	1.13	2.69
O(D)	3.40	4.48	2.36	1.87	3.03
O/PLOT3	3.15	3.73	1.82	1.62	2.58
P	3.29	4.37	3.15	2.73	3.38
N2P	4.00	5.15	3.80	4.67	4.41
N1MIN	6.18	6.62			6.40
MIN	6.28	6.83	4.03	3.22	5.09
PNAMG	2.80	3.32	3.45	3.29	3.22
N2MIN	7.30	7.55	6.34	5.66	6.71
N2PNAMG	4.13	5.09	4.27	4.60	4.52
N3MIN	8.23	6.79	6.99	6.51	7.13
N3MINSI	8.12	8.05	7.23	6.55	7.49
O/PLOT12	2.84	2.30	2.00	1.97	2.28
D/F	8.60	8.40	7.10	6.64	7.68
N2*MIN	6.49	7.52	7.92	6.58	7.13
MIN(N2*)	6.40	6.35	3.84	3.39	4.99
N1*MIN	6.98	7.13	6.58	5.19	6.47
N1*	3.58	3.81	4.00	2.93	3.58
N2KNAMG0			1.23	1.88	1.56
N2KNAMG2	3.07				3.07
N2KNAMG1	2.31	2.72			2.52
D0	5.02				5.02
D2	5.52				5.52
D1	5.25				5.25
D/N*PK0	6.24				6.24
D/N*PK2	7.56				7.56
D/N*PK1	7.04				7.04

TOTAL OF 2 CUTS MEAN DM% 22.3

PLOT AREA HARVESTED 0.00002

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83/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 14th year of revised scheme, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-82/R/AG/6.

Treatments: All combinations of:-

Whole plots

1. OLDRESD — Fertilizers 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. RN CROP — Rotation 1848-1951 and crop in 1983:

FALLOW	With fallow: Roots (turnips or swedes), s. barley, fallow, w. wheat 1848-1951. Fallow in 1983
WHEAT	With legume: Roots, s. barley, legume (clover or beans), w. wheat 1848-1951. W. wheat 1983 (after w. beans 1982)

Half plots

3. 1964RESD — Residues of 1964 treatments:

P
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

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83/R/AG/6

Sixteenth plots

5. P_2O_5 64	K_2O 64	Rates of 1964 treatments (kg): P_2O_5 to P-test half plots	K_2O to K-test half plots
0	0		
500	315		
1000	630		
2000	1260		

Thirty second plots

6.		To RN CROP WHEAT. Residues of P_2O_5 applied 1970-72 (kg) and in 1980 and 1982 (kg):
P_2O_5 722		
(0)0		None
(375)300		375 total in 1970-72, 150 in 1980, 150 in 1982
		To RN CROP WHEAT. Residues of K_2O applied 1973-76 (kg) and in 1980 and 1982 (kg):
K_2O 762		
(0)0		None
(870)600		870 total in 1973-76, 300 in 1980, 300 in 1982

NOTE: Treatment combinations to thirty second plots of FALLOW plots are not shown above.

Standard applications:

W. wheat: Manures: 'Nitro-Chalk' at 130 kg followed by 770 kg. Weedkillers: Mecoprop at 3.2 l with isoproturon at 2.1 kg in 250 l applied with the prochloraz. Glyphosate at 1.4 kg in 250 l. Fungicides: Prochloraz at 0.40 kg. Propiconazole at 0.12 kg in 250 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.:-

W. wheat: Ploughed: 7 Sept, 1982. Spring-tine cultivated: 2 Oct. Rotary harrowed, seed sown: 15 Oct. First N applied: 16 Mar, 1983. Second N applied: 15 Apr. Mecoprop, isoproturon and prochloraz applied: 16 Apr. Propiconazole applied: 17 June. Glyphosate applied: 4 Aug. Combine harvested: 12 Aug.

Fallow: Ploughed: 7 Sept, 1982. Rotary cultivated: 24 May, 20 June, 1983. Spring-tine cultivated: 2 Aug.

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83/R/AG/6

WHEAT P PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	P205 722	(0)0	(375)300	(0)0	(375)300	(0)0	(375)300
PREVCROP	P205 64						
ARABLE	0	7.57	9.21	7.87	7.99	7.55	8.06
	500	7.51	8.86	8.32	8.46	7.15	8.06
	1000	8.55	8.46	8.08	8.41	8.15	8.53
	2000	8.94	8.96	8.62	9.03	7.78	7.89
GRASS	0	5.99	9.35	6.96	8.56	6.13	7.62
	500	8.77	9.20	6.82	6.54	8.13	8.11
	1000	8.65	9.10	8.13	8.05	7.71	8.45
	2000	8.67	9.04	7.33	5.32	7.90	7.56

GRAIN MEAN DM% 86.3

WHEAT K PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	K20 762	(0)0	(870)600	(0)0	(870)600	(0)0	(870)600
PREVCROP	K20 64						
ARABLE	0	8.19	9.03	8.53	8.41	8.59	8.33
	315	8.26	9.58	8.13	8.32	7.92	7.33
	630	8.47	8.67	8.27	8.55	8.15	8.48
	1260	9.00	9.40	9.03	8.36	8.34	8.72
GRASS	0	8.50	8.98	7.99	8.45	8.11	8.55
	315	8.75	8.93	8.20	8.48	8.04	8.25
	630	8.71	9.12	8.91	8.61	8.18	8.77
	1260	8.63	9.43	8.36	9.07	8.36	8.77

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED (OLDRESD NONE) 0.00131

PLOT AREA HARVESTED (REMAINDER) 0.00146

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83/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.

Sections 1 and 2 fallow. The ninth year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-82/R/BN/7.

Plot dimensions: Grass: 10.7 x 55.9.

Treatments to Grass: All combinations of:-

Whole plots

1. MANURE	Fertilizers and organic manures:
D	D
DPK	D P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
0	0

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. N PERCUT	Nitrogen fertilizer in 1983 (kg N per cut) as 'Nitro-Chalk' and residues of forms of N previously each supplying 96 kg N per annum:
75	75, previously nitrate of soda
100	100, previously sulphate of ammonia
125	125, previously sulphate of ammonia + castor meal
150	150, previously castor meal

Castor meal last applied 1961, nitrate of soda and sulphate of ammonia until 1959.

Plus one plot MANURE KMG 100

NOTES: (1) P K and D treatments were applied to Sections 1 and 2 (fallow) until 1980 but not since.

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83/R/BN/7

Standard applications:
Grass: Weedkillers: Glyphosate at 1.4 kg in 250 l. Paraquat at 1.1 kg ion in 250 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.
Fallow: Weedkillers: Paraquat at 1.1 kg ion in 250 l.

Seed: S.215 Meadow fescue at 12 kg, Climax timothy at 12 kg, mixture sown at 24 kg.

NOTE: Sowing in August, 1982 failed and the crop was re-sown in March, 1983.

Cultivations, etc.:-
Grass: Glyphosate applied: 20 June, 1982. P applied: 25 June. K applied: 2 July. Ploughed: 30 July. Disced: 9 Aug. Rotary harrowed: 18 Aug. Rotary harrowed, seed sown: 25 Aug. Paraquat applied: 20 Nov. Spring-tine cultivated: 8 Mar, 1983. Seed re-sown: 12 Mar. N applied: 25 May. 'Herrisol' applied: 16 June. Cut: 11 July. N applied: 15 July. Cut: 1 Nov.
Fallow: Ploughed: 30 July, 1982. Disced: 9 Aug, 18 Aug. Paraquat applied: 20 Nov. Spring-tine cultivated: 8 Mar, 1983. Heavy spring-tine cultivated: 26 May. Rotary cultivated: 16 June. Spring-tine cultivated: 23 June. Spring-tine cultivated, rotary harrowed: 11 Oct.

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83/R/BN/7

1ST CUT (11/7/83) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	MEAN
D	3.40	3.64	3.61	3.58	3.56
DPK	3.09	3.88	3.87	4.23	3.77
PKMG	1.81	2.16	2.56	2.22	2.19
P	1.47	1.55	2.05	2.19	1.81
PK	1.78	2.28	2.59	1.68	2.08
PMG	2.07	2.15	2.59	1.25	2.01
0	0.81	0.95	1.22	1.14	1.03
MEAN	2.06	2.37	2.64	2.33	2.35

MANURE KMG 100 1.88

GRAND MEAN 2.33

1ST CUT MEAN DM% 29.4

83/R/BN/7

2ND CUT (1/11/83) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	MEAN
D	2.50	2.59	2.37	2.12	2.39
DPK	2.55	2.72	2.65	2.36	2.57
PKMG	1.25	1.98	2.30	1.77	1.83
P	0.87	1.17	1.33	0.68	1.01
PK	1.27	2.38	2.20	1.04	1.72
PMG	1.23	1.69	1.53	0.59	1.26
0	0.95	0.93	1.11	0.87	0.96
MEAN	1.52	1.92	1.93	1.35	1.68

MANURE KMG 100 1.75

GRAND MEAN 1.68

2ND CUT MEAN DM% 22.8

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83/R/BN/7

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	MEAN
D	5.90	6.23	5.98	5.69	5.95
DPK	5.63	6.60	6.51	6.59	6.33
PKMG	3.06	4.14	4.86	3.98	4.01
P	2.34	2.72	3.38	2.87	2.83
PK	3.04	4.66	4.79	2.72	3.80
PMG	3.30	3.84	4.12	1.84	3.27
0	1.76	1.88	2.33	2.02	2.00
MEAN	3.58	4.29	4.57	3.67	4.03

MANURE KMG 100 3.63

GRAND MEAN 4.01

TOTAL OF 2 CUTS MEAN DM% 26.1

SUB PLOT AREA HARVESTED 0.00568

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83/R/GC/8

GARDEN CLOVER

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

Sponsor: J. McEwen.

The 130th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-82/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.02 x 1.42.

Treatments:

FUNG RES	Fungicide residues:
NONE	None
BENOMYL	Benomyl in the winters of 1979/80, 1980/81 and 1981/82.

Basal applications: Manures: Chalk at 1.25 t. (0:18:36) at 420 kg. Mg at 50 kg, as Epsom Salts. Nematicide: Aldicarb at 10 kg. Irrigation: 20 mm.

Seed: Hungaropoly, sown at 34 kg.

Cultivations, etc.:- Hand dug, root stumps carted, PK, Mg and chalk applied: 8 March, 1983. Sown, aldicarb applied: 14 Apr. Irrigation applied: 20 July. Cut: 28 July, 31 Aug, 27 Sept.

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83/R/GC/8

1ST CUT (28/7/83) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	MEAN
	2.44	2.36	2.40

1ST CUT MEAN DM% 23.3

2ND CUT (31/8/83) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	MEAN
	1.28	1.33	1.30

2ND CUT MEAN DM% 30.7

3RD CUT (27/9/83) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	MEAN
	0.77	0.84	0.81

3RD CUT MEAN DM% 15.7

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	MEAN
	4.49	4.53	4.51

TOTAL OF 3 CUTS MEAN DM% 23.2

PLOT AREA HARVESTED 0.00008

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83/S/RN/1

ROTATION I

Object: To compare nutrient cycles, uptakes of nutrients and responses to fresh P and K. To obtain an estimate of the rate of release of nutrients, particularly K, from Saxmundham soil - Saxmundham.

Sponsor: A.E. Johnston.

The 84th year, grass, w. wheat, w. beans, s. barley.

For previous years see 'Details' 1967 and 1973, and 74-82/S/RN/1.

Whole plot dimensions (original treatments): 5.49 x 40.2.

Treatments: From 1899 to 1969 the experiment followed a four-course rotation of w. wheat, roots, s. 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 being continued under the original treatment until 1979 (OLDTREAT), modified treatments (NEWTREAT) being applied on the larger sub-plots (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). In 1977 lucerne was ploughed on one pair of blocks to start an arable rotation and in 1978 lucerne on the other blocks was replaced by a grass/clover mixture. The grass/clover mixture was ploughed in 1979 for a test of subsoiling. Part of the grass area on two of the blocks was ploughed in autumn 1980 and added to the arable rotation area; the remainder of the grass on these two blocks was destroyed after the first cut in 1982; part of the arable rotation area was added to these two blocks for a new test on the effects of soil K depletion. Treatments to the remaining grass in 1983 were:

TREATMENT 1899-1965	OLDTREAT Grass 1966-79	NEWTREAT Grass 1966-83
	MANURE	MANURE
D	(D)	(D)N
B	B	BN
N	N	(N)P2N
P	P	(P)P1N
K	K	(K)P2KN
-	-	(-)P2N
PK	PK	(PK)P1KN
NK	NK	(NK)P2KN
NP	NP	(NP)P1N
NPK	NPK	(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 - 38 kg N as nitrate of soda. Since 1970 - 100 kg N (38 kg N on OLDTREAT) per cut as ammonium nitrate ('Nitro-Chalk' until 1982)
P: 1899-1965 40 kg P205 as single superphosphate. Since 1966 50 kg P205 as triple superphosphate

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83/S/RN/1

P1,P2: 50, 100 kg P205 as triple superphosphate
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) From 1980 treatments have not been applied to OLDTREAT grass and yields have not been taken.

The pair of blocks in arable crops from 1977 were sown to w. wheat in 1983. Yields were not taken.

MANURE — Manures applied 1899-1965 and 1966-83:

(D)P2N
BN
(N)P2N
(P)P1N
(K)P2KN
(-)P2N
(PK)P1KN
(NK)P2KN
(NP)P1N
(NPK)P1KN

N: 40 kg N as 'Nitro-Chalk' at drilling; 160 kg N as ammonium nitrate in spring. Other symbols as above.

The pair of blocks testing subsoiling were sown to s. barley and tested all combinations of:

Whole plots

1. MANURE (as for w. wheat above but with basal N at 30 kg N as ammonium nitrate at sowing) and:

2. TREATMNT — Cultivations etc in May, 1979 only:

CNVNTIAL — Conventional, mouldboard ploughed
SUBDUG — Subsoil dug by Wye double digger
SUBDUG+F — Subsoil dug by Wye double digger incorporating P at 374 kg and K at 712 kg (as 0:20:20) into the subsoil at the time of working

Sub plots

3. N — Nitrogen fertilizer (kg N) as 'Nitro-Chalk' in addition to the 30 kg N at sowing:

30
60
90
120

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83/S/RN/1

The new test on the effects of soil K depletion included w. beans on the area after grass 1982 and w. wheat on the area after arable. W. wheat tested all combinations of:-

Whole plots

1. MANURE (as for w. wheat on arable crop test blocks above)

Sub plots

2. N Nitrogen fertilizer (kg N) as 'Nitro-Chalk' in spring in addition to 40 kg N at sowing:-

120
160
200
240

W. beans tested:-

Whole plots

1. MANURE (as for w. wheat above but without basal N)

Standard applications:
W. wheat, on arable crops from 1977, and new soil K depletion test: Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l with isoproturon at 2.5 kg and with the permethrin. Fungicides: Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg with captafol at 1.0 kg in 220 l applied with the pirimicarb. Propiconazole at 0.12 kg in 220 l (to new soil K depletion test only). Insecticides: Permethrin at 0.05 kg. Pirimicarb at 0.14 kg.
W. beans: Weedkiller: Simazine at 1.1 l in 220 l. Fungicide: Benomyl at 0.28 kg in 220 l, on two occasions.
S. barley: Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l. Fungicides: Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg applied in 220 l with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat: Norman, sown at 400 seeds per m^2.
W. beans: Throws MS, sown at 250 kg.
S. barley: Triumph, seed dressed with ethirimol, sown at 180 kg.

Cultivations, etc.:-
W. wheat on arable crops from 1977 and on new soil K depletion test: P and K treatments applied: 3 Sept, 1982. Ploughed: 15 Sept. Power harrowed, seedbed N applied, seed sown: 29 Sept. 'Brittox', isoproturon and permethrin applied: 28 Oct. Treatment N applied (to new soil K depletion test only): 27 Apr, 1983. Basal N applied (to arable crops for 1977 only): 28 Apr. Bonemeal applied: 28 Apr. Carbendazim, maneb, tridemorph, captafol and pirimicarb applied: 30 June. Propiconazole applied to new soil K depletion test only: 13 July. Combine harvested: 9 Aug.
W. beans: P and K treatments applied: 3 Sept, 1982. Ploughed: 15 Sept. Power harrowed, seed sown: 28 Oct. Weedkiller applied: 29 Oct. Bonemeal applied: 28 Apr, 1983. Fungicide applied: 4 May, 30 June. Combine harvested: 26 Aug.

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83/S/RN/1

S. barley: P and K treatments applied: 3 Sept, 1982. Ploughed: 19 Oct.
Power harrowed, seedbed N applied, seed sown: 10 Mar, 1983.
Treatment N and bonemeal applied: 28 Apr. Weedkiller applied: 4 May.
Fungicides and insecticide applied: 30 June. Combine harvested:
10 Aug.
Grass section: P, K and bonemeal treatments applied: 23 Feb, 1983.
N applied: 10 Mar. Cut: 30 June. N applied: 13 July. Cut: 15 Nov.

GRASS

DRY MATTER TONNES/HECTARE

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

	1ST CUT(30/6/83)	2ND CUT(15/11/83)	TOTAL OF 2 CUTS
MANURE			
(D)N	5.40	0.85	6.25
BN	5.23	0.68	5.91
(N)P2N	5.31	0.57	5.89
(P)P1N	4.97	0.47	5.44
(K)P2KN	5.84	0.86	6.70
(-)P2N	5.94	1.07	7.02
(PK)P1KN	6.12	1.21	7.33
(NK)P2KN	6.46	1.52	7.98
(NP)P1N	5.57	1.08	6.65
(NPK)P1KN	5.91	1.30	7.20
MEAN	5.68	0.96	6.64
MEAN DM%	29.3	42.0	35.7

PLOT AREA HARVESTED 0.00095

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83/S/RN/1

W.WHEAT

GRAIN TONNES/HECTARE

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

N / MANURE	120	160	200	240	MEAN
(D)P2N	9.76	9.95	8.49	8.87	9.27
BN	8.94	8.38	8.78	7.72	8.46
(N)P2N	7.81	8.24	8.95	8.12	8.28
(P)P1N	8.95	8.27	7.71	9.43	8.59
(K)P2KN	9.85	11.40	10.00	9.75	10.25
(-)P2N	9.48	9.02	8.81	9.82	9.28
(PK)P1KN	+	9.98*	10.08*	+	
(NK)P2KN	11.00	10.13	10.31	9.41	10.21
(NP)P1N	9.19	9.06	10.12	8.93	9.32
(NPK)P1KN	10.27*	+	+	10.00*	

* THESE PLOTS WERE DUPLICATED

\+ TREATMENT COMBINATION MISSING

GRAIN MEAN DM% 82.0

PLOT AREA HARVESTED 0.00075

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83/S/RN/1

W.BEANS

GRAIN TONNES/HECTARE

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

MANURE	
(D)P2	3.08
B	2.47
(N)P2	2.39
(P)P1	3.01
K)P2K	4.16
(-)P2	3.18
PK)P1K	4.63
(NK)P2K	4.40
(NP)P1	3.07
(NPK)P1K	4.67
MEAN	3.51

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

TABLE	MANURE
SED	0.215

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.215	6.1

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00556

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83/S/RN/1

S. BARLEY

GRAIN TONNES/HECTARE

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

TREATMNT MANURE	CNVNTIAL	SUBDUG	SUBDUG+F	MEAN
(D)P2N	5.11	5.76	5.72	5.53
BN	4.14	4.57	4.60	4.44
(N)P2N	4.48	4.67	4.58	4.58
(P)P1N	3.96	4.05	4.37	4.13
(K)P2KN	4.83	4.44	4.49	4.59
(-)P2N	4.88	4.75	4.66	4.76
(PK)P1KN	4.46	4.76	4.57	4.59
(NK)P2KN	4.58	4.76	5.05	4.79
(NP)P1N	3.86	4.05	4.35	4.09
(NPK)P1KN	4.30	4.47	4.51	4.43
MEAN	4.46	4.63	4.69	4.59

N MANURE	30	60	90	120	MEAN
(D)P2N	3.47	5.67	5.93	7.05	5.53
BN	2.73	4.63	4.83	5.55	4.44
(N)P2N	2.86	3.86	5.57	6.01	4.58
(P)P1N	2.37	3.70	4.74	5.70	4.13
(K)P2KN	2.73	4.23	5.40	5.99	4.59
(-)P2N	2.80	4.37	5.46	6.41	4.76
(PK)P1KN	2.33	4.24	5.56	6.24	4.59
(NK)P2KN	2.82	4.38	5.62	6.36	4.79
(NP)P1N	2.34	3.65	4.93	5.43	4.09
(NPK)P1KN	2.77	3.79	5.13	6.01	4.43
MEAN	2.72	4.25	5.32	6.07	4.59

N TREATMNT	30	60	90	120	MEAN
CNVNTIAL	2.59	4.16	5.31	5.78	4.46
SUBDUG	2.93	4.10	5.30	6.18	4.63
SUBDUG+F	2.65	4.50	5.35	6.26	4.69
MEAN	2.72	4.25	5.32	6.07	4.59

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83/S/RN/1

S. BARLEY

GRAIN TONNES/HECTARE

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

MANURE	N / TREATMNT	30	60	90	120
(D)P2N	CNVNTIAL	3.19	5.00	5.58	6.66
	SUBDUG	3.46	6.16	6.37	7.06
	SUBDUG+F	3.75	5.85	5.83	7.42
BN	CNVNTIAL	2.64	4.30	4.56	5.05
	SUBDUG	3.91	4.36	4.25	5.76
	SUBDUG+F	1.64	5.23	5.68	5.85
(N)P2N	CNVNTIAL	3.02	3.92	5.52	5.45
	SUBDUG	3.46	3.42	5.49	6.32
	SUBDUG+F	2.11	4.24	5.71	6.27
(P)P1N	CNVNTIAL	2.32	3.44	4.84	5.25
	SUBDUG	2.53	3.51	4.62	5.55
	SUBDUG+F	2.28	4.14	4.77	6.30
(K)P2KN	CNVNTIAL	3.16	4.59	5.43	6.15
	SUBDUG	2.01	3.96	5.99	5.78
	SUBDUG+F	3.01	4.13	4.79	6.02
(-)P2N	CNVNTIAL	2.77	4.50	6.19	6.06
	SUBDUG	2.79	4.63	5.17	6.43
	SUBDUG+F	2.85	3.98	5.03	6.75
(PK)P1KN	CNVNTIAL	1.74	4.37	5.66	6.04
	SUBDUG	2.75	3.95	5.99	6.34
	SUBDUG+F	2.49	4.41	5.03	6.34
(NK)P2KN	CNVNTIAL	2.26	4.24	5.84	5.96
	SUBDUG	2.90	4.06	5.63	6.45
	SUBDUG+F	3.30	4.85	5.39	6.65
(NP)P1N	CNVNTIAL	1.98	3.62	4.85	5.00
	SUBDUG	2.51	3.21	4.69	5.80
	SUBDUG+F	2.52	4.13	5.25	5.49
(NPK)P1KN	CNVNTIAL	2.83	3.58	4.58	6.20
	SUBDUG	2.96	3.78	4.82	6.31
	SUBDUG+F	2.51	4.01	6.01	5.51

GRAIN MEAN DM% 84.6

SUB PLOT AREA HARVESTED 0.00081

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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 and of fresh dressings since - Saxmundham.

Sponsor: A.E. Johnston.

The 14th year of revised scheme, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-82/S/RN/2.

Whole plot dimensions: 5.49 x 39.8.

Treatments: From 1899-1964 the experiment tested farmyard manure and nitrogen and phosphate fertilizers 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, s. barley, sugar beet, s. barley - were grown until 1974. The whole experiment was sown to s. barley in 1975 and 1976, alternating w. wheat and s. barley from 1977 to 1979, alternating w. beans and w. wheat in 1980 and 1981, w. wheat alone in 1982 and 1983. Combinations of the following treatments were tested on second and third wheats after beans in 1980 and 1981:

Whole plots

1. RESIDUE — Residues of previous treatments:-

		Approximate total dressing 1899-1964	Total dressing 1965-1967
(0)0	Plot 1	None	None
(D)0	Plot 2	400 tonnes FYM	None
(DP)0	Plot 3	400 tonnes FYM, 2.7 tonnes P205	None
(DP)D2	Plot 4	400 tonnes FYM, 2.7 tonnes P205	100 tonnes FYM
(DP)D2P1	Plot 5	400 tonnes FYM, 2.7 tonnes P205	100 tonnes FYM, 0.56 tonnes P205
(DP)P1	Plot 6	400 tonnes FYM, 2.7 tonnes P205	0.56 tonnes P205
(DP)P2	Plot 7	400 tonnes FYM, 2.7 tonnes P205	1.13 tonnes P205
(DP52)0	Plot 8	326 tonnes FYM, 4.3 tonnes P205 (until 1952 only)	None

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83/S/RN/2

Sub plots

2. P — Phosphate (total P_2O_5 applied in each period (kg)):

	1969-71	1973-75	1978*	1980*	1982*
(0)(0)0	0	0	0	0	0
(0)(3)0	0	378	0	0	0
(1)(3)1	126	378	120	120	120
(2)(3)1	252	378	120	120	120
(3)(3)0	378	378	0	0	0

* 1978, 1980 and 1982 are the years of application for third wheat in 1983. Years of application for second wheat in 1983 were 1979, 1981 and 1983.

and some of the combinations of 2 with:-

3. N — Nitrogen fertilizer in spring (kg N) as 'Nitro-Chalk' in addition to 40 kg N at sowing:

80
120
160
200

NOTE: Plots with the combinations of RESIDUE (DP)D2, (DP)D2P1, (DP)P1, (DP)P2 with P(3)(3)(0) were used for N15 studies, yields not taken.

Basal applications: Manures: K_2O at 188 kg as muriate of potash. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l with isoproturon at 2.5 kg and with the permethrin. Fungicides: Benomyl at 0.28 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg in 220 l with captafol at 1.0 kg and with the pirimicarb. Insecticides: Permethrin at 0.05 kg. Pirimicarb at 0.14 kg.

Seed: Hustler, sown at 180 kg.

Cultivations, etc.:- K applied: 2 Sept, 1982. Test P applied for second wheat after beans only: 3 Sept. Ploughed: 15 Sept. Seed sown: 30 Sept. 'Brittox', isoproturon and permethrin applied: 28 Oct. Test N applied: 27 Apr, 1983. Benomyl applied: 4 May. Carbendazim, maneb, tridemorph, captafol and pirimicarb applied: 30 June. Combine harvested: 10 Aug.

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83/S/RN/2

2ND WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

RESIDUE	N P	80	120	160	200
(0)0	(0)(0)0	4.73	5.34		
(0)0	(0)(3)0			5.29	7.51
(0)0	(1)(3)1		8.01		8.98
(0)0	(2)(3)1	7.79		8.54	
(0)0	(3)(3)0	6.71		7.38	
(D)0	(0)(0)0			7.05	6.32
(D)0	(0)(3)0	7.07	7.31		
(D)0	(1)(3)1	7.71		8.56	
(D)0	(2)(3)1		8.22		7.24
(D)0	(3)(3)0		7.30		7.74
(DP)0	(0)(0)0	7.10	7.35		
(DP)0	(0)(3)0			8.07	8.36
(DP)0	(1)(3)1		8.25		8.08
(DP)0	(2)(3)1	7.63		8.35	
(DP)0	(3)(3)0	7.06		7.70	
(DP)D2	(0)(0)0			7.52	8.08
(DP)D2	(0)(3)0	6.89	7.65		
(DP)D2	(1)(3)1		8.31		8.01
(DP)D2	(2)(3)1	7.61		8.77	
(DP)D2P1	(0)(0)0	7.17	8.05		
(DP)D2P1	(0)(3)0			7.67	7.08
(DP)D2P1	(1)(3)1		7.53		7.89
(DP)D2P1	(2)(3)1	7.80		7.76	
(DP)P1	(0)(0)0	7.55	8.10		
(DP)P1	(0)(3)0			8.31	7.89
(DP)P1	(1)(3)1	7.30		8.40	
(DP)P1	(2)(3)1		8.52		8.01
(DP)P2	(0)(0)0			7.87	7.80
(DP)P2	(0)(3)0	7.70	7.32		
(DP)P2	(1)(3)1	7.17		7.73	
(DP)P2	(2)(3)1		8.25		7.57
(DP52)0	(0)(0)0			7.32	6.63
(DP52)0	(0)(3)0	7.34	7.93		
(DP52)0	(1)(3)1	6.76		8.53	
(DP52)0	(2)(3)1		8.27		7.60
(DP52)0	(3)(3)0		8.12		7.20

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00075

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83/S/RN/2

3RD WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

RESIDUE	N P	80	120	160	200
(0)0	(0)(0)0			5.44	6.94
(0)0	(0)(3)0	5.26	5.62		
(0)0	(1)(3)1	7.32		8.40	
(0)0	(2)(3)1		8.70		8.19
(0)0	(3)(3)0		8.46		7.39
(D)0	(0)(0)0	6.31	7.82		
(D)0	(0)(3)0			8.15	7.36
(D)0	(1)(3)1		7.21		8.31
(D)0	(2)(3)1	7.01		8.09	
(D)0	(3)(3)0	6.84		7.46	
(DP)0	(0)(0)0			7.62	8.62
(DP)0	(0)(3)0	7.35	7.68		
(DP)0	(1)(3)1	7.43		8.58	
(DP)0	(2)(3)1		8.27		8.13
(DP)0	(3)(3)0		8.45		7.85
(DP)D2	(0)(0)0	7.14	8.30		
(DP)D2	(0)(3)0			8.82	8.52
(DP)D2	(1)(3)1	7.78		8.54	
(DP)D2	(2)(3)1		8.58		8.76
(DP)D2P1	(0)(0)0			8.34	8.41
(DP)D2P1	(0)(3)0	7.99	8.60		
(DP)D2P1	(1)(3)1	7.87		8.57	
(DP)D2P1	(2)(3)1		8.46		8.69
(DP)P1	(0)(0)0			8.53	8.40
(DP)P1	(0)(3)0	7.62	8.32		
(DP)P1	(1)(3)1		8.19		8.69
(DP)P1	(2)(3)1	7.83		8.93	
(DP)P2	(0)(0)0	7.32	8.36		
(DP)P2	(0)(3)0			8.44	7.74
(DP)P2	(1)(3)1		8.35		8.29
(DP)P2	(2)(3)1	7.55		8.67	
(DP52)0	(0)(0)0	7.26	7.79		
(DP52)0	(0)(3)0			8.18	7.87
(DP52)0	(1)(3)1		7.45		8.31
(DP52)0	(2)(3)1	7.70		7.99	
(DP52)0	(3)(3)0	7.32		8.05	

GRAIN MEAN DM% 84.6

PLOT AREA HARVESTED 0.00075

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83/R/RN/1 and 83/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. From 1968, continuous w. wheat was grown on some blocks after the three test crops to study the build-up and decline of take-all (Gaeumannomyces graminis) after the different cropping sequences. From 1977 new crop sequences were introduced on these blocks - Highfield and Fosters.

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

The 35th year, old grass, leys, sugar beet, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-82/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (83/R/RN/1)

FOSTERS — A site with little organic matter initially (83/R/RN/2)

ROTATION — Treatments: The experiment originally tested four six-course rotations, with all phases present each year. For many years these rotations were:-

	Treatment crops	Test crops
LUCERNE	LU, LU, LU	W, P, B
CLOGRA	LC, LC, LC	W, P, B
GRASS	LN, LN, LN	W, P, B
ARABLE	H, SB, O	W, P, B

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

From 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.

From 1975 the s. barley test crop was changed to w. 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

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.

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83/R/RN/1 and 83/R/RN/2

From 1968 only two phases on each field continued in the original six-course rotation (the museum blocks). The four other phases (the new sequence blocks) were sown to w. wheat every year at the end of the test-crop cycle. In 1977, 1978, 1979 and 1980 one phase, fallowed in the previous year started new sequences of treatment cropping:

SEQUENCE		Treatment crops	Test crops
LUCERNE	(previously LUCERNE)	LU, LU, LU	W, W, W, W
CLOGRA	(previously CLOGRA)	LC, LC, LC	W, W, W, W
GRASS/G	(previously GRASS)	R, R, R	W, W, W, W
ARABLE/A	(previously ARABLE)	O, P, BE	W, W, W, W
ARABLE/R	(previously RESEEDED)	B, B, W	W, W, W, W
GRASS/OG	(previously OLDGRASS)	R, R, R	W, W, W, W

R = ryegrass, BE = s. beans. Other symbols as above. All ploughed at the end of the treatment crop cycle except GRASS/OG - direct drilled to 1st and 2nd w. wheats, ploughed thereafter. Treatment crop cycles started after nine previous cereals followed by one fallow.

Additional treatments to 2nd test crop w. wheat in the museum blocks:-

Sub plots

FYMRES70 Farmyard manure residues, last applied 1970:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1983 (kg N) as 'Nitro-Chalk':

0
50
100
150

Additional treatments to 1st, 2nd, 3rd and 4th test crops w. wheat in the new sequence blocks:

Sub plots

N Nitrogen fertilizer in 1983 (kg N) as 'Nitro-Chalk':

0
50
100
150

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83/R/RN/1 and 83/R/RN/2

Standard applications:
- Museum blocks:
  - 2nd Treatment crops:
    - Lucerne: Manures: (0:18:36) at 620 kg.
    - All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg in spring and after each cut except the last.
    - Clover-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg in spring (in error).
    - Sugar beet: Manures: (10:10:15+Mg) at 1640 kg. Weedkillers: Glyphosate at 1.4 kg in 500 l. Chloridazon at 2.6 kg in 250 l. Insecticide: Demeton-S-Methyl at 0.24 kg in 250 l.
  - 2nd Test crop:
    - W. wheat: Manures: (0:20:20) at 250 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.0 kg in 250 l.
    - Reseeded grass and old grass: Manures: (0:18:36) at 420 kg. All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.
- New sequence blocks:
  - 1st, 2nd, 3rd and 4th Test crops:
    - W. Wheat: Manures: (0:20:20) at 250 kg, combine drilled. Weedkillers: Glyphosate at 1.4 kg in 250 l, to all except 1st test after LUCERNE, CLOGRA and GRASS/G. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.0 kg in 250 l.

Seed:
- Museum blocks:
  - Sugar beet: Monoire, sown at 490,000 seeds per ha.
  - W. wheat: Flanders, sown at 200 kg.
- New sequence blocks:
  - W. wheat: Flanders, sown at 200 kg.

Cultivations, etc.:-
- Museum blocks:
  - 2nd Treatment crops:
    - Lucerne: PK applied: 11 Jan, 1983. Cut: 10 June, 1 Aug, 31 Oct.
    - All-grass ley and clover-grass ley: PK applied: 11 Jan, 1983. NK applied: 25 Mar to both leys and on 17 June, 3 Aug to all-grass ley only. Cut: 6 June, 1 Aug, 31 Oct (Highfield), 1 Nov (Fosters).
    - Sugar beet: Glyphosate applied: 20 Nov, 1982. Ploughed: 11 Jan, 1983. NPK Mg applied: 14 Apr. Rotary harrowed, chloridazon applied, seed sown: 29 Apr. Singled: 14 June. Insecticide applied: 17 June. Lifted: 3 Nov.
  - 2nd Test crop:
    - W. wheat: Spring-tine cultivated: 31 Oct, 1982. PK applied: 11 Nov. Rotary harrowed, seed sown, spring-tine cultivated: 18 Nov. N treatments applied: 14 Apr, 1983 (Fosters), 15 Apr (Highfield). Weedkillers applied: 28 Apr. Combine harvested: 11 Aug (Fosters), 13 Aug (Highfield).
    - Re-seeded grass and old grass: PK applied: 11 Jan, 1983. NK applied to all-grass half-plots: 25 Mar, 17 June, 3 Aug. Cut: 6 June, 1 Aug, 31 Oct (Highfield), 1 Nov (Fosters).

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83/R/RN/1 and 83/R/RN/2

New sequence blocks:

1st Test crop:

W. wheat: After lucerne, clover-grass, and ryegrass (except GRASS/OG): Ploughed: 2 Aug, 1982. Glyphosate applied to GRASS/OG: 3 Aug. Spring-tine cultivated after lucerne, clover-grass and ryegrass (except GRASS/OG): 27 Aug. Glyphosate applied after wheat: 8 Sept. Glyphosate applied after beans: 10 Sept. Ploughed after beans and wheat: 27 Sept (Fosters), 28 Sept (Highfield). Spring-tine cultivated: 31 Oct (Fosters), 1 Nov (Highfield, except GRASS/OG). PK applied, rotary harrowed, seed sown: 11 Nov. GRASS/OG direct drilled: 17 Nov. N treatments applied: 14 Apr, 1983 (Fosters), 15 Apr (Highfield). 'Brittox' and isoproturon applied: 28 Apr. Combine harvested: 11 Aug (Fosters), 13 Aug (Highfield).

2nd, 3rd and 4th Test crops:

W. wheat: Glyphosate applied: 8 Sept, 1982. Ploughed: 27 Sept (Fosters), 28 Sept (Highfield, except 2nd test GRASS/OG). Spring-tine cultivated: 31 Oct (Fosters), 1 Nov (Highfield, except 2nd test GRASS/OG). PK applied, rotary harrowed, seed sown: 11 Nov. 2nd test GRASS/OG direct drilled, spring-tine cultivated: 17 Nov. N treatments applied: 14 Apr, 1983 (Fosters), 15 Apr (Highfield). 'Brittox' and isoproturon applied: 28 Apr. Combine harvested: 11 Aug (Fosters), 13 Aug (Highfield).

NOTE: Due to waterlogging two plots were lost on Highfield 2nd test crop, new sequence blocks wheat, those with treatment combinations:-

SEQUENCE	GRASS/OG	GRASS/OG
N	0	150

Also on 4th test crop one plot was lost with treatment combinations:-

SEQUENCE	CLOGRA
N	0

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83/R/RN/1 AND 83/R/RN/2

MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
TOTAL OF 3 CUTS	9.96	9.55
MEAN DM%	26.1	26.1
ALL GRASS LEY		
TOTAL OF 3 CUTS	13.64	11.98
MEAN DM%	24.6	24.1
LUCERNE		
TOTAL OF 3 CUTS	5.48	10.24
MEAN DM%	26.2	26.0
OLD GRASS		
TOTAL OF 3 CUTS		

	HIGHFIELD	
	C	N
35TH EXPTL YEAR		
BLOCKS 1 & 4	6.12	11.54
BLOCK 2	6.11	11.24
MEAN DM%	23.6	19.8

RESEEDED GRASS

TOTAL OF 3 CUTS

	HIGHFIELD		FOSTERS		
	BLOCKS	C	N	BLOCKS	C	N
35TH EXPTL YEAR	1 & 4	6.09	11.49	1 & 3	8.02	11.25
35TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	6.70	12.52	2 & 4	7.71	9.54
MEAN DM%		24.7	22.4		21.9	22.3

SUGAR BEET	HIGHFIELD	FOSTERS
ROOTS (WASHED)	45.5	39.4
SUGAR PERCENTAGE	17.5	16.7
TOTAL SUGAR	7.97	6.61
TOPS	23.6	26.7

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83/R/RN/1 HIGHFIELD

W.WHEAT 2ND TEST CROP - MUSEUM BLOCKS

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	MEAN
SEQUENCE			
LUCERNE	5.31	5.22	5.27
CLOGRA	4.53	4.93	4.73
GRASS	4.72	4.59	4.66
ARABLE	4.38	3.99	4.19
MEAN	4.73	4.69	4.71

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	3.84	5.08	6.23	5.90	5.27
CLOGRA	3.53	5.08	5.26	5.06	4.73
GRASS	3.69	4.55	5.16	5.24	4.66
ARABLE	2.52	4.19	4.95	5.09	4.19
MEAN	3.40	4.73	5.40	5.32	4.71

N	0	50	100	150	MEAN
FYMRES70					
NONE	3.46	5.00	5.14	5.34	4.73
FYM	3.33	4.46	5.66	5.31	4.69
MEAN	3.40	4.73	5.40	5.32	4.71

N		0	50	100	150
FYMRES70	SEQUENCE				
NONE	LUCERNE	3.93	5.53	6.06	5.70
	CLOGRA	3.45	5.10	4.49	5.09
	GRASS	3.82	4.84	5.05	5.17
	ARABLE	2.65	4.52	4.96	5.39
FYM	LUCERNE	3.75	4.64	6.40	6.11
	CLOGRA	3.61	5.07	6.03	5.03
	GRASS	3.56	4.27	5.26	5.30
	ARABLE	2.40	3.85	4.94	4.78

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00663

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83/R/RN/2 FOSTERS

W.WHEAT 2ND TEST CROP - MUSEUM BLOCKS

GRAIN TONNES/HECTARE

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

FYMRES70	NONE	FYM	MEAN
SEQUENCE			
LUCERNE	5.68	6.06	5.87
CLOGRA	5.42	5.30	5.36
GRASS	4.48	4.87	4.67
ARABLE	4.51	4.46	4.48
MEAN	5.02	5.17	5.10

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	5.03	6.40	6.15	5.90	5.87
CLOGRA	4.51	5.69	5.62	5.64	5.36
GRASS	3.51	4.58	5.29	5.31	4.67
ARABLE	2.64	4.23	5.77	5.30	4.48
MEAN	3.92	5.22	5.71	5.54	5.10

N	0	50	100	150	MEAN
FYMRES70					
NONE	3.78	5.20	5.50	5.61	5.02
FYM	4.06	5.24	5.92	5.46	5.17
MEAN	3.92	5.22	5.71	5.54	5.10

N		0	50	100	150
FYMRES70	SEQUENCE				
NONE	LUCERNE	4.72	6.19	5.30	6.51
	CLOGRA	4.18	6.48	5.24	5.80
	GRASS	3.42	4.36	5.00	5.14
	ARABLE	2.82	3.79	6.45	5.00
FYM	LUCERNE	5.34	6.61	7.00	5.29
	CLOGRA	4.83	4.90	6.00	5.47
	GRASS	3.60	4.80	5.58	5.48
	ARABLE	2.46	4.67	5.09	5.61

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00663

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83/R/RN/1 HIGHFIELD

W.WHEAT 1ST TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	5.93	6.44	5.89	6.22	6.12
CLOGRA	5.47	6.23	5.90	4.86	5.62
GRASS/G	3.96	5.44	5.70	5.46	5.14
ARABLE/A	4.59	5.46	6.52	6.20	5.69
ARABLE/R	3.87	4.19	5.60	5.41	4.77
GRASS/OG	2.96	3.68	3.53	5.19	3.84
MEAN	4.46	5.24	5.52	5.56	5.20

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.327	0.186	0.512
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.455

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.327	6.3
BLOCK.WP.SP	18	0.455	8.8

GRAIN MEAN DM% 87.0

SUB PLOT AREA HARVESTED 0.00325

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83/R/RN/1 HIGHFIELD

W.WHEAT 2ND TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	3.56	5.65	5.94	5.98	5.28
CLOGRA	3.23	5.31	6.17	5.89	5.15
GRASS/G	4.38	5.91	6.55	6.40	5.81
ARABLE/A	3.21	4.52	5.69	6.19	4.90
ARABLE/R	3.89	5.50	6.25	6.03	5.42
GRASS/OG	3.47	4.19	4.58	5.29	4.39
MEAN	3.62	5.18	5.86	5.97	5.16

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.194	0.222	0.509
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.544

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.194	3.8
BLOCK.WP.SP	16	0.544	10.5

GRAIN MEAN DM% 86.6

SUB PLOT AREA HARVESTED 0.00322

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83/R/RN/1 HIGHFIELD

W.WHEAT 3RD TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	2.90	4.43	5.72	5.03	4.52
CLOGRA	2.23	4.33	5.28	6.04	4.47
GRASS/G	2.78	4.30	5.08	5.22	4.34
ARABLE/A	2.58	3.84	5.16	5.51	4.27
ARABLE/R	3.64	4.57	6.12	5.85	5.04
GRASS/OG	4.24	5.89	5.81	5.78	5.43
MEAN	3.06	4.56	5.53	5.57	4.68

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.377	0.154	0.499
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.378

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.377	8.0
BLOCK.WP.SP	18	0.378	8.1

GRAIN MEAN DM% 86.6

SUB PLOT AREA HARVESTED 0.00322

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W.WHEAT 4TH TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N / SEQUENCE	0	50	100	150	MEAN
LUCERNE	2.86	3.37	4.82	4.69	3.93
CLOGRA	2.50	3.71	4.03	5.35	3.90
GRASS/G	2.39	4.26	4.79	5.15	4.15
ARABLE/A	2.50	4.33	5.43	5.82	4.52
ARABLE/R	3.19	4.76	6.08	5.78	4.95
GRASS/OG	3.75	4.63	5.88	6.15	5.10
MEAN	2.87	4.18	5.17	5.49	4.43

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.354	0.184	0.527
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.451

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.354	8.0
BLOCK.WP.SP	17	0.451	10.2

GRAIN MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00322

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83/R/RN/2 FOSTERS

W.WHEAT 1ST TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	6.23	7.25	7.17	6.64	6.82
CLOGRA	5.69	6.60	6.60	6.26	6.29
GRASS/G	5.35	5.79	6.27	6.10	5.88
ARABLE/A	4.53	6.96	6.57	7.20	6.31
ARABLE/R	4.21	5.62	6.16	6.49	5.62
MEAN	5.20	6.45	6.55	6.54	6.19

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.283	0.108	0.352
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.240

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.283	4.6
BLOCK.WP.SP	15	0.240	3.9

GRAIN MEAN DM% 85.5

SUB PLOT AREA HARVESTED 0.00325

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83/R/RN/2 FOSTERS

W.WHEAT 2ND TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	4.75	6.26	7.29	7.24	6.38
CLOGRA	4.31	6.13	6.20	7.25	5.97
GRASS/G	4.28	6.06	6.70	6.70	5.94
ARABLE/A	3.18	5.17	5.66	6.28	5.07
ARABLE/R	3.83	5.75	6.51	6.18	5.57
MEAN	4.07	5.87	6.47	6.73	5.79

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.160	0.186	0.394
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.416

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.160	2.8
BLOCK.WP.SP	15	0.416	7.2

GRAIN MEAN DM% 85.7

SUB PLOT AREA HARVESTED 0.00322

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83/R/RN/2 FOSTERS

WHEAT 3RD TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	3.35	4.74	6.19	6.20	5.12
CLOGRA	4.12	5.83	6.36	6.87	5.80
GRASS/G	3.71	5.20	6.90	6.69	5.62
ARABLE/A	3.12	4.40	6.48	6.14	5.03
ARABLE/R	3.97	4.77	6.22	6.17	5.28
MEAN	3.65	4.99	6.43	6.41	5.37

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.151	0.228	0.467
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.510

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.151	2.8
BLOCK.WP.SP	15	0.510	9.5

GRAIN MEAN DM% 85.8

SUB PLOT AREA HARVESTED 0.00322

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83/R/RN/2 FOSTERS

WHEAT 4TH TEST CROP - NEW SEQUENCE BLOCKS

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	3.28	5.38	6.59	6.74	5.50
CLOGRA	4.18	5.77	6.10	6.55	5.65
GRASS/G	4.01	5.29	6.69	6.51	5.63
ARABLE/A	3.69	4.89	6.38	6.96	5.48
ARABLE/R	3.68	4.75	6.50	6.62	5.39
MEAN	3.77	5.22	6.45	6.68	5.53

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.155	0.159	0.344
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.355

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.155	2.8
BLOCK.WP.SP	15	0.355	6.4

GRAIN MEAN DM% 86.3

SUB PLOT AREA HARVESTED 0.00322

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83/W/RN/3

LEY/ARABLE

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

Sponsor: A.E. Johnston.

The 46th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-82/W/RN/3.

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

Whole plot dimensions: 8.53 x 40.7.

Treatments: All phases of four five-course rotations were originally present:

ROTATION

LEY	Clover/grass ley:	L, L, L, P, W
CLO	All legume ley:	SA, SA, SA, P, W until 1971 then CL, CL, CL, P, W
A	Arable with roots:	P, R, C, P, W until 1971 then P, B, B, P, W
A H	Arable with hay:	P, R, H, P, W until 1971 then P, B, H, P, W

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

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated

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

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

LN 3	(Previous LEY) LN, LN, LN, W, B
LC 3	(Previous CLO) LC, LC, LC, W, B
AF	(Previous A) F, F, BE, W, B
AB	(Previous A H) B, B, BE, W, B

LN = grass ley with N, LC = clover/grass ley no N, BE = s. beans (s. oats until 1980, failed in 1983 and replaced by potatoes), F = fallow

Plots hitherto in alternating rotations were changed to test eight-year leys:

LN 8	LN, LN, LN, LN, LN, LN, LN, LN, W, B
LC 8	LC, LC, LC, LC, LC, LC, LC, LC, W, B

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The new scheme started by sowing these new leys in spring 1976 on four phases and in spring 1977 on the fifth phase (2nd test crop in 1976).

