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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1982



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Rothamsted Experimental Station

Harpenden

Lawes Agricultural Trust

YIELDS

of the

FIELD

EXPERIMENTS

1982

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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CONVERSION FACTORS

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CONVENTIONS 1982

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% P_2O_5, 10% K_2O), 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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82/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 139th year, w. wheat, fallow, potatoes. The 15th 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 74-81/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00434
	1	0.00798
	3,5,6,and 7	0.00659
	8 and 9	0.00694
Potatoes:	4	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	-
17N1+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK (Na) Mg)+
18N0+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N0+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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82/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 combine drilled + 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		68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
SC0/W31	Section 0	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W16	Section 1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	Section 2	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W	F
SC3/W3	Section 3	W	W	F	W	W	F	W	W	F	W	W	F	W	W	W
POTATOES	Section 4	W	P	BE	W	P	BE	W	P	BE	W	P	P	W	F	P
SC5/W4	Section 5	W	F	W	W	F	W	W	F	W	W	F	W	W	W	W
SC6/W5	Section 6	F	W	W	F	W	W	F	W	W	F	W	W	W	W	W
SC7/W1P	Section 7	P	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W
SC8/W1F	Section 8*	W	W	W	W	F	W	W	W	W	W	W	W	W	F	W
SC9/W24	Section 9	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.
(3) On many plots of Section 8 the yields presented include a substantial proportion of weed seeds.

Standard applications:
W. wheat: Manures: Sections 1 and 3 only: Chalk at 2.9 t. Weedkillers: (not applied to section 8): Chlortoluron at 5.6 l in 250 l; mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.
Plots 03, 05 and 06, sections 0,1,5,6 and 7 and plot 05, section 9: Glyphosate at 1.4 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l applied twice, with the insecticide on the second occasion. Insecticide: Pirimicarb at 0.14 kg.

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82/R/BK/1

Potatoes: Weedkillers: Linuron at 1.1 kg and paraquat at 0.5 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions, with the insecticide on the first two. Ofurace at 0.12 kg and maneb at 1.2 kg in 250 l, on two occasions with the insecticide on the first. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 220 l.
Fallow: Manures: Chalk at 2.9 t.

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: 21 Sept, 1981. FYM applied: 25 Sept. Ploughed: 28 Sept. Disced: 14 Oct.
Cropped Sections:
W. wheat: Rotary harrowed: 14 Oct, 1981. Seed sown: 16 Oct. Chlortoluron applied: 17 Oct. N applied: 15 Apr, 1982. Mecoprop, bromoxynil and ioxynil applied: 16 Apr. Propiconazole applied: 26 May. Propiconazole with insecticide applied: 17 June. Glyphosate applied: 10 Aug. Combine harvested: 20 Aug.
Potatoes: Spring-tine cultivated: 16 Apr, 1982. N applied: 17 Apr. Spiked rotary cultivated, potatoes planted: 20 Apr. Rotary ridged: 10 May. Weedkillers applied: 17 May. Mancozeb with the insecticide applied: 14 June, 30 June. Mancozeb applied: 12 July. Ofurace and maneb with the insecticide applied: 26 July. Ofurace and maneb applied: 9 Aug. Haulm mechanically destroyed: 21 Aug. Desiccant applied: 24 Aug. Lifted: 13 Sept.
Fallow: Chalk applied: 11 Sept, 1981. Spring-tine cultivated: 16 Apr, 1982. Ploughed: 4 May. Rolled, spring-tine cultivated: 12 May. Ploughed: 21 June. Spring-tine cultivated: 30 June. Rotary harrowed: 28 July.

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82/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC7/W1P	SC8/W1F	SC3/W3	SC5/W4	SC6/W5	SC1/W16	SC9/W24	SC0/W31	MEAN
01DN2PK	8.55	*	7.09	7.14	7.08	*	*	*	7.47
21DN2	8.69	5.49	7.39	7.75	7.48	8.04	8.20	7.83	7.61
22D	7.18	6.59	4.99	5.05	5.20	5.59	6.37	5.23	5.77
030	3.49	2.03	1.03	1.04	0.89	1.23	1.28	1.26	1.53
05F	4.11	4.60	1.32	1.08	1.03	1.10	1.40	1.59	2.03
06N1F	6.03	4.72	3.36	3.22	3.29	3.36	3.83	3.73	3.94
07N2F	7.32	4.98	4.76	4.70	5.17	5.47	5.84	5.47	5.46
08N3F	7.86	4.54	5.88	5.52	5.71	5.76	6.38	5.98	5.96
09N4F	7.88	5.48	6.51	6.20	5.80	6.60	6.73	6.29	6.44
10N2	4.66	2.19	3.10	3.87	3.70	2.78	2.52	2.71	3.19
11N2P	5.55	2.25	3.49	3.75	3.09	3.34	1.96	3.80	3.40
12N2PNA	6.51	2.79	4.19	4.28	3.22	4.34	3.46	5.03	4.23
13N2PK	6.86	4.49	4.67	4.76	4.11	5.15	5.17	5.05	5.03
14N2PKMG	7.35	4.89	4.19	4.63	4.11	5.31	5.81	5.27	5.19
15N3F	7.46	5.11	5.68	6.17	5.71	6.22	6.61	6.17	6.14
16N2F	6.98	4.19	4.81	4.72	4.24	5.34	5.48	5.15	5.11
17N1+3FH	7.31	4.80	6.27	6.38	5.52	6.44	6.02	6.43	6.14
18N0+3FH	7.23	4.53	5.81	6.73	5.93	6.03	6.26	6.02	6.07
19C	5.33	4.88	2.33	2.88	2.10	3.20	3.14	2.74	3.32
20NKMG	*	*	*	*	*	2.80	*	3.07	2.93

GRAIN MEAN DM% 79.9

STRAW TONNES/HECTARE

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

SECTION PLOT	SC7/W1P	SC1/W16	MEAN
01DN2PK	5.88	*	5.88
21DN2	5.75	5.59	5.67
22D	4.17	3.62	3.89
030	1.44	0.59	1.02
05F	1.97	0.75	1.36
06N1F	3.26	2.35	2.81
07N2F	4.13	3.14	3.63
08N3F	4.22	3.50	3.86
09N4F	4.31	3.97	4.14
10N2	1.66	2.03	1.85
11N2P	2.53	2.02	2.28
12N2PNA	3.18	2.25	2.71
13N2PK	3.57	3.03	3.30
14N2PKMG	3.35	3.07	3.21
15N3F	3.89	3.52	3.70
16N2F	4.09	2.87	3.48
17N1+3FH	3.93	3.72	3.83
18N0+3FH	4.41	2.83	3.62
19C	2.63	2.00	2.31
20NKMG	*	1.76	1.76

STRAW MEAN DM% 87.5

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82/R/BK/1

POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM(1.5 INCH) RIDDLE
01DN2PK	41.0	93.4
21DN2	49.4	92.8
22D	39.9	96.0
030	9.2	92.0
05F	16.5	93.1
06N1F	32.7	93.7
07N2F	38.2	94.4
08N3F	43.8	95.3
09N4F	43.3	94.9
10N2	8.5	87.8
11N2P	18.1	78.0
12N2PNA	19.9	78.7
13N2PK	32.2	87.8
14N2PKMG	41.3	91.8
15N3F	45.0	95.7
16N2F	41.6	93.7
17N3FH	32.4	93.6
18N3FH	38.3	94.2
19C	18.8	91.3

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82/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 131st year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-81/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
---15F	None	-	-	15 after fallow
-P-15F	None	P	-	15 after fallow
--K15F	None	K(Na)Mg	-	15 after fallow
-PK15F	None	PK(Na)Mg	-	15 after fallow
A--15F	A	-	-	15 after fallow
AP-15F	A	P	-	15 after fallow
A-K15F	A	K(Na)Mg	-	15 after fallow
APK15F	A	PK(Na)Mg	-	15 after fallow
N----15F	N	-	-	15 after fallow
NP---15F	N	P	-	15 after fallow
N-K--15F	N	K(Na)Mg	-	15 after fallow
NPK--15F	N	PK(Na)Mg	-	15 after fallow
N--S-15F	N	Si	Si omitted	15 after fallow
NP-S-15F	N	P Si	"	15 after fallow
N-KS-15F	N	K(Na)MgSi	"	15 after fallow
NPKS-15F	N	PK(Na)MgSi	"	15 after fallow
N---S4BE	N	-	Si added	4 after beans
NP--S4BE	N	P	"	4 after beans
N-K-S4BE	N	K(Na)Mg	"	4 after beans
NPK-S4BE	N	PK(Na)Mg	"	4 after beans
N--SS4BE	N	Si	-	4 after beans
NP-SS4BE	N	P Si	-	4 after beans
N-KSS4BE	N	K(Na)MgSi	-	4 after beans
NPKSS4BE	N	PK(Na)MgSi	-	4 after beans
C(--)15F	C	-	PKMg omitted	15 after fallow
C(P-)15F	C	P	"	15 after fallow
C(-K)15F	C	K(Na)Mg	"	15 after fallow
C(PK)15F	C	PK(Na)Mg	"	15 after fallow
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(--)4BE	C	-	"	4 after beans
C(P-)4BE	C	P	"	4 after beans
C(-K)4BE	C	K(Na)Mg	"	4 after beans
C(PK)4BE	C	PK(Na)Mg	"	4 after beans
C(--)4PO	C	-	"	4 after potatoes
C(P-)4PO	C	P	"	4 after potatoes
C(-K)4PO	C	K(Na)Mg	"	4 after potatoes
C(PK)4PO	C	PK(Na)Mg	"	4 after potatoes

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82/R/HB/2

D15F	None	D	PKMg omitted	15 after fallow
(D)15F	(D)	-	"	15 after fallow
(A)15F	(Ashes)	-	"	15 after fallow
-15F	None	-	"	15 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	15th barley
561--PK	Plot 561 --PK	15th barley
571NN2--	Plot 571 NN2	15th barley
581NN2--	Plot 581 NN2	15th 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 except 4th and 5th barley after beans and 4th barley after potatoes.
(3) Glyphosate was applied to 'Form of N 1852 - 1966' 'N and C' plots at 1.4 kg.

Basal applications: Weedkillers: Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

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

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82/R/HB/2

Cultivations, etc.:-Glyphosate applied to 'Form of N 1852 - 1966' 'N and C' plots: 4 Nov, 1981. P and K applied: 12 Nov. Silicate of soda applied: 13 Nov. Chalk applied: 17 Nov. FYM applied: 18 Nov. Ploughed: 19 Nov. Spring-tine cultivated: 28 Mar, 1982. Seed sown: 29 Mar. N applied: 5 May. Weedkiller and fungicide applied: 17 May. Combine harvested: 16 Aug.

BARLEY

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---15F	0.40	1.14	0.60	0.76	0.73
-P-15F	0.60	1.82	1.82	1.42	1.42
--K15F	0.57	0.99	1.53	1.36	1.11
-PK15F	0.79	2.26	3.28	3.66	2.50
A--15F	0.40	0.59	0.59	0.60	0.55
AP-15F	0.82	1.64	2.03	1.21	1.42
A-K15F	0.59	0.78	1.37	0.78	0.88
APK15F	0.82	2.47	3.67	3.67	2.66
D15F	3.50	4.29	4.03	4.30	4.03
(D)15F	0.52	1.60	3.01	2.14	1.82
(A)15F	0.54	1.90	1.64	1.91	1.50
-15F	0.53	1.05	1.33	1.34	1.06
MEAN	0.84	1.71	2.07	1.93	1.64

STRAW MEAN DM% 88.5

PLOT AREA HARVESTED 0.00007

BARLEY

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	MEAN
MGNESIUM					
0	3.93	1.28	3.73	1.21	2.54
35	5.41	1.66	3.06	1.23	2.84
MEAN	4.67	1.47	3.39	1.22	2.69

GRAIN MEAN DM% 83.4

PLOT AREA HARVESTED 0.00306

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82/R/HB/2

BARLEY

GRAIN TONNES/HECTARE

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

N / MANURE	0	48	96	144	MEAN
---15F	0.81	1.04	1.08	1.15	1.02
-P-15F	1.95	3.61	3.85	2.54	2.99
--K15F	0.99	2.39	2.80	2.06	2.06
-PK15F	2.14	5.01	5.65	6.11	4.73
A--15F	0.77	1.03	1.08	1.12	1.00
AP-15F	1.93	3.01	3.45	1.89	2.57
A-K15F	0.92	1.32	1.67	1.64	1.39
APK15F	2.25	4.92	5.99	5.95	4.78
N----15F	0.75	0.94	0.95	1.13	0.94
NP---15F	2.24	4.37	4.56	3.19	3.59
N-K--15F	1.14	1.61	2.13	1.75	1.66
NPK--15F	2.50	4.96	5.92	6.02	4.85
N--S-15F	1.36	1.89	3.50	2.67	2.35
NP-S-15F	2.66	4.88	5.21	4.54	4.32
N-KS-15F	2.25	3.21	3.89	4.38	3.43
NPKS-15F	2.80	5.97	6.57	6.74	5.52
N---S4BE	1.76	1.71	3.27	2.21	2.24
NP--S4BE	2.87	5.30	5.98	6.34	5.12
N-K-S4BE	1.74	2.47	3.92	4.86	3.25
NPK-S4BE	3.09	6.02	6.81	6.12	5.51
N--SS4BE	1.90	2.43	3.06	3.66	2.76
NP-SS4BE	2.80	5.29	5.88	6.16	5.03
N-KSS4BE	2.23	3.32	4.78	5.55	3.97
NPKSS4BE	3.06	6.15	6.95	6.17	5.58
C(--)15F	1.77	3.49	3.57	4.52	3.34
C(P-)15F	2.67	4.95	4.99	4.77	4.34
C(-K)15F	2.32	3.91	5.40	5.16	4.20
C(PK)15F	2.63	5.28	6.08	5.90	4.97
C(--)5BE	1.71	3.03	3.04	4.14	2.98
C(P-)5BE	2.35	4.56	5.22	5.82	4.49
C(-K)5BE	2.27	5.11	5.25	5.89	4.63
C(PK)5BE	2.83	4.97	6.17	6.16	5.03
C(--)4BE	2.19	3.44	4.27	4.63	3.63
C(P-)4BE	2.54	4.70	5.61	5.93	4.69
C(-K)4BE	2.40	4.82	6.34	5.79	4.84
C(PK)4BE	2.95	5.72	6.02	5.92	5.15
C(--)4PO	2.19	3.57	4.21	4.54	3.63
C(P-)4PO	2.54	4.28	5.00	5.37	4.30
C(-K)4PO	2.13	4.34	5.72	5.59	4.45
C(PK)4PO	2.54	5.21	6.11	5.36	4.81
D15F	6.46	6.11	5.99	5.44	6.00
(D)15F	1.67	2.92	6.01	4.28	3.72
(A)15F	1.44	3.45	3.69	3.69	3.07
-15F	1.05	1.91	2.70	2.47	2.03
MEAN	2.17	3.83	4.55	4.44	3.75

GRAIN MEAN DM% 82.5

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82/R/WF/3

WHEAT AND FALLOW

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

The 127th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-81/R/WF/3.

Whole plot dimensions: 9.60 x 52.1.

Treatments:

PLOT	Plot number and phase of fallowing cycle (up to 1982):-									
1 FALL 3	Plot 1	F	W	F	W	F	W	F	F	F	W
-	Plot 2	W	F	W	F	F	F	W	F	W	F
3 FALL 1	Plot 3	F	F	F	W	F	W	F	W	F	W
-	Plot 4	W	F	W	F	W	F	F	F	W	F
5 FALL 1	Plot 5	F	W	F	F	F	W	F	W	F	W
-	Plot 6	F	F	W	F	W	F	W	F	W	F
7 FALL 1	Plot 7	F	W	F	W	F	F	F	W	F	W
-	Plot 8	W	F	F	F	W	F	W	F	W	F

W = w. wheat, F = fallow.

NOTE: The comparison of effects of three-year and one-year fallow started in 1932 was made for the last time in 1982.

Seed: Flanders, dressed chlorfenvinphos, sown at 200 kg.

Cultivations, etc.:-
Wheat plots: Ploughed: 29 Sept, 1981. Rotary harrowed: 15 Oct. Seed sown: 16 Oct. Combine harvested: 20 Aug, 1982.
Fallow plots: Ploughed: 29 Sept, 1981. Spring-tine cultivated: 15 Apr, 1982. Ploughed: 4 May. Spring-tine cultivated: 12 May. Ploughed: 17 June. Spring-tine cultivated: 30 June. Rotary harrowed: 29 July.

GRAIN TONNES/HECTARE

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

PLOT	1 FALL 3	3 FALL 1	5 FALL 1	7 FALL 1	MEAN
	1.42	1.29	1.41	1.39	1.38

GRAIN MEAN DM% 81.2

STRAW TONNES/HECTARE

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

PLOT	1 FALL 3	3 FALL 1	5 FALL 1	7 FALL 1	MEAN
	0.70	0.67	0.73	0.67	0.69

STRAW MEAN DM% 88.3

PLOT AREA HARVESTED 0.01483

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82/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 127th year, s. barley.

For previous years see 'Details' 1967, 1973 and 74-81/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

NOTE: Chalk was applied at 2.9 t to Plot 2 N0 and N48, Plot 4 all N rates, Plots 8 and 10 N96; at 5.8 t to Plot 2 N96 and N144, Plot 6 N0 and N96, Plots 8 and 10 N0, N48 and N144, at 8.7 t to Plot 6 N48 and N144.

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 'Banlene Plus' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

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

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82/R/EX/4

Cultivations, etc.:- Glyphosate applied: 27 Oct, 1981. Ploughed: 20 Nov. Spring-tine cultivated: 28 Mar, 1982. Rotary harrowed: 29 Mar. Seed sown: 30 Mar. Dicamba, mecoprop and MCPA applied with the fungicide: 26 May. Combine harvested: 16 Aug.

GRAIN TONNES/HECTARE

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

N / PLOTFERT(01)	0	48	96	144	MEAN
1-	0.67	0.87	1.06	1.70	1.07
2-	0.28	0.48	0.98	0.98	0.68
3D	2.80	4.36	4.15	4.90	4.05
4D	1.73	2.20	3.89	3.78	2.90
5N	0.72	1.00	1.19	1.62	1.13
6N*	0.45	0.53	0.54	0.32	0.46
7NMIN	1.79	2.47	2.61	3.61	2.62
8N*MIN	0.80	1.32	1.99	2.12	1.56
9P	2.34	3.04	2.40	3.26	2.76
10MIN	0.98	1.52	2.30	2.35	1.79
MEAN	1.26	1.78	2.11	2.46	1.90

GRAIN MEAN DM% 81.9

STRAW TONNES/HECTARE

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

N / PLOTFERT(01)	0	48	96	144	MEAN
1-	0.29	0.36	0.42	0.71	0.44
2-	0.21	0.27	0.35	0.42	0.31
3D	0.65	1.73	1.94	2.46	1.70
4D	0.50	1.06	1.66	1.37	1.15
5N	0.14	0.28	0.35	0.43	0.30
6N*	0.21	0.33	0.21	0.14	0.22
7NMIN	0.43	0.94	1.00	1.59	0.99
8N*MIN	0.40	0.99	0.99	1.18	0.89
9P	0.43	1.38	1.01	1.36	1.05
10MIN	0.46	1.21	1.29	1.34	1.08
MEAN	0.37	0.85	0.92	1.10	0.81

STRAW MEAN DM% 87.3

SUB PLOT AREA HARVESTED 0.00728

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82/R/PG/5

PARK GRASS

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

The 127th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-81/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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82/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 CaCO3 applied every fourth year 1920-1964):-

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

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

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

Cultivations, etc.:- Superphosphate applied, not completed: 7 Dec, 1981. Other mineral fertilizers applied: 1 Feb, 1982. Superphosphate application completed: 2 Feb. N treatments applied: 16 Apr. Cut: 6 July, 9 Nov.

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82/R/PG/5

1ST CUT (6/7/82) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	3.19	3.43	1.63	0.84	2.27
O(D)	3.23	3.80	2.70	1.80	2.89
O/PLOT3	3.05	3.77	2.13	2.03	2.75
P	3.04	3.70	2.56	2.54	2.96
N2P	4.08	3.82	4.05	2.72	3.67
N1MIN	5.77	5.48			5.62
MIN	4.92	5.02	3.88	3.31	4.28
PNAMG	2.97	3.19	3.24	3.11	3.13
N2MIN	4.86	5.17	5.43	4.59	5.01
N2PNAMG	4.04	4.36	4.34	3.03	3.94
N3MIN	6.28	5.70	6.03	4.98	5.75
N3MINSI	5.69	5.76	5.01	5.19	5.41
O/PLOT12	3.15	2.39	1.97	1.91	2.35
D/F	4.58	4.84	4.12	3.39	4.23
N2*MIN	5.56	5.12	4.86	5.43	5.24
MIN(N2*)	4.55	5.04	2.94	2.72	3.81
N1*MIN	5.06	5.39	4.87	4.18	4.87
N1*	3.67	3.18	2.93	2.44	3.06
N2KNAMG0			1.23	0.42	0.83
N2KNAMG2	3.93				3.93
N2KNAMG1	4.06	4.02			4.04
D0	4.55				4.55
D2	4.74				4.74
D1	4.63				4.63
D/N*PK0	5.49				5.49
D/N*PK2	5.23				5.23
D/N*PK1	4.87				4.87

1ST CUT MEAN DM% 24.1

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82/R/PG/5

2ND CUT (9/11/82) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	1.78	1.47	0.48	0.14	0.96
0(D)	1.28	1.57	1.22	0.95	1.26
0/PLOT3	1.04	1.17	0.70	0.83	0.94
P	0.97	1.06	0.69	0.86	0.90
N2P	0.87	1.30	0.55	0.90	0.90
N1MIN	1.62	1.33			1.47
MIN	1.51	1.42	1.45	1.06	1.36
PNAMG	0.83	1.27	1.18	1.12	1.10
N2MIN	1.49	1.38	0.99	0.91	1.19
N2PNAMG	1.11	1.11	0.93	0.89	1.01
N3MIN	1.95	1.39	1.36	2.29	1.75
N3MINSI	2.20	2.02	1.63	2.32	2.04
0/PLOT12	1.68	1.20	1.12	1.13	1.28
D/F	2.56	2.15	2.55	1.47	2.18
N2*MIN	1.64	1.85	1.63	1.36	1.62
MIN(N2*)	1.67	1.51	1.00	1.14	1.33
N1*MIN	1.55	1.87	1.52	1.48	1.61
N1*	1.46	1.61	2.36	1.61	1.76
N2KNAMG0			0.41	0.17	0.29
N2KNAMG2	1.39				1.39
N2KNAMG1	1.34	1.43			1.38
D0	1.93				1.93
D2	1.91				1.91
D1	2.03				2.03
D/N*PK0	1.73				1.73
D/N*PK2	1.64				1.64
D/N*PK1	1.64				1.64

2ND CUT MEAN DM% 24.4

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82/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	4.96	4.90	2.11	0.97	3.24
0(D)	4.52	5.37	3.92	2.75	4.14
0/PLOT3	4.09	4.94	2.84	2.86	3.68
P	4.01	4.76	3.25	3.40	3.86
N2P	4.95	5.12	4.60	3.62	4.57
N1MIN	7.40	6.80			7.10
MIN	6.44	6.44	5.33	4.37	5.64
PNAMG	3.80	4.46	4.41	4.24	4.23
N2MIN	6.35	6.55	6.43	5.50	6.21
N2PNAMG	5.15	5.48	5.27	3.92	4.95
N3MIN	8.23	7.09	7.40	7.27	7.50
N3MINSI	7.89	7.78	6.63	7.51	7.46
0/PLOT12	4.82	3.59	3.09	3.04	3.63
D/F	7.14	6.99	6.67	4.86	6.42
N2*MIN	7.20	6.98	6.49	6.80	6.87
MIN(N2*)	6.22	6.55	3.94	3.86	5.14
N1*MIN	6.62	7.25	6.39	5.66	6.48
N1*	5.13	4.79	5.29	4.06	4.82
N2KNAMG0			1.64	0.60	1.12
N2KNAMG2	5.32				5.32
N2KNAMG1	5.40	5.45			5.42
D0	6.49				6.49
D2	6.66				6.66
D1	6.66				6.66
D/N*PK0	7.23				7.23
D/N*PK2	6.87				6.87
D/N*PK1	6.51				6.51

TOTAL OF 2 CUTS MEAN DM% 24.3

PLOT AREA HARVESTED 0.00002

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82/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 13th year of revised scheme, w. beans, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-81/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 1982:

F/WHEAT	With fallow: Roots (turnips or swedes), s. barley, fallow, w. wheat 1848-1951. W. wheat (after w.beans 1981)
L/BEANS	With legume: Roots, s. barley, legume (clover or beans), w. wheat 1848-1951. W. beans (after w. wheat 1981)

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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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. On P-test half plots:
To RN CROP F/WHEAT. Residues of P_2O_5 applied 1970-72 (kg) and in 1979 and 1981 (kg):

P_2O_5 721

(0)0	None
(375)300	375 total in 1970-72, 150 in 1979, 150 in 1981

To RN CROP L/BEANS. Residues of P_2O_5 applied 1970-72 (kg) and fresh dressings 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

On K-test half plots:
To RN CROP F/WHEAT. Residues of K_2O applied 1973-76 (kg) and in 1979 and 1981 (kg):

K_2O 761

(0)0	None
(870)600	870 total in 1973-76, 300 in 1979, 300 in 1981

To RN CROP L/BEANS. Residues of K_2O applied 1973-76 (kg) and fresh dressings in 1980 and 1982 (kg):

K_2O 762

(0)0	None
(870)600	870 total in 1973-76, 300 in 1980, 300 in 1982

Standard applications:
Both crops: Weedkillers: Glyphosate at 1.4 kg in 250 l. Paraquat at 0.3 kg ion and diquat at 0.3 kg ion in 250 l.
W. beans: Weedkillers: Propyzamide at 0.85 kg in 250 l. Diquat at 0.42 kg ion (applied with 'Agral', a wetting agent) in 250 l.
Nematicide: Aldicarb at 10 kg.