Yields are taken only from the test crops.

Treatments to first test crop w. wheat, all combinations of:

Whole plots

1. ROTATION — Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

2. FYMRES62 — Farmyard manure residues, last applied 1962:

   NONE — None
   FYM — 38 tonnes on each occasion

1/8 plots

3. N — Nitrogen fertilizer (kg N):

   0
   70
   140
   210

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

Whole plots

1. ROTATION — Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

2. FYMRES66 — Farmyard manure residues, last applied 1966:

   NONE — None
   FYM — 38 tonnes on each occasion

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1/8 plots

3.	N	Nitrogen fertilizer (kg N):
	0	None
	60+60	60 kg to seedbed + 60 kg in June
	120+60	120 kg to seedbed + 60 kg in June
	180+60	180 kg to seedbed + 60 kg in June

NOTE: June nitrogen fertilizer was applied because of much leaching in the wet spring and consequent poor crop growth.

Corrective K dressings (kg K_2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block:

Continuous rotations	No FYM half plots	FYM half plots
LN	276	276
LC	188	163
AF	289	251
AB	264	264
Ex-alternating rotations		
LN 8 ploughed for w. wheat	226	251
LN 8 not ploughed	301	163
LC 8 ploughed for w. wheat	0	0
LC 8 not ploughed	251	0

Standard applications:-

Grass ley and clover/grass, 1st year: Manures: (0:18:36) at 420 kg. N at 75 kg as 'Nitro-Chalk' to grass ley only. Weedkiller: Glyphosate at 1.5 kg in 280 l.

Grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:18:36) at 410 kg. (25:0:16) at 300 kg in spring and after the first cut.

Clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Manures: Magnesian limestone at 5.0 t to 5th year only. (0:18:36) at 410 kg. K_2O at 48 kg as muriate of potash in spring and after the first cut.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg, N at 60 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Fallow, 1st treatment crop: Weedkiller: Paraquat 0.84 kg ion in 280 l.

S. beans: 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkiller: Trietazine at 0.76 kg with simazine at 0.11 kg in 280 l.

Potatoes, 3rd treatment crop: Manures: (10:10:15+4.5 Mg) at 1990 kg. Weedkillers: Linuron at 1.0 kg with paraquat at 0.40 kg ion in 250 l. Fungicides: Mancozeb at 1.4 kg in 250 l applied three times, with insecticide on the first and third occasions. Fentin hydroxide at 0.28 kg in 250 l applied five times, with insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg on six occasions.

W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with fungicide in 250 l. Fungicide: Prochloraz at 0.40 l. Nematicide: Aldicarb at 10 kg.

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83/W/RN/3

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 300 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Nematicide: Aldicarb at 10 kg.

Varieties: Grass ley: Climax timothy at 17 kg, meadow fescue at 17 kg, mixture sown at 34 kg.
Clover/grass ley: Climax timothy at 18 kg, meadow fescue at 15 kg, Huia white clover at 4 kg, mixture sown at 37 kg.
S. barley: Triumph, dressed with triadimenol and fuberidazole, sown at 160 kg.
S. beans: Minden, sown at 270 kg.
W. wheat: Avalon, sown at 190 kg.
Potatoes: Cara

NOTE: 3rd treatment crop of spring beans failed and was replaced by potatoes.

Cultivations, etc.:- Treatment crops:

Grass ley and clover/grass ley, 1st year: Ploughed: 8 Oct, 1982. Spring-tine cultivated: 8 Mar, 1983. PK applied, N applied to grass ley only: 13 Apr. Weedkiller applied: 16 May. Rotary cultivated: 7 June. Seeds sown: 9 June. Topped: 2 Aug, 15 Aug.

Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Corrective K applied to 4th year only: 1 Oct, 1982. Magnesian limestone applied to 5th year only: 5 Oct. PK applied: 12 Jan, 1983. NK applied to grass ley, K applied to clover/grass ley: 17 Mar, 7 July. Cut: 17 June, 23 Aug.

S. barley, 1st and 2nd treatment crops: Ploughed, 2nd treatment crop: 21 Sept, 1982, 1st treatment crop: 8 Oct. Heavy spring-tine cultivated 2nd treatment crop, spring-tine cultivated 1st treatment crop: 8 Mar, 1983. NPK applied: 9 Mar. Spring-tine cultivated with crumbler attached, seed sown: 10 Mar. Weedkillers applied: 26 May. N applied: 6 June. Combine harvested: 10 Aug.

S. beans/Potatoes, 3rd treatment crop: Ploughed: 21 Sept, 1982. Heavy spring-tine cultivated: 8 Mar, 1983. PK applied: 9 Mar. Rotary cultivated, seed sown: 17 Mar. Trietazine with simazine applied: 29 Mar. NPK with Mg applied, rotary cultivated, potatoes planted: 27 May. Rotary ridged, linuron with paraquat applied: 7 June. Mancozeb applied: 22 June, 1 July, 8 July. Fentin hydroxide applied: 18 July, 29 July, 11 Aug, 26 Aug, 9 Sept. Insecticide applied: 22 June, 8 July, 18 July, 29 July, 11 Aug, 26 Aug. Haulm mechanically destroyed: 15 Sept. Lifted: 16 Sept.

Test crops:

W. wheat, 1st test crop: Glyphosate applied: 10 Sept, 1982. Ploughed: 24 Sept. PK applied: 30 Sept. Corrective K and aldicarb applied, rotary cultivated, seed sown: 1 Oct. N applied: 6 Apr, 1983. 'Brittox' with prochloraz applied: 15 Apr. Combine harvested: 12 Aug.

S. barley, 2nd test crop: Magnesian limestone applied: 5 Oct, 1982. Ploughed: 8 Oct. Spring-tine cultivated: 8 Mar, 1983. PK applied: 9 Mar. Aldicarb applied, rotary cultivated, seed sown: 10 Mar. N applied: 14 Mar. 'Herrisol' applied: 26 May. Extra N applied: 6 June. Combine harvested: 6 Aug.

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83/W/RN/3

W.WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	MEAN
ROTATION			
LN 8	6.75	6.29	6.52
LN 3	6.46	7.17	6.81
LC 8	8.22	9.02	8.62
LC 3	8.14	8.74	8.44
AF	7.26	6.98	7.12
AB	6.65	6.98	6.81
MEAN	7.25	7.53	7.39

N	0	70	140	210	MEAN
ROTATION					
LN 8	4.45	7.23	7.48	6.93	6.52
LN 3	3.86	7.05	8.06	8.28	6.81
LC 8	7.39	9.64	8.80	8.66	8.62
LC 3	6.36	9.67	9.34	8.40	8.44
AF	3.76	6.79	8.50	9.43	7.12
AB	4.11	6.28	8.70	8.17	6.81
MEAN	4.99	7.78	8.48	8.31	7.39

N	0	70	140	210	MEAN
FYMRES62					
NONE	4.94	7.48	8.30	8.26	7.25
FYM	5.03	8.07	8.66	8.36	7.53
MEAN	4.99	7.78	8.48	8.31	7.39

N		0	70	140	210
ROTATION	FYMRES62				
LN 8	NONE	4.99	7.23	7.31	7.48
	FYM	3.91	7.23	7.65	6.38
LN 3	NONE	3.61	6.74	7.40	8.07
	FYM	4.10	7.36	8.71	8.49
LC 8	NONE	7.21	8.79	8.95	7.95
	FYM	7.56	10.49	8.65	9.37
LC 3	NONE	5.85	9.15	9.32	8.25
	FYM	6.86	10.19	9.36	8.55
AF	NONE	4.01	7.16	8.29	9.58
	FYM	3.51	6.42	8.71	9.28
AB	NONE	3.98	5.82	8.53	8.25
	FYM	4.24	6.74	8.87	8.09

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00251

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83/W/RN/3

BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	MEAN
ROTATION			
LN 8	6.19	5.89	6.04
LN 3	5.70	5.63	5.66
LC 8	5.95	5.66	5.80
LC 3	5.66	5.59	5.62
AF	3.82	3.72	3.77
AB	4.73	6.04	5.39
MEAN	5.34	5.42	5.38

N	0	60+60	120+60	180+60	MEAN
ROTATION					
LN 8	5.20	6.91	5.95	6.09	6.04
LN 3	4.82	6.47	6.02	5.32	5.66
LC 8	5.30	6.42	5.72	5.78	5.80
LC 3	4.22	6.29	6.11	5.87	5.62
AF	1.32	3.99	5.20	4.58	3.77
AB	3.79	6.07	6.53	5.16	5.39
MEAN	4.11	6.02	5.92	5.47	5.38

N	0	60+60	120+60	180+60	MEAN
FYMRES66					
NONE	3.87	6.04	5.99	5.46	5.34
FYM	4.34	6.01	5.85	5.48	5.42
MEAN	4.11	6.02	5.92	5.47	5.38

N		0	60+60	120+60	180+60
ROTATION	FYMRES66				
LN 8	NONE	4.70	7.11	6.49	6.44
	FYM	5.69	6.70	5.41	5.74
LN 3	NONE	4.54	6.55	6.12	5.57
	FYM	5.11	6.39	5.93	5.08
LC 8	NONE	5.01	6.55	5.39	6.83
	FYM	5.58	6.30	6.04	4.73
LC 3	NONE	4.92	6.02	6.46	5.23
	FYM	3.53	6.57	5.75	6.52
AF	NONE	1.00	4.50	5.71	4.08
	FYM	1.65	3.48	4.69	5.07
AB	NONE	3.06	5.53	5.75	4.59
	FYM	4.51	6.61	7.31	5.73

GRAIN MEAN DM% 85.0

PLOT AREA HARVESTED 0.00251

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83/W/RN/4

MARKET GARDEN

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

Sponsor: S.P. McGrath.

The 42nd year, red beet, carrots, s. barley.

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

Design: 2 series each of 4 blocks of 10 plots. On one series the plots are split, systematically, for red beet and carrots.

Whole plot dimensions: 8.15 x 5.18.

Treatments:

To Series A, red beet and carrots, all combinations of:-

1. OM RESID — Residues of organic manures:

FYM	Farmyard manure until 1967
SEWAGE	Sewage sludge until 1962
SEW COM	Sewage sludge, composted with straw, until 1962
VEG COM	Vegetable compost until 1962, then farmyard manure until 1967

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

25
50

EXTRA — plus one extra treatment (duplicated):

NONE — No organic manures

To Series B, s. barley, all combinations of:-

1. OM RESID — Residues of organic manures:

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

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83/W/RN/4

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

25
50

EXTRA — plus one extra treatment (duplicated):

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

NOTE: In 1981 and 1982 (25:0:16) was applied to the grass in spring and after each cut except the last. Two cuts were made in each year. Weedkillers: Mecoprop (as 'Herrifex' at 3.5 l) with MCPA (as 'Agroxone' at 1.4 l) in 250 l was applied in 1982 only.

Basal applications:
To both series: Weedkiller: Glyphosate at 2.0 kg in 250 l.
Series A: Red beet: Manures: (0:20:20) at 750 kg, N at 170 kg as 'Nitro-Chalk'. Weedkillers: Paraquat at 0.84 kg ion in 280 l, phenmedipham at 1.3 kg in 280 l. Insecticide: Demeton-s-methyl at 0.24 kg in 280 l.
Carrots: Manures: (0:20:20) at 750 kg, N at 60 kg as 'Nitro-Chalk'. Weedkiller: Linuron at 0.47 kg in 280 l. Insecticide: Carbofuran (as 'Yaltox' granules at 34 kg).
Series B: S. barley: Manures: (0:20:20) at 380 kg, N at 120 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Red beet: Detroit Crimson Globe, sown by precision drill.
Carrots: Chantenay Red-cored Supreme, sown by precision drill.
S. barley: Triumph, dressed with triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.:-
Series A: Red beet: Glyphosate applied: 10 Aug, 1982. Ploughed: 13 Sept. Spring-tine cultivated: 11 Mar, 1983. Paraquat applied: 16 Apr. PK and N applied, spring-tine cultivated: 26 Apr. Rotary cultivated, seed sown: 30 Apr. Phenmedipham applied: 7 June. Insecticide applied: 29 June. Singled: 30 June, 1 July. Hand harvested: 9 Aug.
Carrots: Glyphosate applied: 10 Aug, 1982. Ploughed: 13 Sept. Spring-tine cultivated: 11 Mar, 1983. PK and N applied, spring-tine cultivated: 26 Apr. Rotary cultivated, seed sown: 30 Apr. Insecticide applied: 8 June. Rotary cultivated because of crop failure, seed resown: 8 June. Weedkiller applied: 16 June.
Series B: S. barley: Glyphosate applied: 10 Aug, 1982. Ploughed: 13 Sept. Spring-tine cultivated: 11 Mar, 1983. PK and N applied, spring-tine cultivated with crumbler attached, seed sown: 15 Mar. Weedkillers applied: 27 May. Fungicide applied: 16 June. Combine harvested: 9 Aug.

NOTES: (1) Despite resowing, the carrot crop failed to establish.
(2) Crop samples were taken at maturity and soil samples after harvest for chemical analyses.

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83/W/RN/4 RED BEET

ROOTS FRESH WEIGHT TONNES/HECTARE

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

OM RESID / OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	21.7	15.9	16.6	20.4	18.6
50	22.1	14.7	18.1	23.8	19.6
MEAN	21.9	15.3	17.4	22.1	19.1

NONE 16.7 GRAND MEAN 18.7

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	1.66	1.17	2.34

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 2.03

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	3.31	17.8

TOPS FRESH WEIGHT TONNES/HECTARE

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

OM RESID / OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	10.6	9.4	8.8	10.2	9.7
50	11.5	7.5	9.9	11.8	10.2
MEAN	11.1	8.4	9.3	11.0	10.0

NONE 9.7 GRAND MEAN 9.9

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	0.65	0.46	0.92

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.79

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	1.30	13.1

PLOT AREA HARVESTED 0.00045

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83/W/RN/4

SPRING BARLEY

GRAIN TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	6.00	5.88	6.02	6.70	6.15
50	6.27	5.51	5.82	5.80	5.85
MEAN	6.14	5.70	5.92	6.25	6.00

NONE 6.54

GRAND MEAN 6.11

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	0.256	0.181	0.362

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.313

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.511	8.4

GRAIN MEAN DM% 86.5

STRAW TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	4.34	4.01	4.02	4.80	4.29
50	4.54	3.90	4.13	3.88	4.11
MEAN	4.44	3.95	4.07	4.34	4.20

NONE 3.92

GRAND MEAN 4.15

STRAW MEAN DM% 88.4

PLOT AREA HARVESTED 0.00249

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83/R/RN/5

ARABLE REFERENCE PLOTS

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

Sponsor: F.V. Widdowson.

The 28th year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980, w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 23rd year of a rotation on the additional plots (as the initial above rotation for 20 years; w. barley, ley, potatoes, w. wheat, w. oats since 1980). The 27th 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 69-82/R/RN/5.

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

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilizers and farmyard manure:

MANURE

Original plots

0
N1
P
N1P
K
N1K
PK
N1PK
N2PK
D
N1PKD
N2PKD

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

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

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83/R/RN/5

Additional plots

MANURE	Fertilizers from 1980 to 1983 and in previous years:
1980-83	Until 1979
0	0
N2PK	N2 PK
N2PKMG	N2 PK MG CA
N2PKS	N2 PK CA S
N2PKMGS	N2 PK MG S
N1PKMGS	N2 PK CA MG S
N3PKMGS	N2 PK CA MG S TE

N: In 1983: N1: 20 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 200 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). Until 1979 N2 = larger rate on original plots in these years. As urea in all years. Cereals receive 40 kg N in March, remainder in April.
P: 126 kg P205 as potassium dihydrogen phosphate
K: 251 kg K20 total. As potassium dihydrogen phosphate (83 kg K20) on all PK plots. In addition plots without S receive 168 kg K20 as potassium chloride, plots with S receive 92 kg K20 as potassium sulphate plus 76 kg K20 as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg K20 for potatoes, applied in autumn as potassium chloride.
MG: 126 kg MgO as magnesium chloride
CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given CA received calcium carbonate at 7.5 t, except 0 which was given 5 t.
S: 30 kg S supplied by the potassium sulphate
TE: Trace element mixture which included Mn, Cu, Zn, B, Mo, Ca and Fe.

Standard applications:
Original and additional plots:
All cereals: Weedkillers: Ioxynil at 0.32 kg with mecoprop at 0.95 kg in 220 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.1 l) in 220 l with the tridemorph. Fungicides: Tridemorph at 0.52 kg. Benomyl at 0.28 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg in 220 l, applied on three occasions, with the growth regulator on the first, and with the pirimicarb and captafol on the third. Captafol at 1.1 kg. Insecticides: Pirimicarb at 0.14 kg. Permethrin at 0.05 kg in 220 l.
W. wheat: Growth regulator: Chlormequat at 1.9 kg in 220 l.
W. barley: Additional insecticide: Omethoate at 0.64 l in 220 l. Growth regulator: Mepiquat chloride and ethephon (as 'Terpal' at 2.8 l) in 220 l.
W. oats: Growth regulator: Chlormequat at 1.9 kg in 220 l.
Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat: Norman, sown at 210 kg
W. barley: Igri, sown at 200 kg
W. oats: Peniarth, sown at 210 kg
Potatoes: Desiree
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.

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Cultivations, etc.:-

W. wheat: Dug by hand: 10 Sept, 1982. P, K and Mg applied to original plots; P, K, Mg and S applied to additional plots: 14 Sept. All plots raked level, seed sown and raked in: 15 Sept. Ioxynil and mecoprop applied: 18 Oct. Permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 22 Apr. Growth regulator, carbendazim with maneb and tridemorph applied: 27 Apr. Carbendazim with maneb and tridemorph applied: 20 May. Pirimicarb, captafol, carbendazim with maneb and tridemorph applied: 16 June. Harvested by hand: 1 Aug.

W. barley: Rotary cultivated: 13 Sept, 1982. P and K applied to original plots; P, K, Mg and S to additional plots, raked level, seed sown, raked in: 15 Sept. Ioxynil and mecoprop applied: 18 Oct. Omethoate, permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 8 Apr. Growth regulator, carbendazim, maneb and tridemorph applied: 27 Apr. Carbendazim, maneb and tridemorph applied: 20 May. Pirimicarb, carbendazim, maneb, tridemorph and captafol applied: 16 June. Harvested by hand: 18 July.

W. oats: Rotary cultivated: 14 Sept, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots, raked level, seed sown, raked in: 22 Sept. Ioxynil and mecoprop applied: 18 Oct. Permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 8 Apr. Growth regulator, carbendazim, maneb and tridemorph applied: 27 Apr. Carbendazim, maneb and tridemorph applied: 20 May. Pirimicarb, carbendazim, maneb, tridemorph and captafol applied: 16 June. Harvested by hand: 26 July.

Potatoes: FYM applied to original plots, dug by hand; extra K applied to additional plots, dug by hand: 19 Oct, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots: 1 Nov. Total N applied, rotary cultivated, potatoes planted and ridged by hand: 23 May, 1983. Linuron and paraquat applied: 7 June. Mancozeb and pirimicarb applied: 6 July. Plots given neither FYM nor K harvested by hand: 26 Aug. Remaining plots harvested by hand: 19 Sept.

Grass-clover ley: Rotary cultivated, raked level, seed sown and raked in: 26 July, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots: 1 Nov. N applied: 14 Mar, 1983. Cut: 25 May, 20 July, 11 Oct.

Permanent grass: P and K applied: 1 Nov, 1982. FYM and first N applied: 14 Mar, 1983. Second N applied: 24 May. Final N applied: 20 July. Cut: 24 May, 20 July, 11 Oct.

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83/R/RN/5

GREAT FIELD IV (R):ORIGINAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT:		BARLEY:		LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
	GRAIN	STRAW	GRAIN	STRAW				
MANURE								
0	5.00	5.25	3.02	2.19	1.85	1.84	0.90	4.60
N1	7.91	8.33	1.80	2.82	4.36	1.81	0.65	6.83
P	2.90	3.14	2.81	2.32	2.83	3.14	1.59	7.55
N1P	2.29	3.86	1.30	2.76	4.86	1.87	0.62	7.35
K	5.24	5.97	3.13	3.73	2.32	3.20	1.45	6.96
N1K	9.39	10.21	5.91	5.34	4.20	2.54	1.09	7.82
PK	5.89	6.75	4.87	3.62	4.09	5.09	1.68	10.86
N1PK	9.73	10.67	8.31	7.02	5.11	4.61	2.43	12.15
N2PK	10.92	12.59	10.04	9.96	6.17	4.19	2.35	12.72
D	9.26	10.98	4.55	3.64	3.91	4.47	2.18	10.55
N1PKD	11.27	13.74	8.98	8.68	5.84	5.36	2.66	13.86
N2PKD	10.92	14.42	9.93	11.70	7.33	4.00	2.10	13.43
MEAN DM%	80.1	67.6	86.9	63.8	23.4	28.4	23.1	25.0

	OATS:		POTATOES: TOTAL TUBERS	PERMANENT GRASS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
	GRAIN	STRAW					
MANURE							
0	4.39	6.28	9.6	0.64	0.82	0.29	1.75
N1	7.03	10.40	9.4	1.59	1.29	0.80	3.68
P	4.80	6.56	7.6	0.64	1.03	0.24	1.90
N1P	6.33	10.72	8.8	2.24	1.55	1.04	4.83
K	4.46	6.76	25.0	0.78	1.04	0.39	2.22
N1K	7.06	11.99	26.3	2.02	2.26	0.88	5.17
PK	4.69	7.67	27.5	0.72	1.06	0.38	2.17
N1PK	8.60	13.59	36.5	3.42	2.31	0.78	6.52
N2PK	6.94	15.50	33.8	4.94	2.84	1.56	9.34
D	6.06	9.20	36.5	5.15	2.04	0.65	7.84
N1PKD	8.42	14.66	47.7	5.68	2.97	1.37	10.02
N2PKD	8.36	20.50	43.8	5.81	4.10	1.68	11.58
MEAN DM%	82.6	46.1	23.2	25.6	35.3	23.6	28.2

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83/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT:		BARLEY:		OATS:		POTATOES: TOTAL
	GRAIN	STRAW	GRAIN	STRAW	GRAIN	STRAW	TUBERS
MANURES							
0	5.15	5.81	3.27	2.13	3.01	3.82	9.1
N2PK	10.28	11.95	8.32	8.29	8.50	17.71	40.9
N2PKMG	10.68	11.73	10.49	8.69	7.45	13.97	45.6
N2PKS	10.97	12.00	9.77	8.04	8.19	11.42	40.8
N2PKMGS	10.83	12.84	9.76	8.66	7.71	17.16	32.3
N1PKMGS	9.22	10.66	9.50	8.81	8.06	13.01	43.6
N3PKMGS	10.49	12.40	9.96	8.99	7.07	16.23	42.7
MEAN DM%	80.8	73.0	87.7	67.1	85.2	58.0	23.8

	LEY : DRY MATTER			
	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURES				
0	2.87	2.06	0.66	5.59
N2PK	6.60	4.46	1.95	13.01
N2PKMG	5.21	4.00	1.80	11.01
N2PKS	5.56	4.61	2.03	12.20
N2PKMGS	6.17	4.41	2.00	12.58
N1PKMGS	5.25	4.74	2.04	12.03
N3PKMGS	5.85	4.86	1.91	12.63
MEAN DM%	22.9	28.4	21.7	24.3

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83/R/RN/8

CULTIVATION/WEEDKILLER

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

Sponsors: R. Moffitt, J.A. Currie.

The 23rd year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-82/R/RN/8.

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

Whole plot dimensions: 12.8 x 12.2.

Treatments: All combinations of:-

Whole plots

1.	CULTIVTN	Primary cultivations annually:
	PLOUGH	Ploughed: 24 Sept, 1982
	ROTA DIG	Cultivated by rotary digger: 9 Sept
	DEEPTINE	Deep-tine cultivated: 8 Sept
2.	SUBSOIL	Subsoiling in autumn 1982:
	NONE	None
	CNVNTIAL	Conventional vertical tine on 6 Sept
	PARAPLOW	'Paraplowed' on 6 Sept

Sub plots

3.	WEEDKLLR(75)	Hormone weedkiller to cereals in the previous rotation, last applied to barley 1975 (basal hormone weedkiller to s. wheat 1977, s. barley 1978 to 1980 and w. barley 1981 to 1983):
	NONE	
	HORMONE	
4.	WEEDKLLR(81)	Paraquat weedkiller to preceding cereal stubbles last applied for w. barley 1981:
	NONE	
	PARAQUAT	

NOTE: The combinations of 3 and 4 are tested on half plots: WEEDKLLR(75) NONE, WEEDKLLR(81) NONE and WEEDKLLR(75) HORMONE, WEEDKLLR(81) PARAQUAT on one block, remaining combinations on the other.

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83/R/RN/8

EXTRA (DD)	plus three extra whole plot treatments all with sub plot test 3 above; all given paraquat to preceding cereal stubble, direct drilled 1981, 1982 and 1983 but differing in subsoiling in autumn 1982:
NONE	None
CNVNTIAL	Conventional vertical tine on 6 Sept, 1982
PARAPLOW	'Paraplowed' on 6 Sept

NOTES: (1) The conventional vertical tine sub-soiler had tines 76 cm apart and worked at a depth of about 50 cm.
(2) The 'Paraplow' had rigid tines set at a 45° angle. The tip of each tine was in line with the attachment of an adjacent tine. The tines were 51 cm apart and worked at a depth of about 38 cm.

Basal applications: Manures: (5:14:30) at 340 kg, combine drilled. 'Nitro-Chalk' at 250 kg followed by 500 kg. Weedkillers: Paraquat at 0.70 kg ion in 250 l followed by 0.84 kg ion in 500 l. Isoproturon at 2.1 kg with dicamba, mecoprop and MCPA (as 'Poly-Farmon CMPP' at 4.2 l) in 250 l applied with the prochloraz. Fungicides: Prochloraz at 0.40 kg. Carbendazim at 0.15 kg with maneb at 1.6 kg and tridemorph at 0.38 kg in 250 l.

Seed: Igri, dressed ethirimol, sown at 160 kg.

Cultivations, etc.:- Paraquat applied: 23 Aug, 1982. Disced: 1 Sept. Paraquat applied: 15 Oct. Spring-tine cultivated: 29 Oct. Seed sown: 30 Oct. Isoproturon, 'Poly-Farmon CMPP' and prochloraz applied: 4 Feb, 1983. First N applied: 14 Mar. Second N applied: 14 Apr. Carbendazim with maneb and tridemorph applied: 8 June. Combine harvested: 26 July.

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

WEEDKLLR(75) EXTRA DD	NONE	HORMONE	MEAN
NONE	7.22	7.26	7.24
CNVNTIAL	7.72	7.69	7.71
PARAPLOW	7.35	7.70	7.52
MEAN	7.43	7.55	7.49

GRAIN MEAN DM% 86.5

SUB PLOT AREA HARVESTED 0.00347

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83/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

SUBSOIL CULTIVTN	NONE	CNVNTIAL	PARAPLOW	MEAN
PLOUGH	7.26	7.25	7.37	7.29
ROTA DIG	7.44	7.43	7.38	7.42
DEEPTINE	7.65	7.61	7.75	7.67
MEAN	7.45	7.43	7.50	7.46

WEEDKLLR(75) CULTIVTN	NONE	HORMONE	MEAN
PLOUGH	7.47	7.12	7.29
ROTA DIG	7.42	7.42	7.42
DEEPTINE	7.62	7.71	7.67
MEAN	7.50	7.42	7.46

WEEDKLLR(75) SUBSOIL	NONE	HORMONE	MEAN
NONE	7.55	7.35	7.45
CNVNTIAL	7.47	7.38	7.43
PARAPLOW	7.49	7.51	7.50
MEAN	7.50	7.42	7.46

WEEDKLLR(81) CULTIVTN	NONE	PARAQUAT	MEAN
PLOUGH	7.26	7.33	7.29
ROTA DIG	7.34	7.49	7.42
DEEPTINE	7.72	7.62	7.67
MEAN	7.44	7.48	7.46

WEEDKLLR(81) SUBSOIL	NONE	PARAQUAT	MEAN
NONE	7.39	7.51	7.45
CNVNTIAL	7.47	7.39	7.43
PARAPLOW	7.46	7.54	7.50
MEAN	7.44	7.48	7.46

WEEDKLLR(81) WEEDKLLR(75)	NONE	PARAQUAT	MEAN
NONE	7.59	7.42	7.50
HORMONE	7.30	7.54	7.42
MEAN	7.44	7.48	7.46

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83/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

TABLE	CULTIVTN	SUBSOIL	WEEDKLLR(75)	WEEDKLLR(81)
SED	0.147	0.147	0.040	0.040

TABLE	CULTIVTN SUBSOIL	CULTIVTN WEEDKLLR(75)	SUBSOIL WEEDKLLR(75)	CULTIVTN WEEDKLLR(81)
SED	0.254	0.155	0.155	0.155
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CULTIVTN		0.070		0.070
SUBSOIL			0.070	

TABLE	SUBSOIL WEEDKLLR(81)
SED	0.155
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:	
SUBSOIL	0.070

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.254	3.4
BLOCK.WP.SP	8	0.121	1.6

GRAIN MEAN DM% 87.1

SUB PLOT AREA HARVESTED 0.00347

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83/W/RN/12

ORGANIC MANURING

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

Sponsor: A.E. Johnston.

The 19th year, sugar beet, w. wheat, ley.

For previous years see 'Details' 1973 and 74-82/W/RN/12.

Design for sugar beet and w. wheat: 2 blocks of 4 plots
2nd, 3rd, 4th and 5th year leys: 2 blocks of 2 plots.

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. In addition to leys the first pair included sugar beet in 1983 and the second pair w. wheat.

Sugar beet and w. wheat tested:

MANURE	Organic manures and fertilizers in 1983, cumulative to 1982 (both crops) and 1981 (sugar beet only) and to those applied in the preliminary period:
FYM	Farmyard manure at 50 tonnes
STRAW	Straw at 7.5 tonnes plus P_2O_5 at 140 kg, K_2O at 140 kg, MgO at 50 kg
FERT-FYM	P_2O_5 at 280 kg, K_2O at 560 kg, MgO at 100 kg
FERT-STR	P_2O_5 at 140 kg, K_2O at 280 kg, MgO at 50 kg

All leys are clover/grass (LC) without N except to seedbed in first year. 2nd and 3rd year leys tested:

PREV LEY	Previous ley:
LC(LC)	Clover/grass ley in preliminary period
LC(LN)	Grass ley with N in preliminary period

4th and 5th year leys tested:

PREV MAN	Previous manure:
LC(GM)	Green manures in preliminary period
LC(PT)	Peat in preliminary period

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Standard applications:
W. wheat: Manures: N at 150 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 4.2 l) in 280 l.
Sugar beet: Manures: Ground chalk at 5.0 t, N at 150 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l. Phenmedipham at 1.3 kg in 280 l. Insecticide: Demeton-s-methyl at 0.24 kg in 280 l.
Leys, 2nd, 3rd, 4th and 5th years: Manures: Ground chalk at 5.0 t to 3rd and 5th years only. P_2O_5 at 140 kg, K_2O at 280 kg as (0:18:36), MgO at 50 kg as kieserite.

Seed: W. wheat: Avalon, sown at 190 kg.
Sugar beet: Monoire, sown by precision drill.

Cultivations, etc.:-
W. wheat: Glyphosate applied: 10 Sept, 1982. Half PK and Mg applied to FERT-FYM plots: 5 Oct. Treatment FYM and straw applied, ploughed: 5 Nov. Half PK and Mg applied to FERT-FYM, all PK and Mg applied to FERT-STR and STRAW plots only: 8 Nov. Spring-tine cultivated with crumbler attached, seed sown, spring-tine cultivated: 11 Nov. N applied: 28 Apr, 1983. 'Brittox' applied: 29 Apr. Combine harvested: 12 Aug.
Sugar beet: Glyphosate applied: 10 Sept, 1982. Half PK and Mg applied to FERT-FYM plots: 5 Oct. Ground chalk applied: 3 Nov. Treatment FYM applied and these plots ploughed: 5 Nov. Treatment straw applied, remaining plots ploughed, PK applied to STRAW plots: 8 Nov. Half PK and Mg applied to FERT-FYM, all PK and Mg applied to FERT-STR plots, all Mg applied to STRAW plots: 9 Nov. Deep-tine cultivated: 12 Jan, 1983. Heavy spring-tine cultivated, spring-tine cultivated, N applied: 22 Mar. Spring-tine cultivated with crumbler attached: 14 Apr. Rotary cultivated, seed sown: 30 Apr. Phenmedipham applied: 7 June. Singled: 9-14 June. Tractor hoed: 20 June, 1 July. Insecticide applied: 29 June. Hand hoed: 4-11 July. Lifted: 10 Oct.
2nd, 3rd, 4th and 5th year leys: Ground chalk applied to 3rd and 5th years only: 3 Nov, 1982. PK and Mg applied: 9 Nov. Cut: 16 June, 1983, 24 Aug.

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83/W/RN/12

SUGAR BEET

ROOTS WASHED TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	38.0	36.7	32.7	32.6	35.0

SUGAR PERCENTAGE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	16.7	16.9	17.0	16.2	16.7

TOTAL SUGAR TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	6.32	6.20	5.56	5.34	5.85

TOPS TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	30.4	27.1	25.9	24.8	27.1

PLOT AREA HARVESTED 0.00130

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83/W/RN/12

W.WHEAT

GRAIN TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	6.91	6.16	5.55	6.69	6.32

GRAIN MEAN DM% 86.3

STRAW TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT FYM	FERT STR	MEAN
	4.69	3.73	3.19	3.70	3.83

STRAW MEAN DM% 91.5

PLOT AREA HARVESTED 0.00796

2ND YEAR LEY

DRY MATTER TONNES/HECTARE

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

	1ST CUT(16/6/83)	2ND CUT(23/8/83)	TOTAL OF 2 CUTS
PREV LEY			
LC(LC)	6.31	0.73	7.03
LC(LN)	6.95	1.05	8.00
MEAN	6.63	0.89	7.52
MEAN DM%	26.1	25.6	25.9

3RD YEAR LEY

DRY MATTER TONNES/HECTARE

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

	1ST CUT(16/6/83)	2ND CUT(23/8/83)	TOTAL OF 2 CUTS
PREV LEY			
LC(LC)	6.19	1.17	7.36
LC(LN)	5.49	1.42	6.91
MEAN	5.84	1.29	7.13
MEAN DM%	19.0	27.1	23.1

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83/W/RN/12

4TH YEAR LEY

DRY MATTER TONNES/HECTARE

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

	1ST CUT(16/6/83)	2ND CUT(23/8/83)	TOTAL OF 2 CUTS
PREV MAN			
LC(GM)	5.08	1.04	6.12
LC(PT)	5.59	0.90	6.49
MEAN	5.33	0.97	6.30
MEAN DM%	24.0	30.2	27.1

5TH YEAR LEY

DRY MATTER TONNES/HECTARE

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

	1ST CUT(16/6/83)	2ND CUT(23/8/83)	TOTAL OF 2 CUTS
PREV MAN			
LC(GM)	5.84	1.32	7.16
LC(PT)	4.56	0.94	5.50
MEAN	5.20	1.13	6.33
MEAN DM%	18.4	27.5	23.0

PLOT AREA HARVESTED 0.00265

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83/W/RN/13

INTENSIVE CEREALS

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

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

The 18th year, w. wheat, ley.

For previous years see 'Details' 1973 and 74-82/W/RN/13.

Treatments:-

Until 1977 the experiment tested all phases of the five-course rotation ley, potatoes, cereal, cereal, cereal and continuous cereal. From 1977 to 1980 all phases were cropped with cereal. The experiment was in two halves, one in which the cereal was w. wheat, sown on part of the site of the classical wheat experiment 1877-1954 and one in which the cereal was s. barley, sown on part of the site of the classical barley experiment 1877-1954. From 1981 the experiment is being used to establish leys of different durations for test on w. wheat in 1987. Plots not in ley are sown to w. wheat on both halves of the experiment.

The following crop sequences are being followed:

1981	82	83	84	85	86	87
W(5)	W	W	W	W	L	W
W(5)	W	W	W	L	L	W
W(6)	W	W	L	L	L	W
W(7)	W	L	L	L	L	W
W(8)	L	L	L	L	L	W
L	L	L	L	L	L	W

L = clover/grass ley W = w. wheat (5)etc = number of years continuous cereal

NOTE: Yields are not taken in the period 1981-86.

Standard applications:
W. wheat: Manures: (5:14:30) at 340 kg, N at 150 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with the fungicide in 280 l. Fungicide: Prochloraz at 0.4 kg.
Ley, 1st year: Manures: (5:14:30) at 340 kg, N at 50 kg as 'Nitro-Chalk'. Weedkiller: Paraquat at 0.84 kg ion in 280 l.
Ley, 2nd and 3rd years: Manures: (0:18:36) at 380 kg.

Seed: W. wheat: Avalon, sown at 190 kg.
Ley: S 23 perennial ryegrass at 27 kg, Blanca white clover at 7 kg, mixture sown at 34 kg.

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Cultivations, etc.:-
W. wheat: Ploughed: 20 Sept, 1982. Spring-tine cultivated: 28 Sept. NPK applied: 30 Sept. Rotary cultivated, seed sown: 1 Oct. Weedkillers and fungicide applied: 15 Apr, 1983. N applied: 28 Apr. Combine harvested: 5 Aug.
Ley, 1st year: Ploughed: 20 Sept, 1982. Spring-tine cultivated: 28 Sept. NPK applied: 30 Sept. Spring-tine cultivated: 8 Mar, 1983. N applied, rotary cultivated: 17 Mar. Weedkiller applied: 16 May. Rotary cultivated: 7 June. Seed sown: 9 June. Cut: 15 Aug.
Ley, 2nd and 3rd years: PK applied: 11 Jan, 1983. Cut: 21 June, 15 Aug.

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83/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 and nutrient uptakes of s. barley - Woburn Butt Furlong.

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

The tenth year, s. barley.

For previous years see 74-82/W/RN/16.

Design: 4 series of 3 randomised blocks of 4 plots with PREVCROP on series.

Whole plot dimensions: 4.27 x 2.59.

Treatments: All combinations of:-

Series

1. PREVCROP — Previous crop in 1982, all s. barley 1978 to 1981:

FALLOW
OATS
BARLEY

Plots

2. PK SUB — Extra PK and subsoil treatment (applied autumn 1973):

	Extra PK	Subsoil (25-50 cm) treatment
- - -	None	None
- - S	None	Subsoiled
P K T	To topsoil (0-25 cm)	None
P K S	To subsoil	Subsoiled

NOTES: (1) The rates of P and K were 1930 kg P_2O_5, as superphosphate and 460 kg K_2O as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and 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.
(4) Each series followed the rotation w. wheat, sugar beet, s. barley, potatoes until 1977. Cropping since 1978 was as above, one series in s. barley 1982 was fallow in 1983.

Basal applications:
S. barley: Manures: (20:10:10) at 590 kg. N at 80 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 4.9 l) in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.

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83/W/RN/16

Seed: S. barley: Triumph, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-
S. barley: Ploughed: 5 Oct, 1982. NPK applied: 8 Mar, 1983. Spring-tine cultivated with crumbler attached, seed sown: 9 Mar. Weedkillers applied: 23 May. N applied: 1 June. Fungicide applied: 17 June. Harvested by hand: 12 Aug.
Fallow: Ploughed: 5 Oct, 1982. Spring-tine cultivated with crumbler attached: 9 Mar, 1983. Rotary cultivated: 22 June, 3 Aug.

GRAIN TONNES/HECTARE

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

PK SUB / PREVCROP	- - -	- - S	P K T	P K S	MEAN
FALLOW	5.78	5.50	6.09	6.10	5.87
OATS	4.92	4.05	4.26	4.88	4.53
BARLEY	4.09	4.23	4.73	4.22	4.32
MEAN	4.93	4.60	5.03	5.06	4.90

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

TABLE	PK SUB	PREVCROP* PK SUB
SED	0.279	0.482

*WITHIN THE SAME LEVEL OF PREVCROP ONLY

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

STRATUM	DF	SE	CV%
SERIES.BLOCK	6	0.415	8.5
SERIES.BLOCK.WP	18	0.591	12.0

GRAIN MEAN DM% 87.4

STRAW TONNES/HECTARE

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

PK SUB / PREVCROP	- - -	- - S	P K T	P K S	MEAN
FALLOW	4.49	4.06	4.50	4.40	4.37
OATS	3.41	2.79	3.31	3.45	3.24
BARLEY	2.82	3.11	3.41	3.16	3.12
MEAN	3.57	3.32	3.74	3.67	3.58

STRAW MEAN DM% 86.6

PLOT AREA HARVESTED 0.00063

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83/R/RN/17

RATES OF P AND K TO THE SUBSOIL

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

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

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

For previous years see 81-82/R/RN/17.

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

Whole plot dimensions: 3.0 x 14.0.

Treatments to each series:

TREATMNT — Extra P and K and primary cultivation tool in autumn 1980 only except on R plots, treatments repeated each autumn:

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

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NOTES: (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(2) The topsoil PK dressing was equally divided before and after ploughing.
(3) All plots other than R were conventionally ploughed in autumn 1981 and 1982.
(4) The rate of 350 kg K_2O applied was in error for 500 kg K_2O.

Standard applications:
Potatoes: Manures: (10:10:15 + 4.5 Mg) at 1960 kg. Weedkillers: Paraquat at 0.56 kg ion with linuron at 1.0 l in 500 l. Fungicides: Mancozeb at 1.4 kg in 250 l on three occasions. Fentin hydroxide at 0.28 kg in 250 l on five occasions, with the insecticide on the first four. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: BOV at 170 l.
S. barley: Manures: (20:10:10) at 450 kg. 'Nitro-Chalk' at 250 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Prochloraz at 0.40 kg in 250 l.
S. beans: Weedkillers: Trietazine and simazine (as 'Aventox' at 2.4 l) in 250 l. Insecticides: Pirimicarb at 0.14 kg in 250 l. Phorate at 5.6 kg.
W. wheat: Manures: (0:18:36) at 350 kg combine drilled. 'Nitro-Chalk' at 750 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l.

Seed: Potatoes: Pentland Crown.
S. barley: Triumph, seed dressed with ethirimol, sown at 160 kg.
S. beans: Minden, sown at 280 kg.
W. wheat: Avalon, sown at 210 kg.

Cultivations, etc.:-
All crops: Treatments applied by double digger: 15-17 Nov, 1982. Ploughed: 18 Nov.
Potatoes: Spring-tine cultivated twice: 7 Mar, 1983. NPK Mg applied: 28 Apr. Spiked rotary cultivated, potatoes planted: 29 Apr. Rotary ridged: 6 May. Weedkillers applied: 24 May. Mancozeb applied: 22 June. Fentin hydroxide with insecticide applied: 1 July, 8 July, 18 July and 28 July. Fentin hydroxide applied: 11 Aug. Mancozeb applied: 25 Aug, 9 Sept. Haulm mechanically destroyed: 11 Oct. BOV applied: 19 Oct. Lifted: 27 Oct.
S. barley: Spring-tine cultivated, NPK applied, spring-tine cultivated a second time: 7 Mar, 1983. Rotary harrowed, seed sown: 8 Mar. 'Herrisol' applied: 23 May. N applied: 26 May. Fungicide applied: 23 June. Combine harvested: 3 Aug.
S. beans: Spring-tine cultivated, phorate applied, spring-tine cultivated a second time, rotary harrowed, seed sown: 7 Mar, 1983. Weedkillers applied: 12 Mar. Pirimicarb applied: 16 June. Combine harvested: 12 Aug.
W. wheat: Heavy spring-tine cultivated twice, spring-tine cultivated twice, seed sown: 18 Jan, 1983. N applied: 16 Apr. Weedkillers applied: 28 Apr. Fungicide applied: 17 June. Combine harvested: 12 Aug.

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83/R/RN/17

SERIES III POTATOES

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	
- - -	43.6
P6 K6 T	45.4
- - S	41.5
- - SR	38.8
P2 - SR	36.1
P3 - S	45.8
P4 - S	45.3
P5 - S	42.1
P6 - S	46.4
- K2 SR	39.8
- K3 S	44.6
- K4 S	45.2
- K5 S	41.8
- K6 S	46.5
P1 K1 SR	39.2
P1 K3 SR	45.2
P2 K2 SR	36.4
P3 K1 SR	43.1
P3 K3 SR	39.3
P3 K4 S	41.0
P4 K3 S	42.4
P4 K4 S	39.7
P4 K5 S	44.2
P4 K6 S	46.9
P5 K4 S	43.1
P5 K5 S	43.9
P5 K6 S	47.6
P6 K4 S	47.5
P6 K5 S	45.3
P6 K6 S	43.5
MEAN	42.9

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

TABLE	TREATMNT*
SED	4.73 MIN REP
	3.74 MAX-MIN

* SED APPLIES ONLY TO - - -, P6 K6 T, - - S, - - SR, P5 - S, - K5 S, P4 K5 S AND P5 K4 S

	TREATMNT
MAX-MIN	- - S V ANY OF REMAINDER
MIN REP	ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
WP	10	3.34	7.8

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83/R/RN/17

SERIES III POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	
- - -	93.8
P6 K6 T	94.7
- - S	93.5
- - SR	95.2
P2 - SR	93.9
P3 - S	93.5
P4 - S	93.4
P5 - S	94.1
P6 - S	96.2
- K2 SR	92.6
- K3 S	94.6
- K4 S	93.9
- K5 S	95.1
- K6 S	95.5
P1 K1 SR	93.5
P1 K3 SR	95.9
P2 K2 SR	93.7
P3 K1 SR	95.2
P3 K3 SR	93.3
P3 K4 S	95.5
P4 K3 S	94.8
P4 K4 S	93.7
P4 K5 S	95.3
P4 K6 S	96.9
P5 K4 S	94.1
P5 K5 S	94.7
P5 K6 S	95.0
P6 K4 S	94.5
P6 K5 S	94.4
P6 K6 S	93.6
MEAN	94.4

PLOT AREA HARVESTED 0.00210

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83/R/RN/17

SERIES IV SPRING BARLEY

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.30
P6 K6 T	7.43
- - S	6.82
- - SR	6.42
P2 - SR	6.35
P3 - S	6.66
P4 - S	6.98
P5 - S	7.09
P6 - S	7.05
- K2 SR	6.87
- K3 S	7.24
- K4 S	7.37
- K5 S	6.94
- K6 S	7.56
P1 K1 SR	6.81
P1 K3 SR	7.33
P2 K2 SR	5.68
P3 K1 SR	7.13
P3 K3 SR	6.77
P3 K4 S	7.51
P4 K3 S	7.42
P4 K4 S	7.37
P4 K5 S	6.93
P4 K6 S	7.39
P5 K4 S	6.98
P5 K5 S	7.24
P5 K6 S	7.10
P6 K4 S	7.51
P6 K5 S	7.40
P6 K6 S	6.34
MEAN	7.01

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

TABLE	TREATMNT*	
SED	0.336	MIN REP
	0.266	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.238	3.4

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00286

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83/R/RN/17

SERIES I SPRING BEANS

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	4.17
P6 K6 T	4.49
- - S	4.32
- - SR	4.61
P2 - SR	4.72
P3 - S	4.82
P4 - S	4.48
P5 - S	4.44
P6 - S	4.46
- K2 SR	4.34
- K3 S	4.28
- K4 S	4.01
- K5 S	4.28
- K6 S	4.41
P1 K1 SR	4.53
P1 K3 SR	4.24
P2 K2 SR	4.13
P3 K1 SR	4.34
P3 K3 SR	4.69
P3 K4 S	4.16
P4 K3 S	4.39
P4 K4 S	4.73
P4 K5 S	4.37
P4 K6 S	4.08
P5 K4 S	4.66
P5 K5 S	4.44
P5 K6 S	4.82
P6 K4 S	4.39
P6 K5 S	4.58
P6 K6 S	4.57
MEAN	4.42

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

TABLE	TREATMNT*	
SED	0.324	MIN REP
	0.257	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.229	5.2

GRAIN MEAN DM% 85.5

PLOT AREA HARVESTED 0.00386

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83/R/RN/17

SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	6.52
P6 K6 T	7.40
- - S	6.81
- - SR	6.06
P2 - SR	6.45
P3 - S	6.72
P4 - S	6.98
P5 - S	7.06
P6 - S	6.70
- K2 SR	5.65
- K3 S	7.04
- K4 S	6.78
- K5 S	6.44
- K6 S	5.42
P1 K1 SR	5.62
P1 K3 SR	6.14
P2 K2 SR	6.04
P3 K1 SR	6.54
P3 K3 SR	6.51
P3 K4 S	6.61
P4 K3 S	7.23
P4 K4 S	7.33
P4 K5 S	6.66
P4 K6 S	6.69
P5 K4 S	6.76
P5 K5 S	7.16
P5 K6 S	6.44
P6 K4 S	7.51
P6 K5 S	5.57
P6 K6 S	7.41
MEAN	6.64

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

TABLE	TREATMNT*	
SED	0.362	MIN REP
	0.286	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.256	3.9

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00286

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83/R/CS/10 and 83/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 are also studied - Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsors: S.P. McGrath, D.P. Stribley.

The 22nd year, potatoes.

For previous years see 'Details' 1967, 1973 and 74-82/R&W/CS/10.

Design: 2 randomised blocks of 16 plots.

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

1. CHALK — Ground chalk (tonnes $CaCO_3$) (total applied 1962-83):

		Rothamsted Total			Woburn Total		
R	W	1962-78	1982	1983	1962-78	1982	1983
0	0	0	0	0	0	0	0
14	8	7	2	5	6	2	0
23	24	15	5	3	14	5	5
50	43	30	10	10	23	10	10

2. P — P fertilizer applied:

	Until 1978	1981	1982	1983	
	R & W	R & W	R & W	R	W
0	0	0	0	0	0
P1	0	P1	P1	0	P2
P2	P	P1	0	P2	P2
P3	P	P3	P1	P2	P4

Rates 1981-1983 P1, P2, P3, P4 = 25, 50, 75, 100 kg P as superphosphate

NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with crop. None was applied in 1979 and 1980 (fallow). K was applied, cumulatively, to P1 and P3 plots. Since 1981 K has been applied basally.
(2) A sub plot test of Mg applied in earlier years has been ignored. Since 1981 Mg has been applied basally.

Basal applications:
Sawyers I (R): Manures: N at 250 kg as 'Nitro-Chalk', K at 210 kg as muriate of potash, Mg at 40 kg as kieserite. Weedkillers: Linuron at 1.0 l with paraquat at 0.4 kg ion in 500 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions. Fentin hydroxide at 0.28 kg in 250 l on five occasions with the insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 170 l.

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83/R/CS/10 and 83/W/CS/10

Stackyard C (W): Manures: N at 260 kg as 'Nitro-Chalk', K at 210 kg as muriate of potash, Mg at 40 kg as kieserite. Weedkillers: Glyphosate at 1.5 kg in 280 l. Linuron at 1.0 l with paraquat at 0.4 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on four occasions with the insecticide on the first, third and fourth occasions. Fentin hydroxide at 0.28 kg in 250 l on four occasions with insecticide on the first three occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.50 kg ion in 250 l.

Seed: Pentland crown.

Cultivations, etc.:-

Sawyers I (R): Ground chalk treatments applied: 26 Nov, 1982. Ploughed: 1 Dec. P treatments and N, K and Mg applied: 11 May, 1983. Rotary harrowed, potatoes planted: 23 May. Rotary ridged: 26 May. Weedkillers applied: 7 June. Mancozeb applied: 22 June, 25 Aug, 9 Sept. Fentin hydroxide applied with insecticide: 1 July, 8 July, 18 July, 28 July. Fentin hydroxide applied: 11 Aug. Haulm mechanically destroyed: 11 Oct. Haulm desiccant applied: 19 Oct. Lifted: 28 Oct.

Stackyard C (W): Glyphosate applied: 12 Sept, 1982. Ploughed: 8 Oct. Ground chalk treatments applied: 4 Nov. Ploughed: 23 Dec. Heavy spring-tine cultivated: 21 Mar, 1983. P treatments and N, K and Mg applied: 22 Mar. Heavy spring-tine cultivated: 28 Mar, 11 May. Rotary cultivated, potatoes planted: 11 May. Rotary ridged, weedkiller applied: 7 June. Mancozeb applied with insecticide: 22 June, 8 July, 18 July. Mancozeb applied: 1 July. Fentin hydroxide applied with insecticide: 29 July, 11 Aug, 26 Aug. Fentin hydroxide applied: 9 Sept. Haulm mechanically destroyed: 5 Oct. Haulm desiccant applied: 17 Oct. Lifted: 7 Nov.

NOTE: Soil samples were taken from both sites after harvest for chemical analyses.

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83/R/CS/10 SAWYERS (R)

TOTAL TUBERS TONNES/HECTARE

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

P / CHALK	0	P1	P2	P3	MEAN
0	19.3	18.7	27.9	29.4	23.8
14	26.8	28.8	29.4	33.1	29.5
23	26.6	29.2	30.7	33.5	30.0
50	26.3	27.8	29.0	32.2	28.8
MEAN	24.8	26.1	29.2	32.0	28.0

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

TABLE	CHALK	P	CHALK P
SED	0.99	0.99	1.97

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	1.97	7.0

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

P / CHALK	0	P1	P2	P3	MEAN
0	97.4	96.6	97.3	97.5	97.2
14	97.6	98.2	96.7	97.3	97.5
23	97.6	97.8	97.6	97.8	97.7
50	97.6	97.5	97.2	98.2	97.6
MEAN	97.5	97.5	97.2	97.7	97.5

PLOT AREA HARVESTED 0.00274

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83/W/CS/10 STACKYARD (W)

TOTAL TUBERS TONNES/HECTARE

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

P / CHALK	0	P1	P2	P3	MEAN
0	29.8	40.2	45.5	43.0	39.6
8	43.9	52.2	46.1	50.0	48.1
24	37.7	42.9	41.9	42.4	41.2
43	36.6	41.9	37.5	40.0	39.0
MEAN	37.0	44.3	42.7	43.8	42.0

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

TABLE	CHALK	P	CHALK P
SED	0.88	0.88	1.77

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	1.77	4.2

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

P / CHALK	0	P1	P2	P3	MEAN
0	97.6	96.8	95.7	95.9	96.5
8	97.8	96.9	96.9	96.2	97.0
24	97.5	98.2	96.0	96.1	97.0
43	98.6	98.5	97.4	97.6	98.0
MEAN	97.9	97.6	96.5	96.5	97.1

PLOT AREA HARVESTED 0.00274

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83/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. 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 19th year, old grass.

For previous years see 'Details' 1973 and 74-82/R/CS/13.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 1.83 x 10.1.

Treatments

TOTAL N	Fertilizer nitrogen (kg N-total per annum applied in three equal dressings as (25:0:16)):
0(S)	0 (sprayed with mecoprop to control legumes, duplicated)
0	0 (duplicated)
56	
112	
168	
225	
281	
338	

NOTES: (1) Mecoprop was applied (as 'Farmon CMPP' at 4.2 l) in 220 l on 30 Mar, 1983.
(2) Rates of fertilizer nitrogen per cut were as hitherto but only three cuts were taken instead of the usual four; accordingly total rates of nitrogen were three quarters of standard.

Basal applications: Manures: 34 kg P as superphosphate. 11 kg Mg as magnesium sulphate.

Cultivations, etc.:- Basal P and Mg applied: 22 Nov, 1982. Test NK applied: 16 Mar, 1983, 2 June, 5 Aug. Cut: 2 June, 3 Aug and 26 Oct.

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83/R/CS/13

1ST CUT (2/6/83) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	56	112	168	225	281	338	MEAN
	1.11	3.63	3.75	3.86	5.29	7.14	6.35	6.85	4.27

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

TABLE	TOTAL N	
SED	0.444	MIN REP
	0.384	MAX-MIN
	0.314	MAX REP

	TOTAL N
MAX REP	0(S) V 0
MAX-MIN	0(S) OR 0 V ANY OF THE REMAINDER
MIN REP	ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.627	14.7

1ST CUT MEAN DM% 16.6

2ND CUT (3/8/83) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	56	112	168	225	281	338	MEAN
	0.56	2.48	2.29	2.33	2.91	2.93	3.30	3.40	2.32

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

TABLE	TOTAL N	
SED	0.204	MIN REP
	0.177	MAX-MIN
	0.144	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.288	12.4

2ND CUT MEAN DM% 29.0

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83/R/CS/13

3RD CUT (26/10/83) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	56	112	168	225	281	338	MEAN
	0.37	0.55	0.93	1.20	1.65	2.16	2.12	2.04	1.19

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

TABLE	TOTAL N	
SED	0.101	MIN REP
	0.087	MAX-MIN
	0.071	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.142	11.9

3RD CUT MEAN DM% 19.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	56	112	168	225	281	338	MEAN
	2.04	6.65	6.97	7.39	9.86	12.23	11.78	12.29	7.79

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

TABLE	TOTAL N	
SED	0.542	MIN REP
	0.470	MAX-MIN
	0.384	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.767	9.8

TOTAL OF 3 CUTS MEAN DM% 21.7

PLOT AREA HARVESTED 0.00086

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83/W/CS/34

NEMATICIDES IN CROP SEQUENCE

Object: To study the effects of a range of nematicides on incidence of Globodera 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 15th year, potatoes, w. wheat, s. barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-82/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	70	71	72	73	74	75	76	77	78	79	80	81	82	83
Series I	P	P	P*	SB	B	P	P*	W	B	P	P*	B	B	P	P*
Series II	P	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B	P
Series III	P	B	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B
Series IV	P	B	P	P	P	P*	SB	B	P	P*	W	B	P	P*	W

P = potatoes, SB = sugar beet, B = s. barley, W = w. wheat

* Treatments applied to potatoes, subsequent crops test residual effects.

Treatments to potatoes (Series I): All combinations of:-

1. NEMACIDE(83) Nematicides applied 1983:

   FMC65201
   FMC67825
   OXAMYL

2. RATE Rates of nematicide (kg a.i.):

   2.8
   5.6
   11.2

plus one untreated plot

RATE

0.0

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83/W/CS/34

Treatments to potatoes (Series II):

NEMACIDE(80)	Residues of nematicides applied 1980 (kg a.i.):
NONE	None
BAS 1	'BAS 263 08J 80-1' at 2.8
BAS 2	'BAS 263 08J 80-1' at 5.6
BAS 4	'BAS 263 08J 80-1' at 11.2
CARBOF 2	Carbofuran at 5.6
ETHOP 4	Ethoprophos at 11.2
FMC 2	'FMC 35001' at 5.6
OX 2	Oxamyl at 5.6
OX S1 2	Oxamyl slow-release formulation 'DPX 4702' at 5.6
OX S2 2	Oxamyl slow-release formulation 'DPX 5577' at 5.6

Treatments to s. barley (Series III): All combinations of:-

1. NEMACIDE(81) Residues of nematicides applied 1981:

   ALDICARB
   HOE00668
   RH 9358

2. RATE Rates of nematicide (kg a.i.):

   2.8
   5.6
   11.2

plus one untreated plot

RATE

0.0

Treatments to w. wheat (Series IV): All combinations of:-

1. NEMACIDE(82) Residues of nematicides applied 1982:

   DS 46995
   DS 47187
   OXAMYL

2. RATE Rates of nematicide (kg a.i.):

SINGLE	Single (1.5 kg, for 'DS 46995' and 'DS 47187': 2.8 kg for oxamyl)
DOUBLE	Double (3.0 kg for 'DS 46995' and 'DS 47187': 5.6 kg for oxamyl)
QUAD	Quadruple (6.0 kg for 'DS 46995' and 'DS 47187': 11.2 kg for oxamyl)

plus one untreated plot

RATE

NONE

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83/W/CS/34

Standard applications:
Potatoes (Series I and II): Manures: (10:10:15+4.5 Mg) at 2480 kg. N at 90 kg as 'Nitro-Chalk'. Weedkillers: Linuron at 1.0 l with paraquat at 0.4 kg ion in 250 l. Fungicides: Mancozeb at 1.4 kg in 250 l on three occasions, with insecticide on the first and third occasions, Fentin hydroxide at 0.28 kg in 250 l on five occasions, with insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.50 kg ion in 250 l.
S. barley (Series III): Manures: (20:10:10) at 630 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.
W. wheat (Series IV): Manures: Magnesian limestone at 5.0 t. (0:20:20) at 310 kg. N at 180 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 280 l.

Seed: S. barley: Triumph, dressed with triadimenol plus fuberidazole, sown at 160 kg.
W. wheat: Avalon, sown at 190 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
Potatoes (Series I and II): Heavy spring-tine cultivated (Series I): 26 Oct, 1982. Ploughed (Series II): 8 Nov. Deep-tine cultivated (Series I): 12 Jan, 1983. Heavy spring-tine cultivated (Series I): 8 Mar. Heavy spring-tine cultivated: 21 Mar, 14 Apr, 5 May. NPK with Mg applied: 14 Apr. N applied: 5 May. Treatments applied, rotary cultivated, potatoes planted (Series I): 10 May. Rotary cultivated, potatoes planted (Series II): 11 May. Rotary ridged: 6 June. Weedkillers applied: 7 June. Mancozeb applied with insecticide: 22 June, 8 July. Mancozeb applied: 1 July. Fentin hydroxide applied with insecticide: 18 July, 29 July, 11 Aug, 26 Aug. Fentin hydroxide applied: 9 Sept. Haulm mechanically destroyed: 5 Oct. Haulm desiccant applied: 17 Oct. Lifted: 19 Oct.
S. barley (Series III): Ploughed: 8 Nov, 1982. Spring-tine cultivated: 7 Mar, 1983. NPK applied: 8 Mar. Spring-tine cultivated with crumbler attached, seed sown: 9 Mar. Weedkillers applied: 27 May. N applied: 3 June. Fungicide applied: 16 June. Combine harvested: 5 Aug.
W. wheat (Series IV): Magnesian limestone and PK applied, heavy spring-tine, and spring-tine cultivated, seed sown: 26 Oct, 1982. Weedkillers applied: 16 Apr. N applied: 29 Apr. Combine harvested: 12 Aug.

NOTES: Soil samples were taken before applying treatments and after harvest for counts of cysts, eggs and larvae of Globodera rostochiensis.

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83/W/CS/34

POTATOES SERIES I

TOTAL TUBERS TONNES/HECTARE

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

RATE / NEMACIDE(83)	2.8	5.6	11.2	MEAN
FMC65201	26.7	31.6	38.4	32.2
FMC67825	26.6	31.5	38.4	32.2
OXAMYL	40.3	42.7	39.7	40.9
MEAN	31.2	35.3	38.8	35.1

RATE 0.0 14.4

GRAND MEAN 33.0

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

TABLE	NEMACIDE(83)	RATE	NEMACIDE(83) RATE & RATE 0.0
SED	2.33	2.33	4.04

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	4.95	15.0

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

RATE / NEMACIDE(83)	2.8	5.6	11.2	MEAN
FMC65201	92.4	92.4	92.6	92.5
FMC67825	92.1	93.3	93.4	92.9
OXAMYL	93.1	93.5	92.4	93.0
MEAN	92.5	93.0	92.8	92.8

RATE 0.0 88.7

GRAND MEAN 92.4

PLOT AREA HARVESTED 0.00130

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83/W/CS/34

POTATOES SERIES II

TOTAL TUBERS TONNES/HECTARE

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

NEMACIDE(80)	
NONE	18.7
BAS 1	22.4
BAS 2	24.6
BAS 4	27.2
CARBOF 2	24.2
ETHOP 4	26.8
FMC 2	15.0
OX 2	27.2
OX S1 2	24.3
OX S2 2	24.9
MEAN	23.5

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

TABLE	NEMACIDE(80)
SED	1.40

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	1.71	7.3

PERCENTAGE WARE 3.81CM (1.5 INCH RIDDLE)

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

NEMACIDE(80)	
NONE	90.6
BAS 1	91.7
BAS 2	91.8
BAS 4	92.2
CARBOF 2	91.5
ETHOP 4	92.9
FMC 2	88.6
OX 2	92.1
OX S1 2	90.8
OX S2 2	90.4
MEAN	91.3

PLOT AREA HARVESTED 0.00130

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83/W/CS/34

WINTER WHEAT SERIES IV

GRAIN TONNES/HECTARE

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

RATE NEMACIDE(82)	SINGLE	DOUBLE	QUAD	MEAN
DS 46995	4.82	5.32	4.96	5.03
DS 47187	4.78	4.81	5.15	4.92
OXAMYL	5.70	5.26	5.07	5.34
MEAN	5.10	5.13	5.06	5.10

RATE NONE 4.66

GRAND MEAN 5.05

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

TABLE	NEMACIDE(82)	RATE NEMACIDE(82)	RATE & RATE NONE
SED	0.341	0.341	0.591

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.724	14.3

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00130

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83/W/CS/34

BARLEY SERIES III

GRAIN TONNES/HECTARE

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

RATE	2.8	5.6	11.2	MEAN
NEMACIDE(81)				
ALDICARB	6.01	5.03	4.79	5.27
HOE00668	4.43	4.68	4.79	4.63
RH 9358	4.73	4.66	5.20	4.87
MEAN	5.06	4.79	4.93	4.92

RATE 0.0 5.06

GRAND MEAN 4.94

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

TABLE	NEMACIDE(81)	RATE	NEMACIDE(81) RATE & RATE 0.0
SED	0.326	0.326	0.564

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.691	14.0

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00251

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83/W/CS/35

NEMATICIDES DOSAGE

Object: To study the effects of rates and methods of applying nematicides on Globodera rostochiensis and yield of potatoes; residual effects are also studied - Woburn Stackyard AII.

Sponsor: A.G. Whitehead.

The 12th year, potatoes, s. barley.

For previous years see 72/W/CS/35(t) and 73-82/W/CS/35.

Design: 2 series each of 4 randomised blocks of 18 plots with S NEM YR on blocks

Whole plot dimensions: 4.27 x 6.10.

Treatments:-

The experiment has two series with the following cropping:-

	1968-72	73	74	75	76	77	78	79	80	81	82	83
Series II	P	P*	SB	B	P*	P	P	P*	W	B	B	P*
Series III	P	P	P*	SB	B	P*	P	P	P*	W	B	B

Series I was damaged by soil erosion and has been excluded from the experiment since 1980.
P = Potatoes, SB = Sugar beet, B = S. barley, W = W. wheat

*Treatments applied to potatoes, subsequent crops test residual effects.

Treatments:

Series II, potatoes 1983, tests the residual and fresh effects of treatments applied for potatoes in 1979 and 1983, ignoring those applied in earlier years. All combinations of:-

Blocks

1. S NEM YR — Years of applying spring nematicides:

   1979 — 1979 only
   1979 + 83 — 1979 repeated cumulatively in 1983

Whole plots

2. A NEM(79) — Residual effects of nematicide applied autumn 1978:

   NONE — None
   TELONE — 'Telone' at 224 kg

3. S NEM — Nematicides applied in spring 1979 and 1983:

   ALDICARB
   OXAMYL

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83/W/CS/35

4. SNEMRATE Rates of spring nematicides (kg):

2.5
5.0
7.5
10.0

plus two untreated plots per block

RATE

0.0

Series III, s. barley 1983, tests the residual effects of sets of treatments applied for potatoes in 1980, ignoring those applied in earlier years. All combinations (duplicated) of:-

1. S NEM(80) Spring nematicides:

ALDICARB
OXAMYL

2. SNEMRATE Rates of spring nematicides (kg):

2.5
5.0
7.5
10.0

plus two untreated plots per block

RATE

0.0

Standard applications:
Potatoes (Series II): Manures: Magnesian limestone at 5.0 t. (10:10:15+ 4.5 Mg) at 2480 kg. N at 90 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l. Linuron at 1.0 l with paraquat at 0.4 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions, with insecticide on the first and third occasions. Fentin hydroxide at 0.28 kg in 250 l on five occasions, with insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.50 kg ion in 250 l.
S. barley (Series III): Manures: (20:10:10) at 500 kg. N at 60 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.

Seed: S. barley: Triumph, dressed with triadimenol plus fuberidazole, sown at 160 kg.
Potatoes: Pentland Crown.

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83/W/CS/35

Cultivations, etc.:-

Potatoes (Series II): Magnesian limestone applied: 5 Oct, 1982. Glyphosate applied: 6 Oct. Ploughed: 3 Nov. Spring-tine cultivated: 8 Mar, 1983. NPK with Mg applied, heavy spring-tine cultivated: 14 Apr. N applied, heavy spring-tine cultivated: 5 May. Treatments applied, spring-tine cultivated: 11 May. Rotary cultivated, potatoes planted: 16 May. Rotary ridged: 6 June. Linuron with paraquat applied: 7 June. Mancozeb applied with insecticide: 22 June, 8 July. Mancozeb applied: 1 July. Fentin hydroxide applied with insecticide: 18 July, 29 July, 11 Aug, 26 Aug. Fentin hydroxide applied: 9 Sept. Haulm mechanically destroyed: 5 Oct. Haulm desiccant applied: 17 Oct. Lifted: 18 Oct.

S. barley (Series III): Glyphosate applied: 6 Oct, 1982. Ploughed: 3 Nov. Spring-tine cultivated: 8 Mar, 1983. NPK applied: 9 Mar. Spring-tine cultivated with crumbler attached, seed sown: 10 Mar. Spring-tine cultivated with crumbler attached, seed resown: 14 Apr. 'Brittox' applied: 30 May. N applied: 3 June. Combine harvested: 10 Aug.

NOTES: (1) Soil samples were taken before treatments were applied and after harvest for cyst and egg counts of Globodera rostochiensis.

(2) Because of waterlogging seven plots were lost from series II, those with treatment combinations:

S NEM YR	1979	1979	1979	1979
A NEM(79)	TELONE	NONE	TELONE	NONE
S NEM	OXAMYL	ALDICARB	OXAMYL	OXAMYL
SNEMRATE	2.5	2.5	7.5	2.5

and 3 plots with RATE 0.0

Estimated values were used in the analysis.

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83/W/CS/35

SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

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

A NEM(79)	NONE	TELONE	MEAN
S NEM YR			
1979	34.9	35.9	35.4
1979+83	42.5	40.3	41.4
MEAN	38.7	38.1	38.4

S NEM	ALDICARB	OXAMYL	MEAN
S NEM YR			
1979	35.1	35.6	35.4
1979+83	40.1	42.7	41.4
MEAN	37.6	39.2	38.4

S NEM	ALDICARB	OXAMYL	MEAN
A NEM(79)			
NONE	37.0	40.4	38.7
TELONE	38.3	37.9	38.1
MEAN	37.6	39.2	38.4

SNEMRATE	2.5	5.0	7.5	10.0	MEAN
S NEM YR					
1979	33.7	36.3	36.4	35.1	35.4
1979+83	41.8	41.5	42.4	39.8	41.4
MEAN	37.8	38.9	39.4	37.5	38.4

SNEMRATE	2.5	5.0	7.5	10.0	MEAN
A NEM(79)					
NONE	40.7	39.0	38.2	36.8	38.7
TELONE	34.8	38.8	40.6	38.1	38.1
MEAN	37.8	38.9	39.4	37.5	38.4

SNEMRATE	2.5	5.0	7.5	10.0	MEAN
S NEM					
ALDICARB	39.4	38.3	36.1	36.8	37.6
OXAMYL	36.2	39.5	42.8	38.2	39.2
MEAN	37.8	38.9	39.4	37.5	38.4

A NEM(79)	NONE		TELONE	
S NEM	ALDICARB	OXAMYL	ALDICARB	OXAMYL
S NEM YR				
1979	33.2	36.5	37.0	34.7
1979+83	40.7	44.3	39.6	41.0

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83/W/CS/35

SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

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

S NEM YR	A NEM(79)	SNEMRATE 2.5	5.0	7.5	10.0
1979	NONE	37.5	34.9	34.6	32.6
	TELONE	29.9	37.7	38.3	37.7
1979+83	NONE	43.9	43.2	41.8	41.1
	TELONE	39.8	39.9	43.0	38.6

S NEM YR	S NEM	SNEMRATE 2.5	5.0	7.5	10.0
1979	ALDICARB	36.3	36.6	33.1	34.5
	OXAMYL	31.2	35.9	39.8	35.8
1979+83	ALDICARB	42.4	40.0	39.1	39.0
	OXAMYL	41.2	43.0	45.8	40.7

A NEM(79)	S NEM	SNEMRATE 2.5	5.0	7.5	10.0
NONE	ALDICARB	38.1	40.3	34.9	34.5
	OXAMYL	43.2	37.7	41.5	39.1
TELONE	ALDICARB	40.6	36.4	37.3	39.0
	OXAMYL	29.1	41.2	44.0	37.3

S NEM YR	A NEM(79)	S NEM	SNEMRATE 2.5	5.0	7.5	10.0
1979	NONE	ALDICARB	33.2	37.0	34.4	28.4
		OXAMYL	41.8	32.8	34.8	36.8
	TELONE	ALDICARB	39.3	36.3	31.8	40.7
		OXAMYL	20.5	39.0	44.8	34.7
1979+83	NONE	ALDICARB	43.0	43.7	35.4	40.7
		OXAMYL	44.7	42.7	48.3	41.5
	TELONE	ALDICARB	41.9	36.4	42.8	37.4
		OXAMYL	37.7	43.4	43.2	39.8

RATE	0.0	33.9

GRAND MEAN 37.9

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

TABLE	S NEM YR	A NEM(79)	S NEM	SNEMRATE
SED	1.83	1.42	1.42	2.01

TABLE	S NEM YR A NEM(79)	S NEM YR S NEM	A NEM(79) S NEM	S NEM YR SNEMRATE
SED	2.32	2.32	2.01	3.07
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
S NEM YR	2.01	2.01		2.85

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SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

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

TABLE	A NEM(79) SNEMRATE	S NEM SNEMRATE	S NEM YR A NEM(79) S NEM	S NEM YR A NEM(79) SNEMRATE
SED	2.85	2.85	3.07	4.19
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
S NEM YR			2.85	4.03

TABLE	S NEM YR S NEM SNEMRATE	A NEM(79) S NEM SNEMRATE	S NEM YR A NEM(79) S NEM SNEMRATE
SED	4.19	4.03	5.81
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
S NEM YR	4.03		5.69

SED FOR COMPARING A RATE 0.0 WITH ANY ITEM
IN SNEM YR.A NEM(79).S NEM.SNEMRATE TABLE IS 4.50

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	5.69	15.0

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

A NEM(79) / S NEM YR	NONE	TELONE	MEAN
1979	92.5	93.1	92.8
1979+83	93.2	92.9	93.0
MEAN	92.8	93.0	92.9

S NEM / S NEM YR	ALDICARB	OXAMYL	MEAN
1979	93.3	92.4	92.8
1979+83	92.9	93.1	93.0
MEAN	93.1	92.7	92.9

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83/W/CS/35

SERIES II POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

S NEM A NEM(79)	ALDICARB	OXAMYL	MEAN
NONE	93.0	92.7	92.8
TELONE	93.2	92.8	93.0
MEAN	93.1	92.7	92.9

SNEMRATE S NEM YR	2.5	5.0	7.5	10.0	MEAN
1979	92.6	92.9	93.8	92.0	92.8
1979+83	93.3	93.0	92.7	93.1	93.0
MEAN	92.9	92.9	93.2	92.6	92.9

SNEMRATE A NEM(79)	2.5	5.0	7.5	10.0	MEAN
NONE	93.3	92.5	93.1	92.5	92.8
TELONE	92.6	93.4	93.4	92.6	93.0
MEAN	92.9	92.9	93.2	92.6	92.9

SNEMRATE S NEM	2.5	5.0	7.5	10.0	MEAN
ALDICARB	93.7	93.3	93.0	92.4	93.1
OXAMYL	92.2	92.6	93.5	92.8	92.7
MEAN	92.9	92.9	93.2	92.6	92.9

A NEM(79)	NONE		TELONE	
S NEM	ALDICARB	OXAMYL	ALDICARB	OXAMYL
S NEM YR				
1979	92.9	92.1	93.6	92.6
1979+83	93.1	93.3	92.8	93.0

	SNEMRATE	2.5	5.0	7.5	10.0
S NEM YR	A NEM(79)				
1979	NONE	93.1	92.4	93.1	91.5
	TELONE	92.1	93.3	94.5	92.5
1979+83	NONE	93.5	92.7	93.1	93.5
	TELONE	93.1	93.4	92.4	92.7

	SNEMRATE	2.5	5.0	7.5	10.0
S NEM YR	S NEM				
1979	ALDICARB	93.7	93.6	93.5	92.2
	OXAMYL	91.5	92.1	94.1	91.8
1979+83	ALDICARB	93.7	93.0	92.5	92.5
	OXAMYL	92.9	93.0	92.9	93.7

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83/W/CS/35

SERIES II POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

A NEM(79)	SNEMRATE / S NEM	2.5	5.0	7.5	10.0
NONE	ALDICARB	93.8	93.2	92.9	92.1
	OXAMYL	92.8	91.9	93.2	92.9
TELONE	ALDICARB	93.6	93.5	93.1	92.6
	OXAMYL	91.6	93.2	93.7	92.7

S NEM YR	A NEM(79)	SNEMRATE / S NEM	2.5	5.0	7.5	10.0
1979	NONE	ALDICARB	93.9	93.3	93.1	91.2
		OXAMYL	92.2	91.4	93.0	91.8
	TELONE	ALDICARB	93.5	93.9	93.9	93.2
		OXAMYL	90.7	92.8	95.1	91.9
1979+83	NONE	ALDICARB	93.7	93.0	92.7	93.1
		OXAMYL	93.3	92.4	93.4	94.0
	TELONE	ALDICARB	93.7	93.1	92.3	92.0
		OXAMYL	92.5	93.6	92.4	93.5

RATE	0.0	91.5

GRAND MEAN 92.8

PLOT AREA HARVESTED 0.00087

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83/W/CS/35

SERIES III SPRING BARLEY

GRAIN TONNES/HECTARE

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

SNEMRATE	2.5	5.0	7.5	10.0	MEAN
S NEM(80)					
ALDICARB	2.34	2.37	2.25	2.36	2.33
OXAMYL	2.00	2.12	2.28	2.12	2.13
MEAN	2.17	2.25	2.27	2.24	2.23

RATE 0.0 2.26

GRAND MEAN 2.23

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

TABLE	S NEM(80)	SNEMRATE	S NEM(80) SNEMRATE & RATE 0.0
SED	0.086	0.122	0.173

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

STRATUM	DF	SE	CV%
BLOCK.WP	60	0.345	15.5

MEAN DM% 83.0

PLOT AREA HARVESTED 0.00126

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83/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 13th year, forage maize.

For previous years see 71/W/CS/66(t), 72/W/CS/66(t) and 73-82/W/CS/66.

Design: 2 blocks of 4 plots split into 4.

Whole plot dimensions: 2.13 x 16.5.

Treatments: All combinations of:-

Whole plots

1. DAZOMET(79) Dazomet (kg per annum) cumulative 1971-79, none since:

   0
   450

2. DAZOMET(83) Dazomet (kg) in 1982 and 1983:

   0
   450

Sub plots

3. N+FUNG Nitrogen fertilizer as 'Nitro-Chalk' and fungicide cumulative to 1982:

NONE	None
N78+N120	78 kg N on 29 Mar, 120 kg N to seedbed on 6 June
N120	120 kg N to seedbed on 6 June
N120+CYP	120 kg N to seedbed + 50 kg cyprofuram to seedbed

NOTE: Sub plot treatments were superimposed on previous cumulative N treatments 1971-81.

Basal applications: Manures: (0:18:36) at 490 kg. Weedkiller: Atrazine at 1.1 kg in 280 l.

Seed: Fronica, sown at 103,000 seeds per hectare.

Cultivations, etc.:- Ploughed: 19 Nov, 1982. Spring-tine cultivated with crumbler attached: 9 Mar, 1983. Dazomet applied, rotary cultivated twice: 16 Mar. Early N applied: 29 Mar. Spring-tine cultivated with crumbler attached, weedkiller applied, PK applied: 16 May. Fungicide treatment applied: 17 May. Spring-tine cultivated with crumbler attached, seed sown: 25 May. Seedbed N applied: 6 June. Hand harvested: 4 Oct.

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83/W/CS/66

NOTES: (1) Soil samples were taken for estimates of total biomass.
(2) Plant samples were taken for assessments of bacteria and fungi on roots.
(3) Plant heights were measured at weekly intervals during July and August.
(4) Soil samples were taken before sowing, mid season and after harvest for counts of ectoparasitic nematodes.

FORAGE DRY MATTER TONNES/HECTARE

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

DAZOMET(83)	0	450	MEAN
DAZOMET(79)			
0	15.36	17.21	16.29
450	14.63	18.07	16.35
MEAN	15.00	17.64	16.32

N+FUNG	NONE	N78+N120	N120	N120+CYP	MEAN
DAZOMET(79)					
0	10.50	18.16	19.30	17.19	16.29
450	10.59	17.65	18.73	18.43	16.35
MEAN	10.55	17.90	19.01	17.81	16.32

N+FUNG	NONE	N78+N120	N120	N120+CYP	MEAN
DAZOMET(83)					
0	7.61	17.25	18.40	16.72	15.00
450	13.49	18.55	19.62	18.90	17.64
MEAN	10.55	17.90	19.01	17.81	16.32

DAZOMET(79)	N+FUNG DAZOMET(83)	NONE	N78+N120	N120	N120+CYP
0	0	7.74	17.85	19.25	16.61
	450	13.27	18.46	19.35	17.78
450	0	7.49	16.65	17.55	16.83
	450	13.70	18.64	19.90	20.02

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

TABLE	N+FUNG	DAZOMET(79)* N+FUNG	DAZOMET(83)* N+FUNG	DAZOMET(79)* DAZOMET(83) N+FUNG
SED	0.646	0.913	0.913	1.291

* WITHIN SAME LEVEL OF DAZOMET(79) OR DAZOMET(82) OR BOTH

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	12	1.291	7.9

FORAGE MEAN DM% 28.0 SUB PLOT AREA HARVESTED 0.00039

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83/W/CS/99

EFFECTS OF BREAKS ON TAKE-ALL

Object: To study factors affecting the incidence of take-all (Gaeumannomyces graminis) and their effects on yields of s. cereals - Woburn, Butt Furlong.

Sponsor: D. Hornby.

The 12th year, s. barley, s. wheat.

For previous years see 72/W/CS/99(t) and 73-82/W/CS/99.

Design: 2 randomised blocks of 9 plots, 6 of which are split into 2.

Whole plot dimensions: 5.34 x 15.2.

Treatments: All combinations of:-

Whole plots

1. TREATMNT(1) Crop sequences; soil sterilant and inoculum in 1979:

	72	73	74	75	76	77	78	79	80	81	82	83
B 10(S)	F	BE	B	B	B	B	B	B(S)	B	B	B	B
B 8	B	B	F	BE	B	B	B	B	B	B	B	B
B 7(SI)	B	B	B	F	BE	B	B	B(SI)	B	B	B	B
B 6(I)	B	B	B	B	F	BE	B	B(I)	B	B	B	B
W 9	B	F	BE	B	B	B	B	B	B	W	W	W

All sequences were in s. barley 1968-71

Sub plots

2. INOCULUM Take-all inoculum:

0	None
I	Inoculated (in 1980 and 1983 to s. barley, in 1981 to s. wheat)

plus an extra combination of:

Whole plots

1. TREATMNT(2) Crop sequences (s. barley 1968-71):

	72	73	74	75	76	77	78	79	80	81	82	83
B 16	B	B	B	B	B	B	B	B	B	B	B	B

Sub plots

2. AUT CROP Crop in autumn 1982 before sowing in spring 1983:

NONE	None
BARLEY	Barley sown 26 Oct, destroyed 8 Mar.

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83/W/CS/99

plus three extra plots testing crop sequences alone (all s. barley 1968-71):

EXTRA

	72	73	74	75	76	77	78	79	80	81	82	83
B 2	F	B	B	B	B	B	B	F	BE	0	B	B
B 4	B	B	B	B	B	F	BE	0	B	B	B	B
B 3	B	B	B	B	B	B	F	BE	0	B	B	B

B = S. barley, W = S. wheat, BE = S. beans, 0 = S. oats, F = Fallow
S = Soil sterilant (1979), formalin.
(I) & I = Inoculum of take-all applied on colonised autoclaved oats, in the ratio of three oats to one s. barley or s. wheat seed, broadcast at 310 kg on the surface and rotary harrowed in 1983, 1981 and 1980, combine drilled in 1979.

NOTE: Spring barley was sown in error before applying the inoculum . It was therefore applied as soon as plants emerged and then all s. barley plots were rotary cultivated and resown.

Standard applications:
S. wheat and s. barley: Manures: (20:10:10) at 590 kg. N at 60 kg as 'Nitro-Chalk'.
S. barley: Weedkiller: Paraquat at 0.56 kg ion in 280 l. Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: S. barley: Triumph, dressed with ethirimol, sown at 160 kg.
S. wheat: Sicco, sown at 190 kg.

Cultivations, etc.:-
S. barley: Ploughed: 5 Oct, 1982. Early-sown plots spring-tine cultivated, seed sown: 26 Oct. Paraquat applied, NPK applied: 8 Mar, 1983. Spring-tine cultivated with crumbler attached, seed sown: 9 Mar. Inoculum treatment applied, rotary cultivated, seed resown: 7 Apr. 'Herrisol' applied: 26 May. N applied: 3 June. Combine harvested: 9 Aug.
S. wheat: Ploughed: 5 Oct, 1982. NPK applied: 8 Mar, 1983. Spring-tine cultivated with crumbler attached, seed sown: 9 Mar. N applied: 3 June. Combine harvested: 16 Aug.

NOTE: Plant samples were taken in July for incidence of take-all.

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GRAIN TONNES/HECTARE

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

TREATMNT(1)	B10(S)	B8	B7(SI)	B6(I)	W9	MEAN
INOCULUM						
0	1.61	2.70	1.50	2.37	2.03	2.04
I	0.75	2.33	0.85	1.63	2.77	1.67
MEAN	1.18	2.51	1.18	2.00	2.40	1.85

AUT CROP	NONE	BARLEY	MEAN
TREATMNT(2)			
B16	1.75	2.64	2.19

EXTRA	B2	B4	B3	MEAN
	3.30	4.04	3.07	3.47

GRAND MEAN 2.43

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

TABLE	AUT CROP	EXTRA	INOCULUM	TREATMNT(1)	INOCULUM TREATMNT(1)
SED	0.407	0.563	0.182	0.563	0.632

EXCEPT WHEN COMPARING MEANS WITHIN THE SAME LEVEL(S) OF:
TREATMNT(1) 0.407

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.563	23.2
BLOCK.WP.SP	12	0.407	16.8

MEAN DM% 85.4

PLOT AREA HARVESTED 0.00193

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83/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.

The tenth year, forage maize.

For previous years see 74-82/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 (2 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, 1979 and 1981)
PERMETH	Permethrin, 0.15 kg as foliar spray (1979 only)
PHORATE	Phorate, 1.68 kg as granules to seedbed
PIRIMICA	Pirimicarb, 0.14 kg as foliar spray (1979 only)
BE+DA+PH	Benomyl + dazomet (not applied 1975, 1979 & 1981) + phorate, at above rates and times

Sub plots

2. N	Nitrogen fertilizer (kg N), as 'Nitro-Chalk':
50	
100	
150	

Basal applications: Weedkiller: Atrazine at 1.7 l in 340 l.

Seed: Fronica, sown at 100,000 seeds per hectare.

Cultivations, etc.:- Ploughed: 20 Dec, 1982. Power harrowed, dazomet treatments applied and rotary cultivated in: 10 Mar, 1983. Spring-tine cultivated: 16 May. Remaining chemical treatments applied, power harrowed in: 17 May. Power harrowed, seed sown: 7 June. N treatments applied: 14 June. Weedkiller applied: 15 June. Harvested by hand: 11 Oct.

NOTE: Frit fly (Oscinella frit) damage was assessed. The N content of the harvested produce was measured.

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83/R/CS/133

FORAGE MAIZE DRY MATTER TONNES/HECTARE

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

N	50	100	150	MEAN
CHEMICAL				
NONE	7.86	9.88	10.14	9.29
ALDICARB	7.79	8.91	9.86	8.85
BENOMYL	7.67	10.58	10.32	9.52
DAZOMET	9.81	10.57	11.77	10.72
PERMETH	8.08	9.18	9.49	8.92
PHORATE	6.98	8.80	9.91	8.56
PIRIMICA	7.53	9.57	10.22	9.11
BE+DA+PH	10.36	10.83	12.16	11.11
MEAN	8.22	9.80	10.45	9.49

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

TABLE	CHEMICAL	N	CHEMICAL N	
SED	0.692		0.899	MIN REP
	0.600	0.234	0.778	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CHEMICAL			0.702	MIN REP
			0.496	MAX REP

	CHEMICAL
MAX REP	WITHIN NONE
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	17	0.848	8.9
BLOCK.WP.SP	38	0.860	9.1

FORAGE MEAN DM% 25.6

SUB PLOT AREA HARVESTED 0.00059

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83/R/CS/140

CHEMICAL REFERENCE PLOTS

Object: To study the persistence in soil of agricultural chemicals applied annually, singly and in combination and their effects on soil microflora and on yield of continuous s. barley - Long Hoos V 3.

Sponsors: G.G. Briggs, R. MacDonald.

The tenth year, s. barley.

For previous years see 74-82/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments, applied cumulatively except as stated:

All combinations of:-

1.	WEEDKLLR	Weedkiller in autumn:
	NONE	None
	GLYPHOS	Glyphosate at 1.5 kg to stubble of 1979, 1980, 1981 and 1982 s. barley.
2.	FUNGCIDE(1)	Fungicide in autumn:
	NONE	None
	TRIADIM	Triadimefon at 0.25 kg in autumn 1981 and 1982 cumulative to chlortoluron in 1974 and 1976 only
3.	FUNGCIDE(2)	Fungicide in spring:
	NONE	None
	BENOMYL	Benomyl at 4 kg to the seedbed
4.	INSCTCDE	Insecticide:
	NONE	None
	CHLORFEN	Chlorfenvinphos at 2 kg to the seedbed
5.	NEMACIDE	Nematicide:
	NONE	None
	ALDICARB	Aldicarb at 6 kg to the seedbed as granules

NOTE: Glyphosate and triadimefon were applied in 340 l on 2 Sept, 1982. Other treatments were applied on 9 Mar, 1983.

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. 'Nitro-Chalk' at 460 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 340 l.

Seed: Triumph, seed not dressed, sown at 160 kg.

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Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 28 Sept. Ploughed: 29 Nov. N applied, spring-tine cultivated, power harrowed, seed sown: 9 Mar, 1983. Weedkillers applied: 16 May. Combine harvested: 9 Aug.

NOTE: Mildew and aphids were assessed twice during the season. Soil was analysed for benomyl residues.

GRAIN TONNES/HECTARE

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

FUNGCIDE(1)	NONE	TRIADIM	MEAN
WEEDKLLR			
NONE	4.41	4.27	4.34
GLYPHOS	4.48	4.50	4.49
MEAN	4.44	4.39	4.41

FUNGCIDE(2)	NONE	BENOMYL	MEAN
WEEDKLLR			
NONE	4.18	4.50	4.34
GLYPHOS	4.47	4.51	4.49
MEAN	4.32	4.50	4.41

FUNGCIDE(2)	NONE	BENOMYL	MEAN
FUNGCIDE(1)			
NONE	4.37	4.51	4.44
TRIADIM	4.28	4.50	4.39
MEAN	4.32	4.50	4.41

INSCTCDE	NONE	CHLORFEN	MEAN
WEEDKLLR			
NONE	4.31	4.36	4.34
GLYPHOS	4.45	4.53	4.49
MEAN	4.38	4.45	4.41

INSCTCDE	NONE	CHLORFEN	MEAN
FUNGCIDE(1)			
NONE	4.40	4.48	4.44
TRIADIM	4.36	4.41	4.39
MEAN	4.38	4.45	4.41

INSCTCDE	NONE	CHLORFEN	MEAN
FUNGCIDE(2)			
NONE	4.33	4.32	4.32
BENOMYL	4.43	4.58	4.50
MEAN	4.38	4.45	4.41

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83/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE WEEDKLLR	NONE	ALDICARB	MEAN
NONE	4.17	4.51	4.34
GLYPHOS	4.32	4.65	4.49
MEAN	4.25	4.58	4.41

NEMACIDE FUNGCIDE(1)	NONE	ALDICARB	MEAN
NONE	4.25	4.63	4.44
TRIADIM	4.24	4.53	4.39
MEAN	4.25	4.58	4.41

NEMACIDE FUNGCIDE(2)	NONE	ALDICARB	MEAN
NONE	4.18	4.47	4.32
BENOMYL	4.32	4.69	4.50
MEAN	4.25	4.58	4.41

NEMACIDE INSCTCDE	NONE	ALDICARB	MEAN
NONE	4.30	4.47	4.38
CHLORFEN	4.20	4.69	4.45
MEAN	4.25	4.58	4.41

FUNGCIDE(1)	NONE		TRIADIM	
FUNGCIDE(2)	NONE	BENOMYL	NONE	BENOMYL
WEEDKLLR				
NONE	4.22	4.60	4.14	4.40
GLYPHOS	4.53	4.43	4.42	4.59

FUNGCIDE(1)	NONE		TRIADIM	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
WEEDKLLR				
NONE	4.37	4.45	4.26	4.28
GLYPHOS	4.43	4.52	4.46	4.54

FUNGCIDE(2)	NONE		BENOMYL	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
WEEDKLLR				
NONE	4.23	4.12	4.39	4.61
GLYPHOS	4.43	4.51	4.47	4.55

FUNGCIDE(2)	NONE		BENOMYL	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
FUNGCIDE(1)				
NONE	4.44	4.30	4.36	4.66
TRIADIM	4.22	4.33	4.50	4.49

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83/R/CS/140

GRAIN TONNES/HECTARE

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

FUNGCIDE(1)	NONE		TRIADIM	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	4.17	4.65	4.18	4.36
GLYPHOS	4.34	4.61	4.31	4.70

FUNGCIDE(2)	NONE		BENOMYL	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	3.99	4.36	4.35	4.65
GLYPHOS	4.37	4.57	4.28	4.73

FUNGCIDE(2)	NONE		BENOMYL	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(1)				
NONE	4.21	4.54	4.30	4.72
TRIADIM	4.15	4.40	4.33	4.66

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	4.17	4.45	4.17	4.56
GLYPHOS	4.42	4.48	4.23	4.83

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(1)				
NONE	4.29	4.51	4.22	4.75
TRIADIM	4.30	4.42	4.19	4.64

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(2)				
NONE	4.16	4.50	4.20	4.44
BENOMYL	4.43	4.43	4.20	4.95

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

MARGINS OF TWO FACTOR TABLES	0.073
TWO FACTOR TABLES	0.103
THREE FACTOR TABLES	0.146

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

STRATUM	DF	SE	CV%
WP	6	0.207	4.7

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00075

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83/R/CS/212

SEASONAL EFFECTS OF TAKE-ALL

Object: To study the incidence of take-all (Gaeumannomyces graminis) in continuous w. wheat and in first and second w. wheats after a break - Great Harpenden I.

Sponsor: D. Hornby.

The sixth year, s. beans, w. wheat.

For previous years see 78-82/R/CS/212.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 5.33 x 31.4.

Treatments:

PREVCROP Previous crops before w. wheat 1983:

	1978	1979	1980	1981	1982
CONT W	W	W	W	W	W
FIRST W	BE	W	W	BE	W
BEANS	W	BE	W	W	BE

BE = s. beans, W = w. wheat

NOTE: An additional crop sequence was in s. beans 1983, yields not taken.

Standard applications:
W. wheat: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 350 kg. Weedkiller: Methabenzthiazuron at 3.2 kg in 250 l.

Seed: W. wheat: Avalon, sown at 200 kg.
S. beans: Minden, sown at 280 kg.

Cultivations, etc.:-
Both crops: Ploughed: 9 Sept, 1982.
W. wheat: Rotary harrowed, PK applied, seed sown: 23 Sept. Weedkiller applied: 24 Sept. N applied: 16 Apr, 1983. Combine harvested: 10 Aug.
S. beans: Spring-tine cultivated: 8 Mar, 1983. Rotary harrowed, seed sown: 9 Mar. Combine harvested: 12 Aug.

NOTE: Take-all was assessed in soil and in wheat plants. Weed counts were made.

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83/R/CS/212

W.WHEAT

GRAIN TONNES/HECTARE

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

PREVCROP	CONT W	FIRST W	BEANS	MEAN
	7.80	5.83	8.05	7.23

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

TABLE	PREVCROP
SED	0.549

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.672	9.3

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00434

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83/R/CS/216 and 83/W/CS/216

EFFECTS OF SUBSOILING & DEEP PK

Object: To study the effects of subsoiling and of incorporating a large dressing of PK in the subsoil on yields and nutrient uptakes of a sequence of crops - Rothamsted (R) Delharding and Woburn (W) Road Piece.

Sponsors: J. McEwen, A.E. Johnston (R), M.K.V. Carr, R.J. Godwin (National College of Agricultural Engineering), I.B. Warboys, J.M. Wilkes (Wye College).