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82/R/AG/6

W. wheat: Manures: 'Nitro-Chalk' at 130 kg and 770 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l. Glyphosate at 1.4 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l and on a second occasion at 0.25 kg in 250 l with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. beans: Throws MS, sown at 300 kg.
W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-
Both crops: Glyphosate applied: 16 Sept, 1981. Paraquat and diquat applied: 7 Oct.
W. beans: Aldicarb applied, seed direct drilled: 29 Oct, 1981. Propyzamide applied: 30 Oct. Diquat applied: 25 Aug, 1982. Combine harvested: 2 Sept.
W. wheat: Seed direct drilled: 13 Oct, 1981. Chlortoluron applied: 16 Oct. N applied: 25 Feb, 1982 and 23 Apr. Mecoprop, bromoxynil and ioxynil applied: 19 Apr. Propiconazole applied: 26 May. Propiconazole with insecticide applied: 15 June. Glyphosate applied: 4 Aug. Combine harvested: 21 Aug.

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82/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	6.51	7.73	7.06	6.26	3.88	3.80
	500	7.57	8.16	7.98	8.57	5.58	5.48
	1000	7.97	7.79	6.04	7.07	5.97	4.31
	2000	7.73	8.22	8.26	8.66	6.43	7.68
GRASS	0	5.27	7.44	4.65	7.37	7.06	7.73
	500	6.78	6.03	7.22	8.06	6.52	7.16
	1000	6.93	8.32	7.66	7.37	5.37	6.90
	2000	6.90	7.44	8.42	8.76	5.13	5.92

GRAIN MEAN DM% 83.6

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	7.35	8.36	8.41	8.08	7.55	7.89
	315	7.28	7.95	8.68	8.75	8.16	8.20
	630	7.99	8.56	6.40	7.16	7.87	7.68
	1260	7.85	8.14	7.15	6.87	7.75	7.37
GRASS	0	4.73	6.81	7.73	8.43	6.97	7.98
	315	6.78	7.74	8.09	8.11	7.48	8.62
	630	7.70	8.23	7.98	8.34	6.84	7.77
	1260	7.50	8.34	8.24	8.54	6.68	7.33

GRAIN MEAN DM% 83.7

PLOT AREA HARVESTED (OLDRESD NONE) 0.00121

PLOT AREA HARVESTED (REMAINDER) 0.00136

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82/R/AG/6

BEANS P PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	P205 721	(0)0	(375)300	(0)0	(375)300	(0)0	(375)300
PREVCROP	P205 64						
ARABLE	0	0.92	2.73	1.78	0.76	1.53	1.83
	500	1.98	2.93	2.37	1.95	0.47	0.54
	1000	2.48	2.99	0.45	0.99	1.61	1.53
	2000	1.40	3.57	1.60	2.57	0.85	1.00
GRASS	0	2.36	1.36	0.69	0.61	1.89	2.63
	500	1.87	0.85	0.11	0.53	1.88	1.29
	1000	1.61	0.85	0.46	0.61	2.10	1.29
	2000	2.62	1.11	0.76	0.39	2.82	2.94

GRAIN MEAN DM% 80.9

BEANS K PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	K20 761	(0)0	(870)600	(0)0	(870)600	(0)0	(870)600
PREVCROP	K20 64						
ARABLE	0	2.01	3.07	2.50	2.52	1.22	1.37
	315	3.36	3.69	2.56	3.11	0.70	0.46
	630	2.76	2.90	2.29	2.17	1.91	1.59
	1260	3.32	2.82	2.67	3.34	1.08	0.77
GRASS	0	2.61	2.11	1.15	1.22	1.04	2.44
	315	2.84	2.36	1.12	2.22	1.05	1.86
	630	2.87	1.61	2.06	0.76	0.38	0.76
	1260	2.60	1.18	2.41	2.57	0.38	1.13

GRAIN MEAN DM% 81.4

PLOT AREA HARVESTED (OLDRESD NONE) 0.00144

PLOT AREA HARVESTED (REMAINDER) 0.00127

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82/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 eighth year of Italian ryegrass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-81/R/BN/7.

Plot dimensions: Ryegrass: 10.7 x 55.9.

Treatments to ryegrass: All combinations of:-

Whole plots

1. MANURE — Fertilizers and organic manures:

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

N: 100 kg N before first cut, 75 kg N after first cut (not applied 1982). All as 'Nitro-Chalk'.
P: 35 kg P as single superphosphate (triple superphosphate in 1974).
K: 225 kg K as sulphate of potash
(Na): 90 kg Na as sodium chloride until 1973
Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973).
D: Farmyard manure at 35 tonnes (until 1975).

Quarter plots

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

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

Castor meal last applied 1961, others until 1959.

Plus one plot MANURE NKMG

NOTES: (1) P K and D treatments were applied to Sections 1 and 2 (fallow) until 1980 but not since.
(2) Grass was destroyed after the first cut preparatory to resowing.

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82/R/BN/7

Cultivations, etc.:-
Ryegrass: P applied: 13 Nov, 1981. K applied: 2 Feb, 1982. Mg applied: 3 Feb. N applied: 22 Mar. Cut: 2 June.
Fallow: Ploughed: 12 Nov, 1981. Spring-tine cultivated: 14 Apr, 1982. Rotary cultivated: 25 May. Spring-tine cultivated: 21 June.

1ST AND ONLY CUT (2/6/82) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	5.45	5.45	4.99	4.92	5.20
DNPK	5.91	5.49	5.04	5.30	5.43
NPKMG	4.66	4.02	4.10	4.36	4.28
NP	3.19	2.84	2.89	3.31	3.06
NPK	4.54	3.92	4.47	4.51	4.36
NPMG	3.34	2.66	3.06	3.61	3.17
N	2.65	2.02	2.65	2.79	2.53
MEAN	4.25	3.77	3.89	4.11	4.00

MANURE NKMG 3.67

GRAND MEAN 3.99

MEAN DM% 23.6

SUB PLOT AREA HARVESTED 0.00568

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82/R/GC/8

GARDEN CLOVER

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

Sponsor: J. McEwen.

The 129th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-81/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.02 x 1.42.

Treatments:

FUNGCIDE	Fungicide to control Sclerotinia trifoliorum:
NONE	None
BENOMYL	Benomyl at 0.6 kg in 800 l on 12 Oct, 1981; 10 Nov, 31 Dec, 1 Feb, 1982; 4 Mar.

Basal applications: Manures: Chalk at 1.25 t. (0:14:28) at 540 kg. Mg at 50 kg, as Epsom Salts. N at 125 kg, as 'Nitro-Chalk', in spring and after each cut except the last. Nematicide: Aldicarb at 10 kg.

Seed: Hungaropoly, sown in April 1979.

Cultivations, etc.:- Chalk, PK and Mg applied: 2 Feb, 1982. N applied: 23 Mar. Aldicarb applied: 31 Mar. Cut and N applied: 15 June, 19 July, 2 Sept. Cut: 25 Oct.

NOTE: N, P, K, Ca and Mg contents of herbage were measured.

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82/R/GC/8

1ST CUT (15/6/82) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	8.72	9.21	8.96

1ST CUT MEAN DM% 16.1

2ND CUT (19/7/82) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	5.78	4.76	5.27

2ND CUT MEAN DM% 12.9

3RD CUT (2/9/82) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	3.32	2.89	3.10

3RD CUT MEAN DM% 15.9

4TH CUT (25/10/82) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	0.84	0.93	0.89

4TH CUT MEAN DM% 16.8

TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	18.66	17.79	18.23

TOTAL OF 4 CUTS MEAN DM% 15.4

PLOT AREA HARVESTED 0.00010

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82/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 83rd year, grass, w. beans, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-81/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 killed with glyphosate at 1.8 kg in 200 l applied on 17 June, 1982 after the first cut; two cuts were taken from the other two blocks. Treatments to grass in 1982 were:

TREATMENT 1899-1965	OLDTREAT Grass 1966-79	NEWTREAT Grass 1966-82
	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 'Nitro-Chalk'
P: 1899-1965 40 kg P2O5 as single superphosphate. Since 1966 50 kg P2O5 as triple superphosphate

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82/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. beans in 1982. Yields were not taken.

MANURE	Manures applied 1899-1965 and 1966-82:
(D)P2	
BN	
(N)P2	
(P)P1	
(K)P2K	
(-)P2	
(PK)P1K	
(NK)P2K	
(NP)P1	
(NPK)P1K	

Symbols as above

The pair of blocks testing subsoiling were sown to w. wheat and tested all combinations of:

Whole plots

1. MANURE (as for w. beans above) 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) in spring as 'Nitro-Chalk' in addition to 40 kg N at sowing:

80
120
160
200

Standard applications:
W. beans: Fungicides: Benomyl at 0.56 kg in 220 l. Carbendazim (as 'Bavistin' at 0.56 kg) in 220 l.

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W. wheat: Weedkillers: Chlortoluron at 3.5 kg in 220 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l applied with the benomyl. Fungicides: Benomyl at 0.42 kg. Carbendazim, maneb and tridemorph (as 'Cosmic' at 3.9 kg) in 220 l with captafol at 1.1 kg on two occasions, on the second occasion with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. beans: Throws MS, sown at 250 kg.
W. wheat: Avalon, sown at 400 seeds per m^2.

Cultivations, etc.:-
W. beans: P, K and bonemeal applied: 2 Sept, 1981. Ploughed: 10 Sept. Seed sown: 23 Oct. Benomyl applied: 1 Apr, 1982. Carbendazim applied: 5 May. Combine harvested: 26 Aug.
W. wheat: P, K and bonemeal applied: 2 Sept, 1981. Ploughed: 10 Sept. Seed sown, seedbed N applied: 13 Oct. Chlortoluron applied: 14 Oct. Mecoprop, bromoxynil and ioxynil with benomyl applied: 1 Apr, 1982. N applied: 15 Apr. 'Cosmic' with captafol applied: 28 May. 'Cosmic' with captafol and pirimicarb applied: 30 June. Combine harvested: 11 Aug.
Grass section: P, K and bonemeal applied: 16 Feb, 1982. N applied: 23 Mar. Cut: 3 June. N applied: 17 June. Cut: 23 Aug.

NOTE: Yields of the first cut are based on all four blocks. Those of the second cut are based on the two blocks remaining after 17 June; the total of two cuts is based on the yields of these two blocks only.

GRASS

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

MANURE	1ST CUT(3/6/82)	2ND CUT(23/8/82)	TOTAL OF 2 CUTS
(D)N	5.47	3.36	8.63
BN	4.47	2.59	6.95
(N)P2N	4.87	3.71	8.56
(P)P1N	4.80	2.68	7.60
(K)P2KN	5.93	2.98	9.00
(-)P2N	4.75	3.03	8.41
(PK)P1KN	5.34	3.41	8.90
(NK)P2KN	5.56	3.37	9.22
(NP)P1N	4.89	2.75	8.06
(NPK)P1KN	5.69	2.89	8.91
MEAN	5.17	3.08	8.42
MEAN DM%	28.6	48.0	38.3

PLOT AREA HARVESTED 0.00095

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82/S/RN/1-3

WINTER WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT MANURE	CNVNTIAL	SUBDUG	SUBDUG+F	MEAN
(D)P2	8.95	8.35	8.73	8.68
BN	8.13	7.71	8.20	8.02
(N)P2	8.29	7.93	8.12	8.12
(P)P1	7.83	7.98	8.08	7.97
(K)P2K	7.26	7.78	7.76	7.60
(-)P2	7.75	8.04	8.06	7.95
(PK)P1K	7.65	7.75	7.74	7.71
(NK)P2K	7.48	7.84	7.87	7.73
(NP)P1	7.49	7.93	8.02	7.81
(NPK)P1K	7.58	8.10	8.24	7.97
MEAN	7.84	7.94	8.08	7.95

N MANURE	80	120	160	200	MEAN
(D)P2	7.75	8.40	8.46	10.10	8.68
BN	6.25	7.81	8.72	9.29	8.02
(N)P2	6.39	8.00	8.97	9.10	8.12
(P)P1	6.43	7.43	8.57	9.43	7.97
(K)P2K	6.01	7.39	8.23	8.77	7.60
(-)P2	6.38	7.42	8.65	9.34	7.95
(PK)P1K	6.20	7.44	8.37	8.85	7.71
(NK)P2K	6.00	7.34	8.67	8.90	7.73
(NP)P1	6.07	7.73	8.50	8.96	7.81
(NPK)P1K	6.79	7.31	8.38	9.40	7.97
MEAN	6.43	7.63	8.55	9.21	7.95

N TREATMNT	80	120	160	200	MEAN
CNVNTIAL	6.26	7.53	8.47	9.11	7.84
SUBDUG	6.43	7.60	8.45	9.27	7.94
SUBDUG+F	6.59	7.75	8.74	9.25	8.08
MEAN	6.43	7.63	8.55	9.21	7.95

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82/S/RN/1-3

WINTER WHEAT

GRAIN TONNES/HECTARE

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

MANURE	N / TREATMNT	80	120	160	200
(D)P2	CNVNTIAL	7.98	8.66	8.93	10.24
	SUBDUG	7.82	7.99	7.42	10.18
	SUBDUG+F	7.46	8.56	9.04	9.87
BN	CNVNTIAL	6.92	7.85	8.48	9.29
	SUBDUG	5.10	8.02	8.72	9.01
	SUBDUG+F	6.73	7.56	8.95	9.56
(N)P2	CNVNTIAL	6.65	7.75	9.18	9.60
	SUBDUG	6.09	7.98	9.08	8.58
	SUBDUG+F	6.42	8.29	8.66	9.12
(P)P1	CNVNTIAL	6.18	7.52	8.60	9.02
	SUBDUG	6.71	7.23	8.33	9.66
	SUBDUG+F	6.40	7.54	8.77	9.62
(K)P2K	CNVNTIAL	5.64	6.73	8.04	8.62
	SUBDUG	5.97	7.54	8.66	8.93
	SUBDUG+F	6.40	7.90	7.98	8.76
(-)P2	CNVNTIAL	5.89	7.48	8.49	9.12
	SUBDUG	6.51	7.62	8.54	9.47
	SUBDUG+F	6.73	7.15	8.93	9.43
(PK)P1K	CNVNTIAL	5.97	7.29	8.54	8.79
	SUBDUG	6.48	7.34	8.16	9.04
	SUBDUG+F	6.16	7.68	8.41	8.72
(NK)P2K	CNVNTIAL	5.43	7.40	8.66	8.43
	SUBDUG	5.98	7.42	8.54	9.41
	SUBDUG+F	6.59	7.20	8.81	8.87
(NP)P1	CNVNTIAL	5.56	7.73	8.12	8.56
	SUBDUG	6.67	7.37	8.64	9.04
	SUBDUG+F	5.97	8.10	8.74	9.29
(NPK)P1K	CNVNTIAL	6.36	6.85	7.62	9.47
	SUBDUG	6.96	7.54	8.45	9.43
	SUBDUG+F	7.06	7.52	9.08	9.29

GRAIN MEAN DM% 87.4

SUB PLOT AREA HARVESTED 0.00082

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82/S/RN/2

ROTATION II

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

Sponsor: A.E. Johnston.

The 13th year of revised scheme, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-81/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. Combinations of the following treatments were tested after both beans and wheat:

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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82/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

* Years shown are for wheat after wheat. Years for wheat after beans were 1979 and 1981 only.

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 150 kg as muriate of potash. Weedkillers: Isoproturon at 2.4 kg in 220 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l applied with the benomyl. Fungicides: Benomyl at 0.42 kg. Carbendazim, maneb and tridemorph (as 'Cosmic' at 3.9 kg) in 220 l with captafol at 1.0 kg applied on two occasions, the second time with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: Hustler, sown at 170 kg.

Cultivations, etc.:- K applied: 2 Sept, 1981. P applied: 3 Sept. Ploughed: 10 Sept. Seed sown, isoproturon applied: 14 Oct. Mecoprop, bromoxynil and ioxynil with benomyl applied: 1 Apr, 1982. N applied: 14 Apr. 'Cosmic' with captafol applied: 28 May. 'Cosmic' with captafol and pirimicarb applied: 30 June. Combine harvested: 11 Aug.

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82/S/RN/2

WHEAT AFTER WHEAT

GRAIN TONNES/HECTARE

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

RESIDUE	N P	80	120	160	200
(0)0	(0)(0)0			2.44	3.09
(0)0	(0)(3)0	4.37	3.07		
(0)0	(1)(3)1	4.29		6.49	
(0)0	(2)(3)1		6.59		7.03
(0)0	(3)(3)0		4.65		4.37
(D)0	(0)(0)0	4.25	6.82		
(D)0	(0)(3)0			6.01	5.24
(D)0	(1)(3)1		6.97		7.50
(D)0	(2)(3)1	5.75		7.52	
(D)0	(3)(3)0	5.83		5.85	
(DP)0	(0)(0)0			7.08	7.84
(DP)0	(0)(3)0	6.64	7.37		
(DP)0	(1)(3)1	7.28		8.05	
(DP)0	(2)(3)1		7.53		8.47
(DP)0	(3)(3)0		6.51		7.85
(DP)D2	(0)(0)0	7.41	7.64		
(DP)D2	(0)(3)0			8.90	7.63
(DP)D2	(1)(3)1	7.82		8.69	
(DP)D2	(2)(3)1		6.64		8.40
(DP)D2P1	(0)(0)0			7.43	8.21
(DP)D2P1	(0)(3)0	6.72	7.28		
(DP)D2P1	(1)(3)1	7.25		8.27	
(DP)D2P1	(2)(3)1		7.50		8.14
(DP)P1	(0)(0)0			8.67	9.13
(DP)P1	(0)(3)0	7.41	7.13		
(DP)P1	(1)(3)1		8.42		8.67
(DP)P1	(2)(3)1	7.23		9.31	
(DP)P2	(0)(0)0	6.69	7.26		
(DP)P2	(0)(3)0			8.66	8.39
(DP)P2	(1)(3)1		7.74		9.35
(DP)P2	(2)(3)1	8.03		8.27	
(DP52)0	(0)(0)0	6.60	7.24		
(DP52)0	(0)(3)0			8.06	9.33
(DP52)0	(1)(3)1		8.25		7.86
(DP52)0	(2)(3)1	7.06		8.32	
(DP52)0	(3)(3)0	6.93		7.83	

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00075

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82/S/RN/2

WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

RESIDUE	N P	80	120	160	200
(0)0	(0)(0)0	6.38	6.66		
(0)0	(0)(3)0			6.87	8.16
(0)0	(1)(3)1		8.98		9.73
(0)0	(2)(3)1	8.91		9.19	
(0)0	(3)(3)0	8.36		8.34	
(D)0	(0)(0)0			8.45	8.02
(D)0	(0)(3)0	9.28	9.28		
(D)0	(1)(3)1	9.67		9.92	
(D)0	(2)(3)1		10.31		10.37
(D)0	(3)(3)0		10.17		9.82
(DP)0	(0)(0)0	8.71	9.60		
(DP)0	(0)(3)0			10.26	10.24
(DP)0	(1)(3)1		10.51		9.55
(DP)0	(2)(3)1	10.10		10.44	
(DP)0	(3)(3)0	9.60		10.72	
(DP)D2	(0)(0)0			10.65	11.20
(DP)D2	(0)(3)0	10.08	10.37		
(DP)D2	(1)(3)1		10.42		10.79
(DP)D2	(2)(3)1	10.15		10.90	
(DP)D2P1	(0)(0)0	10.01	10.28		
(DP)D2P1	(0)(3)0			10.83	10.21
(DP)D2P1	(1)(3)1		10.33		11.04
(DP)D2P1	(2)(3)1	10.08		10.95	
(DP)P1	(0)(0)0	10.05	10.90		
(DP)P1	(0)(3)0			10.90	10.76
(DP)P1	(1)(3)1	9.96		10.97	
(DP)P1	(2)(3)1		10.99		11.17
(DP)P2	(0)(0)0			10.84	10.83
(DP)P2	(0)(3)0	9.73	9.82		
(DP)P2	(1)(3)1	9.14		10.90	
(DP)P2	(2)(3)1		10.60		10.99
(DP52)0	(0)(0)0			9.60	10.42
(DP52)0	(0)(3)0	9.10	9.96		
(DP52)0	(1)(3)1	9.44		10.63	
(DP52)0	(2)(3)1		10.51		10.37
(DP52)0	(3)(3)0		10.26		10.42

GRAIN MEAN DM% 87.5

PLOT AREA HARVESTED 0.00075

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82/R/RN/1 and 82/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 34th year, old grass, leys, potatoes, s. beans, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-81/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (82/R/RN/1)

FOSTERS — A site with little organic matter initially (82/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 much 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

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82/R/RN/1 and 82/R/RN/2

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

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 w. wheat. Treatment crop cycles start after nine previous cereals followed by one fallow. In treatment years yields are taken only from s. barley and w. wheat.

Additional treatments to 1st test crop potatoes 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 1982 (kg N as 'Nitro-Chalk'):

0
80
160
240

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

Sub plots

N Nitrogen fertilizer in 1982 (kg N as 'Nitro-Chalk'):

0
50
100
150

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82/R/RN/1 and 82/R/RN/2

Standard applications:
- Museum blocks:
  - 1st Treatment crops:
    - Lucerne: Manures: (0:20:20) at 380 kg. Weedkiller: Glyphosate at 1.4 kg in 250 l.
    - All-grass ley, clover-grass ley and 1-year seeds hay: Manures: (0:14:28) at 540 kg. Weedkiller: Glyphosate at 1.4 kg in 250 l.
    - All-grass ley and 1-year seeds hay: Manures: 'Nitro-Chalk' at 290 kg to the seedbed. (25:0:16) at 300 kg after each cut except the last.
  - 1st Test crop:
    - Potatoes: Manures: (0:20:20) at 1500 kg. Weedkillers: Linuron at 1.1 kg with paraquat at 0.5 kg ion in 250 l. Alloxydim-sodium at 1.9 kg in 900 l. Glyphosate at 1.4 kg in 250 l. Fungicides: Mancozeb at 1.4 kg in 250 l on four occasions, with pirimicarb on the last two. Ofurace at 0.12 kg and maneb at 1.2 kg in 250 l on two occasions, with pirimicarb on the first. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 220 l.
    - Reseeded grass and old grass: (0:14:28) at 540 kg. All grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last.
- New sequence blocks:
  - 3rd Treatment crops:
    - Lucerne: Manures: (0:14:28) at 720 kg.
    - Clover-grass ley and ryegrass: Manures: (0:14:28) at 720 kg, (25:0:16) at 300 kg in spring and, to ryegrass only, after each cut except the last.
    - W. wheat: Manures: (0:14:28) at 360 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkiller: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.1 kg in 250 l.
    - S. beans: Weedkiller: Trietazine at 1.0 kg and simazine at 0.14 kg in 250 l. Insecticide: Phorate at 2.2 kg, combine drilled.
  - 1st Test crop:
    - W. wheat:
      - After all sequences: Manures: (0:14:28) at 360 kg, combine drilled. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.1 kg in 250 l.
      - After GRASS/OG: Weedkiller: Glyphosate at 1.4 kg in 500 l.
  - 2nd and 3rd Test crops:
    - W. wheat: Manures: (0:14:28) at 360 kg, combine drilled. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.1 kg in 250 l. Glyphosate at 1.4 kg in 250 l.

Seed:
- Museum blocks:
  - Lucerne: Vertus, sown at 28 kg.
  - All-grass ley: Meadow fescue S215 (17 kg), Climax timothy (17 kg), mixture sown at 34 kg.
  - Clover-grass ley: Meadow fescue S215 (15 kg), Climax timothy (18 kg) and New Zealand white clover (4 kg), mixture sown at 37 kg.
  - 1-year seeds hay: RVP Italian ryegrass, sown at 25 kg.
  - Potatoes: Pentland Crown.

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82/R/RN/1 and 82/R/RN/2

New sequence blocks:
Beans: Minden, sown at 210 kg.
W. wheat: Flanders, sown at 200 kg.