The sixth year, s. barley.

For previous years see 78-82/R&W/CS/216.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 4.27 x 13.7.

Treatments:

TREATMNT	Machines and incorporation of extra P and K into the subsoil:
000 00	Not subsoiled, no P or K
F00 F0	Farm standard, unwinged, subsoiler, no P or K, autumn 1977 & autumn 1979
N00 N0	N.C.A.E. winged subsoiler, no P or K, autumn 1977 & autumn 1979
NPK N0	N.C.A.E. winged subsoiler, P and K applied autumn 1977, subsoiled only autumn 1979
W00 00	Wye double digger, no P or K, autumn 1977 only
WPK 00	Wye double digger, P and K applied, autumn 1977 only

NOTES: (1) The rates of P and K were 1930 kg P_2O_5, as triple superphosphate and 460 kg K_2O as muriate of potash.

(2) In autumn 1977 the Farm standard, unwinged, subsoiler was set to work at a depth of 38 cm at intervals of 50 cm Delharding (R) and at a depth of 50 cm at intervals of 70 cm Road Piece (W). In autumn 1979 it was set to work at a depth of 56 cm at intervals of 76 cm Delharding (R) and 142 cm Road Piece (W).

(3) In autumn 1977 the N.C.A.E. winged subsoiler had a single tine set to work at a depth of 40 cm at intervals of 60 cm on plots not given P and K and at alternate depths of 30 cm and 40 cm spaced 30 cm apart on plots given P and K; fertilizer was applied behind the subsoiling points. In autumn 1979 the winged subsoiler had three tines, the centre tine preceding the others, all set to work at a depth of 40 cm spaced 40 cm apart.

(4) The Wye double digger turned a furrow with a conventional plough to a depth of 23 cm and at the same time rotary cultivated the bottom of the furrow to a further depth of 15 cm. When applying P & K this was distributed ahead of the rotary cultivator.

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83/R/CS/216 and 83/W/CS/216

Basal applications:-
Delharding (R): Manures: Ground chalk at 5.0 t. (20:10:10) at 560 kg. N at 70 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.
Road Piece (W): Manures: (20:10:10) at 590 kg. N at 60 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: Both sites: Triumph, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-
Delharding(R): Ploughed: 14 Sept, 1982. Chalk applied: 16 Sept. Spring-tine cultivated: 14 Mar, 1983. NPK applied: 15 Mar. Rotary harrowed: 17 Mar. Seed sown: 18 Mar. Weedkillers applied: 25 May. N applied: 26 May. Combine harvested: 8 Aug.
Road Piece (W): Disced: 24 Aug, 1982. Ploughed: 6 Oct. Spring-tine cultivated: 7 Mar, 1983. NPK applied: 8 Mar. Spring-tine cultivated with crumbler attached, seed sown: 9 Mar. Weedkillers applied: 26 May. N applied: 3 June. Combine harvested: 6 Aug.

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83/R/CS/216 DELHARDING (R)

GRAIN TONNES/HECTARE

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

TREATMNT	000 00	F00 F0	N00 N0	NPK N0	W00 00	WPK 00	MEAN
	4.41	5.29	4.71	4.70	4.32	5.25	4.78

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

TABLE	TREATMNT
SED	0.423

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.518	10.8

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00260

83/W/CS/216 ROAD PIECE (W)

GRAIN TONNES/HECTARE

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

TREATMNT	000 00	F00 F0	N00 N0	NPK N0	W00 00	WPK 00	MEAN
	2.80	3.04	2.73	3.19	2.97	2.68	2.90

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

TABLE	TREATMNT
SED	0.363

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.445	15.3

GRAIN MEAN DM% 84.3

PLOT AREA HARVESTED 0.00251

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83/W/CS/245

MINIMUM CULTIVATION AND DEEP PK

Object: To study the effects of thorough subsoil disturbance and the incorporation of P and K into the subsoil on w. wheat and w. barley either sown conventionally or direct drilled - Woburn Warren Field I and II.

Sponsors: A.E. Johnston, J. McEwen, R.D. Prew, R.J. Gutteridge, A.W. Neill, P.H. Nicholls, C.J. Rawlinson, O.J. Stedman.

The fourth year, w. wheat and w. barley.

For previous years see 80-82/W/CS/245.

Column plot dimensions: 4.27 x 57.6.

Design: 3 series each of 20 x 4 criss cross.

Treatments: All combinations of:-

Series:

1. SER CROP		Series, crops and previous cropping:
	SER1 WW1	Series I, w. wheat in rotation after w. barley, w. oilseed rape
	SER2 WW6	Series II, w. wheat, sixth cereal after a break crop
	SER3 WB6	Series III, w. barley, sixth cereal after a break crop

Column plots: All combinations (duplicated) of:

2. PK SUB		Extra PK and subsoil treatments:
	---	None, mouldboard ploughed
	--S	None, subsoiled
	PKS	PK to subsoil
3. YEAR		Years of applying PK SUB:
	1980	In autumn 1979
	1983	In autumn 1979 and in autumn 1982
4. DRILL		Drills and associated cultivations:
	CNVNTIAL	Mouldboard ploughed, conventionally drilled
	DIRECT	Direct drilled (duplicated) (conventionally drilled in years when factor 2 involves autumn ploughing)

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83/W/CS/245

Row plots:

5. N. PATH Nitrogen fertilizer in spring, and pathogen control:

75 ENHD	75 kg N	enhanced pathogen control
150 ENHD	150 kg N	enhanced pathogen control
225 ENHD	225 kg N	enhanced pathogen control
150 STND	150 kg N	standard pathogen control

plus two extra column plot treatments, in all combinations with row plots above:-

EXTRA

TPK 80 D	PK applied to topsoil and mouldboard ploughed in autumn 1979, direct drilled since
TPK 80 C	PK as above, mouldboard ploughed, conventionally drilled each year

NOTES: (1) Rates of extra P and K were 500 kg P_2O_5, as superphosphate, 250 kg K_2O as muriate of potash.
(2) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(3) The topsoil PK dressing was equally divided before and after ploughing.
(4) Standard pathogen control was conventional seed dressings and methiocarb pellets at sowing. Enhanced pathogen control had in addition prochloraz at 0.4 l in 250 l on 5 May and propiconazole at 0.12 kg in 250 l on 10 June.

Basal applications:
Series I and II, w. wheat, series III w. barley: Manures: N at 20 kg as 'Nitro-Chalk', (5:14:30) at 340 kg combine drilled. Molluscicide: Methiocarb (as 'Draza' pellets at 5.6 kg). Weedkillers: Glyphosate at 1.4 kg in 250 l (Series I). Paraquat at 0.56 kg ion in 280 l. Chlortoluron at 5.6 l, mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l (Series II). Growth regulator: Chlormequat at 1.7 kg (Series I and II).

Seed: Series I and II, w. wheat: Avalon, with methiocarb pellets, sown at 200 kg.
Series III w. barley: Igri, with methiocarb pellets, sown at 170 kg.

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83/W/CS/245

Cultivations, etc.:-
Series I: W. Wheat: Glyphosate applied: 10 Aug, 1982. Disced: 16 Aug. Ploughed and subsoil treatments applied: 27 Aug. These treatments disced: 28 Aug, 30 Aug.
Series II: W. wheat: Disced: 30 Aug, 1982. Ploughed and subsoil treatments applied: 13 Sept. These treatments disced: 15 Sept, 17 Sept. 'Brittox' applied: 15 Apr, 1983.
Series I and II: W. wheat: Paraquat applied to DIRECT plots: 18 Sept. N applied: 28 Sept. Paraquat applied to all plots: 15 Oct. Seed sown, spring-tine cultivated: 27 Oct. Chlortoluron applied: 29 Oct. N treatments applied, growth regulator applied: 29 Apr, 1983. Combine harvested: 11 Aug.
Series III: W. barley: Disced: 30 Aug, 1982. Ploughed treatment applied: 16 Sept. Subsoil treatment applied: 15-16 Sept. These treatments disced: 17 Sept, 20 Sept. Paraquat applied to DIRECT plots: 18 Sept. N applied: 28 Sept. Paraquat applied to all plots: 15 Oct. Seed sown, spring-tine cultivated: 19 Oct. Chlortoluron applied: 29 Oct. N treatments applied: 29 Apr, 1983. Combine harvested: 21 July.

NOTE: Plant establishment counts were made. Observations on diseases were made during the season.

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83/W/CS/245 WINTER WHEAT SERIES I

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	8.75	8.79	9.17	8.90
150 ENHD	9.25	9.65	9.43	9.44
225 ENHD	9.47	9.61	9.82	9.63
150 STND	8.60	8.45	9.02	8.69
MEAN	9.02	9.12	9.36	9.17

YEAR N PATH	1980	1983	MEAN
75 ENHD	8.18	9.62	8.90
150 ENHD	9.38	9.50	9.44
225 ENHD	9.79	9.48	9.63
150 STND	8.25	9.13	8.69
MEAN	8.90	9.43	9.17

YEAR PK SUB	1980	1983	MEAN
---	8.82	9.21	9.02
--S	8.84	9.41	9.12
PKS	9.05	9.68	9.36
MEAN	8.90	9.43	9.17

DRILL N PATH	CNVNTIAL	DIRECT	MEAN
75 ENHD	9.23	8.74	8.90
150 ENHD	9.65	9.34	9.44
225 ENHD	9.72	9.59	9.63
150 STND	9.10	8.49	8.69
MEAN	9.43	9.04	9.17

DRILL PK SUB	CNVNTIAL	DIRECT	MEAN
---	9.25	8.90	9.02
--S	9.51	8.93	9.12
PKS	9.53	9.28	9.36
MEAN	9.43	9.04	9.17

DRILL YEAR	CNVNTIAL	DIRECT	MEAN
1980	9.42	8.64	8.90
1983	9.43	9.43	9.43
MEAN	9.43	9.04	9.17

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83/W/CS/245 WINTER WHEAT SERIES I

GRAIN TONNES/HECTARE

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

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK 80 D	7.92	9.71	10.41	8.42	9.11
TPK 80 C	8.54	9.52	9.68	9.12	9.22
MEAN	8.23	9.62	10.04	8.77	9.17

PK SUB	---		--S		PKS	
YEAR	1980	1983	1980	1983	1980	1983
N PATH						
75 ENHD	8.14	9.36	7.85	9.73	8.56	9.78
150 ENHD	9.38	9.11	9.68	9.62	9.09	9.77
225 ENHD	9.61	9.33	9.82	9.40	9.94	9.70
150 STND	8.17	9.04	8.01	8.90	8.59	9.46

PK SUB	---		--S		PKS	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH						
75 ENHD	8.82	8.71	9.27	8.54	9.60	8.96
150 ENHD	9.75	8.99	9.78	9.58	9.42	9.43
225 ENHD	9.62	9.39	9.89	9.47	9.65	9.91
150 STND	8.80	8.51	9.08	8.14	9.43	8.82

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	9.05	7.75	9.41	9.73
150 ENHD	9.83	9.16	9.47	9.52
225 ENHD	9.96	9.70	9.48	9.48
150 STND	8.83	7.97	9.38	9.01

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
PK SUB				
---	9.20	8.63	9.29	9.17
--S	9.64	8.43	9.37	9.43
PKS	9.41	8.86	9.64	9.70

YEAR		1980		1983	
DRILL		CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH	PK SUB				
75 ENHD	---	8.59	7.91	9.04	9.51
	--S	9.19	7.17	9.34	9.92
	PKS	9.37	8.16	9.83	9.76
150 ENHD	---	9.70	9.22	9.81	8.77
	--S	10.21	9.41	9.34	9.75
	PKS	9.59	8.84	9.25	10.03
225 ENHD	---	9.76	9.53	9.49	9.25
	--S	10.26	9.60	9.53	9.33
	PKS	9.88	9.97	9.43	9.84
150 STND	---	8.76	7.87	8.83	9.15
	--S	8.91	7.56	9.25	8.72
	PKS	8.81	8.47	10.06	9.16

GRAND MEAN 9.17

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83/W/CS/245 WINTER WHEAT SERIES I

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	YEAR	DRILL	
SED	0.502	0.205	0.167	0.177	

TABLE	N PATH* PK SUB	N PATH* YEAR	PK SUB YEAR	N PATH* DRILL	
SED	0.306	0.250	0.290	0.306	MIN REP
				0.265	MAX-MIN
				0.217	MAX REP

TABLE	PK SUB DRILL	YEAR DRILL	N PATH* EXTRA	N PATH* PK SUB YEAR	
SED	0.355	0.290			MIN REP
	0.307	0.251	0.750	0.433	MAX-MIN
	0.251	0.205			MAX REP

TABLE	N PATH* PK SUB DRILL	N PATH* YEAR DRILL	PK SUB YEAR DRILL	N PATH* PK SUB YEAR DRILL	
SED	0.531	0.433	0.502	0.750	MIN REP
	0.459	0.375	0.434	0.650	MAX-MIN
	0.375	0.306	0.355	0.531	MAX REP

* WITHIN THE SAME LEVEL OF N PATH ONLY

	DRILL
MIN-REP	CNVNTIAL
MAX-REP	DIRECT
MAX-MIN	DIRECT V CNVNTIAL

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

STRATUM	DF	SE	CV%
WP1	6	0.355	3.9
WP1.WP2	18	0.456	5.0

GRAIN MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00341

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83/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	6.62	6.97	7.30	6.96
150 ENHD	7.67	7.18	7.71	7.52
225 ENHD	7.91	8.85	8.63	8.46
150 STND	7.17	7.24	7.79	7.40
MEAN	7.34	7.56	7.86	7.59

YEAR N PATH	1980	1983	MEAN
75 ENHD	6.52	7.40	6.96
150 ENHD	6.89	8.15	7.52
225 ENHD	8.20	8.73	8.46
150 STND	6.94	7.86	7.40
MEAN	7.14	8.04	7.59

YEAR PK SUB	1980	1983	MEAN
---	6.86	7.82	7.34
--S	7.08	8.05	7.56
PKS	7.47	8.24	7.86
MEAN	7.14	8.04	7.59

DRILL N PATH	CNVNTIAL	DIRECT	MEAN
75 ENHD	7.35	6.77	6.96
150 ENHD	8.25	7.16	7.52
225 ENHD	8.63	8.38	8.46
150 STND	7.93	7.14	7.40
MEAN	8.04	7.36	7.59

DRILL PK SUB	CNVNTIAL	DIRECT	MEAN
---	7.64	7.19	7.34
--S	7.97	7.35	7.56
PKS	8.50	7.54	7.86
MEAN	8.04	7.36	7.59

DRILL YEAR	CNVNTIAL	DIRECT	MEAN
1980	8.14	6.64	7.14
1983	7.94	8.09	8.04
MEAN	8.04	7.36	7.59

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83/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK 80 D	5.19	6.34	7.88	5.93	6.33
TPK 80 C	7.54	8.12	9.37	7.63	8.16
MEAN	6.36	7.23	8.62	6.78	7.25

PK SUB	---		--S		PKS	
YEAR	1980	1983	1980	1983	1980	1983
N PATH						
75 ENHD	6.11	7.12	6.60	7.35	6.86	7.75
150 ENHD	7.23	8.11	6.26	8.10	7.17	8.25
225 ENHD	7.28	8.54	8.77	8.94	8.54	8.71
150 STND	6.84	7.51	6.67	7.81	7.32	8.26

PK SUB	---		--S		PKS	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH						
75 ENHD	6.92	6.46	7.16	6.88	7.98	6.96
150 ENHD	7.91	7.55	8.27	6.63	8.56	7.29
225 ENHD	8.14	7.79	8.60	8.98	9.14	8.37
150 STND	7.61	6.95	7.87	6.92	8.30	7.54

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	7.51	6.03	7.20	7.51
150 ENHD	8.21	6.22	8.28	8.09
225 ENHD	8.75	7.92	8.51	8.84
150 STND	8.10	6.37	7.76	7.91

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
PK SUB				
---	7.80	6.40	7.49	7.98
--S	7.95	6.64	7.99	8.07
PKS	8.67	6.87	8.32	8.21

		YEAR	1980		1983	
		DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH	PK SUB					
75 ENHD	---		7.12	5.61	6.73	7.32
	--S		7.09	6.36	7.22	7.41
	PKS		8.31	6.13	7.64	7.80
150 ENHD	---		8.05	6.83	7.78	8.27
	--S		8.15	5.31	8.38	7.95
	PKS		8.44	6.53	8.68	8.04
225 ENHD	---		8.24	6.79	8.03	8.79
	--S		8.53	8.89	8.66	9.07
	PKS		9.46	8.08	8.82	8.66
150 STND	---		7.78	6.37	7.44	7.54
	--S		8.04	5.99	7.71	7.86
	PKS		8.48	6.75	8.12	8.33

GRAND MEAN 7.55

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83/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	YEAR	DRILL	
SED	1.715	0.700	0.572	0.606	

TABLE	N PATH* PK SUB	N PATH* YEAR	PK SUB YEAR	N PATH* DRILL	
SED	0.776	0.634	0.990	0.776	MIN REP
				0.672	MAX-MIN
				0.549	MAX REP

TABLE	PK SUB DRILL	YEAR DRILL	N PATH* EXTRA	N PATH* PK SUB YEAR	
SED	1.213	0.990			MIN REP
	1.050	0.858	1.901	1.098	MAX-MIN
	0.858	0.700			MAX REP

TABLE	N PATH* PK SUB DRILL	N PATH* YEAR DRILL	PK SUB YEAR DRILL	N PATH* PK SUB YEAR DRILL	
SED	1.344	1.098	1.715	1.901	MIN REP
	1.164	0.951	1.486	1.647	MAX-MIN
	0.951	0.776	1.213	1.344	MAX REP

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

STRATUM	DF	SE	CV%
WP1	6	1.213	16.0
WP1.WP2	18	0.670	8.8

GRAIN MEAN DM% 86.7

SUB PLOT AREA HARVESTED 0.00341

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83/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	6.47	6.28	7.06	6.60
150 ENHD	7.91	7.37	7.84	7.71
225 ENHD	8.02	7.85	8.35	8.08
150 STND	6.99	6.83	7.28	7.04
MEAN	7.35	7.08	7.63	7.36

YEAR N PATH	1980	1983	MEAN
75 ENHD	5.60	7.61	6.60
150 ENHD	7.27	8.15	7.71
225 ENHD	7.46	8.69	8.08
150 STND	6.08	7.99	7.04
MEAN	6.60	8.11	7.36

YEAR PK SUB	1980	1983	MEAN
---	6.99	7.70	7.35
--S	5.86	8.31	7.08
PKS	6.95	8.32	7.63
MEAN	6.60	8.11	7.36

DRILL N PATH	CNVNTIAL	DIRECT	MEAN
75 ENHD	7.62	6.10	6.60
150 ENHD	8.05	7.53	7.71
225 ENHD	8.45	7.89	8.08
150 STND	7.36	6.87	7.04
MEAN	7.87	7.10	7.36

DRILL PK SUB	CNVNTIAL	DIRECT	MEAN
---	7.45	7.30	7.35
--S	7.73	6.76	7.08
PKS	8.44	7.23	7.63
MEAN	7.87	7.10	7.36

DRILL YEAR	CNVNTIAL	DIRECT	MEAN
1980	7.85	5.98	6.60
1983	7.90	8.21	8.11
MEAN	7.87	7.10	7.36

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83/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK 80 D	6.18	7.40	6.53	5.25	6.34
TPK 80 C	6.36	6.95	8.37	6.99	7.17
MEAN	6.27	7.17	7.45	6.12	6.75

PK SUB	---		--S		PKS	
YEAR	1980	1983	1980	1983	1980	1983
N PATH						
75 ENHD	5.84	7.10	4.79	7.77	6.17	7.95
150 ENHD	8.07	7.76	6.28	8.46	7.45	8.23
225 ENHD	7.58	8.47	6.85	8.86	7.96	8.75
150 STND	6.49	7.49	5.53	8.13	6.23	8.34

PK SUB	---			--S		PKS	
DRILL	CNVNTIAL		DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH							
75 ENHD		6.92	6.24	7.16	5.84	8.77	6.20
150 ENHD		7.72	8.01	7.92	7.10	8.52	7.50
225 ENHD		7.96	8.06	8.48	7.54	8.92	8.07
150 STND		7.18	6.90	7.37	6.56	7.54	7.16

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	7.61	4.59	7.62	7.60
150 ENHD	8.43	6.68	7.68	8.39
225 ENHD	8.36	7.01	8.54	8.77
150 STND	6.97	5.64	7.75	8.10

YEAR	1980		1983	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
PK SUB				
---	7.51	6.73	7.38	7.87
--S	7.46	5.07	8.00	8.46
PKS	8.56	6.15	8.31	8.32

YEAR		1980		1983	
DRILL		CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH	PK SUB				
75 ENHD	---	6.68	5.41	7.16	7.07
	--S	6.95	3.71	7.36	7.98
	PKS	9.21	4.65	8.34	7.76
150 ENHD	---	8.39	7.91	7.06	8.10
	--S	7.87	5.49	7.97	8.71
	PKS	9.04	6.65	8.01	8.34
225 ENHD	---	7.93	7.41	7.99	8.71
	--S	8.21	6.16	8.74	8.92
	PKS	8.95	7.47	8.89	8.67
150 STND	---	7.05	6.21	7.31	7.59
	--S	6.80	4.90	7.93	8.22
	PKS	7.06	5.82	8.01	8.50

GRAND MEAN 7.30

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83/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	YEAR	DRILL	
SED	0.908	0.371	0.303	0.321	

TABLE	N PATH* PK SUB	N PATH* YEAR	PK SUB YEAR	N PATH* DRILL	
SED				0.415	MIN REP
	0.415	0.339	0.524	0.359	MAX-MIN
				0.293	MAX REP

TABLE	PK SUB DRILL	YEAR DRILL	N PATH* EXTRA	N PATH* PK SUB YEAR	
SED	0.642	0.524			MIN REP
	0.556	0.454	1.016	0.586	MAX-MIN
	0.454	0.371			MAX REP

TABLE	N PATH* PK SUB DRILL	N PATH* YEAR DRILL	PK SUB YEAR DRILL	N PATH* PK SUB YEAR DRILL	
SED	0.718	0.586	0.908	1.016	MIN REP
	0.622	0.508	0.786	0.879	MAX-MIN
	0.508	0.415	0.642	0.718	MAX REP

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

STRATUM	DF	SE	CV%
WP1	6	0.642	8.7
WP1.WP2	18	0.372	5.1

GRAIN MEAN DM% 84.3

SUB PLOT AREA HARVESTED 0.00341

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83/R/CS/246

EFFECTS OF SUBSOILING AND DEEP PK

Object: To study the effects of thorough subsoil disturbance and the incorporation of P and K into the subsoil on soil and crop parameters and on yield of s. barley - Gt. Field I.

Sponsors: J. McEwen, A.E. Johnston, D.P. Yeoman.

The fourth year, s. barley.

For previous years see 80-82/R/CS/246.

Whole plot dimensions: 4.27 x 17.7.

Design: 2 replicates of 28 plots, fully randomised.

Treatments: All combinations of:-

1. PK SUB — Extra PK and subsoil treatment (applied autumn/winter 1979/80 only):

- - -	None, mouldboard ploughed (duplicated)
- - S	Subsoiled
P - S	P to subsoil
- K S	K to subsoil
P K S	PK to subsoil
P K T	PK to topsoil, mouldboard ploughed

2. N — Nitrogen fertilizer (kg N) (cumulative to previous years):

0+0	None
40+80	40 on 16 Mar, 1983 plus 80 on 26 May
80+80	80 on 16 Mar, 1983 plus 80 on 26 May
120+80	120 on 16 Mar, 1983 plus 80 on 26 May

NOTES: (1) Rates of P and K were 1000 kg P_2O_5, as superphosphate, 500 kg K_2O, as muriate of potash.
(2) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(3) The topsoil PK dressing was equally divided before and after ploughing.
(4) All treatments were mouldboard ploughed for 1981, 1982 and 1983.
(5) Nitrogen applied on 26 May was required because of exceptional leaching of seedbed N.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: Triumph, seed dressed with ethirimol, sown at 160 kg.

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83/R/CS/246

Cultivations, etc.:- Ploughed: 10 Nov, 1982. Spring-tine cultivated on two occasions: 8 Mar, 11 Mar, 1983. Rotary harrowed: 17 Mar. Seed sown: 18 Mar. Weedkillers applied: 24 May. Combine harvested: 8 Aug.

GRAIN TONNES/HECTARE

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

N PK SUB	0+0	40+80	80+80	120+80	MEAN
- - -	1.41	4.13	4.71	5.95	4.05
- - S	1.31	4.18	5.47	6.18	4.28
P - S	1.59	4.00	5.10	5.85	4.14
- K S	1.00	4.59	5.24	6.49	4.33
P K S	1.94	4.71	5.47	6.11	4.56
P K T	2.16	4.49	5.21	6.14	4.50
MEAN	1.55	4.32	5.13	6.10	4.27

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

TABLE	PK SUB	N	PK SUB N	
SED	0.280		0.560	MIN REP
	0.242	0.212	0.485	MAX-MIN
			0.396	MAX REP

	PK SUB
MAX REP	- - -
MAX-MIN	- - - V ANY OF REMAINDER
MIN REP	ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
WP	32	0.560	13.1

GRAIN MEAN DM% 85.0

STRAW TONNES/HECTARE

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

N PK SUB	0+0	40+80	80+80	120+80	MEAN
- - -	0.43	1.71	1.71	3.17	1.76
- - S	0.49	1.40	2.02	2.92	1.71
P - S	0.50	1.77	2.04	2.64	1.74
- K S	0.50	1.64	2.17	3.03	1.83
P K S	0.63	1.91	2.41	3.41	2.09
P K T	0.64	1.77	2.16	3.17	1.94
MEAN	0.52	1.70	2.03	3.07	1.83

STRAW MEAN DM% 93.1 PLOT AREA HARVESTED 0.00217

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83/R/CS/247

ORGANIC MATTER AND EARTHWORM INOCULATION

Object: To study methods of inoculating earthworms into arable soil and the influence of organic materials on subsequent multiplication and spread - Hoosfield.

Sponsor: C.A. Edwards.

The fourth year, w. wheat.

For previous years see 80-82/R/CS/247.

Design: 3 randomised blocks of 9 plots.

Whole plot dimensions: 7.85 x 7.62.

Treatments: All combinations of:-

1. WORMINOC(80) Earthworms and inoculation method for 1980 crop only:

NONE	None
	Earthworms (Lumbricus terrestris) applied at 16,700 per hectare in November 1979:
EVEN	Evenly spaced throughout
CONC	Concentrated in metre squares, 100 earthworms per square metre

2. ORG MATT(83) Forms of organic matter:

NONE	None
STR	Straw at 6.50 t for 1980, 3.25 t for 1981 and 1982
STR+FYM	Straw at 6.50 t for 1980, 3.25 t for 1981 and 1982 plus farmyard manure at 40 t in each year including 1983

Basal applications: Manures: (5:14:30) at 340 kg, combine drilled. 'Nitro-Chalk' at 280 kg followed by 630 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Paraquat at 0.84 kg ion in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.1 kg in 250 l applied with the fungicide. Fungicide: Prochloraz at 0.40 kg.

Seed: Avalon, sown at 200 kg.

Cultivations, etc.:- Glyphosate applied: 10 Sept, 1982. Paraquat applied: 25 Oct. Seed direct drilled: 1 Nov. Spring-tine cultivated: 4 Nov. FYM treatment applied: 23 Dec. First N applied: 16 Mar, 1983. Second N applied: 14 Apr. 'Brittox', isoproturon and the fungicide applied: 16 Apr. Combine harvested: 11 Aug.

NOTE: Soil was sampled for earthworms in November.

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83/R/CS/247

GRAIN TONNES/HECTARE

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

ORG MATT(83) / WORMINOC(80)	NONE	STR	STR+FYM	MEAN
NONE	6.89	7.25	6.78	6.97
EVEN	7.08	6.57	7.01	6.89
CONC	6.74	6.62	6.92	6.76
MEAN	6.90	6.81	6.90	6.87

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

TABLE	WORMINOC(80)	ORG MATT(83)	WORMINOC(80) ORG MATT(83)
SED	0.154	0.154	0.266

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.326	4.7

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.00238

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83/R/CS/261

BENOMYL AND TAKE-ALL

Object: To study the effects of benomyl, applied to the soil with and without a surfactant, and of nuarimol on take-all (Gaeumannomyces graminis) and on the yield of w. wheat - New Zealand.

Sponsor: G.L. Bateman.

The third year, w. wheat.

For previous years see 81-82/R/CS/261.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 2.13 x 12.2.

Treatments:

FUNGICIDE	Residues of fungicides and surfactant applied for wheat in 1981 and fresh applications for wheat in 1983:
NONE	None
(BEN A)	Benomyl at 20 kg in autumn 1980
(BEN S)	Benomyl at 20 kg in spring 1981
(NUA A)	Nuarimol at 2.2 kg in autumn 1980
BEN A	Benomyl at 20 kg in autumn 1982
BEN SF A	Benomyl at 20 kg plus a surfactant (an alcohol ethoxylate at 44 l) in autumn 1982
SF A	Surfactant alone in autumn 1982

NOTES: (1) Treatments applied in autumn 1982 were randomly allocated to plots given benomyl, nuarimol or surfactant in spring 1981.
(2) All fresh treatments were applied in 8,800 l on 31 Oct, 1982.

Basal applications: Manures: (0:18:36) at 250 kg. 'Nitro-Chalk' at 630 kg. Weedkillers: Isoproturon at 2.0 kg with mecoprop at 3.2 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l. Growth regulator: Chlormequat at 1.1 kg in 250 l.

Seed: Avalon, seed not treated, sown at 180 kg.

Cultivations, etc.:- PK applied: 10 Sept, 1982. Ploughed: 21 Sept. Spring-tine cultivated, rotary harrowed, seed sown: 15 Oct. N applied: 15 Apr, 1983. Weedkillers applied: 16 Apr. Growth regulator applied: 29 Apr. Fungicide applied: 17 June. Combine harvested: 10 Aug.

NOTE: Take-all and footrots were assessed in May, June and July.

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83/R/CS/261

GRAIN TONNES/HECTARE

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

FUNGCIDE	
NONE	9.56
(BEN A)	9.06
(BEN S)	9.84
(NUA A)	10.04
BEN A	9.40
BEN SF A	9.37
SF A	8.96
MEAN	9.46

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

TABLE	FUNGCIDE
SED	0.535

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.757	8.0

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00168

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83/R/CS/271

APHID CONTROL BY NATURAL ENEMIES

Object: To study the effects of early introduction of aphids to ryegrass on subsequent aphid populations on w. wheat - Black Horse I.

Sponsors: W. Powell, A.M. Dewar, N. Wilding, K.E. Fletcher, R. Bardner, C.A. Edwards, J.R. Lofty.

The second year, w. wheat, ryegrass.

For previous year see 82/R/CS/271.

Design: 2 randomised blocks of 4 plots.

Whole plot dimensions: 48 x 48.

Treatments: All combinations of:-

1 RYEGRASS	Provision of ryegrass:
NONE	None
UNDRSOWN	Undersown
2. APHIDS	Aphids applied in April and early May:
NONE	None
METO FES	Metopolophium festucae, on seven occasions, total 20 per square metre

NOTE: Plots with ryegrass in 1982 were re-sown to ryegrass for 1983. Two extra plots were established for the 1983 combination RYEGRASS NONE, APHIDS NONE.

Basal applications: Manures: (5:14:30) at 340 kg. 'Nitro-Chalk' at 280 kg followed by 630 kg. Weedkillers: Methabenzthiazuron at 1.2 kg in 120 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l with the prochloraz. Fungicides: Prochloraz at 0.40 kg. Carbendazim at 0.15 kg with maneb at 1.6 kg and tridemorph at 0.38 kg in 250 l.

Seed: Aquila: sown at 200 kg.
Ryegrass: S24 sown at 22 kg.

Cultivations, etc.:- Ploughed: 31 Aug, 1982. NPK applied: 18 Sept. Spring-tine cultivated: 21 Sept. Spring-tine cultivated, wheat alone plots sown: 11 Oct. Wheat with undersown ryegrass sown: 12 Oct. Methabenzthiazuron applied: 16 Oct. First N applied: 15 Mar, 1983. Second N applied: 13 Apr. 'Herrisol' with prochloraz applied: 16 Apr. Carbendazim with maneb and tridemorph applied: 21 June. Combine harvested: 14 Aug.

NOTE: Cereal aphids were counted on seven occasions during June and July. Above-ground fauna were sampled on nine occasions between May and July. Ground predators were counted weekly from early May to early August. Parasites and fungal pathogens of aphids were assessed during June and July.

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83/R/CS/271

GRAIN TONNES/HECTARE

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

APHIDS / RYEGRASS	NONE	METO FES	MEAN
NONE	6.69	6.23	6.46
UNDRSOWN	5.43	5.35	5.39
MEAN	6.06	5.79	5.92

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.01536

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83/R/CS/272

NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to liquid and solid fertilizers on the yield and nitrogen uptake of grass cut for silage - Highfield Drive.

Sponsors: G.A. Rodgers, F.V. Widdowson.

The second year, ryegrass.

For previous year see 82/R/CS/272.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 2.4 x 12.2.

Treatments, cumulative to 1982: All combinations of:-

1. N TIME(1)		Times of injecting aqueous urea and nitrification inhibitors:
	24 JAN	24 January, 1983
	15 MAR	15 March
2. N INHIB(1)		Nitrification inhibitors, added to injected aqueous urea supplying 375 kg N:
	AU3 0	None
	AU3 ETR	Etridiazole at 1.5 kg
	AU3 NIT	Nitrapyrin at 1.5 kg

plus all combinations of:

1. N TIME(2)		Times of broadcasting prilled urea treated with nitrification inhibitors:
	15 MAR	15 March, 1983
	DIVIDED	Dressing divided equally between three dates, 15 March, 8 June, 4 Aug
2. N INHIB(2)		Nitrification inhibitors, added to prilled urea supplying 375 kg N:
	PU3 0	None
	PU3 DIC	Dicyandiamide at 56 kg
	PU3 HYD	Hydroquinone at 5.0 kg

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plus six extra treatments

EXTRA	'Nitro-Chalk' dressings (kg N):
0	None
NC3 S	375 on 15 March, 1983
	Dressings divided equally between three dates 15 March, 8 June, 4 Aug
NC1 D	125
NC2 D	250
NC3 D	375
NC4 D	500

Basal applications: Manures: (0:18:36) at 500 kg.

Cultivations, etc.:- PK applied: 11 Jan, 1983. Cut: 6 June, 1 Aug, 31 Oct.

NOTES: (1) N in herbage was measured for each cut.
(2) Amounts of ammonia volatilised from soil were measured one month after each treatment.
(3) Amounts of urea, ammonium and nitrate in soils were regularly measured from January.

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83/R/CS/272

1ST CUT (6/6/83) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
24 JAN	6.20	6.38	6.03	6.20
15 MAR	5.06	5.32	5.25	5.21
MEAN	5.63	5.85	5.64	5.71

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
15 MAR	5.68	5.48	5.69	5.62
DIVIDED	6.06	6.11	6.30	6.15
MEAN	5.87	5.79	6.00	5.89

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	0.97	5.98	3.50	5.86	6.07	5.96	4.72

GRAND MEAN 5.44

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.389	0.225	0.275	0.225

TABLE	N INHIB(2)	N TIME(1)	N TIME(2)
SED	0.275	0.389	0.389

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.476	8.8

1ST MEAN DM% 19.0

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83/R/CS/272

2ND CUT (1/8/83) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
24 JAN	1.24	1.04	0.82	1.03
15 MAR	1.26	1.30	1.32	1.29
MEAN	1.25	1.17	1.07	1.16

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
15 MAR	0.51	1.01	0.74	0.75
DIVIDED	1.26	0.91	1.28	1.15
MEAN	0.89	0.96	1.01	0.95

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	0.46	1.14	0.89	1.34	1.51	1.01	1.06

GRAND MEAN 1.06

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.184	0.106	0.130	0.106

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.130	0.184	0.184

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.226	21.3

2ND MEAN DM% 34.7

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83/R/CS/272

3RD CUT (31/10/83) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
24 JAN	0.63	0.69	0.74	0.69
15 MAR	0.79	0.69	0.76	0.75
MEAN	0.71	0.69	0.75	0.72

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
15 MAR	0.57	0.65	0.55	0.59
DIVIDED	1.20	1.17	1.32	1.23
MEAN	0.88	0.91	0.94	0.91

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	0.45	0.86	0.97	1.22	1.12	0.87	0.92

GRAND MEAN 0.85

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.104	0.060	0.073	0.060

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.073	0.104	0.104

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.127	14.9

3RD MEAN DM% 24.0

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83/R/CS/272

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N INHIB(1) N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
24 JAN	8.07	8.12	7.60	7.93
15 MAR	7.11	7.31	7.33	7.25
MEAN	7.59	7.71	7.46	7.59

N INHIB(2) N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
15 MAR	6.76	7.14	6.98	6.96
DIVIDED	8.51	8.19	8.89	8.53
MEAN	7.64	7.67	7.94	7.75

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	1.88	7.98	5.36	8.43	8.69	7.84	6.70

GRAND MEAN 7.34

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.464	0.268	0.328	0.268

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.328	0.464	0.464

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.569	7.7

TOTAL OF 3 CUTS MEAN DM% 25.9

PLOT AREA HARVESTED 0.00093

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83/W/CS/273

INTENSIVE POTATOES

Object: To study the effects of a range of frequencies of cropping on the occurrence of pests and diseases and on the yield of potatoes - Woburn Lansome III.

Sponsors: A.G. Whitehead, T.M. Addiscott, P. Etheridge, D.A. Govier, I.F. Henderson, G.A. Hide, D.H. Lapwood, G.C. Scott.

The second year, s. barley, potatoes.

For previous year see 82/W/CS/273.

Design: In the second year: 6 randomised blocks of 8 plots.

Whole plot dimensions: 9.00 x 24.7.

Treatments: All combinations of:-

1. SD TREAT	Seed treatment:	
NONE	None	
TOL+IMAZ	Tolclofos methyl at 250 g and imazalil at 10 g per tonne of tubers	
2. NEMACIDE	Nematicide:	
NONE	None	
OXAMYL	Oxamyl at 5.0 kg worked in to seedbed	
3. MOLLCIDE	Molluscicide:	
NONE	None	
METHIOCA	Methiocarb at 0.23 kg applied as pellets on 13 July, 1983, 27 July, 8 Sept.	

NOTES: (1) Additional plots were sown to s. barley for cropping sequences with differing frequencies of potatoes. Barley yields were not taken.

(2) Irrigation was applied to the potatoes as follows (mm water):

27 June	12.5	27 July	12.5
30 June	12.5	29 July	25
4 July	12.5	15 Aug	12.5
6 July	12.5	16 Aug	12.5
14 July	12.5	30 Aug	12.5
15 July	12.5	31 Aug	12.5
22 July	12.5		
		Total	175

Standard applications:
Potatoes: Manures: (0:18:36) at 420 kg, (10:10:15+4.5 Mg) at 3000 kg, N at 90 kg as 'Nitro-Chalk'. Weedkillers: Linuron at 1.0 l with paraquat at 0.4 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions, with insecticide on the first and third occasions. Fentin hydroxide at 0.28 kg in 250 l on five occasions, with insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg.

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83/W/CS/273

S. barley: Manures: (0:18:36) at 620 kg, N at 160 kg as 'Nitro-Chalk' and N at 60 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: Potatoes: Desiree.
S. barley: Triumph, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-
Potatoes: PK applied: 2 Nov, 1982. Ploughed: 9 Nov. Spring-tine cultivated: 8 Mar, 1983. NPK with Mg applied: 13 Apr. Heavy spring-tine cultivated: 14 Apr. N applied, heavy spring-tine cultivated: 5 May. Oxamyl applied, harrowed: 17 May. Spike rotary cultivated with crumbler attached, potatoes planted: 25 May. Rotary ridged, weedkillers applied: 7 June. Mancozeb with pirimicarb applied: 22 June, 8 July. Mancozeb applied: 1 July. Fentin hydroxide with pirimicarb applied: 18 July, 2 Aug, 12 Aug, 26 Aug. Fentin hydroxide applied: 8 Sept. Lifted: 17 Oct.
S. barley: Ploughed after barley: 9 Nov, 1982. Heavy spring-tine cultivated after potatoes: 7 Mar, 1983. Spring-tine cultivated all plots: 8 Mar. PK and N applied, spring-tine cultivated with crumbler attached, seed sown: 15 Mar. Weedkillers applied: 27 May. N applied: 3 June. Combine harvested: 10 Aug.

NOTES: (1) Plant samples were taken in August for tuber disease assessments.
(2) Potato cyst nematode numbers were assessed before planting and after harvest.
(3) Slug damage assessments were made on the lifted tubers.

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83/W/CS/273

TOTAL TUBERS TONNES/HECTARE

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

NEMACIDE SD TREAT	NONE	OXAMYL	MEAN
NONE	36.1	48.2	42.1
TOL+IMAZ	29.6	45.9	37.7
MEAN	32.8	47.0	39.9

MOLLCIDE SD TREAT	NONE	METHIOCA	MEAN
NONE	40.8	43.5	42.1
TOL+IMAZ	39.8	35.7	37.7
MEAN	40.3	39.6	39.9

MOLLCIDE NEMACIDE	NONE	METHIOCA	MEAN
NONE	33.8	31.9	32.8
OXAMYL	46.7	47.3	47.0
MEAN	40.3	39.6	39.9

NEMACIDE	NONE		OXAMYL	
MOLLCIDE	NONE	METHIOCA	NONE	METHIOCA
SD TREAT				
NONE	34.9	37.3	46.6	49.7
TOL+IMAZ	32.7	26.5	46.8	44.9

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

TABLE	SD TREAT	NEMACIDE	MOLLCIDE	SD TREAT NEMACIDE
SED	1.67	1.67	1.67	2.36

TABLE	SD TREAT MOLLCIDE	NEMACIDE MOLLCIDE	SD TREAT NEMACIDE MOLLCIDE
SED	2.36	2.36	3.34

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

STRATUM	DF	SE	CV%
BLOCK.WP	35	5.78	14.5

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83/W/CS/273

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

NEMACIDE	NONE	OXAMYL	MEAN
SD TREAT			
NONE	55.1	69.1	62.1
TOL+IMAZ	47.8	68.7	58.3
MEAN	51.5	68.9	60.2

MOLLCIDE	NONE	METHIOCA	MEAN
SD TREAT			
NONE	59.9	64.3	62.1
TOL+IMAZ	61.7	54.8	58.3
MEAN	60.8	59.6	60.2

MOLLCIDE	NONE	METHIOCA	MEAN
NEMACIDE			
NONE	52.7	50.3	51.5
OXAMYL	69.0	68.8	68.9
MEAN	60.8	59.6	60.2

NEMACIDE	NONE		OXAMYL	
MOLLCIDE	NONE	METHIOCA	NONE	METHIOCA
SD TREAT				
NONE	52.3	58.0	67.6	70.6
TOL+IMAZ	53.1	42.6	70.4	67.0

PLOT AREA HARVESTED 0.00075

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83/R/CS/279

NEMATICIDES AND STEM NEMATODE

Object: To study, on sites initially free from or infested by stem nematode (Ditylenchus dipsaci), the effects of nematicides on lucerne - Long Hoos V 5 (healthy) and Long Hoos IV 2 (infested).

Sponsor: A.G. Whitehead.

The second year, lucerne.

For previous year see 82/R/CS/279.

Design: On each site: 3 randomised blocks of 14 plots.

Whole plot dimensions: 1.2 x 3.7.

Treatments (applied to HEALTHY and INFESTED sites):

TREATMNT	Varieties, rates and methods of applying nematicides:
V 0	Vertus, untreated
V A1	Vertus, aldicarb at 1.5 kg in seed furrows in 1982
E 0	Europe, untreated
E A1	Europe, aldicarb at 1.5 kg in seed furrows in 1982
E A2	Europe, aldicarb at 3.0 kg in seed furrows in 1982
E A1 A1	Europe, aldicarb at 1.5 kg in seed furrows in 1982, repeated after each cut thereafter
E A1 T1	Europe, aldicarb at 1.5 kg in seed furrows in 1982, thiabendazole at 1.5 kg over the rows in spring 1983
E A2 T2	Europe, aldicarb at 3.0 kg in seed furrows in 1982, thiabendazole at 3.0 kg over the rows in spring 1983
E C1	Europe, carbofuran at 1.5 kg in seed furrows in 1982
E C2	Europe, carbofuran at 3.0 kg in seed furrows in 1982
E C1 T1	Europe, carbofuran at 1.5 kg in seed furrows in 1982, thiabendazole at 1.5 kg over the rows in spring 1983
E C2 T2	Europe, carbofuran at 3.0 kg in seed furrows in 1982, thiabendazole at 3.0 kg over the rows in spring 1983
E T1 T1	Europe, thiabendazole at 1.5 kg over the rows at sowing in 1982 and in spring 1983
E T2 T2	Europe, thiabendazole at 3.0 kg over the rows at sowing in 1982 and in spring 1983

NOTE: Aldicarb and carbofuran were applied as granules, thiabendazole in 7500 l by weeder bar.

Basal applications: Weedkiller: Propyzamide at 0.7 kg in 220 l.

Cultivations, etc.:-
Both sites: Top: 17 Jan, 1983. Weedkiller applied: 18 Jan. Cut: 13 June (healthy site), 14 June (infected site). Treatments applied: 24 June. Cut: 26 July. Treatments applied: 2 Aug. Cut: 26 Sept. Treatments applied: 12 Oct.

NOTE: The percentage of stems infected with stem nematode was assessed on the infected site only, in July.

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83/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

1ST CUT (13/6/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	6.00
V A1	5.28
E 0	6.03
E A1	6.83
E A2	6.45
E A1 A1	8.27
E A1 T1	6.80
E A2 T2	6.64
E C1	6.26
E C2	6.67
E C1 T1	7.10
E C2 T2	7.17
E T1 T1	7.85
E T2 T2	7.18
MEAN	6.75

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

TABLE	TREATMNT
SED	0.387

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.474	7.0

1ST MEAN DM% 17.8

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83/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

2ND CUT (26/7/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	5.61
V A1	5.33
E 0	6.18
E A1	6.17
E A2	6.08
E A1 A1	6.31
E A1 T1	6.41
E A2 T2	6.04
E C1	6.11
E C2	6.26
E C1 T1	6.57
E C2 T2	5.96
E T1 T1	5.69
E T2 T2	5.84
MEAN	6.04

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

TABLE	TREATMNT
SED	0.480

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.588	9.7

2ND MEAN DM% 25.6

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83/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

3RD CUT (26/9/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	1.55
V A1	1.76
E 0	2.11
E A1	1.83
E A2	1.91
E A1 A1	2.40
E A1 T1	2.16
E A2 T2	1.40
E C1	2.08
E C2	2.24
E C1 T1	2.33
E C2 T2	1.66
E T1 T1	2.12
E T2 T2	2.01
MEAN	1.97

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

TABLE	TREATMNT
SED	0.211

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.258	13.1

3RD CUT MEAN DM% 24.4

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83/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	13.16
V A1	12.37
E 0	14.32
E A1	14.83
E A2	14.44
E A1 A1	16.98
E A1 T1	15.36
E A2 T2	14.09
E C1	14.45
E C2	15.17
E C1 T1	16.00
E C2 T2	14.79
E T1 T1	15.66
E T2 T2	15.03
MEAN	14.76

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

TABLE	TREATMNT
SED	0.732

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.897	6.1

TOTAL OF 3 CUTS MEAN DM% 22.6

PLOT AREA HARVESTED 0.00045

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83/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

1ST CUT (14/6/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	6.41
V A1	5.43
E 0	6.78
E A1	6.14
E A2	5.69
E A1 A1	7.86
E A1 T1	6.53
E A2 T2	8.13
E C1	7.72
E C2	8.42
E C1 T1	7.26
E C2 T2	8.65
E T1 T1	4.58
E T2 T2	7.39
MEAN	6.93

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

TABLE	TREATMNT
SED	0.618

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.757	10.9

1ST MEAN DM% 19.5

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83/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

2ND CUT (26/7/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	4.95
V A1	3.94
E 0	4.16
E A1	3.61
E A2	3.43
E A1 A1	5.91
E A1 T1	4.62
E A2 T2	4.88
E C1	5.47
E C2	5.64
E C1 T1	4.66
E C2 T2	4.86
E T1 T1	3.61
E T2 T2	4.37
MEAN	4.58

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

TABLE	TREATMNT
SED	0.556

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.682	14.9

2ND MEAN DM% 24.8

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83/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

3RD CUT (26/9/83) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	1.62
V A1	1.03
E 0	0.90
E A1	0.50
E A2	0.53
E A1 A1	1.53
E A1 T1	0.63
E A2 T2	0.75
E C1	0.95
E C2	1.06
E C1 T1	0.98
E C2 T2	0.49
E T1 T1	1.30
E T2 T2	0.56
MEAN	0.92

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

TABLE	TREATMNT
SED	0.386

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.473	51.6

3RD CUT MEAN DM% 28.1

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83/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	12.98
V A1	10.40
E 0	11.84
E A1	10.26
E A2	9.65
E A1 A1	15.30
E A1 T1	11.78
E A2 T2	13.75
E C1	14.14
E C2	15.13
E C1 T1	12.91
E C2 T2	13.99
E T1 T1	9.49
E T2 T2	12.33
MEAN	12.43

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

TABLE	TREATMNT
SED	1.106

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	1.354	10.9

TOTAL OF 3 CUTS MEAN DM% 24.1

PLOT AREA HARVESTED 0.00045

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83/R/CS/280

RHIZOBIUM STRAINS

Object: To compare the effectiveness of five strains of Rhizobium meliloti in fixing nitrogen with lucerne and Melilotus alba - Claycroft.

Sponsor: A. Fyson.

The second year, lucerne and Melilotus alba.

For first year see 82/R/CS/280.

Design: 4 randomised blocks of 2 plots split into 6.

Whole plot area: 7.0 x 39.0.

Treatments: All combinations of:-

Whole plots

1. SPECIES	Species:
LUCERNE	Lucerne, Vertus
MEL ALBA	Melilotus alba

Sub plots

2. RM STRN	Strain of Rhizobium meliloti inoculum used in 1982:
RCR 2001	RCR 2001
MEL 5	MEL 5
MEL 10	MEL 10
MEL 16	MEL 16
MEL 17	MEL 17
MIXTURE	Mixture of all above strains

Basal applications: Manures: (0:18:36) at 690 kg.

Seed: Both species sown at 10 kg, in 1982.

Cultivations, etc.:- PK applied: 11 Jan, 1983. Cut: 9 June.

NOTES: (1) Melilotus alba failed after cutting and the experiment ceased.
(2) N content of produce was measured.

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83/R/CS/280

1ST CUT (9/6/83) DRY MATTER TONNES/HECTARE

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

SPECIES RM STRN	LUCERNE	MEL ALBA	MEAN
RCR 2001	4.48	5.81	5.15
MEL 5	4.21	5.47	4.84
MEL 10	4.33	5.45	4.89
MEL 16	4.58	5.14	4.86
MEL 17	4.42	5.69	5.06
MIXTURE	4.32	5.60	4.96
MEAN	4.39	5.53	4.96

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

TABLE	SPECIES	RM STRN	SPECIES RM STRN
SED	0.139	0.237	0.336
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SPECIES			0.336

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	30	0.475	9.6

1ST CUT MEAN DM% 18.4

SUB PLOT AREA HARVESTED 0.00070

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83/W/CS/284

VARIETIES & PCN TOLERANCE

Object: To study the effect of a range of populations of potato cyst nematode (PCN) on varieties differing in susceptibility - Woburn Horsepool.

Sponsors: A.G. Whitehead, K. Evans.

The second year, fallow.

For previous year see 82/W/CS/284.

Design: 3 randomised blocks of 32 plots.

Whole plot dimensions: 2.84 x 6.10.

Treatments:

Timely preparation of the site was not possible because of wet conditions. Potato planting was postponed for a year and the site was fallowed.

Basal applications: Manures: (10:10:15+4.5 Mg) at 2480 kg. N at 90 kg as 'Nitro-Chalk'.

Cultivations, etc.:-
Deep-tine cultivated: 12 Jan, 1983. Heavy spring-tine cultivated: 7 Mar, 21 Mar, 15 Apr, 5 May. NPK with Mg applied: 14 Apr. N applied: 5 May. Spring-tine cultivated: 17 May. Ploughed: 28 June. Subsoiled with tines 76 cm apart and 46 cm deep: 14 July.

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83/R/CS/285

TRIADIMEFON STUDY

Object: To study the residual effects of triadimefon applied to s. barley or fallow in 1982 on the incidence of mildew and on the yield of s. barley in 1983 - Summerdells I.

Sponsors: J.F. Jenkyn, C.J. Rawlinson.

The second year, s. barley.

Design: 2 randomised blocks of 5 plots split into 2.

Whole plot dimensions: 27.0 x 27.0.

Treatments: All combinations of:-

Whole plots

1. CROPFUNG (82) Crop and time of applying triadimefon fungicide in 1982:

BARLEY 0	S. barley, no fungicide
BARLEY 1	S. barley, fungicide on 21 May, 1982
BARLEY 2	S. barley, fungicide on 30 June
FALLOW 1	Fallow, fungicide on 21 May
FALLOW 2	Fallow, fungicide on 30 June

Sub plots

2. CULTIVTN Cultivations in autumn 1982:

PLOUGHED	Ploughed on 2 Dec, 1982
TINED	Tine cultivated on 29 and on 30 Nov

NOTE: Plot sides and ends were separated by 27 m sown with the spring barley variety Atem, seed dressed triadimenol plus fuberidazole.

Basal applications in 1982:
S. barley: Manures: (0:14:28) at 780 kg. 'Nitro-Chalk' at 470 kg. Weedkillers: Paraquat at 0.70 kg ion in 250 l. Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l.
Fallow: Weedkillers: Paraquat at 0.20 kg ion in 3.5 l by hand held sprayer. Paraquat at 0.28 kg ion with diquat at 0.28 kg ion, in 950 l. Diquat at 0.8 kg ion in 250 l.

Standard applications in 1983:
S. barley: Manures: 'Nitro-Chalk' at 470 kg followed by 250 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.
Fallow: Weedkiller: Paraquat at 0.56 kg ion in 250 l.

Seed for 1982: Atem, sown at 160 kg.

Seed for 1983: Triumph, sown at 160 kg.

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83/R/CS/285

Cultivations, etc. for 1982:- Ploughed: 8 Oct, 1981. PK applied: 26 Nov. N applied, paraquat applied to all plots: 25 Mar, 1982. Spring-tine cultivated: 30 Mar. All plots rotary harrowed, seed sown: 2 Apr. 'Poly-Farmon' applied: 17 May. Paraquat applied to fallow plots: 21 May. Paraquat with diquat applied to fallow plots: 30 June. Diquat applied to fallow plots: 3 Aug. Combine harvested: 16 Aug. Previous crops: W. beans 1981, potatoes 1982.

Cultivations, etc. for 1983:- Paraquat applied to 1982 fallow plots only: 10 Sept, 1982. All plots spring-tine cultivated twice, first N applied: 14 Mar, 1983. Seed sown: 15 Mar. 'Herrisol' applied: 24 May. Second N applied: 25 May. Combine harvested: 9 Aug.

NOTE: Soil cores were taken in 1982 and 1983 to bioassay residual triadimefon. Leaf diseases were assessed on four occasions in 1983.

GRAIN TONNES/HECTARE

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

CULTIVTN CROPFUNG(82)	PLOUGHED	TINED	MEAN
BARLEY 0	4.29	4.91	4.60
BARLEY 1	3.82	3.59	3.71
BARLEY 2	4.35	3.98	4.16
FALLOW 1	4.83	5.19	5.01
FALLOW 2	5.15	4.67	4.91
MEAN	4.49	4.47	4.48

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

TABLE	CROPFUNG(82)	CULTIVTN	CROPFUNG(82) CULTIVTN
SED	0.242	0.190	0.386
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
CROPFUNG(82)			0.426

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.242	5.4
BLOCK.WP.SP	5	0.426	9.5

GRAIN MEAN DM% 86.6

SUB PLOT AREA HARVESTED 0.00864

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83/W/CS/293

WINTER OATS

NITRIFICATION INHIBITORS

Object: To study the effects of nitrification inhibitors on the yield and nitrogen uptake of w. oats - Woburn The Pightle.

Sponsors: G.A. Rodgers, A. Penny.

The second year, w. oats.

For previous year see 82/W/WW/3.

Design: 2 randomised blocks of 21 plots.

Whole plot dimensions: 4.0 x 12.0.

Treatments, applied cummulatively to 1982: All combinations of:-

1. I FORM — Nitrification inhibitors applied just before final seedbed cultivations:

DICYANDI	Dicyandiamide
ETRIDIAZ	Etridiazole
NITRAPYR	Nitrapyrin

2. I RATE — Rates of inhibitors:

SINGLE	Single (1.0 kg for etridiazole and nitrapyrin; 10.0 kg for dicyandiamide)
DOUBLE	Double (2.0 kg for etridiazole and nitrapyrin; 20.0 kg for dicyandiamide)

3. N RATE — Rates of nitrogen fertilizer in spring (kg N) as 'Nitro-Chalk':

   0
   35
   70

plus 3 extra treatments given nitrogen fertilizer in spring only (kg N) as 'Nitro-Chalk':

N RATE X
0
35
70

NOTE: Nitrification inhibitors were applied on 11 Oct, 1982.

Basal applications: Manures: Magnesian limestone at 7.5 t. Weedkillers: Methabenzthiazuron at 1.6 kg in 250 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l.

Seed: Panema, sown at 170 kg.

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83/W/CS/293

Cultivations, etc.:- Disced: 10 Sept, 1982. Magnesian limestone applied: 15 Sept. Ploughed: 28 Sept. Spring-tine cultivated with crumbler attached twice, seed sown: 11 Oct. Methabenzthiazuron applied: 15 Oct. N treatments applied: 6 Apr, 1983. 'Poly-Farmon' applied: 14 Apr. Combine harvested: 4 Aug.

NOTES: (1) Soil samples were taken in October, then at intervals until April and again in July for ammonium and nitrate analyses.
(2) Plant samples were taken in April and July and at maturity for estimates of total N and dry matter.

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83/W/CS/293
GRAIN TONNES/HECTARE

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

I FORM / N RATE	DICYANDI	ETRIDIAZ	NITRAPYR	MEAN
0	6.80	6.55	6.40	6.59
35	6.45	5.95	6.18	6.19
70	4.70	5.69	5.26	5.22
MEAN	5.98	6.06	5.95	6.00

I RATE / N RATE	SINGLE	DOUBLE	MEAN
0	6.76	6.41	6.59
35	6.01	6.38	6.19
70	5.19	5.24	5.22
MEAN	5.99	6.01	6.00

I RATE / I FORM	SINGLE	DOUBLE	MEAN
DICYANDI	6.15	5.82	5.98
ETRIDIAZ	5.81	6.32	6.06
NITRAPYR	6.00	5.89	5.95
MEAN	5.99	6.01	6.00

I FORM	DICYANDI		ETRIDIAZ		NITRAPYR	
I RATE / N RATE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE
0	7.00	6.60	6.85	6.25	6.43	6.38
35	6.73	6.18	5.35	6.55	5.96	6.40
70	4.73	4.67	5.23	6.14	5.62	4.89

N RATE X	0	35	70	MEAN
	6.87	5.67	4.80	5.78

GRAND MEAN 5.97

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

TABLE	N RATE X	N RATE	I FORM	I RATE
SED	0.753	0.307	0.307	0.251

TABLE	N RATE I FORM	N RATE I RATE	I FORM I RATE	N RATE I FORM I RATE & N RATE X
SED	0.532	0.435	0.435	0.753

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

STRATUM	DF	SE	CV%
BLOCK.WP	20	0.753	12.6

GRAIN MEAN DM% 86.1

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83/W/CS/293

STRAW TONNES/HECTARE

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

I FORM / N RATE	DICYANDI	ETRIDIAZ	NITRAPYR	MEAN
0	8.63	8.21	6.52	7.79
35	8.30	8.58	8.44	8.44
70	9.45	8.68	9.02	9.05
MEAN	8.79	8.49	7.99	8.43

I RATE / N RATE	SINGLE	DOUBLE	MEAN
0	8.13	7.44	7.79
35	8.44	8.44	8.44
70	9.16	8.95	9.05
MEAN	8.58	8.27	8.43

I RATE / I FORM	SINGLE	DOUBLE	MEAN
DICYANDI	9.00	8.59	8.79
ETRIDIAZ	9.06	7.92	8.49
NITRAPYR	7.67	8.31	7.99
MEAN	8.58	8.27	8.43

I FORM	DICYANDI		ETRIDIAZ		NITRAPYR	
I RATE / N RATE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE
0	9.05	8.21	9.01	7.41	6.34	6.70
35	8.42	8.19	9.13	8.03	7.79	9.09
70	9.52	9.37	9.05	8.32	8.90	9.15

N RATE X	0	35	70	MEAN
	8.07	7.63	9.57	8.42

GRAND MEAN 8.43

STRAW MEAN DM% 83.3

PLOT AREA HARVESTED 0.00244

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83/R/CS/294

ALDICARB AND STEM NEMATODE

Object: To study the effects of a range of rates and methods of applying aldicarb on the control of stem nematode (Ditylenchus dipsaci) and on the yield of s. oats - Fosters O and E VI.

Sponsor: A.G. Whitehead.

The second year, s. oats.

For previous year see 82/R/0/1.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.29 x 7.32.

Treatments:

TREATMNT	Aldicarb rates and row spacings (cumulative to 1982, except as stated):
	Sown in rows 12.7 cm (5 inches) apart:
0 CR N	No aldicarb
2 CR N	Aldicarb at 1.25 kg per ha, applied equally to every row
4 CR N	Aldicarb at 2.5 kg per ha, applied equally to every row
	Sown in rows 12.7 cm (5 inches) apart in 1982, 25.4 cm (10 inches) apart in 1983:
1 CR W	Aldicarb at 0.6 kg per ha, applied to alternate rows only in 1982, all rows in 1983
2 CR W	Aldicarb at 1.25 kg per ha, applied to alternate rows only in 1982, all rows in 1983
4 CR W	Aldicarb at 2.5 kg per ha, applied to alternate rows only in 1982, all rows in 1983
	Sown in 7.6 cm (3 inches) wide bands, centres of bands 25.4 cm (10 inches) apart:
0 WB	No aldicarb
1 WB	Aldicarb at 0.6 kg per ha, applied equally to all bands
2 WB	Aldicarb at 1.25 kg per ha, applied equally to all bands
4 WB	Aldicarb at 2.5 kg per ha, applied equally to all bands

Basal applications: Manures: (20:10:10) at 380 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l with the fungicide. Fungicide: Tridemorph at 0.52 kg.

Seed: Maris Osprey, sown at 190 kg.

Cultivations, etc.:- Ploughed: 24 Sept, 1982. NPK applied: 7 Mar, 1983. Spring-tine harrowed, treatments applied, seed sown, harrowed in: 10 Mar. Weedkillers and fungicide applied: 23 May. Combine harvested: 4 Aug. Previous crops: W. oats 1981, s. oats 1982.

NOTE: The percentages of plants infested with stem nematode were assessed.

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83/R/CS/294

GRAIN TONNES/HECTARE

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

TREATMNT	
0 CR N	2.00
2 CR N	3.03
4 CR N	3.03
1 CR W	2.99
2 CR W	2.87
4 CR W	2.87
0 WB	1.98
1 WB	2.61
2 WB	2.81
4 WB	2.86
MEAN	2.70

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

TABLE	TREATMNT
SED	0.207

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.253	9.4

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED (PLOTS WITH ROWS 12.7 CM APART) 0.00093

PLOT AREA HARVESTED (PLOTS WITH ROWS 25.4 CM APART) 0.00111

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83/W/CS/295

FORAGE MAIZE

EFFECTS OF ALDICARB AND BENOMYL

Object: To study the effects of aldicarb and benomyl on nematodes, mycorrhiza and on the yield of forage maize - Woburn Butt Close.

Sponsor: T.D. Williams.

The second year.

For first year see 82/W/MA/1.

Design: 4 randomised blocks of 4 plots, omitting 4 of the blocks in 82/W/MA/1.

Whole plot dimensions: 2.13 x 4.57.

Treatments: All combinations of:-

1. ALDICARB(82) Aldicarb (kg) to seedbed in 1982:

   0
   5

2. BENOMYL(82) Benomyl (kg) to seedbed in 1982:

   0
   22

Basal applications: Manures: (20:10:10) at 750 kg. Weedkillers: Atrazine at 1.1 kg in 280 l. Insecticide: Chlorfenvinphos at 2.2 kg as granules.

Seed: Fronica, sown at 100,900 seeds per hectare.

Cultivations, etc.:-
Ploughed: 19 Nov, 1982. Spring-tine cultivated with crumbler attached: 18 Mar, 1983. NPK applied, rotary cultivated: 11 May. Spring-tine cultivated with crumbler attached, atrazine applied: 16 May. Spring-tine cultivated with crumbler attached, seed sown: 25 May. Chlorfenvinphos applied: 22 June. Hand harvested: 3 Oct.

NOTE: Nematodes were assessed in soil samples taken at three depths to 60 cm in May, July, August and October, roots were sampled in August.

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83/W/CS/295

FORAGE DRY MATTER TONNES/HECTARE

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

BENOMYL(82) / ALDICARB(82)	0	22	MEAN
0	17.38	18.14	17.76
5	17.78	18.04	17.91
MEAN	17.58	18.09	17.84

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

TABLE	ALDICARB	BENOMYL	ALDICARB BENOMYL
SED	1.060	1.060	1.499

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	2.120	11.9

GRAIN MEAN DM% 31.0

PLOT AREA HARVESTED 0.00049

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83/R/CS/298

NEMATICIDE SPRAYS AND STEM NEMATODE

Object: To study the effects of applying a range of chemicals to stubbles after each cut on the incidence of stem nematode (Ditylenchus dipsaci) in lucerne given carbofuran to the seed furrow - Long Hoos IV I.

Sponsor: A.G. Whitehead.

The first year, lucerne.

Design: 2 randomised blocks of 16 plots.

Whole plot dimensions: 1.2 x 3.7.

Treatments:

TREATMNT	Varieties and chemicals (all applied at 1.5 kg):
EV 0	Euver, untreated
EV C	Euver, carbofuran to seed furrow
ER 0	Europe, untreated (duplicated)
ER C	Europe, carbofuran to seed furrow
	To variety Europe, all given carbofuran to seed furrow, other treatments applied after each cut
ER C AW	Aldicarb watered on
ER C CE	Carbendazim, applied by electrostatic sprayer
ER C CH	Carbendazim, applied by hydraulic sprayer
ER C DE	Dimethoate, applied by electrostatic sprayer
ER C DH	Dimethoate, applied by hydraulic sprayer
ER C PE	Pirimiphos methyl, applied by electrostatic sprayer
ER C PH	Pirimiphos methyl, applied by hydraulic sprayer
ER C TCE	Thiocarb, applied by electrostatic sprayer
ER C TCH	Thiocarb, applied by hydraulic sprayer
ER C TBE	Thiabendazole, applied by electrostatic sprayer
ER C TBH	Thiabendazole, applied by hydraulic sprayer

NOTE: An initial sowing, with treatments applied to seed furrow, failed and the site was re-sown with these treatments repeated.

Basal applications: Manures: (0:20:20) at 640 kg. Weedkillers: Glyphosate at 1.5 kg in 220 l. Paraquat, rate not recorded. 2, 4-DB at 2.5 l in 280 l. Propyzamide at 0.7 kg in 220 l.

Seed: Sown at 11 kg.

Cultivations, etc.:- Glyphosate applied: 14 Sept, 1982. Ploughed: 6 Dec. Propyzamide applied: 18 Jan, 1983. PK applied: 7 Mar. Ditylenchus dipsaci infected stems spread on plots, spring-tine harrowed: 8 Mar. Rotary harrowed, seed sown: 11 Mar. Paraquat applied by hand by weeder bar: 20 May. Rotary harrowed, seed re-sown: 24 May. 2, 4-DB applied: 23 June. Cut: 15 Aug. Foliar spray treatments applied: 24 Aug. Previous crops: Oilseed rape 1981, s. barley 1982.

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83/R/CS/298

FRESH WEIGHT (15/8/83) TONNES/HECTARE

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

TREATMNT	
EV 0	2.35
EV C	3.21
ER 0	1.70
ER C	2.41
ER C AW	2.23
ER C CE	2.20
ER C CH	3.44
ER C DE	1.78
ER C DH	1.94
ER C PE	1.85
ER C PH	2.77
ER C TCE	3.28
ER C TCH	2.73
ER C TBE	2.77
ER C TBH	3.27
MEAN	2.48

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

TABLE	TREATMNT	
SED	0.727	MIN REP
	0.630	MAX-MIN

	TREATMNT
MAX-MIN	ER 0 V ANY OF THE REMAINDER
MIN REP	ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.727	29.4

PLOT AREA HARVESTED 0.00045

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83/S/CS/1

FACTORS AFFECTING YIELD

Object: To study the effects of a range of factors on the yield of w. wheat - Saxmundham.

Sponsors: F.V. Widdowson, A. Penny.

The 18th year, w. wheat.

For previous years see 66/C/30(t), 67/C/23(t), 68/C/39, 69-82/S/CS/1.

Design: The experiment was on two sites, one after beans and one after wheat. On each site the design was a half replicate of 2 x 2 x 2 x 4 x 2 arranged as 8 whole plots split into 4 sub-plots. One extra sub-plot was included in each whole plot.

Whole plot dimensions: Wheat after wheat: 8.53 x 18.3.
Wheat after beans: 6.20 x 30.0.

Treatments: On each site, combinations of:-

Whole plots

1. VARIETY	Varieties:
AVALON	
NORMAN	
2. AUT N	Nitrogen fertilizer to the seedbed in autumn on 29 Sept, 1982:
0	None
40	40 kg as 'Nitro-Chalk':
3. PATHCONT	Pest and pathogen control:
NONE	None
FULL	Benomyl at 0.28 kg with sulphur (as 'Thiovit' at 9.9 kg) in 220 l on 4 May, 1983. Propiconazole at 0.12 kg with sulphur (as 'Thiovit' at 9.9 kg) in 220 l on 25 May. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg with captafol at 1.0 kg and pirimicarb at 0.14 kg in 220 l on 22 June. Propiconazole at 0.12 kg in 220 l, to wheat after beans only, on 13 July.

Sub plots

4 N RATE — Total nitrogen fertilizer applied in spring (kg N) as 'Nitro-Chalk':

After wheat	After beans
160	100
190	130
220	160
250	190

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83/S/CS/1

5. N TIME — Times of applying spring nitrogen fertilizer:

SINGLE	All on 27 April
DIVIDED	40 kg N on 8 March, remainder on 27 April

plus whole plot treatments as above but given no spring nitrogen

Basal applications: Manures: (0:20:20) at 630 kg. Weedkillers: Chlortoluron at 3.5 kg with mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l with the permethrin. Insecticide: Permethrin at 0.05 kg.

Seed: Varieties sown at 400 seeds per m^2.

Cultivations, etc.:- PK applied: 3 Sept, 1982. Ploughed: 15 Sept. Power harrowed, seed sown: 29 Sept. Weedkillers and insecticide applied: 28 Oct. Combine harvested: 9 Aug, 1983.

NOTE: Mineral N content of soil to 90 cm depth and the nitrate content of the crop were assessed in autumn and spring. N content of grain and N content of straw (except after wheat) were measured.

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83/S/CS/1 WHEAT AFTER WHEAT

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	40	MEAN
VARIETY			
AVALON	8.45	8.76	8.60
NORMAN	10.42	10.88	10.65
MEAN	9.43	9.82	9.63

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	8.60	8.61	8.60
NORMAN	10.31	11.00	10.65
MEAN	9.46	9.80	9.63

PATHCONT	NONE	FULL	MEAN
AUT N			
0	9.26	9.61	9.43
40	9.65	10.00	9.82
MEAN	9.46	9.80	9.63

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	8.39	8.82	8.60
NORMAN	10.51	10.80	10.65
MEAN	9.45	9.81	9.63

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	9.13	9.74	9.43
40	9.77	9.88	9.82
MEAN	9.45	9.81	9.63

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	9.37	9.54	9.46
FULL	9.53	10.07	9.80
MEAN	9.45	9.81	9.63

N RATE	160	190	220	250	MEAN
VARIETY					
AVALON	8.30	8.51	8.63	8.97	8.60
NORMAN	10.42	10.52	10.79	10.89	10.65
MEAN	9.36	9.51	9.71	9.93	9.63

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83/S/CS/1 WHEAT AFTER WHEAT

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	160	190	220	250	MEAN
AUT N					
0	8.95	9.28	9.56	9.94	9.43
40	9.76	9.75	9.87	9.91	9.82
MEAN	9.36	9.51	9.71	9.93	9.63

N RATE	160	190	220	250	MEAN
PATHCONT					
NONE	9.09	9.40	9.48	9.85	9.46
FULL	9.63	9.63	9.94	10.00	9.80
MEAN	9.36	9.51	9.71	9.93	9.63

N RATE	160	190	220	250	MEAN
N TIME					
SINGLE	9.18	9.30	9.57	9.75	9.45
DIVIDED	9.54	9.73	9.86	10.10	9.81
MEAN	9.36	9.51	9.71	9.93	9.63

NO SPRING NITROGEN

AUT N	0	40	MEAN
VARIETY			
AVALON	1.94	2.34	2.14
NORMAN	3.40	4.23	3.81
MEAN	2.67	3.28	2.97

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	2.25	2.02	2.14
NORMAN	3.40	4.23	3.81
MEAN	2.82	3.13	2.97

PATHCONT	NONE	FULL	MEAN
AUT N			
0	2.37	2.96	2.67
40	3.28	3.29	3.28
MEAN	2.82	3.13	2.97

GRAND MEAN 8.30

GRAIN MEAN DM% 84.9

SUB PLOT AREA HARVESTED 0.00126

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83/S/CS/1 WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	40	MEAN
VARIETY			
AVALON	10.03	10.33	10.18
NORMAN	10.75	10.89	10.82
MEAN	10.39	10.61	10.50

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	9.66	10.69	10.18
NORMAN	10.74	10.90	10.82
MEAN	10.20	10.80	10.50

PATHCONT	NONE	FULL	MEAN
AUT N			
0	9.97	10.80	10.39
40	10.43	10.79	10.61
MEAN	10.20	10.80	10.50

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	10.12	10.23	10.18
NORMAN	10.69	10.95	10.82
MEAN	10.41	10.59	10.50

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	10.30	10.47	10.39
40	10.51	10.71	10.61
MEAN	10.41	10.59	10.50

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	10.09	10.31	10.20
FULL	10.72	10.88	10.80
MEAN	10.41	10.59	10.50

N RATE	100	130	160	190	MEAN
VARIETY					
AVALON	9.48	10.13	10.49	10.61	10.18
NORMAN	10.32	10.67	11.03	11.27	10.82
MEAN	9.90	10.40	10.76	10.94	10.50

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83/S/CS/1 WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	100	130	160	190	MEAN
AUT N					
0	9.86	10.23	10.70	10.76	10.39
40	9.94	10.57	10.81	11.12	10.61
MEAN	9.90	10.40	10.76	10.94	10.50

N RATE	100	130	160	190	MEAN
PATHCONT					
NONE	9.72	10.11	10.45	10.52	10.20
FULL	10.08	10.69	11.06	11.36	10.80
MEAN	9.90	10.40	10.76	10.94	10.50

N RATE	100	130	160	190	MEAN
N TIME					
SINGLE	9.85	10.28	10.70	10.80	10.41
DIVIDED	9.95	10.53	10.82	11.08	10.59
MEAN	9.90	10.40	10.76	10.94	10.50

NO SPRING NITROGEN

AUT N	0	40	MEAN
VARIETY			
AVALON	4.99	6.08	5.53
NORMAN	5.55	6.75	6.15
MEAN	5.27	6.41	5.84

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	5.46	5.61	5.53
NORMAN	6.17	6.13	6.15
MEAN	5.82	5.87	5.84

PATHCONT	NONE	FULL	MEAN
AUT N			
0	5.17	5.37	5.27
40	6.46	6.36	6.41
MEAN	5.82	5.87	5.84

GRAND MEAN 9.57

GRAIN MEAN DM% 84.3

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83/S/CS/1 WHEAT AFTER BEANS

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	40	MEAN
VARIETY			
AVALON	5.97	6.68	6.33
NORMAN	6.32	6.42	6.37
MEAN	6.14	6.55	6.35

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	6.42	6.23	6.33
NORMAN	6.50	6.24	6.37
MEAN	6.46	6.24	6.35

PATHCONT	NONE	FULL	MEAN
AUT N			
0	6.01	6.28	6.14
40	6.91	6.20	6.55
MEAN	6.46	6.24	6.35

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	5.95	6.70	6.33
NORMAN	6.08	6.66	6.37
MEAN	6.02	6.68	6.35

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	5.76	6.53	6.14
40	6.27	6.84	6.55
MEAN	6.02	6.68	6.35

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	6.15	6.77	6.46
FULL	5.88	6.59	6.24
MEAN	6.02	6.68	6.35

N RATE	100	130	160	190	MEAN
VARIETY					
AVALON	5.79	6.31	6.25	6.95	6.33
NORMAN	6.09	5.96	6.50	6.94	6.37
MEAN	5.94	6.13	6.38	6.95	6.35

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83/S/CS/1 WHEAT AFTER BEANS

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	100	130	160	190	MEAN
AUT N					
0	5.95	5.71	6.39	6.53	6.14
40	5.93	6.56	6.36	7.36	6.55
MEAN	5.94	6.13	6.38	6.95	6.35

N RATE	100	130	160	190	MEAN
PATHCONT					
NONE	6.04	6.50	6.23	7.07	6.46
FULL	5.84	5.76	6.53	6.82	6.24
MEAN	5.94	6.13	6.38	6.95	6.35

N RATE	100	130	160	190	MEAN
N TIME					
SINGLE	5.70	5.65	6.20	6.52	6.02
DIVIDED	6.18	6.62	6.56	7.37	6.68
MEAN	5.94	6.13	6.38	6.95	6.35

NO SPRING NITROGEN

AUT N	0	40	MEAN
VARIETY			
AVALON	3.69	4.30	4.00
NORMAN	3.28	3.49	3.38
MEAN	3.48	3.89	3.69

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	4.15	3.84	4.00
NORMAN	3.45	3.31	3.38
MEAN	3.80	3.58	3.69

PATHCONT	NONE	FULL	MEAN
AUT N			
0	3.23	3.74	3.48
40	4.37	3.42	3.89
MEAN	3.80	3.58	3.69

GRAND MEAN 5.82

STRAW MEAN DM% 79.5

SUB PLOT AREA HARVESTED 0.00189

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83/R/WW/1 and 83/W/WW/1

WINTER WHEAT

VARIETIES

Object: To study a selection of the newer varieties of w. wheat and the effects of growth regulator on them on land in rotation (pathogen free) and after wheat and barley (pathogen infected) - Rothamsted Long Hoos I/II (pathogen free RH) and New Zealand (pathogen infected RD), Woburn White Horse (pathogen free WH).

Sponsors: R. Moffitt, R.J. Gutteridge.

Design: 2 randomised blocks of 2 whole plots split into 10.

Whole plot dimensions: (RH, RD) 3.0 x 10.0 (WH) 4.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. GROWREG Growth regulator:

NONE	None
CHLORMEQ	Chlormequat at 1.1 l in 250 l (RH, RD), 1.7 l in 280 l (WH)

Sub plots

2. VARIETY Varieties:

AQUILA
AVALON
AVOCET
FENMAN
FLANDERS
GALAHAD
LONGBOW
NORMAN
RAPIER
STETSON

Basal applications:
Long Hoos I/II (RH): Manures: (0:18:36) at 280 kg. N at 170 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l. Fungicide: Carbendazim at 0.15 kg, tridemorph at 0.38 kg and maneb at 1.6 kg in 500 l.
New Zealand (RD): Manures: (0:18:36) at 250 kg; N at 170 kg as 'Nitro-Chalk'. Weedkiller: Paraquat at 0.6 kg ion in 250 l. Isoproturon at 2.0 l, and mecoprop at 3.4 l with the prochloraz in 250 l. Glyphosate at 1.4 kg in 250 l. Fungicides: Propiconazole at 0.12 kg in 250 l. Prochloraz at 0.40 l.
White Horse (WH): Manures: N at 160 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with the prochloraz in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l. Prochloraz at 0.40 1.

Seed: Long Hoos I/II (RH), New Zealand (RD): Varieties sown at 180 kg.
White Horse (WH): Varieties sown at 190 kg.

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83/R/WW/1 and 83/W/WW/1

Cultivations, etc.:-

Long Hoos I/II (RH): PK applied: 10 Sept, 1982. Heavy spring-tine cultivated twice: 13 Sept. Rotary harrowed, seed sown: 28 Oct. N applied: 15 Apr, 1983. Weedkillers applied: 16 Apr. Chlormequat applied: 29 Apr. Fungicides applied: 13 June. Combine harvested: 10 Aug.

New Zealand (RD): Disced twice: 9 Sept, 1982, 21 Sept. PK applied: 10 Sept. Paraquat applied: 15 Oct. Spring-tine cultivated, rotary harrowed, seed sown: 28 Oct. N applied: 15 Apr, 1983. Weedkillers with fungicide applied: 16 Apr. Chlormequat applied: 29 Apr. Fungicide applied: 8 June. Glyphosate applied: 4 Aug. Combine harvested: 12 Aug.

White Horse (WH): Spring-tine cultivated twice: 28 Oct, 1982, 29 Oct. Heavy spring-tine cultivated, seed sown: 29 Oct. Weedkillers with fungicide applied: 15 Apr, 1983. N applied: 16 Apr. Chlormequat applied: 29 Apr. Fungicide applied: 10 June. Combine harvested: 15 Aug.

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83/R/WW/1 LONG HOOS I/II (R)

HEALTHY SITE

GRAIN TONNES/HECTARE

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

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	9.27	9.43	9.35
AVALON	10.38	10.77	10.58
AVOCET	10.82	10.70	10.76
FENMAN	10.91	10.94	10.92
FLANDERS	9.00	9.37	9.18
GALAHAD	10.82	10.95	10.89
LONGBOW	11.37	11.01	11.19
NORMAN	11.04	11.00	11.02
RAPIER	9.72	9.95	9.83
STETSON	9.98	9.65	9.81
MEAN	10.33	10.38	10.35

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

TABLE	GROWREG	VARIETY	GROWREG VARIETY
SED	0.175	0.192	0.312
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
GROWREG			0.272

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.272	2.6

GRAIN MEAN DM% 86.5

SUB PLOT AREA HARVESTED 0.00204

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83/R/WW/1 NEW ZEALAND (R)

DISEASED SITE

GRAIN TONNES/HECTARE

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

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	8.49	9.56	9.02
AVALON	11.13	10.67	10.90
AVOCET	9.99	10.57	10.28
FENMAN	10.31	10.84	10.57
FLANDERS	8.39	8.89	8.64
GALAHAD	9.66	10.53	10.10
LONGBOW	11.36	11.23	11.29
NORMAN	9.98	10.71	10.35
RAPIER	9.43	9.87	9.65
STETSON	9.49	8.74	9.11
MEAN	9.82	10.16	9.99

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

TABLE	GROWREG	VARIETY	GROWREG VARIETY
SED	0.349	0.410	0.651
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
GROWREG			0.580

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.580	5.8

GRAIN MEAN DM% 87.3

SUB PLOT AREA HARVESTED 0.00203

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83/W/WW/1 WHITE HORSE (W)

HEALTHY SITE

GRAIN TONNES/HECTARE

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

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	8.87	8.99	8.93
AVALON	8.73	9.56	9.15
AVOCET	8.09	6.89	7.49
FENMAN	9.34	8.31	8.83
FLANDERS	8.08	10.01	9.04
GALAHAD	7.96	8.58	8.27
LONGBOW	9.27	9.07	9.17
NORMAN	7.12	8.54	7.83
RAPIER	8.78	7.97	8.38
STETSON	8.82	9.38	9.10
MEAN	8.51	8.73	8.62

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

TABLE	GROWREG	VARIETY	GROWREG VARIETY
SED	0.672	0.637	1.087
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
GROWREG			0.900

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	0.900	10.4

GRAIN MEAN DM% 88.2

SUB PLOT AREA HARVESTED 0.00330

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83/R/WW/2

WINTER WHEAT

GROWTH AND YIELD ON A CONTRASTED SITE

Object: To compare the effects of some of the factors tested in 83/W/WW/2 on the growth and yield of w. wheat on a contrasted site - Long Hoos I/II.

Sponsors: F.V. Widdowson, P.J. Welbank, A.H. Weir.

Design: Half replicate of 2^5 + 16 extra plots.

Whole plot dimensions: 3.0 x 15.2.

Treatment: Combinations of:-

1. SOWDATE		Dates of sowing:
	15 SEPT	15 September, 1982
	20 OCT	20 October
2. TOTAL N		Total amount of N fertilizer (kg N) as 'Nitro-Chalk':
	140	100 on the first date, 40 on the second
	210	170 on the first date, 40 on the second
3. N TIME		Timing of fertilizer application:
	EARLY	7 Mar, 1983, 4 May
	LATE	7 Apr, 17 May
4. IRRIGATN		Irrigation:
	NONE	None
	FULL	Full (112.5 mm) to lessen a deficit of 37.5 mm to 12.5 mm
5. AUT PEST		Autumn pesticide:
	NONE	None
	ALDICARB	Aldicarb at 7.0 kg worked into seedbed

Plus all combinations of the following (all unirrigated, given aldicarb):

1. TOTAL NX		Total amount of N fertilizer (kg N) as 'Nitro-Chalk':
	0	None
	105	65 on the first date, 40 on the second
	140	100 on the first date, 40 on the second
	175	135 on the first date, 40 on the second
	210	170 on the first date, 40 on the second
	245	205 on the first date, 40 on the second
2. S DATE N		Dates of sowing and timing of N application:
	15 SEP NE	Sown 15 Sept 1982, N applied as N TIME EARLY
	20 OCT NL	Sown 20 Oct, N applied as N TIME LATE

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83/R/WW/2

Plus 4 extra plots for root sampling:

EXTRA

SE 210EX Sown 15 Sept with 210 kg N applied as N TIME EARLY, unirrigated and given aldicarb

NOTE: The irrigation treatment was as follows (mm water):-

24 June	25
28 June	25
14 July	37.5
21 July	25
Total	112.5

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.0 l in 450 l on the first occasion, at 1.8 l in 220 l with the mecoprop on the second, and at 2.5 l with the benomyl in 225 l on the third). Mecoprop (as 'Farmon CMPP' at 2.1 l). Fungicides: Benomyl at 0.56 kg. Captafol at 1.4 kg with propiconazole at 0.12 kg in 220 l. Carbendazim at 0.25 kg with maneb at 1.6 kg and propiconazole at 0.12 kg and the insecticide in 220 l. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.1 kg in 220 l.

Seed: Avalon, dressed chlorfenvinphos, sown at 180 kg.

Cultivations, etc.:- PK applied: 10 Sept, 1982. Heavy spring-tine cultivated twice: 13 Sept. Aldicarb applied for SOWDATE 15 SEPT, rotary harrowed, seed sown: 15 Sept. Aldicarb applied for SOWDATE 20 OCT, rotary harrowed, seed sown: 20 Oct. 'Brittox' applied: 25 Jan, 1983. Growth regulator applied to SOWDATE 15 SEPT plots: 8 Mar. 'Brittox' with mecoprop applied: 28 Mar. Growth regulator applied to SOWDATE 20 OCT plots: 14 Apr. 'Brittox' with benomyl applied: 27 Apr. Captafol with propiconazole applied: 24 May. Carbendazim, maneb, propiconazole and the insecticide applied: 23 June. Combine harvested: 10 Aug. Previous crops: W. oats 1981, potatoes 1982.

NOTES: (1) Light interception, dry weight, leaf area and N content of the above-ground crop were measured on several occasions. Stem nitrate was measured on three occasions during spring.
(2) Soil samples, to measure mineral N content, were taken on several occasions during winter and spring.

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83/R/WW/2

GRAIN TONNES HECTARE

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

SOWDATE	15 SEPT	20 OCT	MEAN
	10.16	9.96	10.06

TOTAL N	140	210	MEAN
	9.76	10.36	10.06

N TIME	EARLY	LATE	MEAN
	10.05	10.07	10.06

IRRIGATN	NONE	FULL	MEAN
	10.13	9.99	10.06

AUT PEST	NONE	ALDICARB	MEAN
	10.03	10.09	10.06

TOTAL NX S DATE N	0	105	140	175	210	245	MEAN
15 SEPT NE	5.59	9.08	9.70	10.55	10.94	10.92	9.46
20 OCT NL	4.58	8.68	9.92	9.99	10.38	10.31	8.98
MEAN	5.09	8.88	9.81	10.27	10.66	10.61	9.22

EXTRA SE 210EX 10.71

GRAND MEAN 9.83

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

TABLE	SOWDATE	TOTAL N	N TIME	IRRIGATN
SED	0.113	0.113	0.113	0.113

TABLE	AUT PEST
SED	0.113

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

STRATUM	DF	SE	CV%
WP	10	0.226	2.2

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00209

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83/W/WW/2

WINTER WHEAT

GROWTH AND YIELD ON CONTRASTED SITES

Object: To study the effects of a range of factors on the incidence of pests and diseases and on the growth and yield of w.wheat grown on light and heavy land and to determine the extent to which differences between the sites can be eliminated by appropriate combinations of factors - Woburn Butt Close IV (BC - light land) and Broad Mead I (BM - heavy land).

Sponsors: F.V. Widdowson, P.J. Welbank, A.H. Weir.

Associate sponsors: P.B. Barraclough, T.D. Williams, R.D. Prew.

Design: Half replicate of 2^5, arranged as 16 plots plus 8 extra plots (BC); half replicate of 2^6, arranged as 32 plots, plus 18 extra plots (BM).

Whole plot dimensions: 3.00 x 14.8 (BC).
3.00 x 15.2 (BM).

Treatments: Combinations of:-

Whole plots

1. SOWDATE — Dates of sowing (only one date of sowing on BC):

16 SEPT	16 September, 1982 (BC and BM)
20 OCT	20 October (BM only)

2. WINTER N — Amounts of nitrogen fertilizer applied, as Urea, on 3 Feb, 1983 (kg N):

BC	BM
0	0
60	30

3. N RATE — Amounts of nitrogen fertilizer applied, as 'Nitro-Chalk', in spring (kg N):

BC	BM
180	100
240	160

4. N TIME — Times of applying spring fertilizer:

EARLY	All except 40 kg N on 2 Mar; remainder on 5 May
LATE	All except 40 kg N on 6 Apr; remainder on 17 May

5. IRRIGATN — Irrigation:

NONE	None
FULL	Full (112.5 mm BC, 87.5 mm BM) to lessen deficit of 25 mm to 12.5 mm

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6. AUT PEST — Autumn pesticide:

NONE	None
ALDICARB	Aldicarb at 5.6 kg worked into seedbed

Plus all combinations of the following (all given irrigation and aldicarb, but not winter nitrogen):

Whole plots

1. S DATE N — Dates of sowing and times of applying nitrogen fertilizer (only single date and time BC):

SEPT NE	Sown 16 SEPT, N applied at N TIME EARLY (timing and division as above) (BC and BM)
OCT NL	Sown 20 OCT, N applied at N TIME LATE (timing and division as above) (BM only)

2. N SCALE — Amounts of nitrogen fertilizer applied in spring (kg N):

BC	BM
0	0
120	40
150	70
210	130
240	160
270	190

Plus extra plots for root sampling (2 BC, 6 BM)

EXTRA

BC

SE 5E WA	Sown 16 SEPT, 240 kg N, N TIME EARLY, 60 kg WINTER N, ALDICARB
SE 5E --	Sown 16 SEPT, 240 kg N, N TIME EARLY

BM

SE 5E --	Sown 16 SEPT, 160 kg N, N TIME EARLY
SE 5E W-	Sown 16 SEPT, 160 kg N, N TIME EARLY, 30 kg WINTER N
SE 3E WA	Sown 16 SEPT, 100 kg N, N TIME EARLY, 30 kg WINTER N, ALDICARB
SE 3E -A	Sown 16 SEPT, 100 kg N, N TIME EARLY, ALDICARB
SL 5L --	Sown 20 OCT, 160 kg N, N TIME LATE
SL 3L W-	Sown 20 OCT, 100 kg N, N TIME LATE, 30 kg WINTER N

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Irrigation was applied as follows (mm water):

Butt Close IV (BC)		Broad Mead I (BM)	
17 June	25	17 June	25
23 June	12.5	23 June	12.5
24 June	12.5	24 June	12.5
6 July	12.5	13 July	25
15 July	12.5	19 July	12.5
18 July	12.5		
29 July	25		
Total	112.5	Total	87.5

Standard applications:
Butt Close IV (BC) and Broad Mead I (BM): Manures: (0:14:28) at 310 kg. Chelated manganese applied on two occasions (as 'Vytel' at 2.8 l on the first occasion and 1.4 l on the second occasion) in 280 l. Weedkillers: Chlortoluron at 3.5 kg with mecoprop (as 'Herrifex DS' at 4.2 l) in 280 l. Mecoprop (as 'Herrifex DS' at 4.9 l) in 280 l to (BM) only. Fungicides: Triadimefon at 0.13 kg in 280 l. Captafol at 1.8 kg with carbendazim at 0.13 kg, tridemorph at 0.32 kg and maneb at 1.3 kg with insecticide in 280 l. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.:-
Butt Close (BC) and Broad Mead I (BM): PK applied: 11 Sept, 1982. Spring-tine cultivated: 13 Sept. Heavy spring-tine cultivated on first occasion to both, second occasion (BM) only: 14 Sept. Aldicarb applied, rotary cultivated and seed sown for SOWDATE 16 SEP: 16 Sept. Chlortoluron and 'Herrifex DS' applied to SOWDATE 16 SEPT : 19 Nov. Fungicides with insecticide applied: 21 June, 1983. Combine harvested: 13 Aug.
Butt Close IV (BC): Growth regulator applied: 15 Mar, 1983. Triadimefon and first manganese applied: 10 May. Second manganese applied: 23 May.
Broad Mead I (BM): Aldicarb applied, rotary cultivated and seed sown for SOWDATE 20 OCT: 20 Oct, 1982. Chlortoluron and 'Herrifex DS' applied to SOWDATE 20 OCT: 3 Dec, 19 Jan, 1983. 'Herrifex DS' and growth regulator applied to SOWDATE 16 SEPT: 8 Apr, and to SOWDATE 20 OCT: 14 Apr. First managanese applied: 14 Apr. Triadimefon and second manganese applied: 10 May.

NOTES: (1) The planned late sowing date on Butt Close IV was not done because the ground was too wet. Spring wheat, not taken for yield, was sown instead in March.
(2) Measurements were made of plant and shoot numbers, dry weight of tops and ears, leaf area and N contents during growth. Weekly measurements were made of soil moisture (between April and harvest). Plant water stress and stomatal resistance were measured. Disease assessments were made during the growing season. Soil samples were taken in autumn and spring to determine N contents.