Cultivations, etc.:-
Museum blocks:
1st Treatment crops:
Lucerne: Glyphosate applied: 16 Sept, 1981. Ploughed: 17 Nov. Spring-tine cultivated: 14 Apr, 1982. PK applied: 26 Apr. Rotary harrowed, rolled, seed sown: 27 Apr. Cut: 15 July, 25 Oct.
All-grass ley and clover-grass ley: Glyphosate applied: 16 Sept, 1981 (Highfield only), 23 Sept (Fosters only). Ploughed: 17 Nov. Spring-tine cultivated: 14 Apr, 1982. PK applied: 26 Apr. N applied (to all-grass ley only): 26 Apr. Rotary harrowed, rolled, seed sown: 27 Apr. Topped: 17 June. Cut: 13 July. NK applied, to all-grass ley only: 19 July. Cut: 25 Oct.
Hay: Glyphosate applied: 23 Sept, 1981. Ploughed: 17 Nov. Spring-tine cultivated: 14 Apr, 1982. PK and N applied: 26 Apr. Rotary harrowed, rolled, seed sown: 27 Apr. 1st cut: 13 July. NK applied: 19 July. 2nd cut: 25 Oct.
1st Test crop:
Potatoes: Glyphosate applied to ARABLE plots: 16 Sept, 1981 (Highfield), 23 Sept (Fosters). These plots ploughed: 17 Nov. Glyphosate applied to remaining plots: 1 Dec. These plots ploughed: 1 Feb, 1982. Spring-tine cultivated: 14 Apr. PK and N applied, spike rotary cultivated: 21 Apr. Planted: 21 Apr (Fosters), 22 Apr (Highfield). Rotary ridged: 8 May (Fosters), 10 May (Highfield). Linuron and paraquat applied: 17 May. Mancozeb with pirimicarb applied: 14 June. Alloxydim-sodium applied: 15 June. Mancozeb with pirimicarb applied: 30 June. Mancozeb applied: 12 July. Ofurace and maneb with pirimicarb applied: 26 July. Ofurace and maneb applied: 9 Aug. Mancozeb applied: 25 Aug. Haulm mechanically destroyed: 9 Sept. BOV applied: 22 Sept. Lifted: 1 Oct.
Reseeded grass and old grass: PK applied: 2 Feb, 1982 (Fosters), 3 Feb (Highfield). NK applied to all-grass half-plots: 23 Mar, 7 June, 19 July. Cut: 1 June, 13 July, 25 Oct.
New sequence blocks:
3rd Treatment crops:
Lucerne: PK applied: 2 Feb, 1982. Cut: 1 June, 14 July.
Clover-grass ley: PK applied: 2 Feb, 1982. NK applied: 23 Mar. Cut: 1 June, 14 July.
Ryegrass: PK applied: 3 Feb, 1982. NK applied: 23 Mar, 7 June. Cut: 1 June, 15 July.
W. wheat: Ploughed: 9 Oct, 1981. Rotary harrowed: 16 Oct. Seed sown: 17 Oct. Weedkillers applied: 14 Apr, 1982. N applied: 16 Apr. Combine harvested: 11 Aug (Fosters), 19 Aug (Highfield).
S. beans: Chisel ploughed: 9 Oct, 1981. Rotary harrowed, phorate applied and seed sown: 24 Mar, 1982. Weedkillers applied: 27 Mar. Combine harvested: 3 Sept (Fosters), 8 Sept (Highfield).

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82/R/RN/1 and 82/R/RN/2

1st Test crop:
W. wheat:
After lucerne, clover-grass ley and ryegrass (except GRASS/OG): Ploughed: 20 Aug, 1981. Disc harrowed: 24 Aug. Rotary harrowed: 16 Oct. Seed sown: 17 Oct.
After GRASS/OG: Glyphosate applied: 27 Aug, 1981. Seed direct drilled: 21 Oct.
After w. wheat and s. beans: Ploughed: 25 Sept, 1981. Rotary harrowed: 16 Oct. Seed sown: 17 Oct.
Subsequent operations to all sequences: Mecoprop, bromoxynil and ioxynil with isoproturon applied: 14 Apr, 1982. N applied: 16 Apr. Combine harvested: 11 Aug (Fosters), 19 Aug (Highfield).

2nd and 3rd Test crops:
W. wheat:
All sequences except GRASS/OG:
Glyphosate applied: 16 Sept, 1981 (Highfield), 23 Sept (Fosters). Ploughed: 25 Sept (Highfield), 9 Oct (Fosters). Rotary harrowed: 16 Oct. Seed sown: 17 Oct.
GRASS/OG only: Glyphosate applied: 16 Sept, 1981. Seed direct drilled and harrowed in: 21 Oct.
Subsequent operations to all sequences:
Mecoprop, bromoxynil and ioxynil with isoproturon applied: 14 Apr, 1982. N applied: 16 Apr. Combine harvested: 11 Aug (Fosters), 19 Aug (Highfield).

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82/R/RN/1 AND 82/R/RN/2

MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
TOTAL OF 2 CUTS	5.73	4.38
MEAN DM%	16.1	13.6
ALL GRASS LEY		
TOTAL OF 2 CUTS	7.52	5.74
MEAN DM%	17.7	17.1
LUCERNE		
TOTAL OF 3 CUTS	3.13	5.33
MEAN DM%	22.1	22.5
HAY		
TOTAL OF 2 CUTS	7.27	6.41
MEAN DM%	17.0	15.8
OLD GRASS		
TOTAL OF 3 CUTS		

	HIGHFIELD	
	C	N
34TH EXPTL YEAR		
BLOCKS 1 & 4	6.38	9.91
BLOCK 2	5.48	9.45
MEAN DM%	20.7	20.6

RESEEDED GRASS

TOTAL OF 3 CUTS

	HIGHFIELD			FOSTERS		
	BLOCKS	C	N	BLOCKS	C	N
34TH EXPTL YEAR	1 & 4	6.03	10.04	1 & 3	5.83	10.12
34TH EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	6.86	11.40	2 & 4	6.52	9.64
MEAN DM%		20.3	21.9		18.8	20.8

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82/R/RN/1 AND 82/R/RN/2

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

SEQUENCE	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	56.3	53.1	51.7	42.2	50.8
FYM	54.9	47.9	47.8	44.3	48.8
MEAN	55.6	50.5	49.8	43.3	49.8

N	0	80	160	240	MEAN
FYMRES70					
NONE	41.4	50.7	56.0	55.3	50.8
FYM	38.2	47.6	55.9	53.3	48.8
MEAN	39.8	49.1	55.9	54.3	49.8

N	0	80	160	240	MEAN
SEQUENCE					
LUCERNE	47.8	57.1	63.6	54.1	55.6
CLOGRA	43.2	48.7	56.2	53.8	50.5
GRASS	37.9	49.4	53.5	58.4	49.8
ARABLE	30.3	41.3	50.5	51.0	43.3
MEAN	39.8	49.1	55.9	54.3	49.8

	N	0	80	160	240
FYMRES70	SEQUENCE				
NONE	LUCERNE	49.8	58.9	62.1	54.5
	CLOGRA	46.7	50.6	60.4	54.6
	GRASS	40.1	49.1	55.3	62.4
	ARABLE	28.8	44.2	45.9	50.0
FYM	LUCERNE	45.7	55.3	65.0	53.8
	CLOGRA	39.7	46.9	52.0	53.1
	GRASS	35.6	49.8	51.6	54.4
	ARABLE	31.8	38.4	55.0	52.0

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82/R/RN/1 HIGHFIELD

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

SEQUENCE	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	96.3	96.8	95.2	93.6	95.5
FYM	96.3	95.5	95.8	92.9	95.1
MEAN	96.3	96.2	95.5	93.2	95.3

N	0	80	160	240	MEAN
FYMRES70					
NONE	94.2	95.4	95.9	96.4	95.5
FYM	94.2	95.1	95.8	95.5	95.1
MEAN	94.2	95.2	95.8	95.9	95.3

N	0	80	160	240	MEAN
SEQUENCE					
LUCERNE	95.4	96.6	96.8	96.2	96.3
CLOGRA	95.8	96.2	96.6	96.0	96.2
GRASS	93.8	95.8	95.8	96.8	95.5
ARABLE	91.6	92.4	94.2	94.8	93.2
MEAN	94.2	95.2	95.8	95.9	95.3

N		0	80	160	240
FYMRES70	SEQUENCE				
NONE	LUCERNE	95.7	96.1	97.2	96.0
	CLOGRA	96.7	96.0	97.2	97.3
	GRASS	93.3	95.6	95.6	96.4
	ARABLE	90.9	93.9	93.5	95.8
FYM	LUCERNE	95.1	97.1	96.5	96.4
	CLOGRA	95.0	96.4	95.9	94.6
	GRASS	94.3	96.0	95.9	97.1
	ARABLE	92.3	90.8	94.8	93.7

PLOT AREA HARVESTED 0.00373

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82/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

TOTAL TUBERS TONNES/HECTARE

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

SEQUENCE	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	50.0	45.6	42.5	40.0	44.5
FYM	51.0	45.9	46.2	39.7	45.7
MEAN	50.5	45.7	44.3	39.8	45.1

N	0	80	160	240	MEAN
FYMRES70					
NONE	32.5	43.5	49.4	52.6	44.5
FYM	35.7	44.0	50.6	52.5	45.7
MEAN	34.1	43.8	50.0	52.5	45.1

N	0	80	160	240	MEAN
SEQUENCE					
LUCERNE	44.2	51.6	52.3	53.8	50.5
CLOGRA	34.6	43.7	51.6	53.0	45.7
GRASS	33.2	42.0	50.1	52.0	44.3
ARABLE	24.4	37.8	46.0	51.2	39.8
MEAN	34.1	43.8	50.0	52.5	45.1

	N	0	80	160	240
FYMRES70	SEQUENCE				
NONE	LUCERNE	41.4	53.2	49.2	56.0
	CLOGRA	31.0	46.1	48.2	57.1
	GRASS	33.6	37.8	50.3	48.3
	ARABLE	23.9	37.1	49.9	49.0
FYM	LUCERNE	46.9	50.0	55.3	51.6
	CLOGRA	38.1	41.3	55.1	49.0
	GRASS	32.8	46.3	50.0	55.8
	ARABLE	24.9	38.5	42.0	53.4

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82/R/RN/2 FOSTERS

POTATOES 1ST TEST CROP

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

SEQUENCE	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES70					
NONE	94.5	93.5	94.2	93.0	93.8
FYM	95.0	94.6	95.2	92.8	94.4
MEAN	94.8	94.1	94.7	92.9	94.1

N	0	80	160	240	MEAN
FYMRES70					
NONE	91.4	93.4	95.2	95.1	93.8
FYM	93.2	93.7	95.0	95.8	94.4
MEAN	92.3	93.6	95.1	95.5	94.1

N	0	80	160	240	MEAN
SEQUENCE					
LUCERNE	93.2	94.7	95.0	96.1	94.8
CLOGRA	92.5	94.0	95.2	94.6	94.1
GRASS	92.6	94.6	95.9	95.7	94.7
ARABLE	90.8	91.0	94.2	95.5	92.9
MEAN	92.3	93.6	95.1	95.5	94.1

N		0	80	160	240
FYMRES70	SEQUENCE				
NONE	LUCERNE	92.1	95.3	94.0	96.5
	CLOGRA	90.2	94.2	94.4	95.2
	GRASS	92.2	94.7	96.2	93.6
	ARABLE	91.2	89.4	96.0	95.2
FYM	LUCERNE	94.3	94.1	96.0	95.7
	CLOGRA	94.8	93.8	96.0	93.9
	GRASS	93.0	94.4	95.5	97.8
	ARABLE	90.5	92.6	92.4	95.7

PLOT AREA HARVESTED 0.00373

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82/R/RN/1 HIGHFIELD

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	6.63	7.52	7.57	7.68	7.35
CLOGRA	3.88	6.11	5.85	6.15	5.50
GRASS/G	4.52	6.12	6.87	6.64	6.04
ARABLE/A	5.88	6.98	7.84	7.73	7.11
ARABLE/R	4.54	5.86	6.76	7.09	6.06
GRASS/OG	3.25	5.57	6.47	6.89	5.55
MEAN	4.78	6.36	6.89	7.03	6.27

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.231	0.145	0.385
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.356

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.231	3.7
BLOCK.WP.SP	18	0.356	5.7

GRAIN MEAN DM% 82.1

SUB PLOT AREA HARVESTED 0.00322

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82/R/RN/1 HIGHFIELD

WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	4.15	6.49	6.80	6.49	5.98
CLOGRA	4.02	6.11	6.64	6.94	5.93
GRASS/G	3.78	5.90	6.74	6.36	5.69
ARABLE/A	3.80	5.93	6.98	7.23	5.99
ARABLE/R	4.06	5.11	5.83	6.53	5.38
GRASS/OG	4.39	5.41	6.09	5.60	5.37
MEAN	4.03	5.82	6.51	6.53	5.72

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.264	0.170	0.447
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.417

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.264	4.6
BLOCK.WP.SP	18	0.417	7.3

GRAIN MEAN DM% 81.6

SUB PLOT AREA HARVESTED 0.00322

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82/R/RN/1 HIGHFIELD

WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	3.01	4.85	5.96	6.53	5.09
CLOGRA	3.27	5.31	6.04	6.90	5.38
GRASS/G	4.15	5.71	6.70	6.94	5.88
ARABLE/A	3.33	5.32	6.30	7.12	5.52
ARABLE/R	4.01	5.46	5.92	6.71	5.52
GRASS/OG	4.16	4.76	6.18	5.97	5.27
MEAN	3.66	5.24	6.18	6.70	5.44

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.412	0.171	0.549
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.418

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.412	7.6
BLOCK.WP.SP	18	0.418	7.7

GRAIN MEAN DM% 81.6

SUB PLOT AREA HARVESTED 0.00322

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WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	6.47	7.90	8.07	8.98	7.85
CLOGRA	4.14	6.08	6.61	7.55	6.10
GRASS/G	4.09	5.82	6.95	7.58	6.11
ARABLE/A	4.98	6.58	7.06	7.41	6.51
ARABLE/R	3.26	5.40	5.95	6.83	5.36
MEAN	4.59	6.36	6.93	7.67	6.39

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.169	0.157	0.348
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.351

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.169	2.6
BLOCK.WP.SP	15	0.351	5.5

GRAIN MEAN DM% 84.7

SUB PLOT AREA HARVESTED 0.00322

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82/R/RN/2 FOSTERS

WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	4.44	5.88	7.26	7.63	6.30
CLOGRA	3.73	5.99	7.03	7.41	6.04
GRASS/G	4.48	5.70	6.50	7.61	6.07
ARABLE/A	3.15	4.60	5.32	6.34	4.85
ARABLE/R	4.24	4.90	4.77	5.56	4.87
MEAN	4.01	5.41	6.18	6.91	5.63

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.427	0.135	0.500
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.301

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.427	7.6
BLOCK.WP.SP	15	0.301	5.4

GRAIN MEAN DM% 85.7

SUB PLOT AREA HARVESTED 0.00322

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82/R/RN/2 FOSTERS

WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	2.60	4.22	5.56	6.02	4.60
CLOGRA	3.61	5.08	6.40	6.99	5.52
GRASS/G	3.54	5.15	5.96	7.05	5.43
ARABLE/A	2.52	3.50	4.99	5.73	4.19
ARABLE/R	2.82	3.14	4.78	5.47	4.05
MEAN	3.02	4.22	5.54	6.25	4.76

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.195	0.106	0.282
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.236

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.195	4.1
BLOCK.WP.SP	15	0.236	5.0

GRAIN MEAN DM% 84.9

SUB PLOT AREA HARVESTED 0.00322

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82/W/RN/3

LEY/ARABLE

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

Sponsors: A.E. Johnston.

The 45th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-81/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), 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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82/W/RN/3

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:

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

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. FYMRES65 — Farmyard manure residues, last applied 1965:

   NONE — None
   FYM — 38 tonnes on each occasion

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82/W/RN/3

1/8 plots

3. N Nitrogen fertilizer (kg N):

0
60
120
180

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	163	151
LC	0	38
AF	264	276
AB	276	251
Ex-alternating rotations		
LN 8 ploughed for w. wheat	238	188
LN 8 not ploughed	126	100
LC 8 ploughed for w. wheat	13	25
LC 8 not ploughed	88	151

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. (0:14:28) at 530 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. (0:14:28) at 530 kg. K_2O at 48 kg in spring and after the first cut.
S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.
Fallow, 1st treatment crop: Glyphosate at 1.5 kg in 280 l.
S. beans, 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, 0.76 kg trietazine with 0.10 kg simazine in 280 l.
W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, chlortoluron at 5.6 l in 280 l. Nematicide: Aldicarb at 10 kg.
S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 300 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 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 ethirimol, sown at 160 kg.
S. beans: Minden, sown at 220 kg.
W. wheat: Avalon, sown at 200 kg.

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82/W/RN/3

Cultivations, etc.:- Treatment crops:

Grass ley and clover/grass ley, 1st year: Weedkiller applied: 1 Oct, 1981. Ploughed: 12 Nov. Spring-tine cultivated with crumbler attached, PK applied, N applied to grass ley only: 15 Apr, 1982. Spring-tine cultivated with crumbler attached: 19 Apr. Seeds sown: 29 Apr. Topped: 16 June, 29 June, 26 July. Cut: 8 Sept.

Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Magnesian limestone applied to 5th year only: 6 Oct, 1981. Corrective K applied to 4th year only: 5 Nov. PK applied: 5 Feb, 1982. NK applied to grass ley, K applied to clover/grass ley: 24 Mar, 15 June. Cut: 8 June, 8 Sept.

S. barley, 1st and 2nd treatment crops: Glyphosate applied: 1 Oct, 1981. Ploughed: 12 Nov. NPK applied, deep-tine cultivated: 25 Mar, 1982. Spring-tine cultivated with crumbler attached, seed sown: 29 Mar. 'Poly-Farmon' applied: 17 May. Combine harvested: 11 Aug.

S. beans, 3rd treatment crop: Glyphosate applied: 1 Oct, 1981. Ploughed: 13 Nov. PK applied, deep-tine cultivated: 25 Mar, 1982. Spring-tine cultivated: 29 Mar. Seed sown: 30 Mar. Simazine and trietazine applied: 5 Apr. Combine harvested: 4 Sept.

Fallow, 1st and 2nd treatment years: Glyphosate applied to 1st treatment year only: 1 Oct, 1981. Ploughed: 12 Nov. Spring-tine cultivated: 15 Apr, 1982, 19 Apr, 5 July. Deep-tine cultivated: 16 June.

Test crops:

W. wheat, 1st test crop: Glyphosate applied after beans: 1 Oct, 1981, after leys: 14 Oct. Ploughed: 4 Nov. Corrective K applied, PK applied, aldicarb applied, rotary cultivated, seed sown: 5 Nov. Chlortoluron applied: 13 Nov. N applied: 15 Apr, 1982. Combine harvested: 16 Aug.

S. barley, 2nd test crop: Glyphosate applied: 1 Oct, 1981. Magnesian limestone applied: 6 Oct. Ploughed: 13 Nov. PK applied, deep-tine cultivated: 25 Mar, 1982. Aldicarb applied, rotary cultivated, seed sown: 29 Mar. N applied: 1 Apr. 'Poly-Farmon' applied: 17 May. Combine harvested: 11 Aug.

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82/W/RN/3

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	70	140	210	MEAN
FYMRES66					
NONE	5.16	7.50	8.23	8.11	7.25
FYM	5.31	7.60	8.03	7.96	7.23
MEAN	5.23	7.55	8.13	8.04	7.24

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
FYMRES66							
NONE	7.27	7.47	7.79	7.37	7.18	6.42	7.25
FYM	7.32	7.16	8.17	7.01	6.72	6.97	7.23
MEAN	7.29	7.32	7.98	7.19	6.95	6.70	7.24

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
N							
0	5.55	5.37	6.56	5.16	4.30	4.47	5.23
70	8.04	7.91	8.36	7.81	6.82	6.38	7.55
140	8.27	7.53	8.60	8.38	8.16	7.82	8.13
210	7.31	8.46	8.41	7.40	8.52	8.13	8.04
MEAN	7.29	7.32	7.98	7.19	6.95	6.70	7.24

	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
FYMRES66	N						
NONE	0	5.59	5.95	6.17	5.38	4.41	3.44
	70	7.90	7.96	8.42	7.28	7.52	5.94
	140	8.27	7.59	8.64	8.43	8.31	8.12
	210	7.30	8.39	7.92	8.39	8.48	8.19
FYM	0	5.50	4.78	6.96	4.93	4.19	5.50
	70	8.17	7.86	8.29	8.35	6.11	6.82
	140	8.27	7.46	8.56	8.33	8.02	7.52
	210	7.32	8.54	8.89	6.41	8.56	8.06

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00251

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82/W/RN/3

BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N	0	60	120	180	MEAN
FYMRES65					
NONE	4.06	6.63	8.09	7.97	6.69
FYM	4.65	6.87	8.21	7.67	6.85
MEAN	4.36	6.75	8.15	7.82	6.77

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
FYMRES65							
NONE	6.53	7.14	7.35	7.27	5.72	6.12	6.69
FYM	7.32	6.87	7.53	7.04	6.15	6.19	6.85
MEAN	6.93	7.01	7.44	7.16	5.94	6.15	6.77

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
N							
0	5.17	5.04	5.66	5.00	2.40	2.86	4.36
60	6.98	7.11	7.87	7.78	5.20	5.55	6.75
120	7.91	8.40	8.72	8.21	7.65	8.02	8.15
180	7.63	7.47	7.50	7.65	8.49	8.19	7.82
MEAN	6.93	7.01	7.44	7.16	5.94	6.15	6.77

	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
FYMRES65	N						
NONE	0	4.03	5.21	5.17	5.01	2.32	2.60
	60	6.84	7.29	7.41	7.70	4.76	5.78
	120	7.44	8.53	8.81	8.49	7.50	7.77
	180	7.81	7.52	7.99	7.90	8.30	8.33
FYM	0	6.32	4.87	6.14	4.99	2.48	3.12
	60	7.13	6.94	8.33	7.86	5.65	5.31
	120	8.38	8.26	8.63	7.94	7.80	8.26
	180	7.46	7.41	7.01	7.39	8.67	8.06

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.00251

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82/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 27th year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980, w. barley, ley, potatoes, w. wheat, w. oats in 1981. The 22nd 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 26th 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 69-81/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): 80, 160 (w. wheat): 125, 250 (potatoes, w. barley, w. oats 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) N rates applied to w. barley and w. oats were, in error, greater than the planned rates of 80 and 160 kg N.

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82/R/RN/5

Additional plots

MANURE	Fertilizers from 1980 to 1982 and in previous years:
1980-82	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: From 1980 to 1982: N1: 20 kg (ley), 80 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). In 1980 all N rates to w. oats were 10 kg N greater. Until 1979 N2 = larger rate on original plots in these years. As urea in all years.

P: 126 kg P2O5 as potassium dihydrogen phosphate

K: 251 kg K2O total. As potassium dihydrogen phosphate (83 kg K2O) on all PK plots. In addition plots without S receive 168 kg K2O as potassium chloride, plots with S receive 92 kg K2O as potassium sulphate plus 76 kg K2O as potassium chloride. Since 1978 all PK plots receive in addition to the standard total 126 kg K2O 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 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 and mecoprop at 0.95 kg in 280 l applied with the tridemorph. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l applied with the benomyl. Fungicides: Tridemorph at 0.53 kg. Benomyl at 0.28 kg. Insecticide: Permethrin at 0.05 kg in 270 l.

W. wheat: Additional fungicides: Carbendazim, maneb and tridemorph (as 'Cosmic' at 3.9 kg) in 220 l applied with the pirimicarb. Propiconazole at 0.13 kg in 220 l applied with the pirimicarb. Additional insecticide: Pirimicarb at 0.14 kg in 220 l. Growth regulator: Chlormequat at 1.9 kg in 220 l.

W. barley: Additional weedkiller: Chlortoluron at 3.5 kg in 280 l . Additional fungicide: Tridemorph at 0.53 kg in 280 l. 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: Additional fungicide: Tridemorph at 0.53 kg in 280 l. 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 on two occasions. Insecticide: Pirimicarb at 0.14 kg.

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82/R/RN/5

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

Cultivations, etc.:-
W. wheat: Dug by hand: 22 Sept, 1981 (original plots), 24 Sept (additional plots). P and K applied to original plots; P, K, Mg and S to additional plots: 28 Sept. Mg applied to original plots, all plots raked level, seed sown and raked in: 29 Sept. Ioxynil and mecoprop with tridemorph applied, permethrin applied: 3 Nov. Mecoprop, bromoxynil and ioxynil with benomyl applied: 2 Apr, 1982. N applied: 19 Apr. Growth regulator applied: 29 Apr. Propiconazole with pirimicarb applied: 3 June. Pirimicarb applied: 18 June. Carbendazim, maneb and tridemorph with pirimicarb applied: 2 July. Harvested by hand: 17 Aug.
W. barley: Rotary cultivated: 17 Aug, 1981. P and K applied to original plots; P, K, Mg and S to additional plots, raked level, seed sown and raked in: 23 Sept. Chlortoluron applied: 28 Sept. Omethoate applied: 22 Oct. Ioxynil and mecoprop, with tridemorph applied, permethrin applied: 3 Nov. N applied: 31 Mar, 1982. Mecoprop, bromoxynil and ioxynil with benomyl applied: 2 Apr. Growth regulator applied: 29 Apr. Tridemorph applied: 19 May. Harvested by hand: 21 July.
W. oats: Rotary cultivated: 14 Aug, 1981. P and K applied to original plots: 28 Sept. P, K Mg and S applied to additional plots, all plots raked level, seed sown and raked in: 29 Sept. Ioxynil and mecoprop with tridemorph applied, permethrin applied: 3 Nov. N applied: 31 Mar, 1982. Mecoprop, bromoxynil and ioxynil with benomyl applied: 2 Apr. Growth regulator applied: 29 Apr. Tridemorph applied: 19 May. Harvested by hand: 2 Aug.
Potatoes: FYM applied to original plots, dug by hand: 26 Oct, 1981. Extra K applied to additional plots, dug by hand: 27 Oct. P and K applied to original plots; P, K, Mg and S applied to additional plots: 28 Oct. N applied to original plots, first half of N to additional plots, both plots rotary cultivated twice, raked, potatoes planted and ridged by hand: 27 Apr, 1982. Linuron and paraquat applied: 17 May. Second half of N applied to additional plots: 25 May. Fungicide and insecticide applied: 18 June, 2 July. Plots given neither FYM nor K harvested by hand: 23 Aug. Remaining plots harvested by hand: 9 Sept.
Grass-clover ley: Rotary cultivated, raked level, seed sown and raked in: 14 Aug, 1981. P and K applied to original plots; P, K, Mg and S applied to additional plots: 28 Oct. N applied: 17 Mar, 1982. Cut: 19 May, 9 July, 23 Sept.
Permanent grass: PK applied: 28 Oct, 1981. FYM and first N applied: 17 Mar, 1982. Second N applied: 19 May. Final N applied: 9 July. Cut: 19 May, 9 July, 23 Sept.

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82/R/RN/5

GREAT FIELD IV (R):ORIGINAL PLOTS

TONNES/HECTARE

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

LEY : DRY MATTER

	WINTER WHEAT:		BARLEY:		1ST	2ND	3RD	TOTAL OF
	GRAIN	STRAW	GRAIN	STRAW	CUT	CUT	CUT	3 CUTS
MANURE								
0	2.67	3.67	1.53	1.56	1.53	1.96	1.83	5.32
N1	3.38	4.65	2.86	3.05	2.49	2.37	1.93	6.79
P	4.61	3.32	2.97	2.76	1.16	1.49	1.14	3.79
N1P	1.52	3.41	2.07	2.32	2.03	2.13	1.30	5.46
K	4.50	4.66	3.03	2.67	2.39	3.02	3.44	8.86
N1K	7.01	6.73	6.10	5.09	3.49	2.83	2.21	8.53
PK	5.10	5.54	3.87	3.11	3.84	4.64	5.60	14.08
N1PK	7.29	7.09	7.62	6.77	4.70	4.48	5.46	14.64
N2PK	8.09	8.82	7.25	12.23	6.22	4.38	4.77	15.38
D	6.53	7.72	4.52	4.55	3.86	3.95	4.73	12.54
N1PKD	8.51	9.40	7.43	9.38	5.67	4.96	5.65	16.28
N2PKD	9.49	11.46	8.14	9.31	7.51	4.44	5.32	17.26
MEAN DM%	82.8	78.6	82.6	60.0	27.3	23.2	26.8	25. 8

	OATS:		POTATOES:	PERMANENT GRASS : DRY MATTER			
	GRAIN	STRAW	TOTAL TUBERS	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE							
0	4.43	4.64	17.3	0.24	0.97	0.78	1.99
N1	5.60	5.50	25.8	0.76	1.96	1.47	4.19
P	3.94	3.85	13.5	0.26	1.09	0.73	2.08
N1P	2.80	5.08	13.8	1.04	2.47	1.59	5.11
K	3.90	4.80	27.5	0.35	1.27	0.97	2.59
N1K	6.56	8.87	36.5	0.98	2.28	2.00	5.26
PK	4.64	5.55	37.1	0.48	1.53	1.01	3.02
N1PK	7.42	12.94	54.4	1.30	2.80	1.91	6.01
N2PK	7.97	11.04	59.2	2.56	3.63	2.73	8.92
D	5.14	6.22	56.9	2.53	2.43	1.78	6.73
N1PKD	7.92	13.50	65.0	4.06	3.69	2.32	10.06
N2PKD	6.87	16.38	75.0	4.57	4.25	3.48	12.30
MEAN DM%	82.6	63.3	23.0	29.2	28.0	32.0	29.7

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82/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

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

	WINTER WHEAT:		BARLEY:		OATS:		POTATOES: TOTAL
	GRAIN	STRAW	GRAIN	STRAW	GRAIN	STRAW	TUBERS
MANURE							
0	4.20	4.35	1.89	1.90	4.99	5.54	14.6
N2PK	8.92	10.37	7.84	10.09	6.90	10.05	63.2
N2PKMG	7.33	8.44	7.92	7.38	7.57	11.40	67.7
N2PKS	7.07	6.70	8.74	9.13	7.44	10.38	66.3
N2PKMGS	8.05	9.14	7.68	9.56	7.54	10.88	62.5
N1PKMGS	7.12	9.27	7.29	7.14	7.37	9.45	60.7
N3PKMGS	7.61	8.78	8.15	8.19	7.45	11.68	67.3
MEAN DM%	82.8	77.2	83.0	61.2	84.0	69.7	23.7

	LEY : DRY MATTER			
	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE				
0	2.63	2.16	2.16	6.95
N2PK	5.89	4.73	4.46	15.08
N2PKMG	6.08	5.31	5.21	16.61
N2PKS	6.45	4.62	4.40	15.47
N2PKMGS	5.85	4.75	4.64	15.24
N1PKMGS	5.34	5.23	5.03	15.61
N3PKMGS	6.02	4.88	4.56	15.46
MEAN DM%	26.3	20.4	25.2	24.0

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82/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 22nd year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-81/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: 1 Oct, 1981
	ROTA DIG	Cultivated by rotary digger: 7 Oct
	DEEPTINE	Deep-tine cultivated: 28 Sept
2.	WEEDCNTL(76)	Weed control to beans and potatoes in the rotation beans, wheat, potatoes, barley practised until 1976. Last applied to beans 1976:
	MECHANCL	Mechanical
	RESIDUAL	Residual weedkiller (duplicated)

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 1982):
	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.

EXTRA plus three extra whole plot treatments; all given simazine to beans in 1976, paraquat to preceding cereal stubble, direct drilled 1981 and 1982, but differing in cultivations for 1979 barley:

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82/R/RN/8

DD(SP T)	Heavy spring-tine cultivated twice for 1979 barley, with sub plot test 3 above.
DD(SH P)	Shallow ploughed for 1979 barley, with sub plot test 3 above.
DD(PL)	Ploughed for 1979 barley, with sub plot test 3 above.

NOTE: Paraquat was applied to direct drilled plots at 0.56 kg ion in 220 l.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 630 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Chlortoluron at 5.6 l in 250 l. Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) applied with the prochloraz in 250 l. Fungicides: Prochloraz at 0.4 kg. Propiconazole at 0.25 kg in 250 l.

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

Cultivations, etc.:- Glyphosate applied: 16 Sept, 1981. Paraquat applied to EXTRA plots and these plots direct drilled, remaining plots rotary harrowed, seed sown: 23 Oct. Chlortoluron applied: 24 Oct. Dicamba, mecoprop and MCPA applied with prochloraz: 14 Apr, 1982. N applied: 22 Apr. Propiconazole applied: 3 June. Combine harvested: 26 July.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

EXTRA / WEEDKLLR(75)	DD(SP T)	DD(SH P)	DD(PL)	MEAN
NONE	6.44	6.73	6.68	6.62
HORMONE	6.96	6.09	7.03	6.69
MEAN	6.70	6.41	6.85	6.66

GRAIN MEAN DM% 81.6

SUB PLOT AREA HARVESTED 0.00347

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82/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

CULTIVTN WEEDCNTL(76)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
MECHANCL	6.01	6.89	7.00	6.63
RESIDUAL	6.39	6.54	6.71	6.55
MEAN	6.26	6.65	6.81	6.58

CULTIVTN WEEDKLLR(75)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
NONE	6.35	6.63	6.81	6.60
HORMONE	6.18	6.67	6.81	6.55
MEAN	6.26	6.65	6.81	6.58

CULTIVTN WEEDKLLR(81)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
NONE	6.23	6.69	6.85	6.59
PARAQUAT	6.29	6.62	6.77	6.56
MEAN	6.26	6.65	6.81	6.58

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

TABLE	CULTIVTN	WEEDCNTL(76)	WEEDKLLR(75)	WEEDKLLR(81)
SED	0.130	0.113	0.080	0.080

TABLE	CULTIVTN WEEDCNTL(76)	CULTIVTN WEEDKLLR(75)	CULTIVTN WEEDKLLR(81)	
SED	0.225			MIN REP
	0.195	0.163	0.163	MAX-MIN
	0.159			MAX REP
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CULTIVTN		0.139	0.139	

	WEEDCNTL(76)
MIN REP	MECHANCL
MAX-MIN	MECHANCL V RESIDUAL
MAX REP	RESIDUAL

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.225	3.4
BLOCK.WP.SP	10	0.241	3.7

GRAIN MEAN DM% 83.6

SUB PLOT AREA HARVESTED 0.00347

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82/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 18th year, w. beans, w. wheat, ley.

For previous years see 'Details' 1973 and 74-81/W/RN/12.

Design for w. beans and w. wheat: 2 blocks of 4 plots
1st, 2nd, 3rd and 4th 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 w. wheat in 1982 and the second pair w. beans.

W. beans and w. wheat tested:

MANURE	Organic manures and fertilizers in 1982, cumulative to 1981 (w. wheat 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. 1st and 2nd year leys tested:

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

3rd and 4th year leys tested:

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

Standard applications:
W. wheat: Manures: N at 150 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 kg in 280 l, isoproturon at 2.1 kg in 280 l.
W. beans: Weedkillers: Glyphosate at 1.5 kg in 280 l. Propyzamide at 0.84 kg in 280 l.

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82/W/RN/12

Clover/grass leys, 1st, 2nd, 3rd and 4th years: Manures: P_2O_5 at 140 kg, K_2O at 280 kg as (0:14:28), MgO at 50 kg as kieserite. N at 50 kg as 'Nitro-Chalk' to 1st year ley only. Weedkiller: Glyphosate at 1.5 kg in 280 l for 1st year ley only.

Seed: W. wheat: Avalon, sown at 190 kg.
W. beans: Throws MS, sown at 250 kg.
Clover/grass ley: Climax timothy at 13.4 kg, S215 Meadow fescue at 11.2 kg, Huia white clover at 3.4 kg. Mixture sown at 28 kg.

Cultivations, etc.:-
W. wheat: Glyphosate applied: 16 Sept, 1981. PK and Mg applied to FERT-FYM plots only, FYM applied to FYM plots only: 8 Oct. PK and straw applied to STRAW plots only, ploughed: 6 Nov. PK applied to FERT-FYM and FERT-STR plots only. Mg applied to FERT-FYM, FERT-STR and STRAW plots only, spring-tine cultivated with crumbler attached: 9 Nov. Seed sown: 10 Nov. N applied: 14 Apr, 1982. Isoproturon applied: 15 Apr. Combine harvested: 16 Aug.
W. beans: Glyphosate applied: 1 Oct, 1981. PK and Mg applied to FERT-FYM plots only, FYM applied to FYM plots only: 8 Oct. PK and straw applied to STRAW plots only, ploughed: 6 Nov. PK applied to FERT-FYM and FERT-STR plots only, Mg applied to FERT-FYM, FERT-STR and STRAW plots only: 9 Nov. Spring-tine cultivated with crumbler attached, seed sown: 10 Nov. Propyzamide applied: 13 Nov. Combine harvested: 13 Aug, 1982.
1st year clover/grass ley: Glyphosate applied: 1 Oct, 1981. Ploughed: 6 Nov. PK and Mg applied: 9 Nov. Spring-tine cultivated with crumbler attached: 10 Nov, 15 Apr, 1982, 19 Apr. N applied: 15 Apr, 23 June. Seed sown: 29 Apr. Topped: 16 June, 29 June, 26 July.
2nd, 3rd and 4th year clover/grass ley: PK and Mg applied: 9 Nov, 1981. Cut: 7 July, 1982.

WINTER BEANS

GRAIN TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	MEAN
	4.77	5.05	4.41	4.67	4.73

GRAIN MEAN DM% 84.2

PLOT AREA HARVESTED 0.02471

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82/W/RN/12

WHEAT

GRAIN TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	MEAN
	5.26	4.12	2.59	3.01	3.74

GRAIN MEAN DM% 80.7

STRAW TONNES/HECTARE

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	MEAN
	2.32	1.80	1.51	1.41	1.76

STRAW MEAN DM% 75.3

PLOT AREA HARVESTED 0.00796

2ND YEAR LEY

1ST CUT (7/7/82) DRY MATTER TONNES/HECTARE

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

PREV LEY	LC(LC)	LC(LN)	MEAN
	6.34	7.02	6.68

1ST CUT MEAN DM% 33.6

3RD YEAR LEY

1ST CUT (7/7/82) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	5.21	5.87	5.54

1ST CUT MEAN DM% 30.6

4TH YEAR LEY

1ST CUT (7/7/82) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	6.40	5.00	5.70

1ST CUT MEAN DM% 36.6

PLOT AREA HARVESTED 0.00265

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82/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 17th year, w. wheat, ley.

For previous years see 'Details' 1973 and 74-81/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: (10:23:23) at 280 kg, N at 150 kg as 'Nitro-Chalk'.
Weedkillers: Glyphosate at 1.5 kg in 280 l, chlortoluron at 3.5 kg in 280 l.
1st year, clover/grass ley: Manures: (10:23:23) at 280 kg. N at 40 kg as 'Nitro-Chalk'.
Weedkiller: Glyphosate at 1.5 kg in 280 l.
2nd year, clover/grass ley: Manures: (0:14:28) at 490 kg.

Seed: W. wheat: Avalon, sown at 190 kg.
Ley: S23 perennial ryegrass at 31 kg, Blanca white clover at 8 kg, mixture sown at 39 kg.

Cultivations, etc.:-
W. wheat: Glyphosate applied: 16 Sept, 1981. Ploughed: 25 Sept. NPK applied: 29 Sept. Spring-tine cultivated with crumbler attached: 7 Oct. Seed sown: 8 Oct. Chlortoluron applied: 15 Oct. N applied: 14 Apr, 1982. Combine harvested: 3 Aug.

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82/W/RN/13

1st year ley: Glyphosate applied: 16 Sept, 1981. Ploughed: 25 Sept. NPK applied: 29 Sept. Spring-tine cultivated with crumbler attached: 7 Oct, 15 Apr, 1982, 19 Apr. Seeds sown: 29 Apr. Topped: 16 June. N applied: 23 June. Cut: 13 July.
2nd year ley: PK applied: 8 Feb, 1982. Cut: 13 July.

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82/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.

Sponsor: J. McEwen.

The ninth year, s. barley and s. oats.

For previous years see 74-81/W/RN/16.

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

Whole plot dimensions: 4.27 x 2.59.

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

PK SUB	Extra PK	Subsoil (25-50 cm) treatment
- - -	None	None
- - 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 P2O5, as superphosphate and 460 kg K2O as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and subsoil.
(2) Subsoiling was done by spade, after removing the topsoil which was then replaced. PK to subsoil was worked in by forking.
(3) PK to topsoil was applied half before ploughing in autumn half soon after on the plough furrow.
(4) Each series followed the rotation w. wheat, sugar beet, s. barley, potatoes until 1977, all were s. barley from 1978 to 1981, two were s. barley in 1982, one was s. oats, one was fallow.

Basal applications:
S. barley, s. oats: Manures: Magnesian limestone at 5.0 t, (20:10:10) at 590 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.
Fallow: Manures: Magnesian limestone at 5.0 t. Weedkiller: Glyphosate at 1.5 kg in 280 l.

Seed: S. barley: Triumph, dressed with ethirimol, sown at 160 kg.
S. oats: Peniarth, sown at 200 kg.

Cultivations, etc.:-
S. barley, s. oats: Glyphosate applied: 1 Oct, 1981. Magnesian limestone applied: 6 Oct. Ploughed: 17 Nov. Deep-tine cultivated: 25 Mar, 1982. NPK applied, spring-tine cultivated with crumbler attached: 26 Mar. Seed sown: 27 Mar. 'Poly-Farmon' applied: 14 May. Harvested by hand: 5 Aug.
Fallow: Glyphosate applied: 1 Oct, 1981. Magnesian limestone applied: 6 Oct. Ploughed: 17 Nov. Deep-tine cultivated: 25 Mar, 1982. Spring-tine cultivated with crumbler attached: 26 Mar.

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82/W/RN/16

SERIES II S.BARLEY

GRAIN TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	5.39	5.22	5.22	5.57	5.35

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

TABLE	PK SUB
SED	0.314

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.385	7.2

GRAIN MEAN DM% 76.5

STRAW TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	4.27	3.82	3.80	3.87	3.94

STRAW MEAN DM% 59.7

PLOT AREA HARVESTED 0.00071

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82/W/RN/16

SERIES IV S.BARLEY

GRAIN TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	4.73	4.68	5.06	5.02	4.87

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

TABLE	PK SUB
SED	0.398

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.488	10.0

GRAIN MEAN DM% 78.1

STRAW TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	3.49	3.51	3.78	3.69	3.62

STRAW MEAN DM% 62.7

PLOT AREA HARVESTED 0.00071

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82/W/RN/16

SERIES III S.OATS

GRAIN TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	3.74	3.48	3.52	3.68	3.61

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

TABLE	PK SUB
SED	0.197

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.241	6.7

GRAIN MEAN DM% 70.5

STRAW TONNES/HECTARE

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

PK SUB	- - -	- - S	P K T	P K S	MEAN
	6.95	6.24	6.57	6.68	6.61

STRAW MEAN DM% 37.6

PLOT AREA HARVESTED 0.00071

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82/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 second year, potatoes, s. barley, s. beans, w. wheat.

For previous year see 81/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 in autumn 1981:

	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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82/R/RN/17

NOTES: (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
(2) The topsoil PK dressing was equally divided before and after ploughing.
(3) All plots other than R were conventionally ploughed in autumn 1981.
(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. Weedkiller: Metribuzin at 0.98 kg in 900 l. Fungicides: Mancozeb at 1.4 kg in 250 l on four occasions, the first two with the insecticide. Ofurace at 0.12 kg and maneb at 1.2 kg in 250 l on two occasions, the first with the insecticide. Insecticide: Pirimicarb at 0.14 kg.
S. barley: Manures: (20:10:10) at 450 kg, combine drilled. Weedkillers: Glyphosate at 1.4 kg in 250 l. Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.
S beans: Weedkillers: Paraquat at 0.6 kg ion in 250 l. Trietazine at 1.0 kg and simazine at 0.14 kg in 250 l. Insecticide: Phorate at 5.6 kg.
W. wheat: Manures: (0:14:28) at 450 kg. 'Nitro-Chalk' at 480 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Mecoprop (as 'Methoxone M' at 5.0 l) and isoproturon at 2.0 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l on the first occasion at 0.25 kg in 250 l applied with the insecticide on the second occasion. Insecticide: Pirimicarb at 0.14 kg.

Seed: Potatoes: Pentland Crown.
S. barley: Triumph, seed dressed with ethirimol, sown at 160 kg.
S. beans: Minden, sown at 270 kg.
W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-
All crops: Treatments applied by double digger: 30 Oct - 2 Nov, 1981. Ploughed: 3 - 4 Nov.
Potatoes: Heavy spring-tine cultivated twice: 6 Nov, 1981 and 24 Mar, 1982. NPK Mg applied: 19 Apr. Spiked rotary cultivated, potatoes planted: 20 Apr. Rotary ridged: 10 May. Weedkiller applied: 8 June. Mancozeb with insecticide applied: 14 June, 30 June. Mancozeb applied: 12 July. Ofurace and maneb with insecticide applied: 26 July. Ofurace and maneb applied: 9 Aug. Mancozeb applied: 25 Aug. Haulm mechanically destroyed: 17 Sept. Lifted: 26 Oct.
S. barley: Heavy spring-tine cultivated twice: 5 Nov, 1981 and 24 Mar, 1982. Rotary harrowed, seed sown: 31 Mar. Dicamba, mecoprop MCPA with tridemorph applied: 10 May. Glyphosate applied: 10 Aug. Combine harvested: 19 Aug.
S. beans: Heavy spring-tine cultivated: 6 Nov, 1981. Paraquat applied: 23 Mar, 1982. Heavy spring-tine cultivated: 24 Mar. Phorate applied, rotary harrowed, seed sown: 27 Mar. Trietazine and simazine applied: 2 Apr. Combine harvested: 2 Sept.

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82/R/RN/17

W. wheat: Heavy spring-tine cultivated twice, PK applied: 5 Nov, 1981. Rotary harrowed, seed sown: 6 Nov. Mecoprop and isoproturon applied: 14 Apr, 1982. N applied: 16 Apr. Propiconazole applied: 26 May. Propiconazole with the insecticide applied: 15 June. Glyphosate applied: 10 Aug. Combine harvested: 21 Aug.

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82/R/RN/17 SERIES IV POTATOES

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	
- - -	53.7
P6 K6 T	52.9
- - S	56.1
- - SR	54.5
P2 - SR	48.7
P3 - S	50.2
P4 - S	58.3
P5 - S	55.0
P6 - S	50.4
- K2 SR	64.1
- K3 S	52.1
- K4 S	55.4
- K5 S	54.2
- K6 S	56.6
P1 K1 SR	59.3
P1 K3 SR	48.5
P2 K2 SR	59.7
P3 K1 SR	61.3
P3 K3 SR	47.8
P3 K4 S	47.0
P4 K3 S	51.4
P4 K4 S	46.3
P4 K5 S	58.5
P4 K6 S	53.8
P5 K4 S	50.6
P5 K5 S	48.9
P5 K6 S	51.4
P6 K4 S	50.5
P6 K5 S	50.4
P6 K6 S	52.6
MEAN	53.7

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

TABLE	TREATMNT*	
SED	1.81	MIN REP
	1.56	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	1.81	3.4

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82/R/RN/17

SERIES IV POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	
- - -	98.1
P6 K6 T	97.5
- - S	97.3
- - SR	96.8
P2 - SR	96.6
P3 - S	96.8
P4 - S	97.7
P5 - S	96.8
P6 - S	96.8
- K2 SR	98.1
- K3 S	96.3
- K4 S	97.7
- K5 S	97.6
- K6 S	97.3
P1 K1 SR	97.6
P1 K3 SR	97.1
P2 K2 SR	96.1
P3 K1 SR	97.9
P3 K3 SR	96.4
P3 K4 S	96.5
P4 K3 S	97.1
P4 K4 S	96.6
P4 K5 S	96.6
P4 K6 S	97.3
P5 K4 S	97.3
P5 K5 S	96.7
P5 K6 S	96.3
P6 K4 S	96.2
P6 K5 S	97.3
P6 K6 S	94.8
MEAN	97.0

PLOT AREA HARVESTED 0.00210

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82/R/RN/17

SERIES I SPRING BARLEY

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.47
P6 K6 T	7.36
- - S	7.37
- - SR	7.32
P2 - SR	7.82
P3 - S	7.52
P4 - S	7.49
P5 - S	7.53
P6 - S	7.61
- K2 SR	7.66
- K3 S	7.45
- K4 S	7.65
- K5 S	7.46
- K6 S	7.40
P1 K1 SR	7.34
P1 K3 SR	7.71
P2 K2 SR	7.71
P3 K1 SR	7.52
P3 K3 SR	7.70
P3 K4 S	7.68
P4 K3 S	7.58
P4 K4 S	7.69
P4 K5 S	7.62
P4 K6 S	7.23
P5 K4 S	7.72
P5 K5 S	7.49
P5 K6 S	7.50
P6 K4 S	7.62
P6 K5 S	7.90
P6 K6 S	7.69
MEAN	7.54

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

TABLE	TREATMNT*
SED	0.195 MIN REP
	0.169 MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.195	2.6

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00286

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82/R/RN/17

SERIES II SPRING BEANS

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	5.07
P6 K6 T	5.23
- - S	5.48
- - SR	5.22
P2 - SR	5.39
P3 - S	5.09
P4 - S	4.74
P5 - S	4.94
P6 - S	5.27
- K2 SR	5.10
- K3 S	4.79
- K4 S	5.02
- K5 S	5.04
- K6 S	5.36
P1 K1 SR	4.73
P1 K3 SR	5.47
P2 K2 SR	5.33
P3 K1 SR	4.86
P3 K3 SR	5.17
P3 K4 S	5.33
P4 K3 S	4.63
P4 K4 S	5.33
P4 K5 S	4.94
P4 K6 S	4.99
P5 K4 S	5.11
P5 K5 S	5.19
P5 K6 S	5.12
P6 K4 S	5.47
P6 K5 S	5.82
P6 K6 S	5.42
MEAN	5.17

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

TABL	TREATMNT*	
SED	0.432	MIN REP
	0.374	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.432	8.4

GRAIN MEAN DM% 74.8

PLOT AREA HARVESTED 0.00386

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82/R/RN/17

SERIES III WINTER WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	8.79
P6 K6 T	8.66
- - S	8.64
- - SR	8.75
P2 - SR	8.83
P3 - S	9.03
P4 - S	8.97
P5 - S	8.94
P6 - S	9.28
- K2 SR	9.02
- K3 S	9.09
- K4 S	8.89
- K5 S	8.86
- K6 S	8.70
P1 K1 SR	8.74
P1 K3 SR	8.82
P2 K2 SR	8.97
P3 K1 SR	8.90
P3 K3 SR	8.76
P3 K4 S	8.74
P4 K3 S	8.77
P4 K4 S	8.90
P4 K5 S	8.96
P4 K6 S	8.96
P5 K4 S	8.93
P5 K5 S	9.23
P5 K6 S	9.10
P6 K4 S	8.84
P6 K5 S	8.96
P6 K6 S	8.81
MEAN	8.87

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

TABLE	TREATMNT*	
SED	0.226	MIN REP
	0.196	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	10	0.226	2.6

GRAIN MEAN DM% 85.2

PLOT AREA HARVESTED 0.00286

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82/R/CS/10 and 82/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. McGrath, D.P. Stribley.