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83/W/WW/2 BUTT CLOSE IV (BC)

GRAIN TONNES/HECTARE

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

N RATE	180	240	MEAN
	9.39	8.84	9.11

N TIME	EARLY	LATE	MEAN
	9.11	9.12	9.11

WINTER N	0	60	MEAN
	8.97	9.26	9.11

IRRIGATN	NONE	FULL	MEAN
	9.36	8.87	9.11

AUT PEST	NONE	ALDICARB	MEAN
	9.05	9.18	9.11

N SCALE	0	120	150	210	240	270	MEAN
	2.86	7.13	8.41	8.56	8.61	9.41	7.50

EXTRA	SE 5E WA	SE 5E --
	9.46	9.52

GRAND MEAN 8.75

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

TABLE	N RATE	N TIME	WINTER N	IRRIGATN
SED	0.349	0.349	0.349	0.349

TABLE	AUT PEST
SED	0.349

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

STRATUM	DF	SE	CV%
WP	10	0.699	7.7

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00202

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83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

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

N RATE	100	160	MEAN
SOWDATE			
16 SEPT	8.60	7.99	8.29
20 OCT	8.60	8.92	8.76
MEAN	8.60	8.46	8.53

N TIME	EARLY	LATE	MEAN
SOWDATE			
16 SEPT	8.19	8.40	8.29
20 OCT	8.88	8.63	8.76
MEAN	8.53	8.52	8.53

N TIME	EARLY	LATE	MEAN
N RATE			
100	8.63	8.56	8.60
160	8.44	8.47	8.46
MEAN	8.53	8.52	8.53

WINTER N	0	30	MEAN
SOWDATE			
16 SEPT	8.21	8.38	8.29
20 OCT	8.54	8.97	8.76
MEAN	8.38	8.68	8.53

WINTER N	0	30	MEAN
N RATE			
100	8.48	8.71	8.60
160	8.27	8.64	8.46
MEAN	8.38	8.68	8.53

WINTER N	0	30	MEAN
N TIME			
EARLY	8.45	8.62	8.53
LATE	8.31	8.73	8.52
MEAN	8.38	8.68	8.53

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
16 SEPT	8.24	8.35	8.29
20 OCT	8.44	9.07	8.76
MEAN	8.34	8.71	8.53

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83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

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

AUT PEST N RATE	NONE	ALDICARB	MEAN
100	8.40	8.79	8.60
160	8.28	8.63	8.46
MEAN	8.34	8.71	8.53

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	8.41	8.66	8.53
LATE	8.27	8.77	8.52
MEAN	8.34	8.71	8.53

AUT PEST WINTER N	NONE	ALDICARB	MEAN
0	8.09	8.66	8.38
30	8.60	8.76	8.68
MEAN	8.34	8.71	8.53

IRRIGATN SOWDATE	NONE	FULL	MEAN
16 SEPT	8.65	7.94	8.29
20 OCT	9.17	8.35	8.76
MEAN	8.91	8.14	8.53

IRRIGATN N RATE	NONE	FULL	MEAN
100	9.05	8.14	8.60
160	8.77	8.14	8.46
MEAN	8.91	8.14	8.53

IRRIGATN N TIME	NONE	FULL	MEAN
EARLY	8.83	8.24	8.53
LATE	8.98	8.05	8.52
MEAN	8.91	8.14	8.53

IRRIGATN WINTER N	NONE	FULL	MEAN
0	8.77	7.98	8.38
30	9.05	8.31	8.68
MEAN	8.91	8.14	8.53

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83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

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

IRRIGATN / AUT PEST	NONE	FULL	MEAN
NONE	8.67	8.01	8.34
ALDICARB	9.15	8.27	8.71
MEAN	8.91	8.14	8.53

N SCALE / S DATE N	0	40	70	130	160	190	MEAN
SEPT NE	5.68	7.51	7.90	8.83	8.35	8.59	7.81
OCT NL	5.26	7.15	8.51	8.50	9.23	9.72	8.06
MEAN	5.47	7.33	8.21	8.67	8.79	9.16	7.94

EXTRA	SE 5E --	SE 5E W-	SE 3E WA	SE 3E -A	SL 5L --	SL 3L W-
	7.83	7.30	8.20	8.53	7.75	8.61

GRAND MEAN 8.34

SED FOR TABLES EXCEPT THOSE INVOLVING N SCALE AND EXTRA ARE

MARGINS OF 2 WAY TABLES	0.265
TWO WAY TABLES	0.375

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

STRATUM	DF	SE	CV%
WP	10	0.751	8.8

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00202

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83/R/WW/3

WINTER WHEAT

FACTORS LIMITING YIELD

Object: To study the effects of a range of factors on the incidence of pests and diseases and on the growth and yield of w. wheat - Little Hoos.

Sponsors: R.D. Prew, B.M. Church, A.M. Dewar, J. Lacey, A. Penny, R.T. Plumb, G.N. Thorne, A.D. Todd, T.D. Williams.

Associate sponsors: D.S. Jenkinson, A.H. Weir, P.J. Welbank, F.V. Widdowson.

Design: Half replicate of 2^8 + 49 extra plots, arranged in 4 blocks with PREVCROP on blocks.

Whole plot dimensions: 3.0 x 15.2.

Treatments: Combinations of:-

Blocks

1.	PREVCROP	Previous cropping:
	BARLEY	Potatoes 1980, w. wheat 1981, w. barley 1982
	OATS	Potatoes 1980, w. wheat 1981, w. oats 1982

Whole plots

2.	SOWDATE	Dates of sowing:
	15 SEP	15 September, 1982
	26 OCT	26 October
3.	TOTAL N	Total amount of N fertilizer (kg N) as 'Nitro-Chalk':
	180	
	250	
4.	N TIME	Timing of nitrogen fertilizer applications:
	EARLY	2 February, 1983, 4 March, 3 May
	LATE	4 March, 5 April, 16 May
5.	GROWREG	Growth regulator:
	NONE	None
	CHLORMEQ	Chlormequat chloride + choline chloride (as 'New 5 C Cycocel' at 1.75 l) at Zadoks GS 30 on 8 March for SOWDATE 15 SEPT and 14 April for SOWDATE 26 OCT
6.	SPR FUNG	Spring fungicide:
	NONE	None
	TRIDEMOR	Tridemorph at 0.52 kg on 13 April

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7. SUM FUNG — Summer fungicide:

NONE	None
PROPICON	Propiconazole at 0.12 kg, alone in 220 l on 25 May with carbendazim at 0.25 kg and maneb at 1.6 kg in 220 l on 22 June

8. PESTCIDE — Autumn and summer pesticides:

NONE	None
ALD+PIR	Aldicarb at 7.0 kg worked into seedbed + pirimicarb at 0.14 kg in 220 l on 23 June

Plus all combinations of the following (all given chlormequat chloride + choline chloride, tridemorph, propiconazole, carbendazim, maneb, aldicarb, pirimicarb; the plots sown 15 Sept were given N timed early and plots sown 26 Oct given N timed late):

Blocks

1. PRECROPX — Previous cropping:

BARLEY	Potatoes 1980, w. wheat 1981, w. barley 1982
OATS	Potatoes 1980, w. wheat 1981, w. oats 1982

Whole plots

2. SOWDATEX — Dates of sowing:

15 SEPT	15 September, 1982
26 OCT	26 October

3. TOTAL NX — Total amount of N fertilizer (kg N) as 'Nitro-Chalk':

0
145
215
285

Plus a half replicate of the following combinations (all trickle irrigated to lessen a deficit of 37.5 mm to 12.5 mm, and given chlormequat chloride + choline chloride, tridemorph, propiconazole, carbendazim, maneb, aldicarb and pirimicarb):

Blocks

1. PRECROPI — Previous cropping:

BARLEY	Potatoes 1980, w. wheat 1981, w. barley 1982
OATS	Potatoes 1980, w. wheat 1981, w. oats 1982

Whole plots

2. SOWDATEI — Dates of sowing:

15 SEPT	15 September, 1982
26 OCT	26 October

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3. TOTAL NI — Total amount of N fertilizer (kg N) as 'Nitro-Chalk':

   180
   250

4. N TIMEI — Timing of fertilizer application:

   EARLY — 2 February, 1983, 4 March, 3 May
   LATE — 4 March, 5 April, 16 May

5. AUT NI — Autumn applied N fertilizer:

   NONE — None
   AUT N — 40 kg N applied to seedbed in addition to spring N

Plus seven extra treatments (all, except NONE plots, given chlormequat chloride + choline chloride, tridemorph, propiconazole, carbendazim, maneb, aldicarb, pirimicarb):

EXTRA

SE GREGX	Sown 15 Sept, after barley given additional chlormequat chloride + choline chloride (as '5 C Cycocel' at 1.0 l) at Zadoks GS 13/21 on 9 Nov, 1982, and 220 kg N at N TIME EARLY (duplicated)
SL GREGX	Sown 26 Oct, after barley given additional chlormequat chloride + choline chloride (as '5 C Cycocel' at 1.0 l) at Zadoks GS 13/21 on 27 Jan, 1983 and 220 kg N at N TIME LATE (duplicated)
SE FAL	Sown 15 Sept after fallow and given 250 kg N at N TIME EARLY (triplicated)
SL FAL	Sown 26 Oct after fallow and given 250 kg N at N TIME LATE (triplicated)
SE NONE B	Sown 15 Sept after barley
SE NONE F	Sown 15 Sept after fallow
SL NONE F	Sown 26 Oct after fallow

NOTES: (1) TOTAL N fertilizer was given in three applications, 40 kg N on the first and third dates for each N TIME the remainder on the second.

(2) Half of the plots with treatment combinations including SOWDATE 15 SEPT and PREVCROP OATS had a second treatment of growth regulator in error on 14 April. Observations suggested that this had no further effect and the presentation of results has not been amended to take account of the error.

(3) The irrigation treatment was as follows (mm water):-

June 28	25
June 29	25
July 14	37.5
July 21	25
Total	112.5

Basal applications: Manures: (0:18:36) at 420 kg. Weedkillers: Paraquat at 0.56 kg ion in 250 l. Glyphosate at 1.4 kg in 250 l. Isoproturon at 2.1 kg with dicamba, mecoprop and MCPA (as 'Poly-Farmon CMPP' at 4.2 l) in 250 l.

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83/R/WW/3

Seed: Avalon, sown at 170 kg.

Cultivations, etc.:- Glyphosate applied: 17 Aug, 1982. Disced: 25 Aug, 1 Sept. PK applied, paraquat applied: 10 Sept. Ploughed: 13 Sept. Aldicarb applied for SOWDATE 15 SEPT, rotary harrowed, seed sown: 15 Sept. Aldicarb applied for SOWDATE 26 OCT: 20 Oct. These plots rotary harrowed, seed sown: 26 Oct. Isoproturon with 'Poly-Farmon CMPP' applied: 11 Mar, 1983. Combine harvested: 11 Aug.

NOTE: Soil was sampled for nematodes, shoot borers, water and mineral N contents. Plants were assessed for foot and root rots throughout the season. The above-ground crop was examined for barley yellow dwarf virus, aphids, foliar diseases and microflora. Light interception, dry weight, leaf area, shoot numbers and N and K content of the above-ground crop and stem nitrate were measured on several occasions.

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GRAIN TONNES/HECTARE

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

SOWDATE	15 SEPT	26 OCT	MEAN
PREVCROP			
BARLEY	7.62	8.26	7.94
OATS	10.03	9.61	9.82
MEAN	8.83	8.94	8.88

TOTAL N	180	250	MEAN
PREVCROP			
BARLEY	7.75	8.12	7.94
OATS	9.74	9.91	9.82
MEAN	8.75	9.02	8.88

TOTAL N	180	250	MEAN
SOWDATE			
15 SEPT	8.72	8.94	8.83
26 OCT	8.77	9.10	8.94
MEAN	8.75	9.02	8.88

N TIME	EARLY	LATE	MEAN
PREVCROP			
BARLEY	7.82	8.06	7.94
OATS	9.74	9.91	9.82
MEAN	8.78	8.99	8.88

N TIME	EARLY	LATE	MEAN
SOWDATE			
15 SEPT	8.60	9.05	8.83
26 OCT	8.95	8.92	8.94
MEAN	8.78	8.99	8.88

N TIME	EARLY	LATE	MEAN
TOTAL N			
180	8.67	8.82	8.75
250	8.88	9.16	9.02
MEAN	8.78	8.99	8.88

GROWREG	NONE	CHLORMEQ	MEAN
PREVCROP			
BARLEY	7.98	7.90	7.94
OATS	9.82	9.83	9.82
MEAN	8.90	8.86	8.88

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GRAIN TONNES/HECTARE

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

GROWREG SOWDATE	NONE	CHLORMEQ	MEAN
15 SEPT	8.78	8.87	8.83
26 OCT	9.03	8.85	8.94
MEAN	8.90	8.86	8.88

GROWREG TOTAL N	NONE	CHLORMEQ	MEAN
180	8.76	8.73	8.75
250	9.04	9.00	9.02
MEAN	8.90	8.86	8.88

GROWREG N TIME	NONE	CHLORMEQ	MEAN
EARLY	8.81	8.75	8.78
LATE	8.99	8.98	8.99
MEAN	8.90	8.86	8.88

SPR FUNG PREVCROP	NONE	TRIDEMOR	MEAN
BARLEY	7.74	8.14	7.94
OATS	9.77	9.88	9.82
MEAN	8.75	9.01	8.88

SPR FUNG SOWDATE	NONE	TRIDEMOR	MEAN
15 SEPT	8.68	8.97	8.83
26 OCT	8.83	9.04	8.94
MEAN	8.75	9.01	8.88

SPR FUNG TOTAL N	NONE	TRIDEMOR	MEAN
180	8.69	8.80	8.75
250	8.82	9.22	9.02
MEAN	8.75	9.01	8.88

SPR FUNG N TIME	NONE	TRIDEMOR	MEAN
EARLY	8.62	8.94	8.78
LATE	8.89	9.08	8.99
MEAN	8.75	9.01	8.88

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GRAIN TONNES/HECTARE

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

SPR FUNG GROWREG	NONE	TRIDEMOR	MEAN
NONE	8.83	8.98	8.90
CHLORMEQ	8.68	9.04	8.86
MEAN	8.75	9.01	8.88

SUM FUNG PREVCROP	NONE	PROPICON	MEAN
BARLEY	7.64	8.24	7.94
OATS	9.48	10.17	9.82
MEAN	8.56	9.20	8.88

SUM FUNG SOWDATE	NONE	PROPICON	MEAN
15 SEPT	8.57	9.08	8.83
26 OCT	8.55	9.33	8.94
MEAN	8.56	9.20	8.88

SUM FUNG TOTAL N	NONE	PROPICON	MEAN
180	8.55	8.94	8.75
250	8.57	9.47	9.02
MEAN	8.56	9.20	8.88

SUM FUNG N TIME	NONE	PROPICON	MEAN
EARLY	8.45	9.10	8.78
LATE	8.66	9.31	8.99
MEAN	8.56	9.20	8.88

SUM FUNG GROWREG	NONE	PROPICON	MEAN
NONE	8.65	9.15	8.90
CHLORMEQ	8.47	9.26	8.86
MEAN	8.56	9.20	8.88

SUM FUNG SPR FUNG	NONE	PROPICON	MEAN
NONE	8.36	9.15	8.75
TRIDEMOR	8.76	9.26	9.01
MEAN	8.56	9.20	8.88

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GRAIN TONNES/HECTARE

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

PESTCIDE PREVCROP	NONE	ALD+PIR	MEAN
BARLEY	8.09	7.79	7.94
OATS	9.80	9.85	9.82
MEAN	8.94	8.82	8.88

PESTCIDE SOWDATE	NONE	ALD+PIR	MEAN
15 SEPT	8.90	8.75	8.83
26 OCT	8.98	8.89	8.94
MEAN	8.94	8.82	8.88

PESTCIDE TOTAL N	NONE	ALD+PIR	MEAN
180	8.79	8.70	8.75
250	9.10	8.94	9.02
MEAN	8.94	8.82	8.88

PESTCIDE N TIME	NONE	ALD+PIR	MEAN
EARLY	8.92	8.64	8.78
LATE	8.97	9.00	8.99
MEAN	8.94	8.82	8.88

PESTCIDE GROWREG	NONE	ALD+PIR	MEAN
NONE	8.99	8.81	8.90
CHLORMEQ	8.90	8.83	8.86
MEAN	8.94	8.82	8.88

PESTCIDE SPR FUNG	NONE	ALD+PIR	MEAN
NONE	8.81	8.70	8.75
TRIDEMOR	9.08	8.94	9.01
MEAN	8.94	8.82	8.88

PESTCIDE SUM FUNG	NONE	ALD+PIR	MEAN
NONE	8.64	8.47	8.56
PROPICON	9.24	9.17	9.20
MEAN	8.94	8.82	8.88

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GRAIN TONNES/HECTARE

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

SOWDATE	15 SEPT		26 OCT	
TOTAL N	180	250	180	250
PREVCROP				
BARLEY	7.46	7.77	8.05	8.48
OATS	9.97	10.10	9.50	9.73

SOWDATE	15 SEPT		26 OCT	
N TIME	EARLY	LATE	EARLY	LATE
PREVCROP				
BARLEY	7.33	7.90	8.30	8.22
OATS	9.88	10.19	9.60	9.63

TOTAL N	180		250	
N TIME	EARLY	LATE	EARLY	LATE
PREVCROP				
BARLEY	7.70	7.80	7.93	8.32
OATS	9.65	9.83	9.83	9.99

TOTAL N	180		250	
N TIME	EARLY	LATE	EARLY	LATE
SOWDATE				
15 SEPT	8.54	8.89	8.67	9.20
26 OCT	8.81	8.74	9.09	9.11

SOWDATE	15 SEPT		26 OCT	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	7.57	7.66	8.39	8.13
OATS	9.98	10.08	9.66	9.57

TOTAL N	180		250	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	7.79	7.71	8.17	8.08
OATS	9.74	9.74	9.91	9.92

TOTAL N	180		250	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
SOWDATE				
15 SEPT	8.63	8.80	8.92	8.95
26 OCT	8.89	8.66	9.16	9.04

N TIME	EARLY		LATE	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	7.87	7.77	8.09	8.03
OATS	9.75	9.73	9.89	9.93

N TIME	EARLY		LATE	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
SOWDATE				
15 SEPT	8.51	8.70	9.05	9.05
26 OCT	9.11	8.79	8.94	8.91

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
TOTAL N				
180	8.69	8.66	8.84	8.79
250	8.93	8.83	9.15	9.16

SOWDATE	15 SEPT		26 OCT	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
PREVCROP				
BARLEY	7.32	7.91	8.15	8.37
OATS	10.03	10.04	9.51	9.72

TOTAL N	180		250	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
PREVCROP				
BARLEY	7.68	7.82	7.79	8.46
OATS	9.69	9.79	9.85	9.97

TOTAL N	180		250	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
SOWDATE				
15 SEPT	8.58	8.85	8.78	9.09
26 OCT	8.80	8.75	8.87	9.34

N TIME	EARLY		LATE	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
PREVCROP				
BARLEY	7.49	8.14	7.98	8.14
OATS	9.74	9.73	9.80	10.02

N TIME	EARLY		LATE	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
SOWDATE				
15 SEPT	8.34	8.87	9.01	9.08
26 OCT	8.90	9.01	8.77	9.08

N TIME	EARLY		LATE	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
TOTAL N				
180	8.64	8.71	8.73	8.90
250	8.59	9.17	9.05	9.26

GROWREG	NONE		CHLORMEQ	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
PREVCROP				
BARLEY	7.90	8.06	7.57	8.22
OATS	9.75	9.89	9.79	9.87

GROWREG	NONE		CHLORMEQ	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
SOWDATE				
15 SEPT	8.77	8.78	8.58	9.16
26 OCT	8.89	9.17	8.78	8.92

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GRAIN TONNES/HECTARE

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

GROWREG	NONE		CHLORMEQ	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
TOTAL N				
180	8.83	8.70	8.54	8.91
250	8.82	9.25	8.82	9.18

GROWREG	NONE		CHLORMEQ	
SPR FUNG	NONE	TRIDEMOR	NONE	TRIDEMOR
N TIME				
EARLY	8.69	8.92	8.54	8.95
LATE	8.96	9.03	8.82	9.14

SOWDATE	15 SEPT		26 OCT	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	7.31	7.93	7.97	8.56
OATS	9.83	10.24	9.13	10.09

TOTAL N	180		250	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	7.60	7.90	7.67	8.58
OATS	9.50	9.98	9.46	10.36

TOTAL N	180		250	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
15 SEPT	8.64	8.79	8.49	9.38
26 OCT	8.46	9.09	8.64	9.56

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	7.45	8.18	7.82	8.30
OATS	9.46	10.02	9.50	10.32

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
15 SEPT	8.30	8.90	8.83	9.27
26 OCT	8.60	9.30	8.50	9.35

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
180	8.36	8.99	8.74	8.89
250	8.55	9.21	8.59	9.72

GROWREG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	7.76	8.20	7.51	8.28
OATS	9.54	10.11	9.42	10.23

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GRAIN TONNES/HECTARE

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

GROWREG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
15 SEPT	8.62	8.93	8.51	9.24
26 OCT	8.68	9.37	8.42	9.28

GROWREG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
180	8.67	8.85	8.43	9.03
250	8.63	9.45	8.51	9.49

GROWREG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
N TIME				
EARLY	8.55	9.07	8.36	9.13
LATE	8.75	9.23	8.57	9.38

SPR FUNG	NONE		TRIDEMOR	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	7.22	8.25	8.05	8.23
OATS	9.50	10.05	9.46	10.29

SPR FUNG	NONE		TRIDEMOR	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
15 SEPT	8.40	8.95	8.73	9.21
26 OCT	8.32	9.34	8.78	9.31

SPR FUNG	NONE		TRIDEMOR	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
180	8.33	9.05	8.77	8.83
250	8.39	9.25	8.74	9.69

SPR FUNG	NONE		TRIDEMOR	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
N TIME				
EARLY	8.24	8.99	8.67	9.21
LATE	8.48	9.30	8.85	9.31

SPR FUNG	NONE		TRIDEMOR	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
GROWREG				
NONE	8.60	9.05	8.70	9.25
CHLORMEQ	8.12	9.24	8.82	9.27

SOWDATE	15 SEPT		26 OCT	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	7.83	7.40	8.34	8.18
OATS	9.97	10.10	9.62	9.61

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GRAIN TONNES/HECTARE

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

TOTAL N	180		250	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	7.84	7.67	8.34	7.91
OATS	9.74	9.73	9.85	9.97

TOTAL N	180		250	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
15 SEPT	8.78	8.65	9.02	8.85
26 OCT	8.79	8.76	9.17	9.03

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	8.12	7.52	8.06	8.06
OATS	9.72	9.76	9.88	9.95

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
15 SEPT	8.81	8.39	8.99	9.10
26 OCT	9.02	8.88	8.94	8.90

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
180	8.93	8.42	8.65	8.98
250	8.90	8.86	9.29	9.02

GROWREG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	8.23	7.73	7.94	7.85
OATS	9.74	9.90	9.85	9.81

GROWREG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
15 SEPT	8.97	8.58	8.83	8.91
26 OCT	9.01	9.05	8.96	8.74

GROWREG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
180	8.76	8.77	8.82	8.64
250	9.22	8.86	8.98	9.02

GROWREG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	9.04	8.58	8.79	8.70
LATE	8.93	9.05	9.00	8.95

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GRAIN TONNES/HECTARE

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

SPR FUNG	NONE		TRIDEMOR	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	7.90	7.57	8.28	8.00
OATS	9.72	9.83	9.88	9.88

SPR FUNG	NONE		TRIDEMOR	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
15 SEPT	8.69	8.66	9.11	8.84
26 OCT	8.93	8.74	9.04	9.05

SPR FUNG	NONE		TRIDEMOR	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
180	8.71	8.67	8.87	8.74
250	8.91	8.73	9.28	9.15

SPR FUNG	NONE		TRIDEMOR	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	8.71	8.53	9.13	8.75
LATE	8.91	8.87	9.02	9.14

SPR FUNG	NONE		TRIDEMOR	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
GROWREG				
NONE	8.89	8.77	9.09	8.86
CHLORMEQ	8.73	8.63	9.06	9.02

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	7.83	7.44	8.34	8.14
OATS	9.45	9.51	10.14	10.19

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
15 SEPT	8.81	8.32	8.99	9.18
26 OCT	8.47	8.63	9.49	9.16

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
180	8.65	8.45	8.93	8.95
250	8.64	8.50	9.56	9.38

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	8.62	8.29	9.22	8.98
LATE	8.67	8.66	9.27	9.35

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GRAIN TONNES/HECTARE

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

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
GROWREG				
NONE	8.76	8.55	9.22	9.08
CHLORMEQ	8.53	8.40	9.26	9.25

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SPR FUNG				
NONE	8.51	8.21	9.11	9.19
TRIDEMOR	8.78	8.74	9.38	9.14

SOWDATEX	15 SEPT	26 OCT	MEAN
PREVCROPX			
BARLEY	6.54	6.46	6.50
OATS	8.64	8.32	8.48
MEAN	7.59	7.39	7.49

TOTAL NX	0	145	215	285	MEAN
PREVCROPX					
BARLEY	2.26	8.28	7.53	7.94	6.50
OATS	3.89	9.35	10.08	10.59	8.48
MEAN	3.08	8.81	8.80	9.27	7.49

TOTAL NX	0	145	215	285	MEAN
SOWDATEX					
15 SEPT	3.17	8.45	9.20	9.53	7.59
26 OCT	2.99	9.17	8.40	9.01	7.39
MEAN	3.08	8.81	8.80	9.27	7.49

SOWDATEI	15 SEPT	26 OCT	MEAN
PRECROPI			
BARLEY	6.97	8.68	7.83
OATS	10.21	9.22	9.71
MEAN	8.59	8.95	8.77

TOTAL NI	180	250	MEAN
PRECROPI			
BARLEY	7.89	7.76	7.83
OATS	9.37	10.06	9.71
MEAN	8.63	8.91	8.77

TOTAL NI	180	250	MEAN
SOWDATEI			
15 SEPT	8.35	8.83	8.59
26 OCT	8.91	8.99	8.95
MEAN	8.63	8.91	8.77

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GRAIN TONNES/HECTARE

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

N TIMEI	EARLY	LATE	MEAN
PRECROPI			
BARLEY	7.80	7.85	7.83
OATS	9.64	9.79	9.71
MEAN	8.72	8.82	8.77

N TIMEI	EARLY	LATE	MEAN
SOWDATEI			
15 SEPT	8.65	8.53	8.59
26 OCT	8.79	9.12	8.95
MEAN	8.72	8.82	8.77

N TIMEI	EARLY	LATE	MEAN
TOTAL NI			
180	8.60	8.66	8.63
250	8.83	8.98	8.91
MEAN	8.72	8.82	8.77

AUT NI	NONE	AUT N	MEAN
PRECROPI			
BARLEY	7.95	7.70	7.83
OATS	9.65	9.78	9.71
MEAN	8.80	8.74	8.77

AUT NI	NONE	AUT N	MEAN
SOWDATEI			
15 SEPT	8.42	8.76	8.59
26 OCT	9.18	8.73	8.95
MEAN	8.80	8.74	8.77

AUT NI	NONE	AUT N	MEAN
TOTAL NI			
180	8.59	8.68	8.63
250	9.01	8.80	8.91
MEAN	8.80	8.74	8.77

AUT NI	NONE	AUT N	MEAN
N TIMEI			
EARLY	8.79	8.64	8.72
LATE	8.80	8.84	8.82
MEAN	8.80	8.74	8.77

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83/R/WW/3

GRAIN TONNES/HECTARE

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

SE GREGX	9.93
SL GREGX	10.15
SE FAL	7.49
SL FAL	10.39
SE NONE B	1.57
SE NONE F	7.33
SL NONE F	6.15
MEAN	8.37
GRAND MEAN	8.59

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

SED APPLY TO MAIN FACTORIAL PLOTS ONLY

MARGINS OF TWO FACTOR TABLES	0.090*
TWO FACTOR TABLES	0.189**
THREE FACTOR TABLES	0.267**

* NOT INCLUDING PREVCROP
** WITHIN SAME LEVEL OF PREVCROP ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	33	0.756	8.5

GRAIN MEAN DM% 86.8

PLOT AREA HARVESTED 0.00209

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83/R/WW/4

WINTER WHEAT

SEED RATES AND DIVIDED N DRESSINGS

Object: To study the effects of a range of rates of early nitrogen dressings on the growth and yield of wheat sown at one third or at standard seed rate - Little Hoos.

Sponsors: J. McEwen, R. Moffitt.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. SD RATE — Seed rates (kg):

   67
   200

2. EARLY N — Nitrogen fertilizer applied 22 Feb, 1983 (kg N) as 'Nitro-Chalk':

   0
   25
   50
   75

3. APRIL N — Nitrogen fertilizer applied 13 Apr (kg N) as 'Nitro-Chalk':

   75
   100
   125

plus extra treatments, all combinations of:-

1. SD RATEX — Seed rates (kg):

   67
   200

2. APRIL NX — Nitrogen fertilizer applied 13 Apr (kg N):

   150
   175
   200

Basal applications: Manures: (0:18:36) at 420 kg. Weedkillers: Paraquat at 0.83 kg ion in 250 l. Isoproturon at 2.1 kg with dicamba, mecoprop, and MCPA (as 'Poly-Farmon CMPP' at 4.2 l) in 250 l. Fungicides: Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.38 kg in 500 l. Growth regulator: Chlormequat at 1.1 kg in 250 l.

Seed: Avalon.

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83/R/WW/4

Cultivations, etc.:- Disced: 25 Aug and 1 Sept, 1982. PK applied: 10 Sept. Paraquat applied: 15 Oct. Rotary harrowed, seed sown: 27 Oct. Isoproturon with 'Poly-Farmon CMPP' applied: 11 Mar, 1983. Growth regulator applied: 29 Apr. Fungicides applied: 13 June. Combine harvested: 10 Aug. Previous crops: W. wheat 1981, w. oats 1982.

NOTES: (1) Plant counts were made in February, shoot counts in March and April and ear counts in July.
(2) 1000 grain weights and N content of grain were measured.

GRAIN TONNES/HECTARE

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

EARLY N	0	25	50	75	MEAN
SD RATE					
67	7.81	8.56	8.64	9.09	8.52
200	7.88	8.62	8.98	9.19	8.67
MEAN	7.85	8.59	8.81	9.14	8.60

APRIL N	75	100	125	MEAN
SD RATE				
67	8.30	8.60	8.67	8.52
200	8.16	8.72	9.13	8.67
MEAN	8.23	8.66	8.90	8.60

APRIL N	75	100	125	MEAN
EARLY N				
0	7.19	8.06	8.28	7.85
25	8.13	8.73	8.90	8.59
50	8.49	8.81	9.14	8.81
75	9.10	9.04	9.28	9.14
MEAN	8.23	8.66	8.90	8.60

	APRIL N	75	100	125
SD RATE	EARLY N			
67	0	7.26	8.04	8.12
	25	8.23	8.80	8.65
	50	8.65	8.64	8.64
	75	9.07	8.92	9.27
200	0	7.13	8.07	8.45
	25	8.04	8.67	9.15
	50	8.34	8.97	9.64
	75	9.12	9.17	9.29

APRIL NX	150	175	200	MEAN
SD RATEX				
67	9.00	8.65	9.16	8.94
200	8.38	9.58	9.23	9.06
MEAN	8.69	9.12	9.19	9.00

GRAND MEAN 8.68

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83/R/WW/4

GRAIN TONNES/HECTARE

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

TABLE	SD RATE	EARLY N	APRIL N	SD RATE EARLY N
SED	0.099	0.139	0.121	0.197

TABLE	SD RATE APRIL N	EARLY N APRIL N	SD RATE EARLY N APRIL N	SDRATEX
SED	0.171	0.241	0.341	0.197

TABLE	APRIL NX	SD RATEX APRIL NX
SED	0.241	0.341

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.341	3.9

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00229

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83/R/WW/6

WINTER WHEAT

ALL PURPOSE ELECTROSTATIC SPRAYING

Object: To compare the efficiency of a range of sprays when applied with electrostatic or hydraulic sprayers - Bylands.

Sponsors: D.C. Griffiths, A.J. Arnold, G.R. Cayley, P. Etheridge, J.F. Jenkyn, F.T. Phillips, B. Pye, G.C. Scott.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 8.0 x 30.0.

Treatments:

SPRAYER	Sprayers:
CNVNTL A	Conventional hydraulic sprayer for all sprays
CNVNTL W	Conventional hydraulic sprayer, only weedkillers applied
ELECT CA	Electrostatic sprayer, charged particles, for all sprays
ELECT UA	Electrostatic sprayer, uncharged particles, for all sprays
EL UW CR	Electrostatic sprayer, uncharged particles to spray weedkillers, charged particles, for all remaining sprays.

NOTE: Details of treatments are shown below:

Date	Chemical	kg per ha	Volume, l per ha Electrostatic	Hydraulic
1 Oct, 1982	Isoproturon +)	1.4	7.0	380
	Trifluralin)	1.4		
20 Nov	Permethrin	0.05	5.6	380
9 Apr, 1983	Mecoprop +)	1.68		
	Ioxynil +)	0.2	6.25	380
	Benazolin)	0.2		
15 Apr	Prochloraz +)	0.4		
	Carbendazim)	0.15	6.25	380
29 Apr	Chlormequat chloride	1.68	6.25	380
16 June	Propiconazole	0.12	8.33	380
7 July	Dimethoate	0.44	8.33	380

Basal applications: Manures: (5:14:30) at 340 kg. 'Nitro-Chalk' at 280 kg followed by 630 kg.

Seed: Aquila, sown at 200 kg.

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83/R/WW/6

Cultivations, etc.:- Disced: 9 Sept, 1982. Heavy spring-tine cultivated: 14 Sept. NPK applied: 18 Sept. Seed sown: 24 Sept. First N applied: 15 Mar, 1983. Second N applied: 13 Apr. Combine harvested: 14 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Weed counts were made in December, February and July. Straw length, percentage eyespot infection and aphids were assessed in July. Samples for chemical analysis were taken immediately after each spray application.

GRAIN TONNES/HECTARE

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

SPRAYER	CNVNTL A	CNVNTL W	ELECT CA	ELECT UA	EL UW CR	MEAN
	7.96	6.74	7.72	7.65	7.93	7.60

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

TABLE	SPRAYER
SED	0.373

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.528	6.9

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00828

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83/R/WW/7

WINTER WHEAT

NUARIMOL AND TAKE-ALL

Object: To study the effects of nuarimol applied to the soil on the incidence of take-all (Gaeumannomyces graminis) and on yield - Gt. Knott I.

Sponsor: G.L. Bateman.

Design: 5 randomised blocks of 4 plots.

Whole plot dimensions: 3.0 x 13.0.

Treatments:

NUARIMOL	Nuarimol fungicide (kg) rotary harrowed into the seedbed:
0.00	
0.55	
1.10	
2.20	

Basal applications: Manures: Chalk at 5.0 t. 'Nitro-Chalk' at 130 kg followed by 500 kg. Weedkillers: Paraquat at 0.70 kg ion in 250 l. Isoproturon at 2.1 kg with dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 4.2 l) in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.:- Paraquat applied: 23 Aug, 1982. Ploughed: 31 Aug. Chalk applied: 16 Sept. First N applied: 20 Sept. Spring-tine cultivated: 23 Sept. Rotary harrowed, seed sown: 1 Oct. Isoproturon and 'Poly-Farmon' applied: 10 Mar, 1983. Second N applied: 15 Apr. Fungicide applied: 16 June. Combine harvested: 11 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Take-all and foot rots were assessed in early April, mid-May and mid-June.

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83/R/WW/7

GRAIN TONNES/HECTARE

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

NUARIMOL	0.00	0.55	1.10	2.20	MEAN
	7.50	7.91	9.00	8.03	8.11

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

TABLE	NUARIMOL
SED	0.489

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.774	9.5

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00248

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83/R/WW/8

WINTER WHEAT

APHID ALARM PHEROMONE AND BYDV

Object: To study the effects of insecticides and an alarm pheromone on aphids, barley yellow dwarf virus (BYDV) and the yield of w. wheat - White Horse II.

Sponsors: D.C. Griffiths, R.T. Plumb, J.A. Pickett.

Design: 4 blocks of 5 plots.

Whole plot dimensions: 6.0 x 12.0.

Treatments:

TREATMNT	Application of insecticides or alarm pheromone:
NONE	None
PHORA SD	Phorate as a seed dressing at 2 g per kg of seed
PERMET A	Permethrin at 0.08 kg
PHER ADD	'ADD 11' at 4 kg
PHER MAN	'Mana' at 4 kg

NOTES: (1) Permethrin was applied by hydraulic sprayer in 450 l on 15 Nov, 1982.
(2) 'ADD 11' is a non-systemic behaviour controlling chemical.
(3) 'Mana' is a systemic behaviour controlling chemical.
(4) Both 'ADD 11' and 'Mana' were applied by electrostatic sprayer in 12 l on 12 Oct, 1982, 27 Oct and 15 Nov.

Basal applications: Manures: 'Nitro-Chalk' at 630 kg. Weedkillers: Methabenzthiazuron at 3.2 kg in 250 l. Mecoprop (as 'Mecoprop 40' at 4.2 l) in 250 l. Fungicide: Triadimefon at 0.12 kg in 250 l.

Seed: Aquila, sown at 180 kg.

Cultivations, etc.:- Deep-tine cultivated: 7 Sept, 1982. Disced twice: 10 Sept. Heavy spring-tine cultivated: 13 Sept. Rotary harrowed, seed sown: 14 Sept. Methabenzthiazuron applied: 24 Sept. Mecoprop applied: 17 Nov. N applied: 14 Apr, 1983. Fungicide applied: 17 June. Combine harvested: 14 Aug. Previous crops: S. barley 1981, w. beans 1982.

NOTE: Counts were made of barley yellow dwarf virus.

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83/R/WW/8

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	PHORA SD	PERMET A	PHER ADD	PHER MAN	MEAN
	9.16	9.42	8.17	9.80	8.40	8.99

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

TABLE	TREATMNT
SED	0.841

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	1.189	13.2

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00259

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83/R/WW/9

WINTER WHEAT

ERYNIA AND APHID CONTROL

Object: To compare the effects of introducing Erynia neoaphidis with two forms and times of applying pirimicarb on cereal aphid population and grain yield - Little Knott I.

Sponsor: N. Wilding.

Design: 3 randomised blocks of 7 plots.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

APH CONT	Chemical and biological aphid control:
NONE	None (triplicated)
PS MY	Pirimicarb standard formulation on 27 May, 1983
PS JN	Pirimicarb standard formulation on 27 June
PM MY	Pirimicarb microencapsulated on 27 May
PM JN	Pirimicarb microencapsulated on 27 June

NOTES: (1) Because aphids were very few it was decided to omit the planned introduction of Erynia.
(2) The pirimicarb was applied at 0.14 kg in 340 l.

Basal applications: Manures: (5:14:30) at 310 kg. 'Nitro-Chalk' at 750 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Paraquat at 0.84 kg ion in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.0 kg in 250 l.

Seed: Maris Huntsman, sown at 190 kg.

Cultivations, etc.:- Glyphosate applied: 3 Aug, 1982. Disced three times: 26 Aug. Paraquat applied: 13 Oct. NPK applied, spring-tine cultivated, seed sown: 15 Oct. N applied: 13 Apr, 1983. 'Brittox' with isoproturon applied: 16 Apr. Combine harvested: 13 Aug. Previous crops: S. barley 1981, grass 1982.

NOTE: Aphid counts were made weekly from May to July.

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83/R/WW/9

GRAIN TONNES/HECTARE

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

APH CONT	
NONE	7.76
PS MY	7.86
PS JN	7.36
PM MY	7.55
PM JN	7.66
MEAN	7.67

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

TABLE	APH CONT	
SED	0.484	MIN REP
	0.396	MAX-MIN

	APH CONT
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	14	0.593	7.7

GRAIN MEAN DM% 88.5

PLOT AREA HARVESTED 0.00173

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83/R/WW/10

WINTER WHEAT

ERYNIA AND APHID CONTROL IN CAGES

Object: To determine whether Erynia neoaphidis can be established in cereal aphid populations by the distribution of triturated bodies of fungus-killed aphids - Long Hoos VI/VII 5.

Sponsor: N. Wilding.

Design: 3 blocks of 3 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments:

TREATMNT	Introduction of fungal-infected dead aphids:
NONE	None
ER JUNE	Erynia neoaphidis, 2 kg on 22 June
ER JULY	Erynia neoaphidis, 2 kg on 7 July

NOTE: Plots were enclosed by mesh-sided cages and Sitobion avenae and Metopolophium dirhodum were introduced in May.

Basal applications: Manures: 'Nitro-Chalk' at 540 kg. Weedkiller: Glyphosate at 1.5 kg in 340 l.

Seed: Maris Huntsman, sown at 210 kg.

Cultivations, etc.:- Weedkiller applied: 14 Sept, 1982. Ploughed: 15 Oct. Seed sown with harrow, seed drill combination: 17 Jan, 1983. N applied: 14 Apr. Harvested by hand: 18 Aug. Previous crops: Fallow 1981, w. and s. beans 1982.

NOTE: Aphids were counted weekly during June and July. Samples of live aphids were taken to determine proportions infected with Erynia.

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83/R/WW/10

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	ER JUNE	ER JULY	MEAN
	2.42	2.60	2.71	2.57

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

TABLE	TREATMNT
SED	0.654

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.801	31.1

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00010

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83/R/B/1

WINTER BARLEY

FACTORS LIMITING YIELD

Object: To study the effects of a range of factors on the incidence of pests and diseases and on the growth and yield of w. barley - Long Hoos I/II.

Sponsors: F.V. Widdowson, J.F. Jenkyn, B.R. Kerry, R.T. Plumb, D.W. Lawlor, G.J.S. Ross, G.C. Scott.

Design: Half replicate of 2^7 in 2 blocks of 32 plots + 2 extra plots in each block.

Whole plot dimensions: 3.0 x 15.2.

Treatments: Combinations of:-

1. SOWDATE	Dates of sowing:
15 SEP	15 September, 1982
26 OCT	26 October
2. N RATE	Rates of nitrogen fertilizer (kg N) as 'Nitro-Chalk':
100	
150	
3. N TIME	Times of applying nitrogen fertilizer:
10 MAR	10 March, 1983
12 APR	12 April
4. AUT PEST	Autumn pesticide to seedbed:
NONE	None
ALDICARB	Aldicarb at 7.1 kg
5. E FUNG	Early fungicides:
NONE	None
TFSD	Triadimenol and fuberidazole seed dressing
6. L FUNG	Late fungicides:
NONE	None
TR+CA+MA	Tridemorph at 0.70 kg in 450 l on 21 Jan 1983, and at 0.70 kg in 220 l on 18 Mar. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.38 kg in 220 l on 26 Apr and 23 May
7. GRTH REG	Growth regulator:
NONE	None
MEP+ETH	Mepiquat chloride + ethephon (as 'Terpal' at 2.8 l) in 220 l

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plus two extra treatments given no nitrogen fertilizer, pesticides, fungicides or growth regulator:

EXTRA

15 SEP 0 Sown 15 September
26 OCT 0 Sown 26 October

NOTE: (1) Aldicarb was applied before sowing on each occasion, and worked in by a rotary harrow seed drill combination.
(2) The growth regulator was applied at the recommended growth stage (Zadoks 31/32) which occurred on 27 April for the first sowing, and 11 May for the second.

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 450 l on SOWDATE 15 SEP plots and again (as 'Brittox' at 1.76 l) with mecoprop (as 'Farmon CMPP' at 2.1 l) in 220 l on SOWDATE 26 OCT plots.

Seed: Igri, sown at 130 kg.

Cultivations, etc.:- PK applied: 10 Sept, 1982. Heavy spring-tine cultivated twice: 13 Sept. Aldicarb applied to SOWDATE 15 SEP, rotary harrowed, seed sown: 15 Sept. Aldicarb applied to SOWDATE 26 OCT: 20 Oct. These plots rotary harrowed, seed sown: 26 Oct. 'Brittox' applied to SOWDATE 15 SEP plots: 26 Nov. 'Brittox' with 'Farmon CMPP' applied to SOWDATE 26 OCT: 28 Mar, 1983. Combine harvested: 26 July. Previous crops: W. oats 1981, potatoes 1982.

NOTES: (1) Stem nitrate and nitrate in the soil were measured on several occasions during the season. Plant counts were taken and leaf diseases were assessed periodically. Crop height and ear numbers were measured in June and blind spikelets were assessed during the season.
(2) A cage was erected over the crop from late May to maturity to prevent damage by birds.

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83/R/B/1

GRAIN TONNES/HECTARE

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

N RATE	100	150	MEAN
SOWDATE			
15 SEPT	7.92	7.84	7.88
26 OCT	7.64	7.75	7.70
MEAN	7.78	7.79	7.79

N TIME	10 MAR	12 APR	MEAN
SOWDATE			
15 SEPT	7.73	8.03	7.88
26 OCT	7.67	7.73	7.70
MEAN	7.70	7.88	7.79

N TIME	10 MAR	12 APR	MEAN
N RATE			
100	7.76	7.81	7.78
150	7.64	7.94	7.79
MEAN	7.70	7.88	7.79

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
15 SEPT	7.72	8.04	7.88
26 OCT	7.66	7.74	7.70
MEAN	7.69	7.89	7.79

AUT PEST	NONE	ALDICARB	MEAN
N RATE			
100	7.68	7.89	7.78
150	7.71	7.88	7.79
MEAN	7.69	7.89	7.79

AUT PEST	NONE	ALDICARB	MEAN
N TIME			
10 MAR	7.62	7.78	7.70
12 APR	7.76	7.99	7.88
MEAN	7.69	7.89	7.79

E FUNG	NONE	TFSD	MEAN
SOWDATE			
15 SEPT	7.71	8.05	7.88
26 OCT	7.68	7.71	7.70
MEAN	7.70	7.88	7.79

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83/R/B/1

GRAIN TONNES/HECTARE

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

E FUNG	NONE	TFSD	MEAN
N RATE			
100	7.65	7.92	7.78
150	7.74	7.85	7.79
MEAN	7.70	7.88	7.79

E FUNG	NONE	TFSD	MEAN
N TIME			
10 MAR	7.59	7.81	7.70
12 APR	7.80	7.95	7.88
MEAN	7.70	7.88	7.79

E FUNG	NONE	TFSD	MEAN
AUT PEST			
NONE	7.56	7.82	7.69
ALDICARB	7.83	7.94	7.89
MEAN	7.70	7.88	7.79

L FUNG	NONE	TR+CA+MA	MEAN
SOWDATE			
15 SEPT	7.37	8.39	7.88
26 OCT	7.32	8.07	7.70
MEAN	7.35	8.23	7.79

L FUNG	NONE	TR+CA+MA	MEAN
N RATE			
100	7.41	8.16	7.78
150	7.28	8.31	7.79
MEAN	7.35	8.23	7.79

L FUNG	NONE	TR+CA+MA	MEAN
N TIME			
10 MAR	7.22	8.18	7.70
12 APR	7.47	8.29	7.88
MEAN	7.35	8.23	7.79

L FUNG	NONE	TR+CA+MA	MEAN
AUT PEST			
NONE	7.31	8.07	7.69
ALDICARB	7.38	8.39	7.89
MEAN	7.35	8.23	7.79

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83/R/B/1

GRAIN TONNES/HECTARE

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

L FUNG / E FUNG	NONE	TR+CA+MA	MEAN
NONE	7.28	8.11	7.70
TFSD	7.41	8.35	7.88
MEAN	7.35	8.23	7.79

GRTH REG / SOWDATE	NONE	MEP+ETH	MEAN
15 SEPT	7.78	7.98	7.88
26 OCT	7.41	7.98	7.70
MEAN	7.60	7.98	7.79

GRTH REG / N RATE	NONE	MEP+ETH	MEAN
100	7.71	7.86	7.78
150	7.48	8.10	7.79
MEAN	7.60	7.98	7.79

GRTH REG / N TIME	NONE	MEP+ETH	MEAN
10 MAR	7.54	7.86	7.70
12 APR	7.65	8.10	7.88
MEAN	7.60	7.98	7.79

GRTH REG / AUT PEST	NONE	MEP+ETH	MEAN
NONE	7.52	7.86	7.69
ALDICARB	7.67	8.10	7.89
MEAN	7.60	7.98	7.79

GRTH REG / E FUNG	NONE	MEP+ETH	MEAN
NONE	7.59	7.81	7.70
TFSD	7.60	8.16	7.88
MEAN	7.60	7.98	7.79

GRTH REG / L FUNG	NONE	MEP+ETH	MEAN
NONE	7.18	7.51	7.35
TR+CA+MA	8.01	8.45	8.23
MEAN	7.60	7.98	7.79

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83/R/B/1

GRAIN TONNES/HECTARE

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

EXTRA	15 SEP 0	26 OCT 0	MEAN
	4.98	4.10	4.54

GRAND MEAN 7.60

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

(NOT INCLUDING EXTRA PLOTS)
MARGIN OF TWO FACTOR TABLES 0.072
TWO FACTOR TABLES 0.102

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.290	3.7

GRAIN MEAN DM% 86.2

STRAW TONNES/HECTARE

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

N RATE	100	150	MEAN
SOWDATE			
15 SEPT	5.54	6.27	5.91
26 OCT	4.93	5.89	5.41
MEAN	5.24	6.08	5.66

N TIME	10 MAR	12 APR	MEAN
SOWDATE			
15 SEPT	6.20	5.62	5.91
26 OCT	5.62	5.21	5.41
MEAN	5.91	5.41	5.66

N TIME	10 MAR	12 APR	MEAN
N RATE			
100	5.49	4.99	5.24
150	6.33	5.84	6.08
MEAN	5.91	5.41	5.66

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
15 SEPT	5.80	6.01	5.91
26 OCT	5.49	5.34	5.41
MEAN	5.64	5.68	5.66

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83/R/B/1

STRAW TONNES/HECTARE

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

AUT PEST N RATE	NONE	ALDICARB	MEAN
100	5.17	5.31	5.24
150	6.12	6.04	6.08
MEAN	5.64	5.68	5.66

AUT PEST N TIME	NONE	ALDICARB	MEAN
10 MAR	5.93	5.89	5.91
12 APR	5.36	5.47	5.41
MEAN	5.64	5.68	5.66

E FUNG SOWDATE	NONE	TFSD	MEAN
15 SEPT	5.69	6.12	5.91
26 OCT	5.42	5.40	5.41
MEAN	5.56	5.76	5.66

E FUNG N RATE	NONE	TFSD	MEAN
100	5.12	5.35	5.24
150	5.99	6.17	6.08
MEAN	5.56	5.76	5.66

E FUNG N TIME	NONE	TFSD	MEAN
10 MAR	5.82	6.00	5.91
12 APR	5.30	5.53	5.41
MEAN	5.56	5.76	5.66

E FUNG AUT PEST	NONE	TFSD	MEAN
NONE	5.56	5.73	5.64
ALDICARB	5.56	5.79	5.68
MEAN	5.56	5.76	5.66

L FUNG SOWDATE	NONE	TR+CA+MA	MEAN
15 SEPT	5.74	6.07	5.91
26 OCT	5.19	5.64	5.41
MEAN	5.46	5.85	5.66

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83/R/B/1

STRAW TONNES/HECTARE

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

L FUNG N RATE	NONE	TR+CA+MA	MEAN
100	4.98	5.49	5.24
150	5.95	6.22	6.08
MEAN	5.46	5.85	5.66

L FUNG N TIME	NONE	TR+CA+MA	MEAN
10 MAR	5.73	6.08	5.91
12 APR	5.20	5.63	5.41
MEAN	5.46	5.85	5.66

L FUNG AUT PEST	NONE	TR+CA+MA	MEAN
NONE	5.50	5.79	5.64
ALDICARB	5.43	5.92	5.68
MEAN	5.46	5.85	5.66

L FUNG E FUNG	NONE	TR+CA+MA	MEAN
NONE	5.32	5.80	5.56
TFSD	5.61	5.91	5.76
MEAN	5.46	5.85	5.66

GRTH REG SOWDATE	NONE	MEP+ETH	MEAN
15 SEPT	6.12	5.70	5.91
26 OCT	5.75	5.08	5.41
MEAN	5.93	5.39	5.66

GRTH REG N RATE	NONE	MEP+ETH	MEAN
100	5.46	5.01	5.24
150	6.41	5.76	6.08
MEAN	5.93	5.39	5.66

GRTH REG N TIME	NONE	MEP+ETH	MEAN
10 MAR	6.18	5.63	5.91
12 APR	5.68	5.14	5.41
MEAN	5.93	5.39	5.66

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83/R/B/1

STRAW TONNES/HECTARE

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

GRTH REG AUT PEST	NONE	MEP+ETH	MEAN
NONE	5.89	5.39	5.64
ALDICARB	5.97	5.38	5.68
MEAN	5.93	5.39	5.66

GRTH REG E FUNG	NONE	MEP+ETH	MEAN
NONE	5.90	5.21	5.56
TFSD	5.96	5.56	5.76
MEAN	5.93	5.39	5.66

GRTH REG L FUNG	NONE	MEP+ETH	MEAN
NONE	5.73	5.20	5.46
TR+CA+MA	6.14	5.57	5.85
MEAN	5.93	5.39	5.66

EXTRA	15 SEP 0	26 OCT 0	MEAN
	3.15	2.05	2.60

GRAND MEAN 5.48

STRAW MEAN DM% 86.1

PLOT AREA HARVESTED 0.00341

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83/W/B/1

WINTER AND SPRING BARLEY

MILDEW STUDY

Object: To study the effects of fungicides applied to w. and s. barley on the incidence of mildew and on yield and whether these effects are influenced by neighbouring treatments - Woburn, Horsepool.