The 21st year, s. oats.

For previous years see 'Details' 1967, 1973 and 74-81/R&W/CS/10.

Design: 2 randomised blocks of 16 plots.

Whole dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

1. CHALK — Ground chalk (tonnes CaCO3) (total applied 1962-82):

		Rothamsted			Woburn	
R	W	Total	1962-78	1982	Total 1962-78	1982
0	0		0	0	0	0
9	8		7	2	6	2
20	19		15	5	14	5
40	33		30	10	23	10

2. P — P fertilizer applied:

	Until 1978	1981	1982
0	None	None	None
P1	K	25 kg P	50 kg P
P2	P	25 kg P	None
P3	P & K	75 kg P	50 kg P

NOTES: (1) Until 1978 test P & K were applied cumulatively, rates varied with crop. None was applied in 1979 & 1980 (fallow).
(2) A basal dressing of 120 kg K has been applied since 1981.
(3) A sub plot test of Mg applied in earlier years has been ignored, but a basal dressing of 100 kg Mg was applied in 1981 and 40 kg Mg in 1982.

Basal applications:
Sawyers I (R): Manures: N at 80 kg as 'Nitro-Chalk' combine drilled, K at 120 kg as muriate of potash, Mg at 40 kg as kieserite. Weedkillers: Dicamba, mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l.
Stackyard C (W): Manures: N at 80 kg as 'Nitro-Chalk', K at 120 kg as muriate of potash, Mg at 40 kg as kieserite. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' at 4.9 l) in 280 l.

Seed: Peniarth, sown at 190 kg (R), 200 kg (W).

Cultivations, etc.:-
Sawyers I (R): Ground chalk, applied: 3-7 Dec, 1981. Ploughed: 3 Feb, 1982. Spring-tine cultivated: 5 Apr. P, K and Mg applied, seed sown: 14 Apr. Weedkillers applied: 26 May. Combine harvested: 26-27 Aug.

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82/R/CS/10 and 82/W/CS/10

Stackyard C (W): Ground chalk applied: 25 Nov, 1981. Ploughed: 26 Feb, 1982. P, and K applied: 24 Mar. Mg and N applied, heavy spring-tine cultivated: 25 Mar. Spring-tine cultivated with crumbler attached, seed sown: 29 Mar. Weedkillers applied: 26 May. Combine harvested: 20 Aug.

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

GRAIN TONNES/HECTARE

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

P / CHALK	0	P1	P2	P3	MEAN
0	1.21	1.20	1.52	1.74	1.42
9	1.15	1.92	1.47	1.38	1.48
20	1.18	1.22	1.37	1.47	1.31
40	1.13	1.43	1.32	1.65	1.38
MEAN	1.17	1.44	1.42	1.56	1.40

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

TABLE	CHALK	P	CHALK P
SED	0.090	0.090	0.180

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.180	12.9

GRAIN MEAN DM% 65.8

PLOT AREA HARVESTED 0.00520

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

GRAIN TONNES/HECTARE

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

P CHALK	0	P1	P2	P3	MEAN
0	1.32	1.79	1.59	1.86	1.64
8	1.58	1.99	1.75	2.08	1.85
19	1.62	1.68	1.86	2.17	1.83
33	1.64	1.77	2.00	1.94	1.84
MEAN	1.54	1.81	1.80	2.01	1.79

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

TABLE	CHALK	P	CHALK P
SED	0.096	0.096	0.191

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.191	10.7

GRAIN MEAN DM% 80.1

PLOT AREA HARVESTED 0.00503

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82/W/CS/11

SOIL STRUCTURE

Object: To study the direct effects of sowing dates and times of applying nitrogen and the residual effects of peat on the nutrient contents and yields of s. barley - Woburn Stackyard II.

Sponsor: A.E. Johnston.

The 20th year, s. barley.

For previous years see 64/C/20(t), 65/C/19(t), 66/C/11(t), 67/C/8(t), 68/C/31(t), 69/W/CS/11(t), 70/W/CS/11(t), 71/W/CS/11, 72/W/CS/11(t) and 73-81/W/CS/11.

Design: Single replicate of 20 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments: Combinations of:-

1. PEAT	Peat (tonnes dry matter - total applied 1963-72):
0	0
1	8
2	55
3	110
4	165
2. SOW DATE	Dates of sowing:
9 FEB	9 February, 1982
9 MAR	9 March
24 MAR	24 March
13 APR	13 April
3. N	Times of applying nitrogen fertilizer at 96 kg N:
-	Never
NS	On the date of sowing
NL	On 11 May for SOW DATE 9 FEB and 9 MAR; on 17 May for SOW DATE 24 MAR; on 28 May for SOW DATE 13 APR

Basal applications: Manures: P at 85 kg as triple superphosphate, K at 300 kg as potassium bicarbonate, Mg at 55 kg as magnesium sulphate. Fungicides: Carbendazim with maneb and tridemorph (as 'Cosmic' at 4.0 kg) with captafol at 1.0 l in 280 l with the insecticide on two occasions. Insecticide: Pirimicarb at 0.14 kg.

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

Cultivations, etc.:- P, K, Mg applied: 6 Jan, 1982. Hand dug: 1 Feb. Fungicides with insecticide applied: 19 May, 4 June. Hand harvested: 16 Aug.

NOTE: Crop samples were taken at regular intervals during the season for N, P, K and Mg analysis.

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82/W/CS/11

GRAIN TONNES/HECTARE

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

GRAND MEAN 5.14

SOW DATE	N PEAT	-	NS	NL
9 FEB	0	2.67		
9 FEB	1		6.73	
9 FEB	2			6.32
9 FEB	3	2.02		
9 FEB	4		6.93	
9 MAR	0	2.09		
9 MAR	1		7.17	
9 MAR	2			6.19
9 MAR	3	2.46		
9 MAR	4		7.19	
24 MAR	0	2.67		
24 MAR	1		7.50	
24 MAR	2			5.79
24 MAR	3		7.42	
24 MAR	4	3.22		
13 APR	0		7.40	
13 APR	1	2.78		
13 APR	2			5.87
13 APR	3		7.33	
13 APR	4	3.00		

GRAIN MEAN DM% 85.8

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82/W/CS/11

STRAW TONNES/HECTARE

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

GRAND MEAN 4.25

SOW DATE	N PEAT	-	NS	NL
9 FEB	0	1.90		
9 FEB	1		5.42	
9 FEB	2			5.41
9 FEB	3	1.34		
9 FEB	4		6.04	
9 MAR	0	1.28		
9 MAR	1		5.82	
9 MAR	2			5.07
9 MAR	3	1.79		
9 MAR	4		6.21	
24 MAR	0	1.93		
24 MAR	1		6.49	
24 MAR	2			5.37
24 MAR	3		6.14	
24 MAR	4	2.27		
13 APR	0		6.14	
13 APR	1	2.16		
13 APR	2			5.55
13 APR	3		6.60	
13 APR	4	2.18		

STRAW MEAN DM% 88.1

PLOT AREA HARVESTED 0.00014

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82/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 18th year, old grass.

For previous years see 'Details' 1973 and 74-81/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 two equal dressings as (25:0:16)):
0(S)	0 (sprayed with ioxynil plus mecoprop and bromoxynil to control legumes, duplicated)
0	0 (duplicated)
38	
75	
112	
150	
188	
225	

NOTES: (1) Ioxynil, mecoprop and bromoxynil (as 'Brittox' at 3.5 l) in 220 l applied on 27 Apr, 1982.
(2) Rates of fertilizer nitrogen per cut were as hitherto but only two cuts were taken instead of the usual four; accordingly total rates of nitrogen were halved.

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

Cultivations, etc.:- Basal P and Mg applied: 2 Dec, 1981. Test NK applied: 19 Mar, 1982 and 22 July. Cut: 20 July and 24 Sept.

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82/R/CS/13

1ST CUT (20/7/82) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	38	75	112	150	188	225	MEAN
	2.65	5.99	5.65	5.73	6.62	6.25	6.78	5.82	5.41

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

TABLE	TOTAL N	
SED	0.384	MIN REP
	0.332	MAX-MIN
	0.271	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	0.542	10.0

1ST CUT MEAN DM% 29.8

2ND CUT(24/9/82)DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	38	75	112	150	188	225	MEAN
	0.87	1.90	1.92	2.03	2.10	2.45	2.40	2.64	1.91

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

TABLE	TOTAL N	
SED	0.174	MIN REP
	0.151	MAX-MIN
	0.123	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.246	12.9

2ND CUT MEAN DM% 17.7

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82/R/CS/13

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	38	75	112	150	188	225	MEAN
	3.52	7.89	7.57	7.77	8.72	8.71	9.19	8.45	7.32

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

TABLE	TOTAL N	
SED	0.467	MIN REP
	0.404	MAX-MIN
	0.330	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.660	9.0

TOTAL OF 2 CUTS MEAN DM% 23.7

PLOT AREA HARVESTED 0.00086

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82/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 14th year, potatoes, w. wheat, s. barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-81/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
Series I	P	P	P*	SB	B	P	P*	W	B	P	P*	B	B	P
Series II	P	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B
Series III	P	B	P	P	P*	SB	B	P	P*	W	B	P	P*	W
Series IV	P	B	P	P	P	P*	SB	B	P	P*	W	B	P	P*

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

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

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

1. NEMACIDE(79) Residues of nematicides applied 1979:

   ALDICARB Aldicarb
   CARBENDA Carbendazim
   TERBUFOS Terbufos

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

   SINGLE Single (2.5 kg for aldicarb and terbufos : 5.0 kg for carbendazim)
   DOUBLE Double (5.0 kg for aldicarb and terbufos : 10.0 kg for carbendazim)
   QUAD Quadruple (10.0 kg for aldicarb and terbufos : 20.0 kg for carbendazim)

plus one untreated plot

RATE

NONE

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82/W/CS/34

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

1. NEMACIDE(81)	Residues of nematicides applied 1981:
ALDICARB	Aldicarb
HOE00668	'HOE 00668'
RH 9358	'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 potatoes (Series IV): All combinations of:-

1. NEMACIDE(82)	Nematicides applied 1982:
DS 46995	'DS 46995'
DS 47187	'DS 47187'
OXAMYL	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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82/W/CS/34

Standard applications:
S. barley (Series II): Manures: (20:10:10) at 440 kg. Weedkiller: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.
W. wheat (Series III): Manures: Magnesian limestone at 5.0 t. (0:20:20) at 310 kg. N at 150 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Fungicide: Propiconazole at 0.12 kg in 280 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.
Potatoes (Series I and IV): Manures: (10:10:15+4.5 Mg) at 2020 kg. Weedkillers: Linuron at 1.1 l with paraquat at 0.28 kg ion in 280 l. Fungicides: Mancozeb at 1.4 kg in 250 l applied four times with insecticide on the first two occasions. Ofurace at 0.1 kg with maneb at 1.4 kg in 250 l applied twice, with insecticide on the first occasion. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 220 l.

Seed: S. barley: Triumph, dressed with ethirimol, sown at 160 kg.
W. wheat: Avalon, sown at 200 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
S. barley (Series II): Ploughed: 14 Sept, 1981. Heavy spring-tine cultivated: 25 Mar, 1982. NPK applied, spring-tine cultivated with crumbler attached: 26 Mar. Seed sown: 27 Mar. Weedkiller applied: 17 May. Combine harvested: 10 Aug.
W. wheat (Series III): Magnesian limestone applied: 6 Oct, 1981. Heavy spring-tine cultivated: 3 Nov. PK applied, spring-tine cultivated with crumbler attached, seed sown: 4 Nov. N applied: 14 Apr, 1982. Weedkillers applied: 20 Apr. Fungicide and insecticide applied: 14 June. Combine harvested: 17 Aug.
Potatoes (Series I and IV): Ploughed: 14 Sept, 1981 (Series I). Heavy spring-tine cultivated: 3 Nov (Series IV). Heavy spring-tine cultivated: 15 Apr, 1982, 20 Apr. NPK with Mg applied: 19 Apr. Rotary cultivated with crumbler attached, potatoes planted: 22 Apr (Series I). Treatments applied, rotary cultivated with crumbler attached: 26 Apr (Series IV). Potatoes planted: 27 Apr (Series IV). Rotary ridged: 17 May. Weedkillers applied: 18 May (Series I), 19 May (Series IV). Mancozeb applied with the insecticide: 16 June, 2 July. Mancozeb applied: 14 July, 23 Aug. Ofurace plus maneb applied with the insecticide: 28 July. Ofurace plus maneb applied: 11 Aug. Haulm desiccant applied: 1 Oct. Haulm mechanically destroyed: 2 Oct. Lifted: 15 Oct (Series IV), 18 Oct (Series I).

NOTES: (1) Soil samples were taken before applying treatments and after harvest for counts of cysts, eggs and larvae of Globodera rostochiensis.
(2) Treatments were incorrectly applied to one plot of series IV with treatment combination OXAMYL QUAD. An estimated value was used in the analysis.

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82/W/CS/34

POTATOES SERIES I

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(79)	SINGLE	DOUBLE	QUAD	MEAN
ALDICARB	27.7	29.1	28.4	28.4
CARBENDA	21.7	20.9	22.8	21.8
TERBUFOS	21.9	26.8	27.9	25.5
MEAN	23.8	25.6	26.4	25.2

RATE NONE 23.1

GRAND MEAN 25.0

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

TABLE	NEMACIDE(79)	RATE NEMACIDE(79)	RATE & RATE NONE
SED	1.21	1.21	2.09

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	2.56	10.2

PERCENTAGE WARE 3.81CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(79)	SINGLE	DOUBLE	QUAD	MEAN
ALDICARB	93.5	95.1	94.6	94.4
CARBENDA	91.9	86.6	90.5	89.7
TERBUFOS	91.6	93.0	93.2	92.6
MEAN	92.3	91.6	92.8	92.2

RATE NONE 90.0

GRAND MEAN 92.0

PLOT AREA HARVESTED 0.00130

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82/W/CS/34

POTATOES SERIES IV

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(82)	SINGLE	DOUBLE	QUAD	MEAN
DS 46995	30.5	35.3	38.2	34.7
DS 47187	30.9	31.2	35.3	32.5
OXAMYL	36.9	40.2	47.4	41.5
MEAN	32.8	35.6	40.3	36.2

RATE NONE 11.4

GRAND MEAN 33.7

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

TABLE	NEMACIDE(82)	RATE NEMACIDE(82) RATE & RATE 0.0
SED	1.90	1.90 3.28

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	4.02	11.9

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(82)	SINGLE	DOUBLE	QUAD	MEAN
DS 46995	96.2	96.2	97.1	96.5
DS 47187	97.1	97.0	96.8	97.0
OXAMYL	97.5	97.3	96.9	97.2
MEAN	96.9	96.8	96.9	96.9

RATE NONE 82.4

GRAND MEAN 95.5

PLOT AREA HARVESTED 0.00130

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82/W/CS/34

WINTER WHEAT SERIES III

GRAIN TONNES/HECTARE

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

RATE NEMACIDE(81)	2.8	5.6	11.2	MEAN
ALDICARB	6.70	6.34	6.04	6.36
HOE00668	6.07	6.12	6.04	6.08
RH 9358	6.22	6.07	6.36	6.22
MEAN	6.33	6.18	6.14	6.22

RATE 0.0 6.48

GRAND MEAN 6.24

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

TABLE	NEMACIDE(81)	RATE	NEMACIDE(81) RATE & RATE NONE
SED	0.295	0.295	0.511

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.626	10.0

GRAIN MEAN DM% 79.1

PLOT AREA HARVESTED 0.00251

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82/W/CS/34

SERIES II SPRING BARLEY

GRAIN TONNES/HECTARE

***** TABLES OF MEAN *****

NEMACIDE(80)	
NONE	4.55
BAS 1	4.25
BAS 2	4.89
BAS 4	4.97
CARBOF 2	4.32
ETHOP 4	4.15
FMC 2	4.39
OX 2	4.43
OX S1 2	4.86
OX S2 2	4.16
MEAN	4.50

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

TABLE	NEMACIDE(80)
SED	0.560

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.686	15.2

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00251

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82/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 eleventh year, s. barley.

For previous years see 72/W/CS/35(t) and 73-81/W/CS/35.

Design: 2 series each of 4 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 6.10.

Treatments:-

The experiment has two series with the following cropping:-

	1968-71	72	73	74	75	76	77	78	79	80	81	82
Series II	P	P	P*	SB	B	P*	P	P	P*	W	B	B
Series III	P	P	P	P*	SB	B	P*	P	P	P*	W	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, following crops test residual effects.

Treatments:

Series II, s. barley 1982, tests the residual effects of new sets of treatments applied for potatoes in 1979, ignoring those applied in earlier years. All combinations of:-

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

   NONE None
   TELONE 'Telone' at 224 kg

2. S NEM(79) Residual effects of nematicide applied spring 1979:

   ALDICARB
   OXAMYL

3. SNEMRATE Rates of spring nematicides (kg):

   2.5
   5.0
   7.5
   10.0

plus two untreated plots per block

RATE

NONE

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82/W/CS/35

Series III, s. barley 1982, tests the residual effects of new 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

NONE

Basal applications:
S. barley (Series II & III): Manures: (20:10:10) at 500 kg.
Weedkillers: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.

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

Cultivations, etc.:-
Ploughed: 15 Sept, 1981, 4 Feb, 1982. NPK applied, heavy spring-tine cultivated: 25 Mar. Spring-tine cultivated with crumbler attached, seed sown: 29 Mar. Weedkillers applied: 17 May. Combine harvested: 10 Aug.

SERIES II SPRING BARLEY

GRAIN TONNES/HECTARE

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

S NEM(79)	ALDICARB	OXAMYL	MEAN
A NEM(79)			
NONE	5.87	6.15	6.01
TELONE	5.96	5.92	5.94
MEAN	5.92	6.04	5.98

SNEMRATE	2.5	5.0	7.5	10.0	MEAN
A NEM(79)					
NONE	6.07	6.07	5.90	6.02	6.01
TELONE	5.65	5.81	6.16	6.14	5.94
MEAN	5.86	5.94	6.03	6.08	5.98

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82/W/CS/35

SERIES II SPRING BARLEY

GRAIN TONNES/HECTARE

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

SNEMRATE S NEM(79)	2.5	5.0	7.5	10.0	MEAN
ALDICARB	5.81	6.00	5.85	6.00	5.92
OXAMYL	5.91	5.88	6.21	6.16	6.04
MEAN	5.86	5.94	6.03	6.08	5.98

	SNEMRATE	2.5	5.0	7.5	10.0
A NEM(79)	S NEM(79)				
NONE	ALDICARB	5.79	6.20	5.65	5.86
	OXAMYL	6.36	5.93	6.14	6.18
TELONE	ALDICARB	5.84	5.80	6.05	6.14
	OXAMYL	5.46	5.82	6.27	6.14

RATE NONE 5.89

GRAND MEAN 5.97

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

TABLE	A NEM(79)	S NEM(79)	SNEMRATE	A NEM(79) S NEM(79)
SED	0.097	0.097	0.137	0.137

TABLE	A NEM(79) SNEMRATE	S NEM(79) SNEMRATE	A NEM(79) S NEM(79) SNEMRATE
SED	0.194	0.194	0.275

SED FOR RATE NONE V ANY MEAN IN
A NEM(79).S NEM(79).SNEMRATE TABLE IS 0.238

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

STRATUM	DF	SE	CV%
BLOCK.WP	52	0.388	6.5

GRAIN MEAN DM% 87.5

PLOT AREA HARVESTED 0.00168

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82/W/CS/35

SERIES III SPRING BARLEY

GRAIN TONNES/HECTARE

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

SNEMRATE S NEM(80)	2.5	5.0	7.5	10.0	MEAN
ALDICARB	5.71	5.62	6.08	5.71	5.78
OXAMYL	5.68	5.41	5.57	5.33	5.50
MEAN	5.70	5.52	5.82	5.52	5.64

RATE NONE 5.60

GRAND MEAN 5.64

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

TABLE	S NEM(80)	SNEMRATE	S NEM(80) SNEMRATE & RATE NONE
SED	0.118	0.168	0.237

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

STRATUM	DF	SE	CV%
BLOCK.WP	60	0.474	8.4

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00126

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82/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 12th year, forage maize.

For previous years see 71/W/CS/66(t), 72/W/CS/66(t) and 73-81/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, residual 1980-81:

   0
   450

2. DAZOMET(82) Dazomet (kg) in 1982 only:

   0
   450

Sub plots

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

NONE	None
N78+N120	78 kg N on 5 Feb, 120 kg N to seedbed on 5 May
N120	120 kg N to seedbed on 5 May
N120+FOS	120 kg N to seedbed + 28 kg fosetyl-Al 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 seed per hectare.

Cultivations, etc.:- Ploughed: 16 Nov, 1981. Spring-tine cultivated: 24 Nov. Dazomet applied, rotary cultivated twice: 26 Nov. Early N applied: 5 Feb, 1982. Heavy spring-tine cultivated: 21 Apr. PK applied: 29 Apr. Seedbed N applied, fungicide treatment applied, rotary cultivated with crumbler attached, weedkiller applied, seed sown: 5 May. Missing portions of row resown by hand: 28 May. Hand harvested: 13 Oct.

NOTES (1): Soil samples were taken for estimates of total biomass.
(2): Plant samples were taken for assessments of bacteria and fungi on the roots.

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(3): Counts were made of common smut (Ustilago maydis) and stalk rots (Fusarium spp.)

FORAGE DRY MATTER TONNES/HECTARE

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

DAZOMET(82)	0	450	MEAN
DAZOMET(79)			
0	5.97	6.64	6.31
450	6.64	6.85	6.74
MEAN	6.30	6.75	6.53

N+FUNG	NONE	N78+N120	N120	N120+FOS	MEAN
DAZOMET(79)					
0	3.13	7.81	7.11	7.16	6.31
450	3.29	8.06	8.13	7.49	6.74
MEAN	3.21	7.94	7.62	7.33	6.53

N+FUNG	NONE	N78+N120	N120	N120+FOS	MEAN
DAZOMET(82)					
0	2.92	8.24	7.09	6.97	6.30
450	3.50	7.64	8.16	7.69	6.75
MEAN	3.21	7.94	7.62	7.33	6.53

N+FUNG		NONE	N78+N120	N120	N120+FOS
DAZOMET(79)	DAZOMET(82)				
0	0	3.08	7.60	6.62	6.58
	450	3.19	8.03	7.61	7.75
450	0	2.77	8.87	7.55	7.36
	450	3.81	7.25	8.72	7.63

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

TABLE	N+FUNG	DAZOMET(79)* N+FUNG	DAZOMET(82)* N+FUNG	DAZOMET(79)* DAZOMET(82) N+FUNG
SED	0.315	0.445	0.445	0.629

* 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	0.629	9.6

GRAIN MEAN DM% 29.7

SUB PLOT AREA HARVESTED 0.00078

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82/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. barley - Woburn, Butt Furlong.

Sponsor: D. Hornby.

The eleventh year, s. barley, s. wheat.

For previous years see 72/W/CS/99(t) and 73-81/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:

	1968-71	72	73	74	75	76	77	78	79	80	81	82
B 9(S)	B	F	BE	B	B	B	B	B	B(S)	B	B	B
B 7	B	B	B	F	BE	B	B	B	B	B	B	B
B 6(SI)	B	B	B	B	F	BE	B	B	B(SI)	B	B	B
B 5(I)	B	B	B	B	B	F	BE	B	B(I)	B	B	B
W 8	B	B	F	BE	B	B	B	B	B	B	W	W

Sub plots

2. INOCULUM Take-all inoculum:

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

plus an extra combination of:

Whole plots

1. TREATMNT(2) Crop sequences:

	1968-71	72	73	74	75	76	77	78	79	80	81	82
B 15	B	B	B	B	B	B	B	B	B	B	B	B

Sub plots

2. AUT CROP Crop in autumn 1981 before sowing in spring 1982:

NONE	None
BARLEY	Barley sown 14 Oct, destroyed 3 Apr.

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82/W/CS/99

plus three extra plots testing crop sequences alone:

EXTRA

	1968-71	72	73	74	75	76	77	78	79	80	81	82
B 1	B	F	B	B	B	B	B	B	F	BE	0	B
B 3	B	B	B	B	B	B	F	BE	0	B	B	B
B 2	B	B	B	B	B	B	B	F	BE	0	B	B

B = S. barley, W = S. wheat, BE = S. beans, O = 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 1981 and 1980, combine drilled in 1979.

Standard applications:-
S. barley and s. wheat: (20:10:10) at 620 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l, paraquat at 0.56 kg ion in 280 l.
S. barley only: Dicamba, with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.

Seed: S. barley: Triumph, dressed with ethirimol, sown at 170 kg in the autumn and 160 kg in the spring.
S. wheat: Timmo, sown at 190 kg.

Cultivations, etc.:-
S. barley and s. wheat: Glyphosate applied: 1 Oct, 1981. Ploughed: 9 Oct. Spring-tine cultivated with crumbler attached, autumn-sown spring barley seed sown: 14 Oct. NPK applied: 26 Mar, 1982. Paraquat applied: 3 Apr. Rotary cultivated, seed sown: 13 Apr. 'Poly-Farmon' applied to barley plots: 17 May. Combine harvested s. barley: 11 Aug, s. wheat: 17 Aug.

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

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82/W/CS/99

GRAIN TONNES/HECTARE

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

TREATMNT INOCULUM	B 9(S)	B 7	B 6(SI)	B 5(I)	W 8	MEAN
0	5.73	6.55	5.35	5.83	3.49	5.39
I	5.81	6.68	5.79	6.23	3.71	5.65
MEAN	5.77	6.62	5.57	6.03	3.60	5.52

AUT CROP	NONE	BARLEY	MEAN
	5.65	5.26	5.45

EXTRA	B 1	B 3	B 2	MEAN
	6.40	6.48	6.67	6.52

GRAND MEAN 5.84

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

TABLE	AUT CROP	EXTRA	INOCULUM	TREATMNT	INOCULUM TREATMNT
SED	0.421	0.549	0.188	0.549	0.625

EXCEPT WHEN COMPARING MEANS WITHIN THE SAME LEVEL(S) OF:
TREATMNT 0.421

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.549	9.4
BLOCK.WP.SP	12	0.421	7.2

MEAN DM% 87.6

PLOT AREA HARVESTED 0.00193

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82/R/CS/130

EFFECTS OF EARTHWORM INOCULATION

Object: To study the effects of different species of earthworms on yield and other characteristics of grass - Fosters O and E.

Sponsor: J.R. Lofty.

The ninth year, ley.

For previous years see 74-81/R/CS/130.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 8.53 x 9.14.

Treatments: Inoculation with earthworm species in 1974, 1975 and 1979:

WORMSPEC	
NONE	None
ALLOLOBO	Allolobophora longa at 15,000 per hectare in 1974; 5,000 in 1975; 96,000 in 1979
LUMBRICU	Lumbricus terrestris at 5,000 per hectare in 1974 and 1975; 96,000 in 1979
SIX SPEC	Six species - A. caliginosa, A. chlorotica, A. longa, A. rosea, L. rubellus, L. terrestris at a total of 35,000 per hectare in 1974; 12,000 in 1975; none in 1979

NOTES: (1) The experiment was ploughed in error in July 1976 and resown in autumn 1976.
(2) Earthworms for the 1979 crop were applied in December, 1978 to one block only. Applications to other blocks have been postponed.

Basal applications: Manures: (0:14:28) at 500 kg. (25:0:16) at 440 kg in spring, (25:0:16) at 220 kg after the first two cuts.

Seed: Grass and clover mixture sown August 1973, ploughed in error in June 1976 and resown September 1976.

Cultivations, etc.:- PK applied: 13 Nov, 1981. NK applied: 22 Mar, 1982, 7 June, 16 July. Cut: 1 June, 14 July, 10 Nov.

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82/R/CS/130

1ST CUT (1/6/82) DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	3.71	4.05	3.63	3.66	3.76

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

TABLE	WORMSPEC
SED	0.407

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.498	13.2

1ST CUT MEAN DM% 23.7

2ND CUT (14/7/82)DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	1.81	1.98	1.91	1.79	1.87

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

TABLE	WORMSPEC
SED	0.057

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.070	3.7

2ND CUT MEAN DM% 20.5

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82/R/CS/130

3RD CUT (10/11/82)DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	1.01	0.78	1.05	0.89	0.93

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

TABLE	WORMSPEC
SED	0.170

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.208	22.3

3RD CUT MEAN DM% 36.0

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	6.53	6.80	6.59	6.34	6.56

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

TABLE	WORMSPEC
SED	0.539

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.660	10.1

TOTAL OF 3 CUTS MEAN DM% 26.7

PLOT AREA HARVESTED 0.00046

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82/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 ninth year, forage maize.

For previous years see 74-81/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):
	50	
	100	
	150	

NOTE: Treatment sprays were applied in 340 l.

Basal applications: Manures: Chalk at 2.9 t: Muriate of potash at 520 kg. Weedkiller: Atrazine at 1.7 kg in 340 l.

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

Cultivations, etc.:- Stover from the previous crop incorporated by rotary cultivator: 10 Nov, 1981. K applied: 12 Nov. Chalk applied: 27 Nov. Ploughed: 29 Feb, 1982. Power harrowed, dazomet treatments applied and rotary cultivated in: 15 Apr. Remaining treatments applied, power harrowed, seed sown: 19 May. Weedkiller and N applied: 1 June. Harvested by hand: 13 Oct.

NOTE: Frit fly (Oscinella frit) damage was assessed and estimates of common smut (Ustilago maydis) were made. The N content of the harvested produce was measured.

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82/R/CS/133

FORAGE MAIZE DRY MATTER TONNES/HECTARE

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

N	50	100	150	MEAN
CHEMICAL				
NONE	12.45	14.62	14.52	13.86
ALDICARB	13.63	14.47	14.18	14.09
BENOMYL	12.94	15.39	14.12	14.15
DAZOMET	13.27	14.97	14.68	14.31
PERMETH	13.18	14.83	14.57	14.19
PHORATE	12.97	14.53	14.55	14.02
PIRIMICA	11.44	13.28	16.03	13.58
BE+DA+PH	13.51	13.82	14.60	13.98
MEAN	12.87	14.50	14.64	14.01

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

TABLE	CHEMICAL	N	CHEMICAL N	
SED	0.536		0.987	MIN REP
	0.465	0.338	0.855	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CHEMICAL			1.015	MIN REP
			0.718	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	0.657	4.7
BLOCK.WP.SP	38	1.244	8.9

GRAIN MEAN DM% 24.5

SUB PLOT AREA HARVESTED 0.00059

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82/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 ninth year, s. barley.

For previous years see 74-81/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 and 1981 s. barley.
2.	FUNGCIDE(1)	Fungicide in autumn:
	NONE	None
	TRIADIM	Triadimefon at 0.25 kg in autumn 1981 only, 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 was applied in 340 l on 22 Sept, 1981, triadimefon on 26 Nov. Other treatments were applied on 25 Mar, 1982.

Basal applications: Manure: 'Nitro-Chalk' at 450 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.

Cultivations, etc.:- Ploughed: 1 Dec, 1981. N applied, spring-tine cultivated: 24 Mar, 1982. Power harrowed, seed sown: 25 Mar.

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82/R/CS/140

Weedkillers applied: 18 May. Combine harvested: 11 Aug.

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

GRAIN TONNES/HECTARE

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

FUNGCIDE(1)	NONE	TRIADIM	MEAN
WEEDKLLR			
NONE	5.05	5.57	5.31
GLYPHOS	4.86	5.31	5.08
MEAN	4.95	5.44	5.20

FUNGCIDE(2)	NONE	BENOMYL	MEAN
WEEDKLLR			
NONE	5.17	5.45	5.31
GLYPHOS	5.01	5.16	5.08
MEAN	5.09	5.30	5.20

FUNGCIDE(2)	NONE	BENOMYL	MEAN
FUNGCIDE(1)			
NONE	4.82	5.09	4.95
TRIADIM	5.35	5.52	5.44
MEAN	5.09	5.30	5.20

INSCTCDE	NONE	CHLORFEN	MEAN
WEEDKLLR			
NONE	5.18	5.43	5.31
GLYPHOS	4.97	5.20	5.08
MEAN	5.08	5.31	5.20

INSCTCDE	NONE	CHLORFEN	MEAN
FUNGCIDE(1)			
NONE	4.96	4.94	4.95
TRIADIM	5.19	5.68	5.44
MEAN	5.08	5.31	5.20

INSCTCDE	NONE	CHLORFEN	MEAN
FUNGCIDE(2)			
NONE	4.98	5.20	5.09
BENOMYL	5.18	5.43	5.30
MEAN	5.08	5.31	5.20

NEMACIDE	NONE	ALDICARB	MEAN
WEEDKLLR			
NONE	5.17	5.45	5.31
GLYPHOS	5.14	5.03	5.08
MEAN	5.15	5.24	5.20

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82/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE FUNGCIDE(1)	NONE	ALDICARB	MEAN
NONE	4.96	4.94	4.95
TRIADIM	5.35	5.53	5.44
MEAN	5.15	5.24	5.20

NEMACIDE FUNGCIDE(2)	NONE	ALDICARB	MEAN
NONE	5.19	4.99	5.09
BENOMYL	5.12	5.49	5.30
MEAN	5.15	5.24	5.20

NEMACIDE INSCTCDE	NONE	ALDICARB	MEAN
NONE	5.06	5.10	5.08
CHLORFEN	5.25	5.38	5.31
MEAN	5.15	5.24	5.20

FUNGCIDE(1)	NONE		TRIADIM	
FUNGCIDE(2)	NONE	BENOMYL	NONE	BENOMYL
WEEDKLLR				
NONE	4.91	5.19	5.43	5.70
GLYPHOS	4.73	4.98	5.28	5.34

FUNGCIDE(1)	NONE		TRIADIM	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
WEEDKLLR				
NONE	4.98	5.12	5.39	5.74
GLYPHOS	4.95	4.77	4.99	5.63

FUNGCIDE(2)	NONE		BENOMYL	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
WEEDKLLR				
NONE	5.10	5.23	5.27	5.62
GLYPHOS	4.86	5.16	5.09	5.24

FUNGCIDE(2)	NONE		BENOMYL	
INSCTCDE	NONE	CHLORFEN	NONE	CHLORFEN
FUNGCIDE(1)				
NONE	4.69	4.95	5.24	4.93
TRIADIM	5.27	5.44	5.12	5.93

FUNGCIDE(1)	NONE		TRIADIM	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	4.96	5.13	5.37	5.76
GLYPHOS	4.96	4.75	5.32	5.30

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82/R/CS/140

GRAIN TONNES/HECTARE

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

FUNGCIDE(2)	NONE		BENOMYL	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	5.06	5.27	5.27	5.62
GLYPHOS	5.31	4.70	4.97	5.35

FUNGCIDE(2)	NONE		BENOMYL	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(1)				
NONE	4.90	4.73	5.02	5.15
TRIADIM	5.47	5.24	5.22	5.82

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
WEEDKLLR				
NONE	5.14	5.23	5.20	5.66
GLYPHOS	4.98	4.96	5.30	5.10

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(1)				
NONE	4.90	5.03	5.03	4.86
TRIADIM	5.22	5.16	5.47	5.90

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE(2)				
NONE	5.03	4.93	5.35	5.04
BENOMYL	5.09	5.26	5.15	5.71

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

MARGINS OF TWO FACTOR TABLES	0.103
TWO FACTOR TABLES	0.145
THREE FACTOR TABLES	0.205

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

STRATUM	DF	SE	CV%
WP	6	0.290	5.6

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00075

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82/W/CS/200

FACTORS AFFECTING YIELD

Object: Originally to study some of the factors limiting yield of grass, clover and lucerne. Modified in 1982 to study the effects of nematode populations built up in 1977 to 1981, on freshly sown leys - Woburn Butt Furlong.

Sponsor: A.M. Spaull.

The sixth year, ryegrass, white clover, lucerne.

For previous years see 77-81/W/CS/200.

Design: Single replicate of 26 plots.

Whole plot dimensions: 1.68 x 4.42.

Treatments: All combinations of:-

1. SPECIES — Species (resown cumulatively in 1982):

GRASS	Ryegrass, S.23 (duplicated)
GRA+CLO	Ryegrass, S.23 + Clover, Blanca (quintuplicated)
CLOVER	Clover, Blanca (quadruplicated)
LUCERNE	Lucerne, Vertus (duplicated)

2. PATHCONT(81) — Control of pathogens and pests in 1977 to 1981:

NONE	No control applied
FULL	Full control applied

NOTES: (1) PATHCONT(81) consisted of:- (1) Aldicarb at 10 kg applied in the spring except to lucerne which received phorate at 5.0 kg, (2) benomyl foliar spray at 0.56 kg + phorate at 5.0 kg, applied as granules, after each cut, (3) four additional benomyl foliar sprays at 0.56 kg in winter, (4) Methiocarb at 0.48 kg, as pellets, applied at monthly intervals.

(2) All the treatments chosen were from the three-cut regime, irrigated in previous years. Previous nitrogen treatments were ignored.

(3) Irrigation was applied as follows (mm water):

20 May	16
10 June	7
16 July	17
23 July	25
29 July	25
5 Aug	25
13 Aug	12.5
17 Sept	12.5
Total	140

Standard applications: Manures: (0:20:20) at 380 kg. N at 75 kg per cut as 'Nitro-Chalk' to GRASS plots only. Weedkiller: Glyphosate at 1.5 kg in 280 l on two occasions.

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82/W/CS/200

Seed: S23 Perennial ryegrass alone, sown at 20 kg.
S23 Perennial ryegrass, sown at 10 kg, with Blanca white clover, sown at 4 kg.
Blanca white clover alone, sown at 4 kg.
Lucerne, Vertus sown at 10 kg, inoculated with Rhizobium.

Cultivations, etc.:- Weedkiller applied: 10 Feb, 1982 and 3 Apr. Ploughed: 5 May. PK applied: 10 May. Sown: 11 May. N applied to GRASS plots only: 10 May, 13 July, 4 Aug. Cut: 7 July, 3 Aug, 15 Nov.

NOTE: Soil samples were taken before sowing and in the autumn for counts of root ectoparasitic nematodes.

1ST CUT (7/7/82) DRY MATTER TONNES/HECTARE

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

SPECIES / PATHCONT(81)	GRASS	GRA+CLO	CLOVER	LUCERNE	MEAN
NONE	2.27	2.01	1.48	0.76	1.69
FULL	2.76	1.97	1.12	1.13	1.70
MEAN	2.51	1.99	1.30	0.94	1.70

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

TABLE	SPECIES	PATHCONT(81)	SPECIES PATHCONT(81)	
SED	0.390	0.216	0.551	(1)
			0.349	(2)
			0.390	(3)
	0.326		0.461	(4)
	0.337		0.477	(5)
	0.261		0.370	(6)

REPLICATIONS FOR SPECIES TREATMENT VARIED
A FOR GRASS OR LUCERNE
B FOR GRA+CLO
C FOR CLOVER
(1) A v A
(2) B v B
(3) C v C
(4) A v B
(5) A v C
(6) B v C

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

STRATUM	DF	SE	CV%
WP	18	0.551	32.5

1ST CUT MEAN DM% 15.4

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82/W/CS/200

2ND CUT(3/8/82)DRY MATTER TONNES/HECTARE

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

SPECIES PATHCONT(81)	GRASS	GRA+CLO	CLOVER	LUCERNE	MEAN
NONE	2.08	1.52	1.26	1.43	1.51
FULL	1.93	1.36	1.35	1.12	1.41
MEAN	2.00	1.44	1.31	1.28	1.46

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

TABLE	SPECIES	PATHCONT(81)	SPECIES PATHCONT(81)	
SED	0.197	0.109	0.279	(1)
			0.176	(2)
			0.197	(3)
	0.165		0.233	(4)
	0.171		0.241	(5)
	0.132		0.187	(6)

REPLICATIONS FOR SPECIES TREATMENT VARIED
A FOR GRASS OR LUCERNE
B FOR GRA+CLO
C FOR CLOVER
(1) A v A
(2) B v B
(3) C v C
(4) A v B
(5) A v C
(6) B v C

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

STRATUM	DF	SE	CV%
WP	18	0.279	19.1

2ND CUT MEAN DM% 16.2

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82/W/CS/200

3RD CUT(15/11/82)DRY MATTER TONNES/HECTARE

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

SPECIES PATHCONT(81)	GRASS	GRA+CLO	CLOVER	LUCERNE	MEAN
NONE	2.12	1.20	0.12	0.06	0.83
FULL	1.99	1.26	0.80	0.09	1.05
MEAN	2.06	1.23	0.46	0.08	0.94

3RD CUT MEAN DM% 17.4

Note: Because of large differences between species standard errors have been omitted.

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82/W/CS/200

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

SPECIES PATHCONT(81)	GRASS	GRA+CLO	CLOVER	LUCERNE	MEAN
NONE	6.46	4.73	2.86	2.25	4.04
FULL	6.68	4.59	3.27	2.35	4.16
MEAN	6.57	4.66	3.07	2.30	4.10

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

TABLE	SPECIES	PATHCONT(81)	SPECIES PATHCONT(81)	
SED	0.387	0.215	0.547	(1)
			0.346	(2)
			0.387	(3)
	0.324		0.458	(4)
	0.335		0.474	(5)
	0.260		0.367	(6)

REPLICATIONS FOR SPECIES TREATMENT VARIED
A FOR GRASS OR LUCERNE
B FOR GRA+CLO
C FOR CLOVER
(1) A v A
(2) B v B
(3) C v C
(4) A v B
(5) A v C
(6) B v C

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

STRATUM	DF	SE	CV%
WP	18	0.547	13.3

TOTAL OF 3 CUTS MEAN DM% 16.3

PLOT AREA HARVESTED 0.00038

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82/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 fifth year, s. beans, w. wheat.

For previous years see 78-81/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 1982:

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

BE = s. beans, W = w. wheat

NOTE: An additional crop sequence was in s. beans 1982, yields not taken.

Standard applications:
W. wheat: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 350 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l.
S. beans: Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l. Insecticide: Phorate at 2.2 kg, combine drilled.

Seed: W. wheat: Avalon, sown at 200 kg.
S. beans: Minden, sown at 210 kg.

Cultivations, etc.:-
Both crops: Ploughed: 1 Oct, 1981. Spring-tine cultivated: 13 Oct. Rotary harrowed: 14 Oct.
W. wheat: Seed sown: 16 Oct. N and weedkiller applied: 15 Apr, 1982. Combine harvested: 20 Aug.
S. beans: Rotary harrowed, seed sown: 24 Mar, 1982. Weedkillers applied: 27 Mar. Combine harvested: 8 Sept.

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

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82/R/CS/212

WHEAT GRAIN TONNES/HECTARE

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

PREVCROP	CONT W	FIRST W	BEANS	MEAN
	3.14	4.03	5.59	4.25

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

TABLE	PREVCROP
SED	0.398

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.487	11.5

GRAIN MEAN DM% 80.9

PLOT AREA HARVESTED 0.00434

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82/R/CS/216 and 82/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 fifth year, s. barley.

For previous years see 78-81/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.

Basal applications:-

Delharding (R): Manures: (20:10:10) at 560 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l, dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

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82/R/CS/216 and 82/W/CS/216

Road Piece (W): Manures: (20:10:10) at 590 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l.

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

Cultivations, etc.:-

Delharding (R): Glyphosate applied: 3 Nov, 1981. Ploughed: 27 Nov. Spring-tine cultivated: 3 Apr, 1982. NPK applied, seed sown: 5 Apr. 'Poly-Farmon' and fungicide applied: 18 May. Combine harvested: 13 Aug.

Road Piece (W): Ploughed: 13 Nov, 1981. NPK applied, heavy spring-tine cultivated: 25 Mar, 1982. Spring-tine cultivated with crumbler attached: 26 Mar. Seed sown: 27 Mar. 'Poly-Farmon' applied: 11 May. Combine harvested: 10 Aug.

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82/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
	5.02	5.17	5.02	4.71	4.66	6.54	5.19

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

TABLE	TREATMNT
SED	0.568

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.695	13.4

GRAIN MEAN DM% 84.3

PLOT AREA HARVESTED 0.00234

82/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
	5.60	6.18	5.98	5.53	5.41	5.89	5.77

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

TABLE	TREATMNT
SED	0.327

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.401	7.0

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.00251

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82/R/CS/230

STUBBLE TREATMENT AND LIGHT LEAF SPOT

Object: To study the residual effects of treatments applied to w. oilseed rape in 1977 and 1978 on the incidence of mildew and yield of s. barley in 1982 - Gt. Field I.

Sponsor: C.J. Rawlinson.

Design: 4 randomised blocks of 6 plots.

The fifth year, s. barley.

For previous years see 78/R/RA/1 and 80-81/R/CS/230.

Whole plot dimensions: 8.53 x 4.27.

Treatments:

FUNGCIDE	Fungicides, rates and times of application		
	To rape crop		To rape stubble
	5 Oct, 1977	18 Jan, 1978	22 Aug, 1978
- -	None	None	None (duplicated)
B1 B2	Benomyl 1.12 kg	None	Benomyl 2.0 kg
B2 B2	Benomyl 1.12 kg	Benomyl 1.12 kg	Benomyl 2.0 kg
T1 T8	Triadimefon 0.25 kg	None	Triadimefon 2.0 kg
T2 T8	Triadimefon 0.25 kg	Triadimefon 0.25 kg	Triadimefon 2.0 kg

NOTES: (1) W. oilseed rape was self-sown in autumn 1978, with minimum cultivations. The crop was severely damaged by birds and yields were not taken.

(2) W. oilseed rape was again self-sown in autumn 1979, with minimum cultivations. The crop failed and was replaced by s. barley. In 1981 and 1982 s. barley only was sown.

Basal applications: Manures: (20:10:10) at 380 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l. Glyphosate at 1.4 kg in 250 l.

Seed: Georgie, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 1 Dec, 1981. Ploughed: 4 Jan, 1982. Spring-tine cultivated: 30 Mar. Rotary harrowed, seed sown: 5 Apr. 'Poly-Farmon' applied: 17 May. Combine harvested: 16 Aug.

NOTE: Mildew was assessed four times from late May to early July, and isolates were tested for sensitivity to triadimefon. Soil cores were taken for residue analysis by bio-assay.

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82/R/CS/230

GRAIN TONNES/HECTARE

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

FUNGCIDE	- -	B1 B2	B2 B2	T1 T8	T2 T8	MEAN
	3.43	3.57	3.14	3.48	3.54	3.43

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

TABLE	FUNGCIDE	
SED	0.293	MIN REP
	0.253	MAX-MIN

FUNGCIDE
MAX-MIN - - V ANY OF REMAINDER
MIN REP ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.414	12.1

GRAIN MEAN DM% 76.9

STRAW TONNES/HECTARE

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

FUNGCIDE	- -	B1 B2	B2 B2	T1 T8	T2 T8	MEAN
	3.22	3.10	2.56	2.39	2.97	2.91

STRAW MEAN DM% 89.2

PLOT AREA HARVESTED 0.00243

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82/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, N.J. Brown, C.A. Edwards, A.W. Neill, P.H. Nicholls, P.F. North, C.J. Rawlinson, O.J. Stedman, A.H. Weir, A.G. Whitehead.

The third year, w. oilseed rape, w. wheat and w. barley.

For previous year see 80-81/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 WOS	Series I, w. oilseed rape in rotation with two cereals
SER2 WW5	Series II, w. wheat, fifth cereal after a break crop
SER3 WB5	Series III, w. barley, fifth cereal after a break crop

Column plots: All combinations (duplicated) of:

2. PK SUB — Extra PK and subsoil treatments (applied autumn 1979 only):

---	None, mouldboard ploughed
--S	None, subsoiled
PKS	PK to subsoil

3. DRILL — Drills:

DIRECT	Direct drilled (duplicated)
CNVNTIAL	Mouldboard ploughed conventionally drilled

Row plots:

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

Rape	w. wheat & barley	Rape	w. wheat & barley	
125 ENHD	75 ENHD	125 kg N	75 kg N	enhanced pathogen control
200 ENHD	150 ENHD	200 kg N	150 kg N	enhanced pathogen control
260 ENHD	225 ENHD	260 kg N	225 kg N	enhanced pathogen control
200 STND	150 STND	200 kg N	150 kg N	standard pathogen control

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

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82/W/CS/245

EXTRA

TPK D — PK applied to topsoil and mouldboard ploughed in 1979, direct drilled since

TPK 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 280 l on 3 Apr to all crops and, to w. wheat and w. barley only, propiconazole at 0.12 kg with maneb at 1.6 kg plus zineb at 0.18 kg in 280 l on 7 June.