Sponsor: D.W. Hollomon.

Design: W. barley: 2 blocks of 12 plots split into 2
S. barley: 2 blocks of 12 plots

Whole plot dimensions: 8.0 x 8.0.

Treatments to W. BARLEY seed treated triadimenol + fuberidazole:

All combinations of:-

Whole plots

1. FS WB		Foliar sprays to w. barley applied 15 Apr, 1983:
	NONE	None
	FENPROP	Fenpropimorph at 0.75 kg in 280 l
	PROPICON	Propiconazole at 0.12 kg in 280 l
2. SD SB		Seed dressings to one adjacent plot of s. barley, other adjacent plot given no fungicides:
	NONE	None
	TRI+FUB	Triadimenol + fuberidazole
3. VAR SB		Variety of adjacent s. barley testing seed dressing, other adjacent s. barley plot sown to Golden Promise given no fungicides:
	G PROMIS	Golden Promise
	KEG	Keg

Sub plots

4. POSITION		Position of w. barley plots in relation to s. barley plots testing seed dressing:
	S EAST	South east
	N WEST	North west

Treatments to S. BARLEY: All combinations of:-

1. SD SB		Seed dressings to s. barley:
	NONE	None
	TRI+FUB	Triadimenol + fuberidazole

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2. VAR SB — Variety of s. barley:

G PROMIS	Golden Promise
KEG	Keg

3. FS WB — Foliar sprays to both adjacent plots of w. barley, none to s. barley:

NONE	None
FENPROP	Fenpropimorph as above
PROPICON	Propiconazole as above

NOTE: Tridemorph at 0.52 kg in 280 l was applied to the internal and external headlands on 10 June, 1983.

Standard applications: Manures: N at 30 kg as 'Nitro-Chalk' to w. barley, N at 160 kg to s. and w. barley. Weedkillers: Methabenzthiazuron at 1.6 kg in 250 l, mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.0 l) in 250 l.

Seed: W. barley: Maris Otter, sown at 180 kg.
S. barley: Golden Promise, sown at 160 kg.
Keg, sown at 160 kg.

Cultivations, etc.:- Disced: 1 Sept, 1982. Ploughed: 30 Sept. N applied for w. barley: 6 Oct. Spring-tine cultivated with crumbler attached for w. barley, w. barley seed sown: 7 Oct. Methabenzthiazuron applied to w. barley and for s. barley: 11 Oct. Deep-tine cultivated for s. barley: 12 Jan, 1983. Heavy spring-tine cultivated for s. barley: 7 Mar. Spring-tine cultivated with crumbler attached, s. barley seed sown: 12 Mar. N applied, 'Brittox' applied to w. and s. barley: 5 May. W. barley combine harvested: 28 July. S. barley combine harvested: 5 Aug. Previous crops: Potatoes 1981, w. wheat 1982.

NOTE: The incidence of barley powdery mildew (Erysiphe graminis f. sp. hordei) and leaf blotch (Rhynchosporium secalis) on w. barley were assessed in April before and after application of fungicide treatments. Disease assessments were made on four occasions on spring barley in May, June and July for mildew, leaf blotch and brown rust. The sensitivity of powdery mildew to triadimenol was measured in June.

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83/W/B/1 WINTER BARLEY

GRAIN TONNES/HECTARE

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

SD SB	NONE	TRI+FUB	MEAN
FS WB			
NONE	4.92	5.35	5.14
FENPROP	5.86	6.02	5.94
PROPICON	5.26	5.20	5.23
MEAN	5.34	5.52	5.43

VAR SB	G PROMIS	KEG	MEAN
FS WB			
NONE	5.04	5.24	5.14
FENPROP	5.61	6.27	5.94
PROPICON	5.18	5.28	5.23
MEAN	5.27	5.59	5.43

VAR SB	G PROMIS	KEG	MEAN
SD SB			
NONE	5.15	5.54	5.34
TRI+FUB	5.40	5.65	5.52
MEAN	5.27	5.59	5.43

POSITION	S EAST	N WEST	MEAN
FS WB			
NONE	4.91	5.36	5.14
FENPROP	5.57	6.31	5.94
PROPICON	4.83	5.63	5.23
MEAN	5.10	5.77	5.43

POSITION	S EAST	N WEST	MEAN
SD SB			
NONE	4.99	5.70	5.34
TRI+FUB	5.22	5.83	5.52
MEAN	5.10	5.77	5.43

POSITION	S EAST	N WEST	MEAN
VAR SB			
G PROMIS	4.94	5.61	5.27
KEG	5.26	5.92	5.59
MEAN	5.10	5.77	5.43

SD SB	NONE		TRI+FUB	
VAR SB	G PROMIS	KEG	G PROMIS	KEG
FS WB				
NONE	4.87	4.96	5.20	5.51
FENPROP	5.45	6.27	5.77	6.27
PROPICON	5.14	5.38	5.22	5.18

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83/W/B/1 WINTER BARLEY

GRAIN TONNES/HECTARE

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

SD SB	NONE		TRI+FUB	
POSITION	S EAST	N WEST	S EAST	N WEST
FS WB				
NONE	4.69	5.14	5.13	5.58
FENPROP	5.51	6.21	5.62	6.41
PROPICON	4.76	5.76	4.90	5.50

VAR SB G	PROMIS		KEG	
POSITION	S EAST	N WEST	S EAST	N WEST
FS WB				
NONE	4.84	5.23	4.98	5.49
FENPROP	5.05	6.17	6.08	6.46
PROPICON	4.92	5.44	4.73	5.82

VAR SB G	PROMIS		KEG	
POSITION	S EAST	N WEST	S EAST	N WEST
SD SB				
NONE	4.84	5.46	5.13	5.94
TRI+FUB	5.03	5.76	5.40	5.90

VAR SB G	PROMIS		KEG	
POSITION	S EAST	N WEST	S EAST	N WEST
FS WB SD SB				
NONE NONE	4.64	5.10	4.74	5.18
TRI+FUB	5.04	5.36	5.22	5.80
FENPROP NONE	5.13	5.77	5.89	6.66
TRI+FUB	4.97	6.57	6.28	6.26
PROPICON NONE	4.76	5.52	4.75	6.00
TRI+FUB	5.09	5.36	4.71	5.64

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

TABLE	FS WB	SD SB	VAR SB	POSITION
SED	0.271	0.221	0.221	0.181

TABLE	FS WB SD SB	FS WB VAR SB	SD SB VAR SB	FS WB POSITION
SED	0.383	0.383	0.313	0.350

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

FS WB	0.313

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83/W/B/1 WINTER BARLEY

GRAIN TONNES/HECTARE

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

TABLE	SD SB POSITION	VAR SB POSITION	FS WB SD SB VAR SB	FS WB SD SB POSITION
SED	0.286	0.286	0.542	0.495
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
SD SB	0.256			
VAR SB		0.256		
FS WB.SD SB				0.443

TABLE	FS WB VAR SB POSITION	SD SB VAR SB POSITION	FS WB SD SB VAR SB POSITION
SED	0.495	0.404	0.700
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
FS WB.VAR SB	0.443		
SD SB.VAR SB		0.362	
FS WB.SD SB.VAR SB			0.627

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.542	10.0
BLOCK.WP.SP	12	0.627	11.5

GRAIN MEAN DM% 86.9

SUB PLOT AREA HARVESTED 0.00220

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83/W/B/1 SPRING BARLEY

GRAIN TONNES/HECTARE

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

VAR SB SD SB	G PROMIS	KEG	MEAN
NONE	3.47	5.04	4.25
TRI+FUB	3.73	5.25	4.49
MEAN	3.60	5.14	4.37

FS WB SD SB	NONE	FENPROP	PROPICON	MEAN
NONE	4.30	4.30	4.16	4.25
TRI+FUB	4.83	4.38	4.26	4.49
MEAN	4.57	4.34	4.21	4.37

FS WB VAR SB	NONE	FENPROP	PROPICON	MEAN
G PROMIS	3.97	3.42	3.40	3.60
KEG	5.16	5.26	5.02	5.14
MEAN	4.57	4.34	4.21	4.37

VAR SB	G PROMIS			KEG		
FS WB	NONE	FENPROP	PROPICON	NONE	FENPROP	PROPICON
SD SB						
NONE	3.92	3.15	3.33	4.69	5.44	4.99
TRI+FUB	4.03	3.69	3.46	5.63	5.08	5.05

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

TABLE	SD SB	VAR SB	FS WB	SD SB VAR SB
SED	0.190	0.190	0.233	0.269

TABLE	SD SB FS WB	VAR SB FS WB	SD SB VAR SB FS WB
SED	0.330	0.330	0.466

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.466	10.7

GRAIN MEAN DM% 87.2

PLOT AREA HARVESTED 0.00220

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83/R/B/4 and 83/W/B/4

SPRING BARLEY

VARIETIES AND N

Object: To study the yields of some of the newer varieties of s. barley at three rates of nitrogen - Rothamsted (R), Highfield IV and Woburn (W), Bull Field.

Sponsor: R. Moffitt.

Design: 2 randomised blocks of 3 plots split into 6.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

Whole plots

1. N — Nitrogen fertilizer (kg N) as 'Nitro-Chalk', in addition to basals:

   75
   113
   150

Sub plots

2. VARIETY — Varieties:

   ATEM
   CARNIVAL
   KYM
   PATTY
   TASMAN
   TRIUMPH

NOTE: At Woburn 75 kg N of the nitrogen treatments was applied to the seedbed as (20:10:10), the remainder and all at Rothamsted was applied as 'Nitro-Chalk'.

Basal applications:
Highfield IV (R): Manures: (0:18:36) at 690 kg, N at 65 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Prochloraz at 0.4 l in 250 l.
Bull Field (W): Manures: Magnesian limestone at 7.5 t, (20:10:10) at 377 kg. Weedkillers: Dicamba, with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Highfield IV (R) and Bull Field (W): Sown at 160 kg.

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83/R/B/4 and 83/W/B/4

Cultivations, etc.:-
Highfield IV (R): PK applied: 18 Oct, 1982. Ploughed: 17 Dec. Spring-tine cultivated: 15 Mar, 1983. N treatments applied, spring-tine cultivated, seed sown: 17 Mar. Weedkillers applied: 24 May. Basal N applied: 27 May. Fungicide applied: 1 July. Combine harvested: 8 Aug. Previous crops: S. beans 1981, w. wheat 1982.
Bull Field (W): Magnesian limestone applied: 15 Sept, 1982. Ploughed: 15 Nov. Heavy spring-tine cultivated: 7 Mar, 1983. NPK applied: 10 Mar. Spring-tine cultivated with crumbler attached, seed sown: 11 Mar. Weedkillers applied: 26 May. Remaining N treatments applied: 3 June. Fungicide applied: 16 June. Combine harvested: 6 Aug. Previous crops: S. barley 1981 and 1982.

83/R/B/4 HIGHFIELD IV (R)

GRAIN TONNES/HECTARE

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

N	75	113	150	MEAN
VARIETY				
ATEM	6.81	6.11	7.10	6.67
CARNIVAL	6.63	5.53	7.06	6.41
KYM	7.37	6.45	7.37	7.06
PATTY	6.71	6.07	7.12	6.63
TASMAN	5.48	5.52	6.64	5.88
TRIUMPH	5.97	5.92	6.79	6.23
MEAN	6.49	5.94	7.01	6.48

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

TABLE	VARIETY	N* VARIETY
SED	0.284	0.493

* FOR WITHIN SAME LEVEL OF N ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	15	0.493	7.6

GRAIN MEAN DM% 85.4

SUB PLOT AREA HARVESTED 0.00204

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83/W/B/4 BULL FIELD (W)

GRAIN TONNES/HECTARE

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

N VARIETY	75	113	150	MEAN
ATEM	5.87	4.79	4.86	5.17
CARNIVAL	4.66	4.50	5.33	4.83
KYM	4.74	4.62	4.81	4.72
PATTY	4.63	4.38	3.61	4.21
TASMAN	3.62	4.09	3.33	3.68
TRIUMPH	4.49	4.28	4.26	4.34
MEAN	4.67	4.44	4.37	4.49

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

TABLE	VARIETY	N* VARIETY
SED	0.330	0.572

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	15	0.572	12.7

GRAIN MEAN DM% 86.1

SUB PLOT AREA HARVESTED 0.00275

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83/R/B/5

SPRING BARLEY

SOWING DATES AND INSECTS

Object: To study the effects of omethoate on insect pests and on yields of s. barley sown on two dates - Sawyers I.

Sponsor: G.C. Scott.

Design: 4 randomised blocks of 9 plots.

Whole plot dimensions: 9.0 x 10.0.

Treatments:

SDTE INS	Sowing dates and insecticides:
SE NONE	Sown 8 Mar, 1983, no insecticides
SE OME R	Sown 8 Mar, omethoate applied on 27 May, 13 June, 28 June, 12 July
SL NONE	Sown 14 Apr, no insecticides
SL OME 1	Sown 14 Apr, omethoate applied on 27 May
SL OME 2	Sown 14 Apr, omethoate applied on 13 June
SL OME 3	Sown 14 Apr, omethoate applied on 28 June
SL OME 4	Sown 14 Apr, omethoate applied on 12 July
SL OME R	Sown 14 Apr, omethoate applied 27 May, 13 June, 28 June, 12 July

NOTE: Omethoate was applied at 0.64 kg in 450 l.

Basal applications: Manures: 'Nitro-Chalk' at 500 kg followed by 250 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Triumph, dressed triadimenol plus fuberidazole, sown at 160 kg.

Cultivations, etc.:- Ploughed: 10 Nov, 1982. Spring-tine cultivated: 7 Mar, 1983. Spring-tine cultivated, early-sown plots rotary harrowed and sown: 8 Mar. Late-sown plots rotary harrowed and sown: 14 Apr. First N applied: 15 Apr. Weedkillers applied: 24 May. Second N applied: 26 May. Fungicide applied: 21 June. Combine harvested: 9 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTES: (1) Aphids, thrips and stem borers were counted from the end of April to the middle of July.
(2) Components of yield were measured.

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83/R/B/5

GRAIN TONNES/HECTARE

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

SDTE INS	
SE NONE	6.27
SE OME R	6.83
SL NONE	5.24
SL OME 1	4.89
SL OME 2	5.44
SL OME 3	5.85
SL OME 4	5.59
SL OME R	5.43
MEAN	5.64

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

TABLE	SDTE INS	
SED	0.424	MIN REP
	0.367	MAX-MIN

	SDTE INS
MAX-MIN	SL NONE V ANY OF REMAINDER
MIN REP	ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	25	0.600	10.6

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00204

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83/W/B/5

SPRING BARLEY

SOWING DATES AND INSECTS

Object: To study the effects of omethoate on insect pests and on yields of s. barley sown on two dates - Gt. Hill Bottom I.

Sponsor: G.C. Scott.

Design: 4 randomised blocks of 8 plots.

Whole plot dimensions: 8.0 x 12.0.

Treatments: All combinations of:-

1. SOW DATE	Dates of sowing:
9 MAR	9 Mar, 1983
15 APR	15 Apr
2. INSEARLY	Insecticide applied early:
NONE	None
OMETHOAT	Omethoate on 7 June
3. INS LATE	Insecticide applied late:
NONE	None
OMETHOAT	Omethoate on 5 July

NOTE: Omethoate was applied at 0.64 l in 280 l on both occasions.

Basal applications: Manures: N at 140 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Triumph, dressed with triadimenol plus fuberidazole, sown at 160 kg.

Cultivations, etc.:- Ploughed: 3 Nov, 1982. Spring-tine cultivated: 7 Mar, 1983. Spring-tine cultivated with crumbler attached: 8 Mar. Spring-tine cultivated with crumbler attached for SOW DATE 15 APR: 15 Apr. N applied: 5 May. Weedkillers applied: 26 May. Fungicide applied: 16 June. Combine harvested SOW DATE 9 MAR: 9 Aug. Combine harvested SOW DATE 15 APR: 18 Aug. Previous crops: Potatoes 1981, w. wheat: 1982.

NOTES: (1) Aphids, thrips and stem borers were counted on several occasions between April and June.
(2) Barley yellow dwarf virus infection was assessed.

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83/W/B/5

GRAIN TONNES/HECTARE

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

INSEARLY SOW DATE	NONE	OMETHOAT	MEAN
9 MAR	5.58	5.34	5.46
15 APR	4.34	4.90	4.62
MEAN	4.96	5.12	5.04

INS LATE SOW DATE	NONE	OMETHOAT	MEAN
9 MAR	5.83	5.09	5.46
15 APR	5.05	4.19	4.62
MEAN	5.44	4.64	5.04

INS LATE INSEARLY	NONE	OMETHOAT	MEAN
NONE	5.51	4.41	4.96
OMETHOAT	5.37	4.88	5.12
MEAN	5.44	4.64	5.04

INSEARLY	NONE		OMETHOAT	
INS LATE	NONE	OMETHOAT	NONE	OMETHOAT
SOW DATE				
9 MAR	6.18	4.98	5.47	5.21
15 APR	4.84	3.84	5.27	4.54

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

TABLE	SOW DATE	INSEARLY	INS LATE	SOW DATE INSEARLY
SED	0.602	0.602	0.602	0.852

TABLE	SOW DATE INS LATE	INSEARLY INS LATE	SOW DATE INSEARLY INS LATE
SED	0.852	0.852	1.205

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

STRATUM	DF	SE	CV%
BLOCK.WP	21	1.703	33.8

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00275

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83/R/B/6

SPRING BARLEY

MILDEW SENSITIVITY

Object: To study the effects of varieties with differing resistance genes on the sensitivity of powdery mildew (Erysiphe graminis) to fungicides - Fosters Corner.

Sponsor: D.W. Hollomon.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 9.0 x 9.0.

Treatments: All combinations of:-

1. VARIETY	Varieties:	
	CARNIVAL	
	TRIUMPH	
2. FUNG SD	Fungicidal seed dressings:	
	NONE	None
	ETHIRIMO	Ethirimol at 4 g per kg seed
	TR DMNOL	Triadimenol at 0.4 g per kg seed
3. FUNG SP	Fungicidal foliar spray:	
	NONE	None
	TR DMFON	Triadimefon at 0.12 kg in 250 l on 17 June, 1983

NOTE: The seed was sown at 160 kg.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitro-Chalk' at 450 kg followed by 250 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Cultivations, etc.:- PK applied: 19 Oct, 1982. Ploughed: 25 Oct. Spring-tine cultivated: 8 Mar, 1983. First N applied: 10 Mar. Spring-tine cultivated: 11 Mar. Seed sown: 12 Mar. Weedkillers applied: 24 May. Second N applied: 26 May. Combine harvested: 8 Aug. Previous crops: S. beans 1981, w. wheat 1982.

NOTE: Mildew was assessed on six occasions during May, June and July; scald (Rhynchosporium secalis) was also recorded in May and June. Sensitivity of mildew to triadimenol was assessed by bioassay on two occasions.

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83/R/B/6

GRAIN TONNES/HECTARE

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

FUNG SD VARIETY	NONE	ETHIRIMO	TR DMNOL	MEAN
CARNIVAL	6.49	6.51	6.98	6.66
TRIUMPH	6.00	6.01	5.95	5.99
MEAN	6.25	6.26	6.47	6.33

FUNG SP VARIETY	NONE	TR DMFON	MEAN
CARNIVAL	6.20	7.13	6.66
TRIUMPH	5.28	6.70	5.99
MEAN	5.74	6.91	6.33

FUNG SP FUNG SD	NONE	TR DMFON	MEAN
NONE	5.68	6.81	6.25
ETHIRIMO	5.72	6.80	6.26
TR DMNOL	5.81	7.13	6.47
MEAN	5.74	6.91	6.33

FUNG SD	NONE		ETHIRIMO		TR DMNOL	
FUNG SP	NONE	TR DMFON	NONE	TR DMFON	NONE	TR DMFON
VARIETY						
CARNIVAL	6.11	6.87	6.08	6.95	6.41	7.56
TRIUMPH	5.26	6.74	5.37	6.66	5.22	6.69

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

TABLE	VARIETY	FUNG SD	FUNG SP	VARIETY FUNG SD
SED	0.196	0.240	0.196	0.339

TABLE	VARIETY FUNG SP	FUNG SD FUNG SP	VARIETY FUNG SD FUNG SP
SED	0.277	0.339	0.480

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.480	7.6

GRAIN MEAN DM% 87.2

PLOT AREA HARVESTED 0.00248

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83/R/B/7

SPRING BARLEY

PLOT SIZES AND MILDEW SPREAD

Object: To study the effects of plot size on the incidence of mildew (Erysiphe graminis) and on the yield of neighbouring plots - Highfield IV.

Sponsor: J.F. Jenkyn.

Design: A serially balanced sequence of 4 'blocks' of 3 plots with separating and flanking plots.

Whole plot dimensions: Narrow plots: 3.0 x 12.0.
Wide plots: 10.0 x 12.0.

Treatments:

TREATMNT	Plot width (all 12m long) and fungicide treatment:
3M NONE	3m, no fungicide
3M TRID	3m, tridemorph spray at 0.52 kg in 220 l on 10 June, 1983
10M NONE	10m, no fungicide

NOTES: (1) The above plots were each separated by 3m wide plots sprayed with tridemorph.
(2) The effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was south-east, 'right' was north-west.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitro-Chalk' at 480 kg followed by 250 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: Georgie, sown at 160 kg.

Cultivations, etc.:- PK applied: 18 Oct, 1982. Ploughed: 17 Dec. Spring-tine cultivated, first N applied: 15 Mar, 1983. Spring-tine cultivated, seed sown: 17 Mar. 'Herrisol' applied: 24 May. Second N applied: 26 May. Combine harvested: 8 Aug. Previous crops: S. beans 1981, w. wheat 1982.

NOTE: Leaf diseases were assessed in late June and mid July.

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83/R/B/7

GRAIN TONNES/HECTARE

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

TREATMNT	3M NONE	3M TRID	10M NONE
	4.99	5.71	4.89

LHN TREATMNT	3M NONE	3M TRID	10M NONE
3M NONE		4.94	5.03
3M TRID	6.01		5.40
10M NONE	4.71	5.06	

RHN TREATMNT	3M NONE	3M TRID	10M NONE
3M NONE		4.98	5.00
3M TRID	5.92		5.50
10M NONE	4.98	4.80	

GRAND MEAN 5.19

GRAIN MEAN DM% 86.8

PLOT AREA HARVESTED 0.00245

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83/R/B/8

SPRING BARLEY

INTERFERENCE BETWEEN PLOTS

Object: To study the influence of neighbouring varieties, on the occurrence of mildew and on yield, in three varieties grown singly or as a mixture - Highfield VI.

Sponsor: J.F. Jenkyn.

Designs: One was a serially balanced sequence of 9 'blocks' of 4 plots with flanking plots on the outsides and at a discontinuity necessitated by field layout, the other was four randomised blocks of 4 plots.

Whole plot dimensions: 2.04 x 18.3.

Treatments:

VARIETY	Varieties:
CLARET	Claret
GOLDMARK	Goldmarker
PATTY	Patty
MIXTURE	Mixture of Claret, Goldmarker and Patty

NOTES: (1) In the serially balanced design plots were separated only by fallow paths 61 cm wide; in the other design plots were separated by equal size 'plots' of Atem s. barley, seed dressed with triadimenol plus fuberidazole, with fallow paths 61 cm wide on each side.
(2) In the serially balanced design the effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was south-east, 'right' was north-west.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitro-Chalk' at 480 kg followed by 250 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 500 l.

Seed: Varieties and mixture sown at 160 kg.

Cultivations, etc.:- PK applied: 18 Oct, 1982. Ploughed: 15 Dec. Spring-tine cultivated, first N applied: 15 Mar, 1983. Spring-tine cultivated, seed sown: 16 Mar. 'Brittox' applied: 26 May. Second N applied: 27 May. Combine harvested: 8 Aug. Previous crops: W. beans 1981, w. wheat 1982.

NOTE: Leaf diseases were assessed in mid-July.

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83/R/B/8

GRAIN TONNES HECTARE

SERIALLY BALANCED DESIGN

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

VARIETY	CLARET	GOLDMARK	PATTY	MIXTURE
	7.12	6.58	6.56	6.70

LHN VARIETY	CLARET	GOLDMARK	PATTY	MIXTURE
CLARET		7.41	7.18	6.78
GOLDMARK	6.93		6.27	6.55
PATTY	6.58	6.17		6.92
MIXTURE	6.62	6.82	6.67	

RHN VARIETY	CLARET	GOLDMARK	PATTY	MIXTURE
CLARET		7.00	7.22	7.15
GOLDMARK	6.64		6.46	6.65
PATTY	6.85	6.26		6.56
MIXTURE	6.19	6.84	7.08	

GRAND MEAN 6.74

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

TABLE	VARIETY	VARIETY LHN	VARIETY RHN
SED	0.268	0.465	0.465

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.569	8.4

MEAN DM% 87.5

RANDOMISED BLOCK DESIGN

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

VARIETY	CLARET	GOLDMARK	PATTY	MIXTURE	MEAN
	7.45	6.40	6.45	6.91	6.80

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

TABLE	VARIETY
SED	0.313

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.443	6.5

MEAN DM% 87.6 PLOT AREA HARVESTED 0.00373

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83/R/B/9

SPRING BARLEY

ELECTROSTATIC SPRAYING AND MILDEW

Object: To compare the effects of electrostatic and conventional sprayers on mildew (Erysiphe graminis) control and on the yield of s. barley - Geescroft.

Sponsors: A.J. Arnold, G.R. Cayley, P. Etheridge, D.C. Griffiths, F.T. Phillips, B.J. Pye, G.C. Scott.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 3.0 x 13.0.

Treatments: All combinations of:-

1. SPRAYER — Spraying machines:

CNVNTIAL	Conventional
ELECT NA	New electrostatic A
ELECT NB	New electrostatic B
ELECT O	Older electrostatic

2. TRIADIME — Rates of applying triadimefon fungicide(g):

31
125

plus two extra treatments

EXTRA	
NONE	None
ELECT C1	New electrostatic C, given triadimefon at 31 g.

NOTES: (1) All the electrostatic sprayers had spinning cone nozzles. A and the older type were mounted vertically but differed in electric charge, 7.5 and 30 kV respectively. B and C both were mounted at an angle of 30° to the vertical and also differed in charge, 7.5 and 30 kV respectively.
(2) Fungicide was applied on 13 June, 1983, in 380 l by conventional sprayer, in 8.3 l by electrostatic sprayers.

Basal applications: Manures: 'Nitro-Chalk' at 500 kg followed by 250 kg. Weedkillers: Glyphosate at 1.4 kg in 120 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed: Koru, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 28 Oct, 1982. Ploughed: 22 Dec. Spring-tine cultivated twice: 11 Mar, 1983. Seed sown: 15 Mar. First N applied: 15 Apr. 'Herrisol' applied: 24 May. Second N applied: 26 May. Combine harvested: 8 Aug. Previous crops: Potatoes 1981, w. wheat 1982.

NOTE: Samples for chemical analysis were taken immediately after treatment. Mildew was assessed seventeen days later.

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83/R/B/9

GRAIN TONNES/HECTARE

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

TRIADIME SPRAYER	31	125	MEAN
CNVNTIAL	6.15	6.34	6.24
ELECT NA	5.95	6.74	6.34
ELECT NB	5.92	6.67	6.29
ELECT 0	6.09	6.48	6.28
MEAN	6.03	6.56	6.29

EXTRA	NONE	ELECT C1	MEAN
	5.91	5.93	5.92

GRAND MEAN 6.22

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

TABLE	SPRAYER	TRIADIME	SPRAYER TRIADIME & EXTRA
SED	0.260	0.184	0.368

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

STRATUM	DF	SE	CV%
BLOCK.WP	27	0.521	8.4

MEAN DM% 87.4

PLOT AREA HARVESTED 0.00359

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83/R/BE/1

WINTER BEANS

EFFECTS OF PESTS AND PATHOGENS

Object: To assess the effects of three amounts of pest and disease control on w. beans - Stackyard.

Sponsors: J. McEwen, A. Bainbridge, R. Bardner, A.J. Cockbain, J.M. Day, K.E. Fletcher, D.C. Griffiths, D.H. Lapwood, R.M. Webb, T.D. Williams, D.P. Yeoman.

Design: 6 randomised blocks of 3 plots.

Whole plot dimensions: 5.33 x 15.0.

Treatments:

PATHCONT	Pest and pathogen control (in addition to basals):
STANDARD	None
ENHANCED	Seed dressed with benomyl and thiram (1.1 g of each per kg of seed)
	Phorate at 2.2 kg as granules to foliage on 14 Apr, 1983
FULL	Seed dressed with benomyl and thiram (1.1 g of each per kg of seed)
	Aldicarb at 10 kg on 23 Sept, 1982
	Benomyl at 0.50 kg and fosetyl-Al at 1.76 kg on 7 Mar, 1983
	Carbofuran at 2.24 kg on 14 Apr
	Benomyl at 0.50 kg on 26 Apr
	Propiconazole at 0.12 kg on 28 June and 11 July

NOTES: (1) Treatment sprays were applied in 340 l.
(2) Sides of plots were separated by strips of w. beans 5.33 m wide plus 0.66 m fallow paths, ends of plots were separated by strips of w. beans 9.2 m wide plus 0.9 m fallow paths. The separating crops received basal applications as for the plots and in addition received benomyl at 0.50 kg on 7 Mar.

Basal applications: Weedkillers: Simazine at 1.2 kg in 250 l. Fungicide: Benomyl at 0.56 kg in 250 l on two occasions, the second time with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: Throws MS, sown at 230 kg.

Cultivations, etc.:- Ploughed: 26 Aug, 1982. Spring-tine cultivated, rotary harrowed: 23 Sept. Seed sown: 24 Sept. Weedkiller applied: 16 Oct. Basal fungicide applied: 26 May, 1983. Basal fungicide with insecticide applied: 23 June. Combine harvested: 12 Aug. Previous crops: W. wheat 1981 and 1982.

NOTE: Plant counts were made after establishment and components of yield were measured at maturity. Migratory nematodes, root and foliar fungi, aphids and weevils were counted at intervals during the season. Total above ground dry matter, and N content, were measured in July. N content of grain was measured.

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83/R/BE/1

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	3.62	3.93	4.03	3.86

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

TABLE	PATHCONT
SED	0.111

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.192	5.0

GRAIN MEAN DM% 86.5

SUB PLOT AREA HARVESTED 0.00320

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83/R/BE/2

WINTER BEANS

CONTROL OF CHOCOLATE SPOT

Object: To study the effects of times of applying benomyl on the incidence of chocolate spot (Botrytis spp.) and on the yield of w. beans - Fosters West.

Sponsor: A. Bainbridge.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 4.27 x 13.7.

Treatments:

FUNGTIME	Time of applying benomyl fungicide, at 0.56 kg in 340 l:
NONE	Not applied
1	Single spray on 28 Apr, 1983
2	Single spray on 17 May
3	Single spray on 10 June
4	Single spray on 1 July
1+2+3+4	Single sprays on each of above dates
R	Routine sprays during flowering on 17 May, 16 June

NOTE: A single spray of benomyl at 0.56 kg in 340 l was applied to all treatments except NONE on 1 March, 1983 to limit spread of Ascochyta.

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Propyzamide at 0.8 kg with simazine at 1.7 l in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Throws MS, sown at 280 kg.

Cultivations, etc.:- Ploughed: 31 Aug, 1982. Chalk applied: 16 Sept. Rotary harrowed: 20 Sept. Seed sown: 22 Sept. Weedkillers applied: 2 Oct. Insecticide applied: 23 June, 1983. Fungicide applied: 12 July. Combine harvested: 12 Aug. Previous crops: W. barley 1981, w. wheat 1982.

NOTE: Emergence counts were made and spore sampling started in November. Disease assessments for chocolate spot and Ascochyta were made on three occasions during the season. Stem and pod counts were made in July.

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83/R/BE/2

GRAIN TONNES/HECTARE

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

FUNGTIME	NONE	1	2	3	4	1+2+3+4	R	MEAN
	3.43	3.47	3.72	3.52	3.51	3.66	3.48	3.54

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

TABLE	FUNGTIME
SED	0.127

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.180	5.1

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00293

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83/R/BE/3

WINTER BEANS

CONTROL OF SITONA

Object: To study the effects of four insecticides on the numbers of Sitona and on the yield of w. beans - Gt. Harpenden I.

Sponsors: R. Bardner, K.E. Fletcher, D.C. Griffiths.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

INSCTCDE	Forms, rates and methods of applying insecticides:
NONE	None
CF2 G S	Carbofuran at 2.2 kg, as granules, applied on 14 Apr, 1983
CS2 G S	Carbosulfan at 2.2 kg, as granules, applied on 14 Apr
PER S S	Permethrin at 0.15 kg, as a single spray, applied on 4 May
PER D S	Permethrin at 0.15 kg, as a divided spray, half applied on 4 May, half on 25 May
PH1 G S	Phorate at 1.7 kg, as granules, applied on 14 Apr
PH2 G S	Phorate at 2.2 kg, as granules, applied on 14 Apr

NOTE: Permethrin was applied in 450 l.

Basal applications: Weedkiller: Simazine at 1.2 l in 250 l. Fungicides: Benomyl at 0.55 kg in 250 l. Propiconazole at 0.12 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 500 l.

Seed: Throws MS, sown at 280 kg.

Cultivations, etc.:- Ploughed: 10 Sept, 1982. Rotary harrowed, seed sown: 22 Sept. Weedkiller applied: 16 Oct. Benomyl applied: 26 May, 1983. Insecticide applied: 1 July. Propiconazole applied: 12 July. Combine harvested: 12 Aug. Previous crops: W. wheat 1981 and 1982.

NOTE: Leaf damage by Sitona and Apion was assessed in May. Soil animals were assessed from soil cores in June and from pitfall traps at weekly intervals. Numbers of Sitona larvae and pupae were estimated in July.

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83/R/BE/3

GRAIN TONNES/HECTARE

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

INSCTCDE	
NONE	3.23
CF2 G S	3.67
CS2 G S	3.44
PER S S	3.72
PER D S	3.82
PH1 G S	3.69
PH2 G S	3.70
MEAN	3.61

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

TABLE	INSCTCDE
SED	0.142

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.201	5.6

GRAIN MEAN DM% 87.4

PLOT AREA HARVESTED 0.00293

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83/R/BE/4

WINTER BEANS

ALL PURPOSE ELECTROSTATIC SPRAYING

Object: To study the effects of using an electrostatic sprayer for all spraying operations during the season on pests, diseases and weeds and on the yields of w. beans - Gt. Harpenden I.

Sponsors: D.C. Griffiths, A.J. Arnold, A. Bainbridge, G.R. Cayley, P. Etheridge, F.T. Phillips, B.J. Pye, G.C. Scott.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 8.0 x 30.0.

Treatments:

SPRAYER	Sprayers:
CNVNTL A	Conventional hydraulic sprayer for all sprays
CNVNTL W	Conventional sprayer, only weedkiller applied
ELECT CA	Electrostatic sprayer, charged particles, for all sprays
ELECT UA	Electrostatic sprayer, uncharged particles, for all sprays
EL UW CR	Electrostatic sprayer, uncharged particles to spray weedkiller, charged particles for all remaining sprays

NOTE: Details of treatments are shown below:

Date	Chemical	kg per ha	VOLUME, l per ha Electrostatic	Hydraulic
28 Oct, 1982	Carbetamide	2.1	11.2	380
29 Mar, 1983	Benomyl	0.55	6.25	380
23 May	Permethrin &)	0.10	6.25	416 (hand sprayer)
	Carbendazim)	0.51		
23 June	Pirimicarb &)	0.15	8.3	380
	Propiconazole)	0.12		

The carbetamide was applied by electrostatic sprayer as two consecutive sprays.

Seed: Throws MS, sown at 280 kg.

Cultivations, etc.:- Ploughed: 10 Sept, 1982. Rotary harrowed, seed sown: 22 Sept. Combine harvested: 12 Aug, 1983. Previous crops: W. Wheat 1981 and 1982.

NOTE: (1) Weed counts were made in May. Sitona leaf notching was counted in June. Chocolate spot and aphids were assessed in June, rust in July.
(2) Samples for chemical analysis were taken immediately after spraying.

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83/R/BE/4

GRAIN TONNES/HECTARE

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

SPRAYER	CNVNTL A	CNVNTL W	ELECT CA	ELECT UA	EL UW CR	MEAN
	3.74	2.95	3.46	3.43	3.51	3.42

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

TABLE	SPRAYER
SED	0.086

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.122	3.6

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00960

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83/R/BE/5

WINTER BEANS

SEED DRESSINGS

Object: To study the effects of benomyl and thiram seed dressings on establishment, disease control and yield of w. beans - Stackyard.

Sponsors: A. Bainbridge, D.C. Griffiths, J. McEwen, D.P. Yeoman.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments: All combinations of:-

1. SEEDRESS(1) Seed dressing:

NONE	None
BENOMYL	Benomyl at 0.8 g per kg seed

2. SEEDRESS(2) Seed dressing:

NONE	None
THIRAM	Thiram (as 'Thiram 80' at 1.0 g per kg seed)

Basal applications: Weedkiller: Simazine at 1.2 l in 250 l. Fungicide: Benomyl at 0.56 kg in 250 l on two occasions, with pirimicarb on the second. Insecticides: Permethrin at 0.15 kg in 340 l on two occasions. Pirimicarb at 0.14 kg.

Seed: Throws MS, sown at 230 kg.

Cultivations, etc.:- Ploughed: 26 Aug, 1982. Rotary harrowed, seed not dressed with benomyl sown: 23 Sept. Remaining seed sown: 24 Sept. Weedkiller applied: 16 Oct. Permethrin applied: 4 May, 20 May, 1983. Benomyl applied: 26 May. Benomyl with pirimicarb applied: 23 June. Combine harvested: 12 Aug. Previous crops: W. wheat 1981 and 1982.

NOTE: Emergence counts were made in December, 1982. Disease assessments were made on three occasions during the season. Spores were sampled from May.

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83/R/BE/5

GRAIN TONNES/HECTARE

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

SEEDRESS(2) / SEEDRESS(1)	NONE	THIRAM	MEAN
NONE	4.29	4.19	4.24
BENOMYL	4.37	4.45	4.41
MEAN	4.33	4.32	4.32

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

TABLE	SEEDRESS(1)	SEEDRESS(2)	SEEDRESS(1) SEEDRESS(2)
SED	0.064	0.064	0.090

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.128	3.0

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00293

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83/R/BE/6

WINTER BEANS

VARIETIES

Object: To compare agronomic characters and yields of four varieties of w. beans - Long Hoos IV 5.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments:

VARIETY	Varieties:
BANNER	Banner
BEAGLE	Maris Beagle
BULLDOG	Bulldog
THROWS	Throws MS

NOTE: Seed was sown by hand in rows 51 cm apart, seed spaced 5 cm apart in the row.

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 340 l. Fungicides: Benomyl at 0.56 kg in 340 l on two occasions, with pirimicarb on the second, propiconazole at 0.12 kg in 340 l with pirimicarb. Insecticides: Permethrin at 0.15 kg in 340 l on two occasions; pirimicarb at 0.14 kg on two occasions with the fungicides.

Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 30 Sept. Ploughed: 11 Oct. Power harrowed, seed sown: 29 Oct. Weedkillers applied: 11 Nov. Permethrin applied: 4 and 20 May, 1983. Benomyl applied: 23 May and 1 July. Propiconazole applied: 12 July. Pirimicarb applied: 1 and 12 July. Harvested by hand: 11 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTE: Plant counts were made after establishment. Components of yield were measured at maturity. N content of grain was measured.

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83/R/BE/6

GRAIN TONNES/HECTARE

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

VARIETY	BANNER	BEAGLE	BULLDOG	THROWS	MEAN
	5.42	5.54	5.02	5.32	5.33

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

TABLE	VARIETY
SED	0.427

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.603	11.3

GRAIN MEAN DM% 88.4

PLOT AREA HARVESTED 0.00015

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83/R/BE/8

WINTER BEANS

CONTROL OF STEM NEMATODE

Object: To study the effects of a range of chemicals, rates and times of application on the control of stem nematode (Ditylenchus dipsaci) and on the yield of w. beans - Highfield 0 and E III.

Sponsor: A.G. Whitehead.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 2.29 x 4.57.

Treatments:

NEMACIDE	Nematicides, rates and times of application: Applied in the furrow at sowing		Top-dressed after emergence
NONE	None		None (duplicated)
AL1+AL1	Aldicarb at 1.17 kg	+	aldicarb at 1.25 kg
AL2+AL2	Aldicarb at 2.34 kg	+	aldicarb at 2.5 kg
AL4+AL4	Aldicarb at 4.68 kg	+	aldicarb at 5.0 kg
AL2+TH2	Aldicarb at 2.34 kg	+	thiabendazole at 2.5 kg
AL2+TH4	Aldicarb at 2.34 kg	+	thiabendazole at 5.0 kg
CA2+TH2	Carbofuran at 2.38 kg	+	thiabendazole at 2.5 kg
CA2+TH4	Carbofuran at 2.38 kg	+	thiabendazole at 5.0 kg
CA1+CA1	Carbofuran at 1.19 kg	+	carbofuran at 1.25 kg
CA2+CA2	Carbofuran at 2.38 kg	+	carbofuran at 2.5 kg
CA4+CA4	Carbofuran at 4.76 kg	+	carbofuran at 5.0 kg

NOTES: (1) To ensure the presence of stem nematode, infested straw was spread on the site and ploughed in.
(2) Thiabendazole was applied in 7,650 l water.
(3) Post emergence treatments were applied to w. beans on 25 May, 1983

Basal applications: Manures: (0:20:20) at 630 kg. Weedkillers: Simazine at 1.1 l in 560 l. Fungicide: Benomyl at 0.56 kg in 560 l, on two occasions, with the insecticide on the second. Insecticide: Pirimicarb at 0.14 kg on three occasions, with the fungicide on the first, in 560 l on the second and third.

Seed: Throws MS, sown at 240 kg.

Cultivations, etc.:- PK applied, infested straw applied, ploughed in: 17 Aug, 1982. Rotary harrowed, seed sown: 11 Nov. Weedkiller and fungicide applied: 4 Feb, 1983. Fungicide with insecticide applied: 10 June. Insecticide applied: 30 June, 19 July. Harvested by hand: 3 Aug. Previous crops: S. beans 1981, w. beans 1982.

NOTE: The percentage of stems infested with stem nematode was assessed in July.

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83/R/BE/8

GRAIN TONNES/HECTARE

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

NEMACIDE	
NONE	0.81
AL1+AL1	1.30
AL2+AL2	1.78
AL4+AL4	2.21
AL2+TH2	1.45
AL2+TH4	1.71
CA2+TH2	1.86
CA2+TH4	1.67
CA1+CA1	2.14
CA2+CA2	2.44
CA4+CA4	2.80
MEAN	1.75

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

TABLE	NEMACIDE	
SED	0.367	MIN REP
	0.318	MAX-MIN

	NEMACIDE
MAX-MIN	NONE V ANY OF THE REMAINDER
MIN REP	ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.449	25.7

GRAIN MEAN DM% 78.6

PLOT AREA HARVESTED 0.00035

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83/R/BE/9

SPRING BEANS

EFFECTS OF PESTS AND PATHOGENS

Object: To assess the benefits from three amounts of pest and disease control on irrigated and unirrigated s. beans - W. Barnfield II.

Sponsors: J. McEwen, R. Bardner, A.J. Cockbain, D.H. Lapwood, R.M. Webb, T.D. Williams, D.P. Yeoman.

Design: 4 randomised blocks of 2 plots split into 3.

Whole plot dimensions: 4.27 x 13.7.

Treatments: All combinations of:-

Whole plots

1. IRRIGATN	Irrigation:	
NONE	None	
FULL	Full (total 138 mm)	

Sub plots

2. PATHCONT	Pest and pathogen control:	
STANDARD	Pirimicarb at 0.14 kg on 13 June, 1983	
ENHANCED	Phorate at 2.2 kg, combine drilled	
	Pirimicarb at 0.14 kg on 13 June	
	Maneb at 0.8 kg with mancozeb at 0.8 kg in 450 l on 18 July	
FULL	Aldicarb at 10 kg on 9 Mar	
	Phorate at 2.2 kg combine drilled	
	Fosetyl-Al at 2.0 kg on 5 May	
	Pirimicarb at 0.14 kg on 13 June	
	Benomyl at 0.50 kg on 5 July and 4 Aug	
	Maneb at 0.8 kg with mancozeb at 0.8 kg in 450 l on 18 July, 26 July, 4 Aug	

NOTES: (1) Irrigation was applied as follows (mm water):

1 July	20
6 July	25
15 July	18
27 July	25
8 Aug	25
14 Aug	25
Total	138 mm

(2) Treatment sprays were applied in 340 l except where stated.

Basal applications: Manures: Chalk at 5 0 t. Weedkillers: Glyphosate at 1.4 kg in 250 l. Trietazine and simazine (as 'Aventox' at 2.4 l) in 250 l.

Seed: Minden, sown at 230 kg.

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83/R/BE/9

Cultivations, etc.:- Chalk applied: 16 Sept, 1982. Glyphosate applied: 19 Oct. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Seedbed treatments applied, rotary harrowed, seed sown: 9 Mar. 'Aventox' applied: 12 Mar. Combine harvested non-irrigated plots: 12 Aug. Combine harvested irrigated plots: 22 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Plant counts were made after establishment and components of yield were measured at maturity. Total above ground dry matter and N content were measured in August. Migratory nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. N content of grain was measured.