Basal applications:
Series I, w. oilseed rape: Manures: (0:20:20) at 290 kg, N at 56 kg as 'Nitro-Chalk' to the seedbed. Molluscicide: Methiocarb (as 'Draza' pellets at 5.6 kg). Weedkiller: TCA at 10 kg in 280 l. Fungicide: Iprodione at 0.98 kg in 280 l (applied as basal in error intended for ENHD only). Desiccant: Diquat at 0.42 kg ion in 280 l.
Series II and III, w. wheat and w. barley: Manures: (10:23:23) at 300 kg, combine drilled. Weedkillers: Paraquat at 0.42 kg ion in 280 l, chlortoluron at 5.6 l in 280 l. Growth regulators: Chlormequat at 1.4 kg in 280 l to series II, w. wheat, mepiquat chloride and ethephon (as 'Terpal' at 2.5 l) in 280 l to series III, w. barley.
Seed: W. oilseed rape: Jet Neuf, sown at 9.0 kg.
W. wheat: Flanders with methiocarb pellets, sown at 200 kg.
W. barley: Igri with methiocarb pellets, sown at 170 kg.

Cultivations, etc.:-
Series I, w. oilseed rape: Barley straw spread and burnt: 5 Aug, 1981. Spring-tine cultivated, DIRECT plots: 10 Aug. Ploughed, CNVNTIAL plots. PK and N applied: 11 Aug. Spike rotary cultivated with crumbler attached, two strokes, CNVNTIAL plots: 12 Aug. Methiocarb applied: 13 Aug. TCA applied: 14 Aug. Seed sown: 19 Aug. N treatments applied: 23 Feb, 1982. Iprodione applied: 9 June. Diquat applied: 14 July. Combine harvested: 22 July.
Series II, w. wheat: Wheat straw spread and burnt: 25 Aug, 1981. Shallow disc cultivated: 27 Aug, 1 Sept. Ploughed, CNVNTIAL plots: 7 Sept. Spike rotary cultivated, with crumbler attached, CNVNTIAL plots: 8 Sept. Rotary cultivated, CNVNTIAL plots: 9 Sept. Paraquat applied: 23 Sept. Seed sown: 24 Sept. Chlortoluron applied: 23 Oct. Chlormequat applied: 12 Apr, 1982. N treatments applied: 13 Apr. Combine harvested: 19 Aug.

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Series III, w. barley: Barley straw spread and burnt: 3 Aug, 1981. Spring-tine cultivated: 10 Aug. Shallow disc cultivated: 27 Aug, 1 Sept. Ploughed, CNVNTIAL plots: 7 Sept. Spike rotary cultivated with crumbler attached, CNVNTIAL plots: 8 Sept. Rotary cultivated, CNVNTIAL plots: 9 Sept. Paraquat applied: 23 Sept. Seed sown: 25-28 Sept. Chlortoluron applied: 23 Oct. 'Terpal' applied: 12 Apr, 1982. N treatments applied: 13 Apr. Combine harvested: 27 July.

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

OILSEED RAPE SERIES I

GRAIN TONNES/HECTARE

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

PK SUB / N PATH	---	--S	PKS	MEAN
125 ENHD	3.63	3.57	3.53	3.57
200 ENHD	4.00	4.07	4.06	4.04
260 ENHD	4.23	4.11	4.20	4.18
200 STND	3.56	3.35	3.97	3.63
MEAN	3.85	3.77	3.94	3.86

DRILL / N PATH	DIRECT	CNVNTIAL	MEAN
125 ENHD	3.49	3.73	3.57
200 ENHD	4.04	4.05	4.04
260 ENHD	4.20	4.13	4.18
200 STND	3.57	3.74	4.63
MEAN	3.83	3.91	3.86

DRILL / PK SUB	DIRECT	CNVNTIAL	MEAN
---	3.89	3.79	3.85
--S	3.67	3.98	3.77
PKS	3.93	3.96	3.94
MEAN	3.83	3.91	3.86

N PATH / EXTRA	125 ENHD	200 ENHD	260 ENHD	200 STND	MEAN
TPK D	3.68	4.54	4.72	4.68	4.40
TPK C	3.51	4.34	3.94	3.41	3.80
MEAN	3.60	4.44	4.33	4.05	4.10

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OILSEED RAPE SERIES I

GRAIN TONNES/HECTARE

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

PK SUB DRILL N PATH	--- DIRECT	--- CNVNTIAL	--S DIRECT	--S CNVNTIAL	PKS DIRECT	PKS CNVNTIAL
125 ENHD	3.56	3.75	3.43	3.83	3.49	3.60
200 ENHD	3.97	4.06	4.01	4.19	4.14	3.90
260 ENHD	4.25	4.19	4.13	4.05	4.21	4.16
200 STND	3.76	3.15	3.09	3.87	3.87	4.19

GRAND MEAN 3.88

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

TABLE	EXTRA	PK SUB	DRILL	N PATH* PK SUB	
SED	0.472	0.193	0.167	0.235	

TABLE	N PATH* DRILL	PK SUB DRILL	N PATH* EXTRA	N PATH* PK SUB DRILL	
SED	0.235	0.334		0.406	MIN REP
	0.203	0.289	0.574	0.352	MAX-MIN
	0.166	0.236		0.287	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	12	0.334	8.6
WP1.WP2	36	0.267	6.9

GRAIN MEAN DM% 74.6

SUB PLOT AREA HARVESTED 0.00341

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WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

PK SUB / N PATH	---	--S	PKS	MEAN
75 ENHD	5.83	6.02	6.16	6.00
150 ENHD	7.17	7.04	7.11	7.11
225 ENHD	6.86	7.53	6.94	7.11
150 STND	6.74	6.93	6.96	6.88
MEAN	6.65	6.88	6.79	6.77

DRILL / N PATH	DIRECT	CNVNTIAL	MEAN
75 ENHD	6.26	5.49	6.00
150 ENHD	7.50	6.31	7.11
225 ENHD	7.63	6.06	7.11
150 STND	7.26	6.12	6.88
MEAN	7.16	5.99	6.77

DRILL / PK SUB	DIRECT	CNVNTIAL	MEAN
---	6.97	6.00	6.65
--S	7.21	6.22	6.88
PKS	7.31	5.75	6.79
MEAN	7.16	5.99	6.77

N PATH / EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK D	6.32	7.59	6.68	7.15	6.94
TPK C	5.36	5.89	6.13	5.99	5.84
MEAN	5.84	6.74	6.41	6.57	6.39

PK SUB	---		--S		PKS	
DRILL / N PATH	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL
75 ENHD	6.05	5.38	6.32	5.42	6.41	5.65
150 ENHD	7.51	6.49	7.30	6.51	7.70	5.93
225 ENHD	7.27	6.02	7.99	6.59	7.62	5.57
150 STND	7.05	6.13	7.21	6.36	7.51	5.87

GRAND MEAN 6.73

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WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	DRILL	N PATH* PK SUB
SED	0.188	0.077	0.066	0.182

TABLE	N PATH* DRILL	PK SUB DRILL	N PATH* EXTRA	N PATH* PK SUB DRILL	
SED	0.182	0.133		0.315	MIN REP
	0.157	0.115	0.574	0.272	MAX-MIN
	0.128	0.094		0.222	MAX REP

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

STRATUM	DF	SE	CV%
WP1	12	0.133	2.0
WP1.WP2	36	0.329	4.9

GRAIN MEAN DM% 83.0

SUB PLOT AREA HARVESTED 0.00341

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WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	5.65	6.29	7.30	6.42
150 ENHD	7.23	7.31	7.37	7.30
225 ENHD	7.60	7.78	7.76	7.71
150 STND	6.95	6.93	7.21	7.03
MEAN	6.86	7.08	7.41	7.12

DRILL N PATH	DIRECT	CNVNTIAL	MEAN
75 ENHD	6.58	6.09	6.42
150 ENHD	7.59	6.72	7.30
225 ENHD	7.93	7.28	7.71
150 STND	7.21	6.68	7.03
MEAN	7.33	6.70	7.12

DRILL PK SUB	DIRECT	CNVNTIAL	MEAN
---	7.16	6.26	6.86
--S	7.37	6.50	7.08
PKS	7.45	7.33	7.41
MEAN	7.33	6.70	7.12

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK D	6.49	7.64	7.93	6.99	7.26
TPK C	6.89	6.67	7.56	6.32	6.86
MEAN	6.69	7.15	7.74	6.66	7.06

PK SUB	---		--S		PKS	
DRILL N PATH	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL
75 ENHD	6.00	4.95	6.56	5.75	7.16	7.58
150 ENHD	7.69	6.32	7.62	6.68	7.46	7.17
225 ENHD	7.95	6.90	8.11	7.12	7.73	7.82
150 STND	7.00	6.86	7.17	6.45	7.45	6.75

GRAND MEAN 7.11

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WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	DRILL	N PATH* PK SUB	
SED	0.537	0.219	0.190	0.386	
TABLE	N PATH* DRILL	PK SUB DRILL	N PATH* EXTRA	N PATH* PK SUB DRILL	
SED	0.386	0.380		0.669	MIN REP
	0.334	0.329	0.946	0.579	MAX-MIN
	0.273	0.268		0.473	MAX REP

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

STRATUM	DF	SE	CV%
WP1	12	0.380	5.3
WP1.WP2	36	0.635	8.9

GRAIN MEAN DM% 85.2

SUB PLOT AREA HARVESTED 0.00341

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82/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, T.M. Addiscott, P. Barraclough, R. Leigh, A.C.D. Newman, P.J. Welbank, D.P. Yeoman.

The third year, s. barley.

For previous years see 80-81/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) to seedbed (cumulative to 1980 and 1981):

0
40
80
120

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 and 1982.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l applied with the tridemorph. Fungicide: Tridemorph at 0.53 kg.

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

Cultivations, etc.:- Ploughed: 4 Jan, 1982. Spring-tine cultivated: 30 Mar. Test N applied: 5 Apr. Rotary harrowed, seed sown: 13 Apr. Weedkillers and fungicide applied: 21 May. Combine harvested: 16 Aug.

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82/R/CS/246

GRAIN TONNES/HECTARE

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

N PK SUB	0	40	80	120	MEAN
- - -	2.96	4.39	5.61	6.67	4.91
- - S	3.18	4.39	6.16	6.58	5.08
P - S	3.39	3.78	5.84	6.78	4.95
- K S	2.36	5.04	5.75	6.60	4.94
P K S	3.88	5.27	6.04	6.62	5.45
P K T	4.16	4.91	6.00	6.49	5.39
MEAN	3.27	4.60	5.86	6.63	5.09

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

TABLE	PK SUB	N	PK SUB N	
SED	0.353		0.707	MIN REP
	0.306	0.267	0.612	MAX-MIN
			0.500	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	0.707	13.9

GRAIN MEAN DM% 81.6

STRAW TONNES/HECTARE

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

N PK SUB	0	40	80	120	MEAN
- - -	1.07	1.86	2.59	4.54	2.52
- - S	1.33	1.84	3.13	4.22	2.63
P - S	1.21	1.58	2.90	4.02	2.43
- K S	0.96	2.40	3.33	4.69	2.84
P K S	1.58	2.87	4.13	4.40	3.25
P K T	1.31	2.12	3.86	5.18	3.12
MEAN	1.22	2.08	3.22	4.51	2.76

STRAW MEAN DM% 82.6

PLOT AREA HARVESTED 0.00217

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82/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 third year, w. wheat.

For previous years see 80-81/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(82) Forms of organic matter:

NONE	None
STR	Straw at 6.50 t for 1980, 3.25 t for 1981.
STR+FYM	Straw at 6.50 t for 1980, 3.25 t for 1981 plus farmyard manure at 40 t in each year including 1982

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 670 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.0 kg in 250 l.

Seed: Avalon, sown at 200 kg.

Cultivations, etc.:- Glyphosate applied: 23 Sept, 1981. Seed direct drilled: 7 Oct. FYM applied: 2 Dec. Mecoprop, bromoxynil, ioxynil and isoproturon applied: 14 Apr, 1982. N applied: 17 Apr. Combine harvested: 20 Aug.

NOTE: Plots were sampled for earthworms in November.

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82/R/CS/247

GRAIN TONNES/HECTARE

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

ORG MATT(82) / WORMINOC(80)	NONE	STR	STR+FYM	MEAN
NONE	6.11	5.59	5.32	5.67
EVEN	5.09	5.82	5.77	5.56
CONC	5.40	6.13	5.36	5.63
MEAN	5.54	5.85	5.48	5.62

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

TABLE	WORMINOC(80)	ORG MATT(82)	WORMINOC(80) ORG MATT(82)
SED	0.331	0.331	0.573

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.702	12.5

GRAIN MEAN DM% 81.6

PLOT AREA HARVESTED 0.00240

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82/R/CS/254

SOIL FUMIGATION, MYCORRHIZA AND P

Object: To study the residual effects on w. barley of applications of mycorrhizal inoculum, methyl bromide and rates of phosphate fertilizer to s. wheat in 1980 - Delharding.

Sponsors: D.P. Stribley, J.A. Buwalda, P.B. Tinker.

The third year, w. barley.

For previous year see 81/R/CS/254.

Design: 3 randomised blocks of 8 plots split into 2.

Whole plot dimensions: 2.2 x 4.4.

Treatments: All combinations of:-

Whole plots

1. STERILNT(80) Soil sterilant in 1980:

NONE	None
METH BR	Methyl bromide at 940 kg

2. P(80) Rates of phosphate fertilizer (kg P), as superphosphate in 1980:

0
15
30
60

Sub plots

3. INOCULUM(81) Mycorrhizal inoculum in 1981:

NONE	None
G MOSSE	Glomus mosseae

NOTES: (1) Treatments were applied to s. wheat in 1980.
(2) Inoculum was prepared by growing leeks in pots of soil infected with the mycorrhiza. After 20 weeks growth, soil and roots in the pots were chopped and broadcast over the plots at 3.5 t. Uninoculated plots received soil and roots at the same rate from pots growing uninfected leeks.
(3) Total above-ground dry matter was measured in June, grain yields were not taken.

Basal applications: Manures: N at 28 kg, K_2O at 18 kg as (25:0:16). N at 30 kg and a further application at 100 kg as 'Nitro-Chalk'. Weedkiller: Chlortoluron at 5.6 l in 280 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: Igri, with no seed dressing, direct drilled at 160 kg.

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82/R/CS/254

Cultivations, etc.:- First N applied: 21 Sept, 1981. NK applied, seed sown: 14 Oct. Weedkiller with fungicide applied: 27 Oct. Second N applied: 2 Mar, 1982. Harvested by hand: 15 June.

NOTES: (1) Plots were sampled three times during the season to assess mycorrhizal infection of roots and once to measure P content of the leaves.
(2) Grain yields were not taken, crop was harvested green on 15 June.

TOTAL DRY MATTER TONNES/HECTARE

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

INOCULUM(81) / STERILNT(80)	NONE	G MOSSE	MEAN
NONE	6.64	6.87	6.75
METH BR	6.69	6.80	6.75
MEAN	6.67	6.84	6.75

P(80) / STERILNT(80)	0	15	30	60	MEAN
NONE	5.04	6.99	7.44	7.55	6.75
METH BR	5.33	6.18	7.43	8.05	6.75
MEAN	5.19	6.59	7.43	7.80	6.75

P(80) / INOCULUM(81)	0	15	30	60	MEAN
NONE	5.01	6.46	7.55	7.64	6.67
G MOSSE	5.36	6.71	7.32	7.96	6.84
MEAN	5.19	6.59	7.43	7.80	6.75

STERILNT(80)	INOCULUM(81) / P(80)	NONE	G MOSSE
NONE	0	4.72	5.35
	15	6.93	7.05
	30	7.57	7.31
	60	7.34	7.75
METH BR	0	5.30	5.36
	15	6.00	6.37
	30	7.53	7.33
	60	7.93	8.16

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82/R/CS/254

TOTAL DRY MATTER TONNES/HECTARE

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

TABLE	STERILNT(80)	P(80)	INOCULUM(81)	STERILNT(80) P(80)
SED	0.154	0.218	0.172	0.308

TABLE	STERILNT(80) INOCULUM(81)	P(80) INOCULUM(81)	STERILNT(80) P(80) INOCULUM(81)
SED	0.231	0.326	0.462

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

STERILNT(80)	0.243
P	0.344
STERILNT(80).P	0.486

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.377	5.6
BLOCK.WP.SP	16	0.595	8.8

SUB PLOT AREA HARVESTED 0.00010

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82/R/CS/261

BENOMYL AND TAKE-ALL

Object: To study the residual 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 second year, w. wheat.

For previous year see 81/R/CS/261.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 2.13 x 12.2.

Treatments:

FUNGICIDE	Residues of fungicides, surfactant and times and methods of application, applied for wheat in 1981:
NONE	None
SF S	Surfactant (an alcohol ethoxylate at 115 l) as a drench in 11,500 l in spring
BEN A	Benomyl at 20 kg worked in to seedbed in autumn
BEN S	Benomyl at 20 kg, as a drench in 11,500 l in spring
BEN+SF S	Benomyl at 20 kg plus surfactant as above as a drench in 11,500 l in spring
NUA A	Nuarimol at 2.2 kg worked in to seedbed in autumn
NUA S	Nuarimol at 2.2 kg, as a drench in 11,500 l in spring

Basal applications: Manures: (0:14:28) at 320 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkillers: Chlortoluron at 5.6 kg in 250 l, glyphosate at 1.4 kg in 250 l. Fungicides: Carbendazim with maneb and tridemorph (as 'Cosmic' at 4.0 kg) with captafol at 1.2 kg in 250 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 kg in 250 l.

Seed: Avalon, untreated, sown at 200 kg.

Cultivations, etc.:- Ploughed: 1 Oct, 1981. PK applied: 26 Oct. Rotary harrowed, seed sown: 28 Oct. Chlortoluron applied: 29 Oct. 'Nitro-Chalk' applied: 22 Apr, 1982. Growth regulator applied: 27 Apr. Fungicides with insecticide applied: 15 June. Glyphosate applied: 10 Aug. Combine harvested: 21 Aug.

NOTE: Foot and root rots were assessed monthly between April and July.

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82/R/CS/261

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	SF S	BEN A	BEN S	BEN+SF S	NUA A	NUA S	MEAN
	9.48	9.45	9.06	9.57	9.41	9.74	9.21	9.42

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

TABLE	FUNGCIDE
SED	0.383

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.542	5.8

GRAIN MEAN DM% 84.1

PLOT AREA HARVESTED 0.00176

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82/R/CS/263

FUNGICIDE TIMES

Object: To study the residual effects on barley of four fungicides applied to w. oilseed rape on land in rotation (pathogen free) and after previous oilseed rape (pathogen infected) - Long Hoos IV 1 (pathogen free) and Summerdells I (pathogen infected).

Sponsor: C.J. Rawlinson.

The second year, w. barley (Long Hoos IV 1), s. barley (Summerdells I).

For previous year see 81/R/CS/263.

Design: 3 randomised blocks of 15 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

1. FUNGCIDE(81) Residues of fungicides applied to w. oilseed rape 1981:

BENOMYL	Benomyl at 0.5 kg
IMAZALIL	Imazalil at 0.5 kg
PROCHLOR	Prochloraz at 0.5 kg
TRIADIME	Triadimefon at 0.5 kg

2. FUNGTIME Times of applying fungicides to w. oilseed rape 1981:

SOIL	To soil surface in August, 1980
FOL	To foliage in October
SOIL+FOL	On both above dates

plus one extra treatment:

EXTRA	
NONE	No fungicides (triplicated)

NOTE: In 1981 on Summerdells I w. oilseed rape failed during the winter and the site was sown to s. barley to assess the residual effects of treatments already applied.

Basal applications:
Long Hoos IV: Manures: 'Nitro-Chalk' at 500 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.8 l) in 450 l. Dicamba, mecoprop and MCPA (as 'Banlene Plus' at 4.2 l) in 340 l.
Summerdells I: Manures: (0:14:28) at 780 kg. 'Nitro-Chalk' at 470 kg. Weedkillers: Paraquat at 0.5 kg ion in 250 l. Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l.

Seed: Long Hoos IV: Maris Otter, undressed, sown at 160 kg.
Summerdells I: Georgie, sown at 160 kg.

Cultivations, etc.:-
Long Hoos IV: Ploughed: 6 Aug, 1981. Power harrowed: 23 Sept. Spring-tine cultivated: 13 Oct. Seed sown: 16 Oct. Mecoprop, bromoxynil and ioxynil applied: 1 Feb, 1982. Dicamba, mecoprop and

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MCPA applied: 19 Apr. N applied: 20 Apr. Combine harvested: 26 July.
Summerdells I: Ploughed: 8 Oct, 1981. PK applied: 26 Nov. N and paraquat applied: 25 Mar, 1982. Spring-tine cultivated: 30 Mar. Rotary harrowed, seed sown: 3 Apr. Dicamba, mecoprop and MCPA applied: 17 May. Combine harvested: 17 Aug.

NOTE: Mildew and other diseases were assessed five times at fortnightly intervals from May to July. Components of yield were measured at maturity.

SUMMERDELLS I

SPRING BARLEY

GRAIN TONNES/HECTARE

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

FUNGTIME / FUNGCIDE(81)	SOIL	FOL	SOIL+FOL	MEAN
BENOMYL	4.63	5.15	4.46	4.75
IMAZALIL	4.52	4.46	4.69	4.56
PROCHLOR	4.80	4.67	4.92	4.80
TRIADIME	4.75	4.72	4.65	4.71
MEAN	4.68	4.75	4.68	4.70

EXTRA NONE 4.75

GRAND MEAN 4.71

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

TABLE	FUNGCIDE(81)	FUNGTIME	FUNGCIDE(81) FUNGTIME
SED	0.145	0.125	0.250

SED OF EXTRA NONE V ANY ITEM IN FUNGCIDE(81).FUNGTIME TABLE IS 0.204

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.307	6.5

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00065

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82/R/CS/263 LONG HOOS IV

WINTER BARLEY

GRAIN TONNES/HECTARE

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

FUNGTIME / FUNGCIDE(81)	SOIL	FOL	SOIL+FOL	MEAN
BENOMYL	3.33	3.22	3.57	3.37
IMAZALIL	4.27	3.50	3.56	3.77
PROCHLOR	3.12	4.57	3.68	3.79
TRIADIME	3.53	2.89	4.07	3.49
MEAN	3.56	3.54	3.72	3.61

EXTRA NONE 3.14

GRAND MEAN 3.51

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

TABLE	FUNGCIDE(81)	FUNGTIME	FUNGCIDE(81) FUNGTIME
SED	0.312	0.270	0.541

SED OF EXTRA NONE V ANY ITEM IN FUNGCIDE(81).FUNGTIME TABLE IS 0.441

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.662	18.8

GRAIN MEAN DM% 73.0

STRAW TONNES/HECTARE

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

FUNGTIME / FUNGCIDE(81)	SOIL	FOL	SOIL+FOL	MEAN
BENOMYL	4.30	4.18	4.75	4.41
IMAZALIL	4.66	4.73	5.16	4.85
PROCHLOR	5.00	5.19	4.62	4.94
TRIADIME	4.50	5.72	4.02	4.75
MEAN	4.61	4.96	4.64	4.74

EXTRA NONE 4.56

GRAND MEAN 4.70

GRAIN MEAN DM% 62.2

PLOT AREA HARVESTED 0.00054

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82/R/CS/264

FUNGICIDE RATES

Object: To study the residual effects on barley of a range of rates of triadimefon applied to w. oilseed rape on land in rotation (pathogen free) and after previous oilseed rape (pathogen infected) - Long Hoos IV 1 (pathogen free) and Summerdells I (pathogen infected).

Sponsor: C.J. Rawlinson.

The second year, w. barley (Long Hoos IV 1), s. barley (Summerdells I).

For previous year see 81/R/CS/264.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments:

FUNGRATE (81) Residues of triadimefon applied at different rates (kg) to soil surface before seedbed cultivation for w. oilseed rape 1981:

0.06
0.12
0.25
0.50
1.00
2.00

NOTE: In 1981 on Summerdells I w. oilseed rape failed during the winter and the site was sown to s. barley to assess the residual effects of treatments already applied.

Basal applications:
Long Hoos IV: Manures: 'Nitro-Chalk' at 500 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.8 l) in 450 l. Dicamba, mecoprop and MCPA (as 'Banlene Plus' at 4.2 l) in 340 l.
Summerdells I: Manures: (0:14:28) at 780 kg, 'Nitro-Chalk' at 470 kg. Weedkillers: Paraquat at 0.5 kg ion in 250 l. Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l.

Seed: Long Hoos IV: Maris Otter, undressed, sown at 160 kg.
Summerdells I: Georgie, sown at 160 kg.