GRAIN TONNES/HECTARE

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

PATHCONT IRRIGATN	STANDARD	ENHANCED	FULL	MEAN
NONE	3.21	3.51	3.90	3.54
FULL	4.83	5.14	5.42	5.13
MEAN	4.02	4.33	4.66	4.34

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

TABLE	PATHCONT	IRRIGATN* PATHCONT
SED	0.072	0.102

* WITHIN THE SAME LEVEL OF IRRIGATN ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	12	0.144	3.3

GRAIN MEAN DM% 85.0

SUB PLOT AREA HARVESTED 0.00293

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83/R/BE/10

SPRING BEANS

CONTROL OF SITONA

Object: To study the effects of a range of insecticides on the numbers of Sitona and on the yield of s. beans - W. Barnfield II.

Sponsors: R. Bardner, D.C. Griffiths.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

INSCTCDE	Forms, rates and methods of applying insecticides:
NONE	None
DI+CH CD	Disulfoton at 1.2 kg plus chlorpyrifos at 0.8 kg combine drilled
PHO 1 CD	Phorate at 1.7 kg combine drilled
PHO 2 CD	Phorate at 2.2 kg combine drilled
CA 1 GR	Carbosulfan at 1.7 kg as granules on 5 May, 1983
TR FS	Triazophos at 0.34 kg as a foliar spray in 450 l on 4 May

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Glyphosate at 1.4 kg in 250 l. Trietazine and simazine (as 'Aventox' at 2.4 l) in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Chalk applied: 16 Sept, 1982. Glyphosate applied: 19 Oct. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Seed sown: 10 Mar. 'Aventox' applied: 12 Mar. Pirimicarb applied: 16 June. Combine harvested: 12 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Leaf damage by Sitona was assessed in April; larval and pupal counts were made in July. Aphis fabae were assessed in June and yellowing in July. Soil cores were taken for chemical analyses in May.

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83/R/BE/10

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE	DI+CH CD	PHO 1 CD	PHO 2 CD	CA 1 GR	TR FS	MEAN
	3.26	3.33	3.58	3.59	3.53	3.41	3.45

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

TABLE	INSCTCDE
SED	0.091

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.128	3.7

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00293

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83/R/BE/11

SPRING BEANS

CONTROL OF PRATYLENCHUS

Object: To study the effects of aldicarb and carbofuran on numbers of Pratylenchus nematodes and on the yield of s. beans - W. Barnfield II.

Sponsor: R.M. Webb.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

NEMACIDE	Nematicides, rates and methods of application:
NONE	None
AL BC	Aldicarb at 10 kg, worked into seedbed
CA 1 CD	Carbofuran at 1.7 kg, combine drilled
CA 2 CD	Carbofuran at 2.2 kg, combine drilled
CA 3 CD	Carbofuran at 3.2 kg, combine drilled

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Trietazine with simazine (as 'Aventox SC' at 2.4 l) in 250 l. Glyphosate at 1.4 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Chalk applied: 16 Sept, 1982. Glyphosate applied: 19 Oct. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Aldicarb treatment applied, rotary harrowed, remaining treatments combine drilled: 10 Mar. Rolled, trietazine with simazine applied: 12 Mar. Pirimicarb applied: 16 June. Combine harvested: 12 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Soils were sampled for nematodes just before treatments were applied, and soils and roots in mid-June.

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83/R/BE/11

GRAIN TONNES/HECTARE

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

NEMACIDE	NONE	AL BC	CA 1 CD	CA 2 CD	CA 3 CD	MEAN
	3.48	3.81	3.81	3.66	3.72	3.69

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

TABLE	NEMACIDE
SED	0.122

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.173	4.7

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00293

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83/R/BE/12

SPRING BEANS

ROW SPACING AND METHODS OF APPLYING PHORATE

Object: To study the effects of methods of applying phorate on the incidence of Sitona and on the yield of s. beans sown in wide or narrow rows - W. Barnfield II.

Sponsors: R. Bardner, D.C. Griffiths.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments: All combinations of:-

1. PHORATE	Methods of applying phorate:
NONE	Not applied
B CAST	Broadcast at 1.7 kg and worked in to the seedbed
C DRILL	Combine drilled at 1.7 kg
2. ROW SPAC	Spacing between rows:
18 CM	7 inches (18 cm)
53 CM	21 inches (53 cm)

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Glyphosate at 1.4 kg in 250 l. Trietazine and simazine (as 'Aventox' at 2.4 l) in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Chalk applied: 16 Sept, 1982. Glyphosate applied: 19 Oct. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Broadcast phorate treatments applied, rotary harrowed: 9 Mar. Combine drilled phorate treatments applied, seed sown: 10 Mar. 'Aventox' applied: 12 Mar. Insecticide applied: 16 June. Combine harvested: 12 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTE: Leaf damage by Sitona was assessed in May; larval and pupal counts were made in July. Yellowing was assessed in July. Soil animals were assessed from soil in June and from pitfall traps at weekly intervals. Soil cores were taken for chemical analyses in May.

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83/R/BE/12

GRAIN TONNES/HECTARE

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

ROW SPAC PHORATE	18 CM	53 CM	MEAN
NONE	3.16	3.16	3.16
B CAST	3.40	3.39	3.40
C DRILL	3.65	3.81	3.73
MEAN	3.40	3.45	3.43

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

TABLE	PHORATE	ROW SPAC	PHORATE ROW SPAC
SED	0.131	0.107	0.185

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.262	7.6

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00293

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83/R/BE/13

SPRING BEANS

TIMES OF APPLYING ERYNIA

Object: To study the effects of rates and times of applying the aphid-pathogenic fungus Erynia neoaphidis on the numbers of black aphids (Aphis fabae) and on the yield of s. beans - W. Barnfield II.

Sponsor: N. Wilding.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 2.67 x 2.13.

Treatments:

APH CONT	Chemical and biological aphid control:
NONE	None
	Pirimicarb at 0.14 kg in 340 l:
PIRIM E	Applied on 10 June, 1983
PIRIM L	Applied on 29 June
	Erynia neoaphidis applied as a powder of mummified aphids:
E NEO1 E	At 0.5 mg per plant on 9 June
E NEO1 L	At 0.5 mg per plant on 28 June
E NEO2 E	At 5.0 mg per plant on 9 June
E NEO2 L	At 5.0 mg per plant on 28 June

NOTE: Basal irrigation was applied as follows (mm water):

21 June	20
28 June	25
5 July	12.5
12 July	12.5
15 July	12.5
23 July	12.5
Total	95 mm

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Glyphosate at 1.4 kg in 250 l. Trietazine with simazine (as 'Aventox' at 2.4 l) in 250 l.

Seed: Minden, sown at 230 kg.

Cultivations, etc.:- Chalk applied: 16 Sept, 1982. Glyphosate applied: 19 Oct. Ploughed: 25 Nov. Spring-tine cultivated twice: 8 Mar, 1983. Seed sown: 9 Mar. Rolled, trietazine and simazine applied: 12 Mar. Combine harvested: 12 Aug. Previous crops: S. barley 1981, w. wheat 1982.

NOTES: (1) Aphid numbers were estimated weekly during June and July.
(2) Samples of live aphids were examined for infection with Erynia and other fungal pathogens.

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83/R/BE/13

GRAIN TONNES/HECTARE

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

APH CONT	
NONE	4.75
PIRIM E	5.34
PIRIM L	4.89
E NE01 E	4.32
E NE01 L	4.33
E NE02 E	4.72
E NE02 L	4.69
MEAN	4.72

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

TABLE	APH CONT
SED	0.203

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.287	6.1

GRAIN MEAN DM% 91.3

PLOT AREA HARVESTED 0.00024

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83/R/BE/14

SPRING BEANS

VARIETIES

Object: To compare agronomic characters and yields of six varieties of s. beans - Long Hoos IV 5.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments:

VARIETY Varieties:

ALFRED
BLAZE
EXELLE
MINDEN
NARBOR
TIGER

Note: Seed was sown by hand in rows 51 cm apart, seed spaced 5 cm apart in the row.

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Weedkillers: Trietazine at 1.1 kg with simazine at 0.16 kg in 220 l. Fungicides: Benomyl at 0.56 kg in 340 l; propiconazole at 0.12 kg in 340 l on three occasions, once with pirimicarb. Insecticides: Pirimicarb at 0.14 kg on two occasions, in 340 l on the first, with propiconazole on the second; permethrin at 0.15 kg in 340 l on two occasions.

Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 30 Sept. Ploughed: 11 Oct. Spring-tine cultivated twice, seed sown: 15 Mar, 1983. Weedkillers applied: 17 Mar. Permethrin applied: 4 May, 20 May. Pirimicarb applied: 13 June. Benomyl applied: 5 July. Pirimicarb with propiconazole applied: 12 July. Propiconazole applied: 18 July, 26 July. Harvested by hand: 15 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTE: Plant counts were made after establishment. Components of yield were measured at maturity. N content of grain was measured.

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83/R/BE/14

GRAIN TONNES/HECTARE

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

VARIETY	ALFRED	BLAZE	EXELLE	MINDEN	NARBOR	TIGER	MEAN
	3.26	3.33	3.28	3.42	3.28	3.45	3.34

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

TABLE	VARIETY
SED	0.128

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.181	5.4

GRAIN MEAN DM% 89.8

PLOT AREA HARVESTED 0.00015

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83/R/BE/15

SPRING BEANS

CONTROL OF RUST

Object: To study the effects of fungicides on the control of rust (Uromyces fabae) and on the yield of spring beans - Long Hoos IV 5.

Sponsors: D.H. Lapwood, J. McEwen, D.P. Yeoman.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments: All combinations of:-

1.	C S FUNG	Fungicide to control chocolate spot but not rust:
	NONE	None
	BENOMYL	Benomyl at 0.50 kg in 340 l on 7 July, 1983
2.	RUSTFUNG	Fungicides to control rust:
	MAN+MANC	Maneb at 0.8 kg + mancozeb at 0.8 kg in 340 l
	PROPICON	Propiconazole at 0.12 kg in 340 l
3.	RFNGTIME	Times of applying fungicides to control rust:
	ONCE	Once on 18 July
	TWICE	Twice, on 18 and 27 July

plus extra treatments:

EXTRA	
NONE	None (duplicated)
BENOMYL	Benomyl at 0.50 kg in 340 l on 7 July (duplicated)

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Weedkillers: Trietazine at 1.1 kg with simazine at 0.16 kg in 220 l. Insecticides: Pirimicarb at 0.14 kg in 340 l on two occasions; permethrin at 0.15 kg in 340 l on two occasions.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 30 Sept. Ploughed: 11 Oct. Spring-tine cultivated, seed sown: 8 Mar, 1983. Weedkillers applied: 17 Mar. Permethrin applied: 4 May, 20 May. Pirimicarb applied; 13 June, 13 July. Harvested by hand: 16 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTE: Plant counts were made after establishment. The incidence of chocolate spot and rust were assessed from early July until maturity. Components of yield were measured at maturity.

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83/R/BE/15

GRAIN TONNES/HECTARE

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

RUSTFUNG C S FUNG	MAN+MANC	PROPICON	MEAN
NONE	3.68	4.22	3.95
BENOMYL	3.86	4.39	4.13
MEAN	3.77	4.30	4.04

RFNGTIME C S FUNG	ONCE	TWICE	MEAN
NONE	4.31	3.59	3.95
BENOMYL	3.83	4.42	4.13
MEAN	4.07	4.00	4.04

RFNGTIME RUSTFUNG	ONCE	TWICE	MEAN
MAN+MANC	3.93	3.62	3.77
PROPICON	4.21	4.39	4.30
MEAN	4.07	4.00	4.04

RUSTFUNG	MAN+MANC		PROPICON	
RFNGTIME	ONCE	TWICE	ONCE	TWICE
C S FUNG				
NONE	4.20	3.15	4.42	4.02
BENOMYL	3.65	4.08	4.01	4.76

EXTRA	NONE	BENOMYL	MEAN
	3.64	3.51	3.58

GRAND MEAN 3.88

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

TABLE	EXTRA	C S FUNG	RUSTFUNG	RFNGTIME
SED	0.253	0.179	0.179	0.179

TABLE	C S FUNG RUSTFUNG	C S FUNG RFNGTIME	RUSTFUNG RFNGTIME	C S FUNG RUSTFUNG RFNGTIME
SED	0.253	0.253	0.253	0.358

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

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.439	11.3

GRAIN MEAN DM% 89.3

PLOT AREA HARVESTED 0.00015

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83/R/BE/16

SPRING BEANS

SEED RATES AND PLANT HEALTH

Object: To study the effects of three seed rates and two standards of plant health on the yield of s. beans - Long Hoos V 2.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.40 x 3.00.

Treatments: All combinations of:-

1. POPULATN — Plant populations in thousands per hectare:

	Target population	Population achieved
2	200,000	140,000
4	400,000	270,000
6	600,000	350,000

2. PATHCONT — Pest and pathogen control:

STANDARD — Pirimicarb at 0.14 kg in 340 l on 13 June, 1983

ENHANCED — Permethrin at 0.15 kg in 220 l on 4 May and 24 May
Pirimicarb at 0.14 kg in 340 l on 13 June
Propiconazole at 0.12 kg in 340 l on 26 July
Benomyl at 0.5 kg in 340 l on 7 July

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Trietazine at 1.1 kg with simazine at 0.16 kg in 220 l.

Seed: Minden.

Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 28 Sept. Ploughed: 26 Nov. Spring-tine cultivated twice: 10 and 11 Mar, 1983. Seed sown: 11 Mar. Weedkillers applied: 17 Mar. Harvested by hand: 15 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTE: Plant counts were made after establishment and components of yield were measured at maturity.

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83/R/BE/16

GRAIN TONNES/HECTARE

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

PATHCONT POPULATN	STANDARD	ENHANCED	MEAN
2	2.06	2.08	2.07
4	2.71	2.72	2.71
6	2.71	3.25	2.98
MEAN	2.49	2.68	2.59

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

TABLE	POPULATN	PATHCONT	POPULATN PATHCONT
SED	0.165	0.135	0.234

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.330	12.8

GRAIN MEAN DM% 88.8

PLOT AREA HARVESTED 0.00015

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83/R/BE/17

SPRING BEANS

CONTROL OF STEM NEMATODE

Object: To study the effects of a range of materials, applied at three rates on the incidence of stem nematode (Ditylenchus dipsaci) and on the yield of spring beans grown from infested seed - ex-Allotments.

Sponsor: A.G. Whitehead.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 2.29 x 4.57.

Treatments: All combinations of:-

1. NEMACIDE — Nematicides applied in the seed furrows at sowing:

ALDICARB	Aldicarb
CARBOFUR	Carbofuran
DIMETHOA	Dimethoate
DISULFOT	Disulfoton
FENAMIPH	Fenamiphos

2. NEM RATE — Rates of nematicides (kg):

1	All applied to seed furrow
2	All applied to seed furrow
4	All applied to seed furrow
2+2	2 kg to seed furrow, 2 kg post emergence on 23 May, 1983

plus one extra treatment:

EXTRA	
NONE	None (quadruplicated)

Basal applications: Manures: (0:14:28) at 450 kg. Weedkillers: Simazine at 1.1 l in 640 l. Fungicide: Benomyl at 0.56 kg in 560 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg on three occasions, with the fungicide on the first, in 560 l on the second and third.

Seed: Maris Bead, sown at 260 kg.

Cultivations, etc.:- Ploughed: 7 Dec, 1982. PK applied: 23 Feb, 1983. Spring-tine cultivated, rotary harrowed, seed sown: 9 Mar. Weedkiller applied: 11 Mar. Fungicide with insecticide applied: 10 June. Insecticide applied: 30 June, 19 July. Combine harvested: 8 Aug. Previous crops: S. barley 1981 and 1982.

NOTE: The percentage of stems infested with stem nematode was estimated in July. Seed infestation was assessed in harvested grain.

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83/R/BE/17

GRAIN TONNES/HECTARE

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

NEM RATE / NEMACIDE	1	2	4	2+2	MEAN
ALDICARB	3.97	4.05	3.98	3.77	3.94
CABBOFUR	4.24	4.19	3.72	3.78	3.98
DIMETHOA	2.82	3.18	2.94	2.86	2.95
DISULFOT	3.12	3.60	3.55	3.24	3.38
FENAMIPH	3.42	3.43	3.69	3.64	3.55
MEAN	3.51	3.69	3.58	3.46	3.56

NONE 2.99

GRAND MEAN 3.47

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

TABLE	NEMACIDE	NEM RATE	NEMACIDE NEM RATE
SED	0.164	0.146	0.327

SED FOR COMPARING NONE WITH ANY ITEM IN THE NEM RATE.NEMACIDE TABLE IS 0.259

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.327	9.4

GRAIN MEAN DM% 84.6

PLOT AREA HARVESTED 0.00035

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83/R/BE/18

SPRING BEANS

PERMETHRIN AND ALARM PHEROMONE

Object: To study the effects of aphid alarm pheromone on the activity of permethrin against bean aphids and on the yield of spring beans - Long Hoos VI/VII 2.

Sponsors: D.C. Griffiths, J.A. Pickett, G.R. Cayley.

Design: 2 randomised blocks of 14 plots.

Whole plot dimensions: 2.4 x 4.5.

Treatments: All combinations of:-

1.	PERMETH	Permethrin (g):
	0	None (duplicated)
	3	
	10	
	30	
	90	
	270	
2.	PHEROMON	Pheromone:
	NONE	None
	BETA FAR	(E), beta farnesene at 0.004 l

NOTE: Treatments were applied by electrostatic sprayer in 4.2 l hexane on 4 July.

Basal applications: Manures: Chalk at 2.9 t. Weedkillers: Trietazine at 1.1 kg with simazine at 0.16 kg in 220 l. Insecticide: Permethrin at 0.15 kg in 220 l.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Chalk applied: 28 Sept, 1982. Ploughed: 4 Nov. Spring-tine cultivated, seed sown: 10 Mar, 1983. Weedkillers applied: 17 Mar. Insecticide applied: 24 May. Combine harvested: 11 Aug. Previous crops: Potatoes 1981, fallow 1982.

NOTE: Aphid infestations were measured in early July.

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83/R/BE/18

GRAIN TONNES/HECTARE

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

PERMETH / PHEROMON	0	3	10	30	90	270	MEAN
NONE	1.73	1.51	1.76	1.92	1.87	1.99	1.79
BETA FAR	1.59	1.98	1.99	1.87	1.89	1.91	1.83
MEAN	1.66	1.74	1.88	1.90	1.88	1.95	1.81

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

TABLE	PERMETH	PHEROMON	PERMETH PHEROMON	
SED	0.183		0.259	MIN REP
	0.159	0.098	0.224	MAX-MIN
			0.183	MAX REP

	PERMETH
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	15	0.259	14.3

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00065

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83/R/PE/1

PEAS

CONTROL OF PESTS AND DISEASES

Object: To study the effects of aldicarb, tolclofos methyl and permethrin on soil-inhabiting pests and pathogens and on the yield of peas - Long Hoos III 4.

Sponsors: J. McEwen, R. Bardner, A.J. Cockbain, C.D. Green, D.H. Lapwood, R.M. Webb, A.G. Whitehead, D.P. Yeoman.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments: All combinations of:-

1.	NEMACIDE	Nematicide:
	NONE	None
	ALDICARB	Aldicarb at 5 kg combine drilled
2.	FUNGCIDE	Fungicide:
	NONE	None
	TOL METH	Tolclofos methyl at 50 kg worked into the seedbed
3.	INSCTCDE	Insecticide:
	NONE	None
	PERMETH	Permethrin at 0.15 kg in 220 l on 11 May, 1983 and 13 June

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Weedkillers: Trietazine at 1.1 kg with simazine at 0.16 kg in 340 l.

Seed: Progreta, dressed metalaxyl, sown at 290 kg.

Cultivations, etc.:- Muriate of potash applied: 16 Sept, 1982. Chalk applied: 30 Sept. Ploughed: 12 Jan, 1983. Spring-tine cultivated twice, seed sown: 16 Mar. Weedkillers applied: 18 Mar. Combine harvested: 2 Aug. Previous crops: Potatoes 1981, s. barley 1982.

NOTE: Plants were counted after establishment. Weevils, migratory nematodes, root fungi and viruses were counted during the season. N content of grain was measured.

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83/R/PE/1

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	TOL METH	MEAN
NEMACIDE			
NONE	4.78	4.79	4.79
ALDICARB	4.58	5.29	4.94
MEAN	4.68	5.04	4.86

INSCTCDE	NONE	PERMETH	MEAN
NEMACIDE			
NONE	4.90	4.68	4.79
ALDICARB	4.65	5.23	4.94
MEAN	4.77	4.95	4.86

INSCTCDE	NONE	PERMETH	MEAN
FUNGCIDE			
NONE	4.55	4.82	4.68
TOL METH	5.00	5.09	5.04
MEAN	4.77	4.95	4.86

FUNGCIDE	NONE		TOL METH	
INSCTCDE	NONE	PERMETH	NONE	PERMETH
NEMACIDE				
NONE	4.97	4.60	4.82	4.76
ALDICARB	4.12	5.05	5.17	5.41

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

TABLE	NEMACIDE	FUNGCIDE	INSCTCDE	NEMACIDE FUNGCIDE
SED	0.189	0.189	0.189	0.267

TABLE	NEMACIDE INSCTCDE	FUNGCIDE INSCTCDE	NEMACIDE FUNGCIDE INSCTCDE
SED	0.267	0.267	0.377

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.462	9.5

GRAIN MEAN DM% 82.3

PLOT AREA HARVESTED 0.00058

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83/R/FE/1

FENUGREEK

N, RHIZOBIUM AND PEST CONTROL

Object: To study the effects of inoculation with Rhizobium, application of insecticide and times of applying nitrogen fertilizer on nodulation and yield of fenugreek (Trigonella foenum - graecum) - Long Hoos IV 4.

Sponsor: D.P. Yeoman.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 2.64 x 8.00.

Treatments: All combinations of:-

1.	INOCULUM	Inoculum applied to the seed:
	NONE	None
	RHIZOBUM	Rhizobium meliloti, strain 2012, as a peat culture
2.	N	Nitrogen fertilizer (kg N) and times of application:
	0	None
	150 S	150 to the seedbed, on 5 May, 1983
	150 F	150 at flowering, on 5 July
3.	INSCTCDE	Insecticide:
	NONE	None
	PERMETH	Permethrin foliar spray at 0.15 kg in 340 l on 13 June

Basal applications: Weedkillers: Trifluralin at 0.81 kg in 220 l. MCPB at 2.1 kg in 220 l. Desiccant: Diquat at 0.84 kg ion in 220 l.

Seed: Barbara, sown at 22 kg.

Cultivations, etc.:- Ploughed: 17 Jan, 1983. Trifluralin applied, spring-tine cultivated twice, power harrowed, seed sown: 5 May. MCPB applied: 1 July. Desiccant applied: 26 Aug. Combine harvested: 23 Sept. Previous crops: Peas 1981, s. barley 1982.

NOTE: Plant counts were made after establishment. N content of grain was measured.

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83/R/FE/1

GRAIN TONNES/HECTARE

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

N	0	150 S	150 F	MEAN
INOCULUM				
NONE	0.31	0.71	0.32	0.45
RHIZOBUM	0.32	0.56	0.36	0.41
MEAN	0.31	0.63	0.34	0.43

INSCTCDE	NONE	PERMETH	MEAN
INOCULUM			
NONE	0.43	0.46	0.45
RHIZOBUM	0.40	0.42	0.41
MEAN	0.42	0.44	0.43

INSCTCDE	NONE	PERMETH	MEAN
N			
0	0.29	0.33	0.31
150 S	0.60	0.67	0.63
150 F	0.36	0.32	0.34
MEAN	0.42	0.44	0.43

N	0		150 S		150 F	
INSCTCDE	NONE	PERMETH	NONE	PERMETH	NONE	PERMETH
INOCULUM						
NONE	0.30	0.32	0.67	0.74	0.32	0.32
RHIZOBUM	0.29	0.34	0.53	0.60	0.40	0.32

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

TABLE	INOCULUM	N	INSCTCDE	INOCULUM N
SED	0.029	0.036	0.029	0.050

TABLE	INOCULUM INSCTCDE	N INSCTCDE	INOCULUM N INSCTCDE
SED	0.041	0.050	0.071

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.071	16.6

GRAIN MEAN DM% 81.7

PLOT AREA HARVESTED 0.00154

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83/R/RA/1

WINTER OILSEED RAPE

MUSTARD OILS AND LIGHT LEAF SPOT

Object: To study the effects of mustard oils, sulphur and benomyl on the incidence of light leaf spot (Pyrenopeziza brassicae) and on the yield of two w. oilseed rape varieties with contrasting glucosinolate levels - Long Hoos V 4.

Sponsors: C.J. Rawlinson, G.R. Cayley, J.A. Pickett.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 1.83 x 6.10.

Treatments: All combinations of:

1. VARIETY — Varieties:

   DP 1305
   NORLI

2. FUNGCIDE — Fungicides:

NONE	None
BENOMYL	Benomyl at 0.5 kg in 4.2 l
M OIL 1	Mustard oil 1 at 0.15 kg in 4.2 l
M OIL 2	Mustard oil 2 at 0.24 kg in 4.2 l
SULPHUR	Elemental sulphur at 10 kg in 340 l (as 'Thiovit')

NOTES: (1) All fungicide treatments were applied on 30 Nov, 1982 and 12 Apr, 1983; sulphur was applied by hydraulic sprayer, the remainder by electrostatic sprayer.
(2) Diseases were so severe on VARIETY DP1305 that all plants, irrespective of treatments were killed by the end of April.

Basal applications: Manures: 'Nitro-Chalk' at 900 kg. Weedkillers: Benazolin ethyl ester at 0.67 kg with 3, 6-dichloropicolinic acid at 0.11 kg in 450 l. Desiccant: Diquat at 0.84 kg ion in 250 l.

Seed: Sown at 19 kg.

Cultivations, etc.:- Spring-tine cultivated twice: 25 Aug, 1982. Seed sown by hand: 26 Aug. Weedkillers applied: 15 Oct. N applied: 14 Mar, 1983. Desiccant applied: 25 July. Combine harvested: 27 July. Previous crops: Potatoes 1981, fallow 1982.

NOTE: Phoma and light leaf spot were assessed on five occasions during the season.

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83/R/RA/1

NORLI ONLY

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	M OIL 1	M OIL 2	SULPHUR	MEAN
	2.05	2.60	2.29	2.47	2.46	2.37

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

TABLE	FUNGCIDE
SED	0.246

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.301	12.7

GRAIN MEAN DM% 75.4

PLOT AREA HARVESTED 0.00111

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83/R/RA/4

WINTER OILSEED RAPE

CONTROL OF PESTS AND DISEASES

Object: To study the effects of carbofuran, cypermethrin, benomyl and triazophos on the incidence of pests and diseases and on the yield of w. oilseed rape - Bones Close.

Sponsors: R.J. Tuppen (MAFF), G.J.W. Dean, I.H. Williams, C.J. Rawlinson.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 4.0 x 20.0.

Treatments: All combinations of:-

1. INSCTCDE — Insecticides:

NONE	None
CARBOFUR	Carbofuran at 2.5 kg as granules on 3 Sept, 1982
CYPERMET	Cypermethrin at 0.035 l in 500 l on 3 June, 1983

2. FUNG INS — Fungicide and additional insecticide:

NONE	None
BEN+TRI	Benomyl at 0.50 kg on 15 Nov, 1982, and triazophos on 8 June, 1983

NOTE: 'Actipron', a wetting agent, was applied at 2.5 l with the benomyl.

Basal applications: Manures: (5:14:30) at 450 kg. 'Nitro-Chalk' at 500 kg followed by 450 kg. Weedkillers: Paraquat at 0.70 kg ion in 250 l. Diquat at 0.60 kg ion applied with 'Agral', a wetting agent, at 0.5 l in 500 l. Propyzamide and 3,6 - dichloropicolinic acid (as 'Matri-Kerb' at 1.63 kg) in 250 l.

Seed: Jet Neuf, dressed thiram and thiabendazole, sown at 7.8 kg.

Cultivations, etc.:- Paraquat applied: 23 Aug, 1982. Disced: 29 Aug. NPK applied, seed sown: 31 Aug. 'Matri-Kerb' applied: 9 Nov. First N applied: 23 Feb, 1983. Second N applied: 28 Mar. Diquat applied: 22 July. Combine harvested: 28 July. Previous crops: W. wheat 1981, w. wheat and w. barley 1982.

NOTE: Light leaf spot was assessed in early spring, May and June.

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83/R/RA/4

GRAIN TONNES/HECTARE

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

FUNG INS INSCTCDE	NONE	BEN+TRI	MEAN
NONE	3.17	3.39	3.28
CARBOFUR	3.11	3.53	3.32
CYPERMET	2.91	3.51	3.21
MEAN	3.06	3.47	3.27

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

TABLE	INSCTCDE	FUNG INS	INSCTCDE FUNG INS
SED	0.219	0.179	0.310

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.439	13.4

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00640

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83/R/P/1

POTATOES

VARIETIES AND STEM CANKER

Object: To study the effects of stem canker (Rhizoctonia solani) on plant development and yield of a range of early and maincrop potato varieties - Summerdells II.

Sponsors: G.A. Hide, P.J. Read.

Design: Early varieties: 3 randomised blocks of 20 plots.
Maincrop varieties: 3 randomised blocks of 28 plots.

Whole plot dimensions: 3.00 x 9.14.

Treatments:

To EARLY varieties, all combinations of:-

1. VARIETY	Varieties:
A COMET	Arran Comet
ESTIMA	Estima
M PEER	Maris Peer
U PRINCE	Ulster Prince
U SCEPTR	Ulster Sceptre

2. RHZ FUNG	R. solani infection and fungicide to tubers:
NONE	None
SEED R	Seed with black scurf symptom
SEED R+F	Seed with black scurf symptom, treated with iprodione
SOIL R	R. solani inoculum to soil

To MAINCROP varieties, all combinations of:-

1. VARIETY	Varieties:
CARA	Cara
DESIREE	Desiree
K EDWARD	King Edward
P CROWN	Pentland Crown
M PIPER	Maris Piper
P SQUIRE	Pentland Squire
RECORD	Record

2. RHZ FUNG	R. solani infection & fungicide to tubers:
NONE	None
SEED R	Seed with black scurf symptom
SEED R+F	Seed with black scurf symptom, treated with iprodione
SOIL R	R. solani inoculum to soil

NOTES: (1) The fungal inoculum was grown on a vermiculite plus malt medium. It was applied by hand around the tubers at planting.
(2) The iprodione treatment was applied by dipping tubers into a 0.05% solution for five minutes.

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83/R/P/1

Basal applications: Manures: (0:18:36) at 700 kg. (10:10:15+4.5 Mg) at 2010 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l. Linuron at 1.0 kg with paraquat at 0.56 kg ion in 500 l. Fungicides: Mancozeb at 1.4 kg in 250 l on three occasions. Fentin hydroxide at 0.28 kg in 250 l applied on five occasions, with the insecticide on the first four occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.

Cultivations, etc:- PK applied: 20 Sept, 1982. Paraquat applied: 16 Oct. Ploughed: 9 Dec. NPK Mg applied: 4 May, 1983. Rotary harrowed for early-sown potatoes, heavy spring-tine cultivated for maincrop: 11 May. Early potatoes planted by hand, maincrop area rotary harrowed: 16 May. Maincrop potatoes planted by hand: 23 May. Linuron and paraquat applied: 7 June. Mancozeb applied: 22 June. Fentin hydroxide with pirimicarb applied: 1 July, 8 July, 18 July, 28 July. Fentin hydroxide alone applied: 11 Aug. Mancozeb applied: 25 Aug, 9 Sept. Haulm mechanically destroyed: 7 Oct. Haulm desiccant applied: 19 Oct. Lifted: 26 Oct. Previous crops: S. barley 1981, w. oats 1982.

NOTES: (1) Emergence counts were made in June.
(2) Measurements of aspects of plant growth and of R. solani infection of stem bases and stolons were made in July and August.
(3) Infection of mature tubers was assessed.

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83/R/P/1 EARLY POTATOES

TOTAL TUBERS TONNES/HECTARE

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

RHZ FUNG VARIETY	NONE	SEED R	SEED R+F	SOIL R	MEAN
A COMET	29.9	30.4	29.6	30.5	30.1
ESTIMA	26.2	29.7	27.7	27.9	27.9
M PEER	15.8	15.2	16.8	15.4	15.8
U PRINCE	16.7	16.7	16.4	16.9	16.7
U SCEPTR	17.1	17.9	17.8	18.1	17.7
MEAN	21.1	22.0	21.7	21.8	21.6

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

TABLE	VARIETY	RHZ FUNG	VARIETY RHZ FUNG
SED	0.76	0.68	1.52

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	1.86	8.6

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

RHZ FUNG VARIETY	NONE	SEED R	SEED R+F	SOIL R	MEAN
A COMET	61.3	65.8	56.0	71.2	63.5
ESTIMA	68.5	71.5	69.6	72.7	70.6
M PEER	31.0	37.9	32.4	40.2	35.4
U PRINCE	74.9	81.1	81.0	81.1	79.5
U SCEPTR	54.5	55.2	53.1	61.2	56.0
MEAN	58.0	62.3	58.4	65.3	61.0

PLOT AREA HARVESTED 0.00117

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83/R/P/1 MAIN CROP POTATOES

TOTAL TUBERS TONNES/HECTARE

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

RHZ FUNG VARIETY	NONE	SEED R	SEED R+F	SOIL R	MEAN
CARA	34.1	37.0	37.0	37.3	36.3
DESIREE	32.6	32.6	33.7	31.2	32.5
K EDWARD	36.3	36.6	34.9	31.8	34.9
P CROWN	33.4	33.7	31.4	34.6	33.2
M PIPER	32.0	33.0	31.4	31.6	32.0
P SQUIRE	38.3	36.4	36.8	36.3	36.9
RECORD	29.5	26.4	27.4	26.7	27.5
MEAN	33.7	33.7	33.2	32.8	33.4

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

TABLE	VARIETY	RHZ FUNG	VARIETY RHZ FUNG
SED	0.89	0.67	1.77

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

STRATUM	DF	SE	CV%
BLOCK.WP	54	2.17	6.5

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

RHZ FUNG VARIETY	NONE	SEED R	SEED R+F	SOIL R	MEAN
CARA	84.9	88.3	85.8	86.3	86.3
DESIREE	62.8	69.4	63.3	69.8	66.3
K EDWARD	42.7	46.2	35.9	55.1	45.0
P CROWN	80.2	84.6	79.9	85.6	82.6
M PIPER	49.8	51.3	51.0	54.6	51.6
P SQUIRE	81.7	85.9	84.0	88.9	85.1
RECORD	56.4	59.3	63.4	60.9	60.0
MEAN	65.5	69.3	66.2	71.6	68.1

PLOT AREA HARVESTED 0.00117

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83/R/SW/1

SWEDES

ELECTROSTATIC SPRAYING AND MILDEW

Object: To compare the effects of electrostatic and conventional sprayers on disease control and on yield of swedes - Pennell's Piece.

Sponsors: A.J. Arnold, G.R. Cayley, P. Etheridge, D.C. Griffiths, F.T. Phillips, B.J. Pye, G.C. Scott.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 3.05 x 13.7.

Treatments: All combinations of:-

1. SPRAYER — Spraying machines:

CNVNTIAL	Conventional
ELECT NA	New electrostatic A
ELECT NB	New electrostatic B
ELECT O	Older electrostatic

2. NUARIMOL — Rates of applying nuarimol fungicide(g):

40
80

plus one extra treatment not sprayed

EXTRA	
NONE	None (duplicated)

NOTES: (1) The new electrostatic A sprayer had spinning-disc nozzles and applied spray in 6.95 l.
(2) The new electrostatic B and older electrostatic sprayers had spinning-cone nozzles, applied spray in 10.6 l, the former was mounted at an angle of 30° to the vertical, the latter vertical.
(3) Nuarimol was applied on 11 Aug, 1983 by all sprayers, in 350 l by the conventional sprayer.

Basal applications: Manures: Chalk at 5.0 t. (0:18:36) at 630 kg. 'Nitro-Chalk' at 380 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Paraquat at 0.98 kg ion in 900 l. Trifluralin at 1.1 kg in 250 l. Insecticide: Pirimicarb at 0.075 kg to all treatments, applied in 380 l by conventional sprays to all treatments except one of the duplicate EXTRA : NONE treatments, by electrostatic sprayer in 8.3 l.

Seed: Doon Major, dressed gamma HCH with captan, sown at 2.0 kg.

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83/R/SW/1

Cultivations, etc.:- Glyphosate applied: 28 Oct, 1982. Chalk applied: 29 Nov. Ploughed: 8 Dec. N and PK applied: 28 Apr, 1983. Paraquat applied: 14 May. Heavy spring-tine cultivated, trifluralin applied, rotary harrowed: 23 May. Seed sown: 25 May. Plants singled: 29 June. Insecticide applied: 25 July. Harvested: 10 Nov. Previous crops: Peas 1981, s. barley 1982.

NOTE: Samples for chemical analysis were taken immediately after spraying. Mildew assessments were made at intervals throughout the season.

TOTAL TUBERS TONNES/HECTARE

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

SPRAYER / NUARIMOL	CNVNTIAL	ELECT NA	ELECT NB	ELECT O	MEAN
40	29.2	32.7	36.0	35.1	33.2
80	33.7	34.5	33.2	32.3	33.4
MEAN	31.5	33.6	34.6	33.7	33.3

NUARIMOL NONE 23.9

GRAND MEAN 31.4

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

TABLE	NUARIMOL	SPRAYER	NUARIMOL SPRAYER
SED	3.40	4.80	6.79

SED FOR COMPARING NUARIMOL NONE WITH A MEAN IN NUARIMOL.SPRAYER TABLE IS 5.88

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

STRATUM	DF	SE	CV%
BLOCK.WP	19	8.32	26.5

PLOT AREA HARVESTED 0.00084

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83/W/G/1

GRASS

FLUID DRILLING AND NEMATICIDES

Object: To study the effects of rates of oxamyl incorporated in a fluid gel at sowing on the establishment and yield of ryegrass - Woburn Butt Close.

Sponsor: A.M. Spaull.

Design: 5 randomised blocks of 5 plots.

Whole plot dimensions: 1.22 x 3.05.

Treatments:

OXAMYL	Rates of oxamyl (kg) incorporated in a fluid gel at sowing:
0.0	
0.2	
0.5	
2.0	
5.0	

Basal applications: Manures: (10:10:15+4.5 Mg) at 750 kg, N at 75 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l, mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 280 l.

Seed: RVP Italian ryegrass, sown at 20 kg.

Cultivations, etc.:- Glyphosate applied: 6 Oct, 1982. Ploughed: 2 Nov. Spring-tine cultivated: 15 Mar, 1983. NPK + Mg applied: 13 Apr. Treatments applied, seeds sown: 15 Apr. Hand weeded: 17 June. 'Brittox' applied: 22 June. Cut twice: 1 Aug, 12 Oct. N applied: 1 Aug. Previous crops: Potatoes 1981, w. wheat 1982.

NOTE: Nematodes were assessed in soil samples taken in April before sowing and in October after the second cut.

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83/W/G/1

1ST CUT (1/8/83) DRY MATTER TONNES/HECTARE

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

OXAMYL	0.0	0.2	0.5	2.0	5.0	MEAN
	2.33	2.00	1.81	2.29	1.88	2.06

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

TABLE	OXAMYL
SED	0.311

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.491	23.8

1ST CUT MEAN DM% 34.3

2ND CUT (12/10/83) DRY MATTER TONNES/HECTARE

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

OXAMYL	0.0	0.2	0.5	2.0	5.0	MEAN
	1.88	1.50	1.72	1.87	1.58	1.71

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

TABLE	OXAMYL
SED	0.274

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.433	25.3

2ND CUT MEAN DM% 16.5

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83/W/G/1

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

OXAMYL	0.0	0.2	0.5	2.0	5.0	MEAN
	4.21	3.50	3.53	4.15	3.46	3.77

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

TABLE	OXAMYL
SED	0.421

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.665	17.6

TOTAL OF 2 CUTS MEAN DM% 25.4

PLOT AREA HARVESTED 0.00025

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METEOROLOGICAL RECORDS 1983 - ROTHAMSTED

(Departure from long-period means in brackets)

MONTH	Total sunshine: hours	Mean temperature: C Air(1)	Dew point	In ground under grass 30cm	100cm
JAN	49 (-3)	5.9 (+3.0)	4.0	6.0	7.1
FEB	74 (+8)	1.1 (-2.3)	-1.3	3.5	5.9
MAR	98 (-17)	5.9 (+0.7)	3.6	5.8	5.9
APR	142 (-8)	6.7 (-0.9)	3.9	7.2	6.8
MAY	120 (-74)	10.1 (-0.9)	6.9	11.0	9.1
JUNE	185 (-16)	14.2 (+0.2)	10.0	14.5	11.9
JULY	262 (+72)	19.5 (+3.6)	14.7	17.6	14.6
AUG	225 (+45)	17.4 (+1.8)	12.3	17.2	15.8
SEPT	111 (-33)	13.7 (+0.3)	10.6	14.6	14.8
OCT	115 (+12)	10.0 (+0.5)	7.5	12.5	13.5
NOV	46 (-16)	7.1 (+1.2)	5.2	9.4	11.1
DEC	58 (+12)	4.8 (+1.0)	3.0	6.6	8.6
YEAR*	1484 (-18)	9.7 (+0.6)	6.7	10.5	10.4

MONTH	Ground frosts (2)	Total rainfall:mm 0.000405 ha (1/1000 acre) gauge	Rain days (3)	Drainage through 50.8cm (20 in) soil:mm	Wind km per hour (4)
JAN	17	71 (+7)	20	49	14.8
FEB	25	41 (-8)	13	29	13.1
MAR	22	48 (-2)	19	18	10.9
APR	18	126 (+76)	22	78	10.4
MAY	4	99 (+45)	22	46	7.9
JUNE	2	27 (-29)	7	4	7.9
JULY	0	36 (-26)	6	0	5.7
AUG	2	15 (-49)	4	0	6.9
SEPT	2	84 (+23)	16	6	9.4
OCT	11	44 (-29)	13	19	10.1
NOV	11	52 (-19)	12	31	7.5
DEC	21	66 (-1)	20	56	10.3
YEAR*	135	709 (-14)	174	337	9.6

(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

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METEOROLOGICAL RECORDS 1983 - WOBURN

(Departure from long-period means in brackets)

Mean temperature: C

MONTH	Total sunshine: hours	Air(1)	Dew point	In ground under grass 30 cm	In ground under grass 100 cm	Ground frosts (2)	Total rainfall: mm 12.7 cm (5in) gauge	Rain days (3)	Wind km per hour (4)
JAN	39 (-10)	6.7 (+3.6)	3.7	6.1	7.4	8	41 (-12)	13	16.2
FEB	60 (-3)	1.3 (-2.0)	0.0	3.5	6.2	25	29 (-11)	16	9.3
MAR	86 (-28)	6.3 (+0.8)	3.5	6.0	6.3	19	38 (-9)	17	10.9
APR	135 (-5)	6.9 (-1.0)	3.8	7.3	7.0	18	97 (+52)	22	8.5
MAY	106 (-77)	10.1 (-0.9)	7.2	11.1	9.3	1	119 (+65)	21	6.8
JUNE	167 (-28)	14.4 (+0.1)	10.3	15.0	11.9	2	24 (-28)	8	7.6
JULY	236 (+57)	19.2 (+3.2)	15.1	19.1	15.0	0	59 (+6)	9	4.8
AUG	215 (+45)	17.3 (+1.5)	13.2	18.2	16.3	0	17 (-45)	7	5.8
SEPT	108 (-27)	14.0 (+0.3)	11.2	14.8	15.1	1	74 (+23)	17	9.9
OCT	110 (+9)	10.3 (+0.3)	8.2	12.1	13.6	9	45 (-10)	13	11.5
NOV	38 (-22)	7.1 (+0.8)	5.7	8.8	11.0	8	40 (-22)	9	5.7
DEC	40 (-4)	5.3 (+1.3)	3.6	6.1	8.6	14	45 (-9)	17	11.6
YEAR*	1340 (-94)	9.9 (+0.7)	7.1	10.7	10.6	105	627 (-2)	169	9.1

METEOROLOGICAL RECORDS 1983 - SAXMUNDHAM

Mean temperature: C

MONTH	Air(1)	Dew point	In ground under bare soil 30 cm	Ground frosts (2)	Total rainfall :mm 12.7 cm (5 in) gauge	Rain days (3)	Wind km per hour (4)
JAN	6.3 (+2.4)	4.4	6.2	9	57 (+4)	12	16.7
FEB	2.2 (-2.2)	0.0	3.6	21	36 (-5)	11	12.5
MAR	6.2 (+0.4)	3.3	5.8	15	34 (-17)	17	12.6
APR	6.6 (-0.8)	4.4	7.6	13	80 (+42)	17	10.8
MAY	9.6 (-1.1)	5.0	11.2	5	83 (+45)	24	9.3
JUNE	14.1 (-0.3)	10.6	15.6	0	26 (-20)	9	7.3
JULY	18.2 (+2.1)	15.0	18.4	0	37 (-8)	6	6.0
AUG	17.4 (+0.9)	13.9	18.0	0	9 (-32)	5	7.2
SEPT	14.2 (-0.2)	12.2	14.8	0	74 (+7)	16	11.6
OCT	10.3 (+0.0)	7.8	12.4	5	51 (-9)	15	12.0
NOV	6.8 (-0.2)	5.6	9.3	6	52 (-10)	9	7.7
DEC	5.1 (+0.5)	3.9	6.5	12	40 (-22)	17	13.2
YEAR*	9.8 (+0.1)	7.2	10.8	86	579 (-26)	158	10.6

(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

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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 (yd²)	= 0·8361 m²
1 acre (ac) (=4840 yd²)	= 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) (t)
1 pint	= 0·5682 litre (l)
1 gallon (gal) (=8 pints)	= 4·546 litres
1 fluid ounce = 1/20 pint	= 0·02841 litre = 28·41 ml
1 cubic foot	= 28·32 litres

To convert	*Multiply by*
oz ac^{-1} to g ha^{-1}	70·06
lb ac^{-1} to kg ha^{-1}	1·121
cwt ac^{-1} to kg ha^{-1}	125·5
cwt ac^{-1} to t ha^{-1}	0·1255
ton ac^{-1} to kg ha^{-1}	2511
ton ac^{-1} to t ha^{-1}	2·511
gal ac^{-1} to l ha^{-1}	11·233

The following factors are accurate to about 2 parts in 100:

1 lb ac^{-1} = 1·1 kg ha^{-1}
1 gal ac^{-1} = 11 litres ha^{-1}
1 ton ac^{-1} = 2·5 t ha^{-1}

In general reading of the text there will be no great inaccuracy in regarding:

1 lb = 0·5 kg
1 lb ac^{-1} = 1 kg ha^{-1}

Temperatures

To convert °F into °C subtract 32 and multiply by $\frac{5}{9}$ (0.556)
To convert °C into °F multiply by $\frac{9}{5}$ (1·8) and add 32

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CONVERSION FACTORS

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 (m^2)	=	1·196 square yards (yd^2)
1 hectare (ha)	=	2·471 acres (ac)
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) (t)	=	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 (ft^3)

To convert	*Multiply by*
g ha^{-1} to oz ac^{-1}	0·01427
kg ha^{-1} to lb ac^{-1}	0·8921
kg ha^{-1} to cwt ac^{-1}	0·007966
t ha^{-1} to cwt ac^{-1}	7·966
kg ha^{-1} to tons ac^{-1}	0·0003983
t ha^{-1} to tons ac^{-1}	0·3983
l ha^{-1} to gal ac^{-1}	0·08902

Plant nutrients

Plant nutrients are best stated in terms of amounts of the elements (P, K, Na, Ca, Mg, S); the old 'oxide' terminology (P_2O_5, K_2O, Na_2O, CaO, MgO, SO_3) is still used in work involving fertilisers and liming since Regulations require statements of P_2O_5, K_2O, etc.

For quick conversions

(accurate to within 2%) the following factors may be used:

$2\frac{1}{3} \times P = P_2O_5$	$\frac{3}{7} \times P_2O_5 = P$
$1\frac{1}{5} \times K = K_2O$	$\frac{5}{6} \times K_2O = K$
$1\frac{2}{5} \times Ca = CaO$	$\frac{7}{10} \times CaO = Ca$
$1\frac{2}{3} \times Mg = MgO$	$\frac{3}{5} \times MgO = Mg$

For accurate conversions:

To convert	*Multiply by*	*To convert*	*Multiply by*
P_2O_5 to P	0·4364	P to P_2O_5	2·2915
K_2O to K	0·8301	K to K_2O	1·2047
CaO to Ca	0·7146	Ca to CaO	1·3994
MgO to Mg	0·6031	Mg to MgO	1·6581

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