Cultivations, etc.:-
Long Hoos IV: Ploughed: 6 Aug, 1981. Power harrowed: 23 Sept. Spring-tine cultivated: 13 Oct. Seed sown: 16 Oct. Mecoprop, bromoxynil and ioxynil applied: 1 Feb, 1982. Dicamba, mecoprop and MCPA applied: 19 Apr. N applied: 20 Apr. Combine harvested: 26 July.
Summerdells I: Ploughed: 8 Oct, 1981. PK applied: 26 Nov. N and paraquat applied: 25 Mar, 1982. Spring-tine cultivated: 30 Mar. Rotary harrowed, seed sown: 3 Apr. Dicamba, mecoprop and MCPA applied: 17 May. Combine harvested: 17 Aug.

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NOTE: Mildew and other diseases were assessed five times at fortnightly intervals from May to July. Components of yield were measured at maturity.

LONG HOOS IV WINTER BARLEY

GRAIN TONNES/HECTARE

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

FUNGRATE	0.06	0.12	0.25	0.50	1.00	2.00	MEAN
	2.81	2.59	2.17	2.36	1.67	2.90	2.42

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

TABLE	FUNGRATE
SED	0.413

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.505	20.9

GRAIN MEAN DM% 69.2

STRAW TONNES/HECTARE

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

FUNGRATE	0.06	0.12	0.25	0.50	1.00	2.00	MEAN
	5.57	5.42	5.65	6.20	6.26	5.54	5.77

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

TABLE	FUNGRATE
SED	0.875

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	1.072	18.6

STRAW MEAN DM% 58.8

PLOT AREA HARVESTED 0.00054

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SUMMERDELLS I SPRING BARLEY

GRAIN TONNES/HECTARE

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

FUNGRATE	0.06	0.12	0.25	0.50	1.00	2.00	MEAN
	4.68	4.35	4.58	4.66	4.22	4.88	4.56

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

TABLE	FUNGRATE
SED	0.448

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.549	12.0

GRAIN MEAN DM% 82.0

PLOT AREA HARVESTED 0.00065

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82/R/CS/265

SOIL FUMIGATION, MYCORRHIZA AND P

Object: To study the residual effects on w. barley of applications of mycorrhizal inoculum, methyl bromide and rates of phosphate fertilizer to s. wheat in 1981 - Delharding.

Sponsors: J.A. Buwalda, D.P. Stribley, P.B. Tinker.

The second year, w. barley.

For previous year see 81/R/CS/265.

Design: 3 randomised blocks of 8 plots split into 2.

Whole plot dimensions: 3.0 x 4.4.

Treatments: All combinations of:-

Whole plots

1. STERILNT(81) Soil sterilant in 1981:

NONE	None
METH BR	Methyl bromide at 900 kg

2. P(81) Rates of phosphate fertilizer (kg P), as superphosphate in 1981:

0
15
30
60

Sub plots

3. INOCULUM(81) Mycorrhizal inoculum in 1981:

NONE	None
G MOSSE	Glomus mosseae

NOTES: (1) Treatments were applied to s. wheat in 1981.
(2) Inoculum was prepared by growing leeks in pots of soil infected with the mycorrhiza. After 20 weeks growth, soil and roots in the pots were chopped and applied to the seed furrows at 3.5 t per ha. Uninoculated plots received soil and roots at the same rate from pots growing uninfected leeks.
(3) Total above-ground dry matter was measured in June, grain yields were not taken.

Basal applications: Manures: N at 30 kg and a further application at 100 kg as 'Nitro-Chalk'. Weedkiller: Chlortoluron at 5.6 l in 280 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: Igri, with no seed dressing, direct drilled at 160 kg.

Cultivations, etc.:- First N applied: 21 Sept, 1981. Seed sown: 14 Oct. Weedkiller with fungicide applied: 27 Oct. Second N applied: 2 Mar, 1982. Harvested by hand: 15 June.

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NOTES: (1) Plots were sampled three times during the season to assess mycorrhizal infection of roots and once to measure P content of the leaves.
(2) Grain yields were not taken, crop was harvested green on 15 June.

TOTAL DRY MATTER TONNES/HECTARE

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

INOCULUM(81) / STERILNT(81)	NONE	G MOSSE	MEAN
NONE	3.81	4.03	3.92
METH BR	4.44	4.91	4.68
MEAN	4.12	4.47	4.30

P(81) / STERILNT(81)	0	15	30	60	MEAN
NONE	3.11	3.47	4.25	4.84	3.92
METH BR	3.75	4.25	4.77	5.95	4.68
MEAN	3.43	3.86	4.51	5.39	4.30

P(81) / INOCULUM(81)	0	15	30	60	MEAN
NONE	3.25	3.74	4.34	5.16	4.12
G MOSSE	3.60	3.98	4.68	5.62	4.47
MEAN	3.43	3.86	4.51	5.39	4.30

P(81)	0	15	30	60
STERILNT(81) / INOCULUM(81)				
NONE / NONE	3.02	3.48	4.11	4.62
NONE / G MOSSE	3.19	3.47	4.39	5.06
METH BR / NONE	3.47	4.00	4.57	5.71
METH BR / G MOSSE	4.02	4.49	4.96	6.18

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TOTAL DRY MATTER TONNES/HECTARE

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

TABLE	STERILNT(81)	P(81)	INOCULUM(81)	STERILNT(81) P(81)
SED	0.087	0.123	0.059	0.175

TABLE	STERILNT(81) INOCULUM(81)	P(81) INOCULUM(81)	STERILNT(81) P(81) INOCULUM(81)
REP	12	6	3
SED	0.105	0.149	0.211

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

STERILNT(81)	0.083		
P(81)		0.118	
STERILNT(81). P(81)			0.167

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.214	5.0
BLOCK.WP.SP	16	0.205	4.8

SUB PLOT AREA HARVESTED 0.00020

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82/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, G.J.W. Dean, N. Wilding, K.E. Fletcher, R. Bardner, C.A. Edwards, J.R. Lofty.

The first year, w. wheat, ryegrass.

Design: 2 randomised blocks of 3 plots.

Whole plot dimensions: 48 x 48.

Treatments:

RYEGRASS	Provision of ryegrass infested with aphids:
NONE	None
UNDRSOWN	Undersown uniformly in wheat
ALTRNATE	Strips of ryegrass 6 m wide alternating with strips of wheat 12 m wide

NOTE: Aphids (Metopolophium festucae) were released on the ryegrass on seven occasions during March and April, totaling 350,000 aphids per ha.

Basal applications: Manures: (10:23:23) at 250 kg. 'Nitro-Chalk' at 670 kg. Weedkillers: Paraquat at 0.56 kg ion in 225 l. Methabenzthiazuron at 1.2 kg in 250 l.

Seed: W. wheat: Maris Huntsman, sown at 190 kg.
Ryegrass: S.24, sown at 22 kg.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 27 Aug, 1981. Paraquat applied: 22 Sept. NPK applied, heavy spring-tine cultivated: 23 Sept. Rotary harrowed, seed sown: 8 Oct. Methabenzthiazuron applied: 15 Oct. N applied: 18 Apr, 1982. Combine harvested: 10 Aug. Previous crops: S. barley 1980, w. barley 1981.

NOTE: Cereal aphids were counted on six occasions during June and July. Above-ground fauna were sampled on 11 occasions between April 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.

GRAIN TONNES/HECTARE

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

RYEGRASS	NONE	UNDRSOWN	ALTRNATE	MEAN
	6.43	5.32	6.57	6.11

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.01524

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82/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 first year, ryegrass.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 2.4 x 12.2.

Treatments: All combinations of:-

1. N TIME(1)		Times of injecting aqueous urea and nitrification inhibitors:
	25 JAN	25 January, 1982
	22 MAR	22 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:
	23 MAR	23 March, 1982
	DIVIDED	Dressing divided equally between three dates, 23 March, 9 June, 22 July
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

plus six extra treatments

	EXTRA	'Nitro-Chalk' dressings (kg N):
	0	None
	NC3 S	375 on 23 March, 1982

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Dressing divided equally between three dates 23 March, 9 June, 22 July

NC1 D	125
NC2 D	250
NC3 D	375
NC4 D	500

Basal applications: Manures: (0:14:28) at 780 kg.

Cultivations, etc.:- PK applied: 24 Nov, 1981. Cut: 1 June, 1982, 14 July, 19 Oct. Previous crops: S. barley undersown grass 1980, grass 1981.

NOTES: (1) N in herbage was measured for each cut.
(2) Amounts of ammonia volatilised for 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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82/R/CS/272

1ST CUT (1/6/82) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
25 JAN	6.74	6.50	6.58	6.61
22 MAR	6.16	5.95	6.35	6.16
MEAN	6.45	6.22	6.47	6.38

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
23 MAR	5.94	6.49	5.87	6.10
DIVIDED	5.79	5.69	5.70	5.73
MEAN	5.87	6.09	5.79	5.91

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	2.24	5.98	4.58	5.62	6.23	6.12	5.13

GRAND MEAN 5.81

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.245	0.142	0.174	0.142

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.174	0.245	0.245

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.301	5.2

1ST CUT MEAN DM% 22.6

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82/R/CS/272

2ND CUT (14/7/82) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
25 JAN	2.07	1.94	2.08	2.03
22 MAR	2.43	2.53	2.20	2.38
MEAN	2.25	2.23	2.14	2.21

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
23 MAR	1.51	1.16	1.44	1.37
DIVIDED	2.24	1.81	1.61	1.89
MEAN	1.88	1.48	1.52	1.63

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	0.13	2.15	0.70	1.66	2.05	2.29	1.49

GRAND MEAN 1.78

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.162	0.093	0.114	0.093

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.114	0.162	0.162

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.198	11.2

2ND CUT MEAN DM% 18.5

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82/R/CS/272

3RD CUT (19/10/82) DRY MATTER TONNES/HECTARE

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

N INHIB(1) / N TIME(1)	AU3 0	AU3 ETR	AU3 NIT	MEAN
25 JAN	0.69	0.94	0.77	0.80
22 MAR	1.10	1.47	1.05	1.21
MEAN	0.89	1.20	0.91	1.00

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
23 MAR	0.62	0.84	0.71	0.73
DIVIDED	2.62	2.63	2.72	2.66
MEAN	1.62	1.73	1.71	1.69

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	0.25	1.11	1.39	2.17	2.58	2.39	1.65

GRAND MEAN 1.45

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.159	0.092	0.112	0.092

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.112	0.159	0.159

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.195	13.4

3RD CUT MEAN DM% 28.8

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82/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
25 JAN	9.50	9.37	9.43	9.44
22 MAR	9.69	9.95	9.60	9.75
MEAN	9.60	9.66	9.51	9.59

N INHIB(2) / N TIME(2)	PU3 0	PU3 DIC	PU3 HYD	MEAN
23 MAR	8.07	8.49	8.01	8.19
DIVIDED	10.66	10.13	10.03	10.27
MEAN	9.37	9.31	9.02	9.23

EXTRA	0	NC3 S	NC1 D	NC2 D	NC3 D	NC4 D	MEAN
	2.62	9.24	6.66	9.45	10.85	10.80	8.27

GRAND MEAN 9.03

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

TABLE	EXTRA	N TIME(1)	N INHIB(1)	N TIME(2)
SED	0.367	0.212	0.260	0.212

TABLE	N INHIB(2)	N TIME(1) N INHIB(1)	N TIME(2) N INHIB(2)
SED	0.260	0.367	0.367

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.450	5.0

TOTAL OF 3 CUTS MEAN DM% 23.3

PLOT AREA HARVESTED 0.00093

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82/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 first year, s. barley, potatoes.

Design: In the first 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
	IPR+IMAZ	Iprodione at 100 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 5 July, 1982, 19 July, 2 Aug, 16 Aug, 31 Aug, 13 Sept.

NOTES: (1) Additional plots were sown to s. barley preparatory to cropping sequences with differing frequencies of potatoes. Barley yields were not taken.
(2) Irrigation was applied to the potatoes as follows (mm water):

8 June	8
23 July	12.5
26 July	12.5
30 July	12.5
4 Aug	25
Total	70.5

Standard applications:
Potatoes: Manures: Magnesian limestone at 7.5 t, (0:14:28) at 820 kg, (10:10:15+4.5 Mg) at 2960 kg. Weedkillers: Linuron at 1.2 kg with paraquat at 0.28 kg ion in 280 l. Fungicides: Mancozeb at 1.4 kg in 250 l applied four times, with pirimicarb on the first two occasions. Ofurace with maneb (as 'Patafol-Plus' at 2 kg) in 250 l applied twice, with pirimicarb on the first occasion. Insecticides: Phorate granules at 1.7 kg, pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 220 l.

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82/W/CS/273

S. barley: Manures: Magnesian limestone at 7.5 t, (0:14:28) at 820 kg, N at 160 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l.

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

Cultivations, etc.:-
Potatoes: Magnesian limestone applied: 26 Sept, 1981. Ploughed twice: 2-3 Nov, 1 Feb 1982. PK applied: 7 Jan. Spring-tine cultivated with crumbler attached: 31 Mar, 2 Apr, 22 Apr. NPK with Mg applied: 19 Apr. Oxamyl applied, rotary cultivated with crumbler attached: 22 Apr. Phorate applied, potatoes planted: 23 Apr. Rotary ridged: 14 May. Weedkillers applied: 18 May. Mancozeb with pirimicarb applied: 16 June, 2 July. Mancozeb applied: 13 July, 23 Aug. 'Patafol-Plus' with pirimicarb applied: 27 July. 'Patafol-Plus' applied: 11 Aug. Haulm desiccant applied: 30 Sept. Lifted: 14 Oct.
S. Barley: Magnesian limestone applied: 26 Sept, 1981. Ploughed twice: 2-3 Nov, 1 Feb, 1982. PK applied: 7 Jan. Spring-tine cultivated with crumbler attached: 31 Mar, 2 Apr. N applied, seed sown: 2 Apr. Weedkiller applied: 17 May. Combine harvested: 12 Aug.

NOTES: (1) Slug traps were set out in the potatoes at intervals and catches monitored during the growing season.
(2) Plant samples were taken in August for tuber disease assessments.
(3) Potato cyst nematode numbers were assessed before planting and after harvest.
(4) OXAMYL was not applied to one plot with treatment combinations

SD TREAT	IPR+IMAZ
NEMACIDE	OXAMYL
MOLLCIDE	METHIOCA

Estimated values was used in the analysis.

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TOTAL TUBERS TONNES/HECTARE

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

NEMACIDE SD TREAT	NONE	OXAMYL	MEAN
NONE	35.9	59.5	47.7
IPR+IMAZ	39.9	62.2	51.1
MEAN	37.9	60.9	49.4

MOLLCIDE SD TREAT	NONE	METHIOCA	MEAN
NONE	49.5	45.8	47.7
IPR+IMAZ	52.0	50.1	51.1
MEAN	50.8	48.0	49.4

MOLLCIDE NEMACIDE	NONE	METHIOCA	MEAN
NONE	41.0	34.8	37.9
OXAMYL	60.5	61.2	60.9
MEAN	50.8	48.0	49.4

NEMACIDE	NONE		OXAMYL	
MOLLCIDE	NONE	METHIOCA	NONE	METHIOCA
SD TREAT				
NONE	40.9	30.9	58.1	60.8
IPR+IMAZ	41.1	38.6	62.9	61.6

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

TABLE	SD TREAT	NEMACIDE	MOLLCIDE	SD TREAT NEMACIDE
SED	2.49	2.49	2.49	3.52

TABLE	SD TREAT MOLLCIDE	NEMACIDE MOLLCIDE	SD TREAT NEMACIDE MOLLCIDE
SED	3.52	3.52	4.98

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	8.63	17.5

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82/W/CS/273

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

NEMACIDE	NONE	OXAMYL	MEAN
SD TREAT			
NONE	57.2	78.3	67.7
IPR+IMAZ	59.6	78.2	68.9
MEAN	58.4	78.2	68.3

MOLLCIDE	NONE	METHIOCA	MEAN
SD TREAT			
NONE	70.3	65.1	67.7
IPR+IMAZ	70.3	67.5	68.9
MEAN	70.3	66.3	68.3

MOLLCIDE	NONE	METHIOCA	MEAN
NEMACIDE			
NONE	61.5	55.2	58.4
OXAMYL	79.1	77.4	78.2
MEAN	70.3	66.3	68.3

NEMACIDE	NONE		OXAMYL	
MOLLCIDE	NONE	METHIOCA	NONE	METHIOCA
SD TREAT				
NONE	62.1	52.3	78.6	78.0
IPR+IMAZ	61.0	58.2	79.6	76.8

PLOT AREA HARVESTED 0.00075

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82/R/CS/279

NEMATICIDES AND STEM NEMATODE

Object: To study, on sites 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 first year, lucerne.

Design: On each site: 3 randomised blocks of 14 plots.

Whole plot dimensions: 1.22 x 3.66.

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 furrow
E 0	Europe, untreated
E A1	Europe, aldicarb at 1.5 kg in seed furrow (duplicated)
E A2	Europe, aldicarb at 3.0 kg in seed furrow (duplicated)
E A1 A1	Europe, aldicarb at 1.5 kg in seed furrow, repeated after each cut
E C1	Europe, carbofuran at 1.5 kg in seed furrow (duplicated)
E C2	Europe, carbofuran at 3.0 kg in seed furrow (duplicated)
E T1	Europe, thiabendazole at 1.5 kg over the rows at drilling
E T2	Europe, thiabendazole at 3.0 kg over the rows at drilling

Basal applications: Manures: (0:25:25) at 530 kg. Weedkiller: 2.4 - DB at 2.8 l in 280 l.

Seed: Both sites: Varieties sown at 11 kg.

Cultivations, etc.:-

HEALTHY site: PK applied: 26 Mar, 1982. Rotary harrowed twice, Europe sown, aldicarb and carbofuran applied to this variety: 29 Mar. Vertus sown and aldicarb applied to this variety, thiabendazole applied to Europe: 30 Mar. Weedkiller applied: 26 May. Cut: 13 July. Aldicarb applied: 16 July. Cut, aldicarb applied: 26 Aug. Previous crops: Potatoes 1980, s.wheat 1981.

INFESTED site: Ploughed: 24 Sept, 1981. PK applied: 26 Mar, 1982. Rotary harrowed, seed sown, aldicarb, carbofuran and thiabendazole applied to Europe and aldicarb to Vertus: 31 Mar. Weedkiller applied: 26 May. Cut north block: 13 July. Aldicarb applied to this block: 16 July. Cut remaining two blocks: 19 July. Aldicarb applied to these two blocks: 22 July. Cut: 25 Aug. Aldicarb applied: 26 Aug. Previous crops: Fallow 1980, lucerne 1981.

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82/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

1ST CUT (13/7/82) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	2.04
V A1	1.38
E 0	2.91
E A1	2.72
E A2	2.41
E A1 A1	2.68
E C1	3.55
E C2	3.25
E T1	3.11
E T2	2.84
MEAN	2.77

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

TABLE	TREATMNT	
SED	0.202	MIN REP
	0.175	MAX-MIN
	0.143	MAX REP

	TREATMNT
MAX REP	E A1 V E A2 V E C1 OR E C2
MAX-MIN	E A1 V E A2 V E C1 OR E C2 V ANY OF REMAINDER
MIN REP	ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.247	8.9

1ST CUT MEAN DM% 17.8

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82/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

2ND CUT (26/8/82) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	2.75
V A1	2.20
E 0	3.15
E A1	2.90
E A2	2.89
E A1 A1	3.16
E C1	3.61
E C2	3.38
E T1	3.51
E T2	2.96
MEAN	3.09

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

TABLE	TREATMNT	
SED	0.208	MIN REP
	0.181	MAX-MIN
	0.147	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.255	8.3

2ND CUT MEAN DM% 21.9

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82/R/CS/279 LONG HOOS V 5 (HEALTHY SITE)

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	4.79
V A1	3.58
E 0	6.05
E A1	5.62
E A2	5.30
E A1 A1	5.84
E C1	7.16
E C2	6.63
E T1	6.62
E T2	5.79
MEAN	5.87

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

TABLE	TREATMNT	
SED	0.360	MIN REP
	0.312	MAX-MIN
	0.255	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.441	7.5

TOTAL OF 2 CUTS MEAN DM% 19.9

PLOT AREA HARVESTED 0.00045

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82/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

1ST CUT (13-19/7/82) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	2.42
V A1	1.89
E 0	3.49
E A1	3.66
E A2	3.27
E A1 A1	3.73
E C1	4.12
E C2	4.03
E T1	3.12
E T2	3.66
MEAN	3.46

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

TABLE	TREATMNT	
SED	0.224	MIN REP
	0.194	MAX-MIN
	0.159	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.275	7.9

1ST CUT MEAN DM% 21.6

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82/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

2ND CUT (25/8/82) DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	2.16
V A1	1.99
E 0	2.62
E A1	2.62
E A2	2.57
E A1 A1	2.70
E C1	2.92
E C2	2.80
E T1	2.53
E T2	2.61
MEAN	2.60

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

TABLE	TREATMNT	
SED	0.117	MIN REP
	0.101	MAX-MIN
	0.083	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.143	5.5

2ND CUT MEAN DM% 24.2

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82/R/CS/279 LONG HOOS IV 2 (INFESTED SITE)

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

TREATMNT	
V 0	4.58
V A1	3.88
E 0	6.11
E A1	6.27
E A2	5.83
E A1 A1	6.43
E C1	7.03
E C2	6.83
E T1	5.64
E T2	6.26
MEAN	6.06

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

TABLE	TREATMNT	
SED	0.273	MIN REP
	0.236	MAX-MIN
	0.193	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.334	5.5

TOTAL OF 2 CUTS MEAN DM% 22.9

PLOT AREA HARVESTED 0.00045

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82/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 first year, lucerne and Melilotus alba.

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:
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 250 kg.

Seed: Both species sown at 10 kg.

Cultivations, etc.:- Ploughed: 27 Nov, 1981. PK applied: 20 Apr, 1982. Power harrowed, seed sown: 21 Apr. Cut by hand: 23 July, 7 Sept. Discards cut by machine: 1 Dec. Previous crops: W. wheat 1980, w. wheat 1981.

NOTE: Yields were recorded only from the harvest on 23 July. Nodules were sampled in July and September for identification of Rhizobium strains.

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82/R/CS/280

1ST CUT (23/7/82) DRY MATTER TONNES/HECTARE

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

SPECIES RM STRN	LUCERNE	MEL ALBA	MEAN
RCR 2001	4.30	10.57	7.43
MEL 5	4.67	7.00	5.83
MEL 10	4.83	7.87	6.35
MEL 16	4.60	10.67	7.63
MEL 17	5.23	9.47	7.35
MIXTURE	4.00	10.70	7.35
MEAN	4.61	9.38	6.99

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

TABLE	SPECIES	RM STRN	SPECIES RM STRN
SED	0.574	0.979	1.388
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SPECIES			1.385

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	30	1.959	28.0

PLOT AREA HARVESTED 0.00001

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82/W/CS/284

VARIETIES & PCN TOLERANCE

Object: In the first year to establish a range of populations of potato cyst nematode (PCN) for subsequent tests on varieties - Woburn Horsepool.

Sponsors: A.G. Whitehead, K. Evans.

The first year, potatoes.

Design: 3 randomised blocks of 32 plots.

Whole plot dimensions: 2.84 x 6.10.

Treatments:

VARIETY	Varieties:
CARA	Cara
CROWN	Pentland Crown
CA CR	Cara plants alternating with Pentland Crown plants within the ridges
CA CA CR	Two Cara plants alternating with one Pentland Crown plant within the ridges

NOTE: Eight replicates of each treatment were contained in each block to allow for future treatments.

Basal applications: Manures: (10:10:15+4.5 Mg) at 3360 kg. Weedkillers: Linuron at 1.1 l with paraquat at 0.28 kg ion in 280 l. Fungicides: Mancozeb at 1.4 kg in 280 l applied four times, with the insecticide on the first two occasions. Ofurace at 0.12 kg with maneb at 1.3 kg in 280 l applied twice with the insecticide on the first occasion. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.58 kg ion in 280 l.

Cultivations, etc.:- Deep-tine cultivated three times: once 29 Oct, 1981, twice 30 Oct. Heavy spring-tine cultivated three times: 15 Apr, 1982, 16 Apr, 19 Apr. NPK with Mg applied: 17 Apr. Rotary cultivated with crumbler attached: 21 Apr. Potatoes planted: 22 Apr. Rotary ridged: 17 May. Weedkillers applied: 18 May. Mancozeb applied: 16 June, 2 July, 13 July, 23 Aug. Ofurace with maneb applied: 27 July, 11 Aug. Insecticide applied: 16 June, 2 July, 27 July. Haulm desiccant applied: 6 Oct. Lifted: 19 Oct.

NOTE: Soil samples were taken before planting and after harvest from selected plots to assess numbers of cysts, eggs and larvae of Globodera rostochiensis.

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82/W/CS/284

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	CARA	CROWN	CA CR	CA CA CR	MEAN
	56.7	62.9	59.9	59.0	59.6

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

TABLE	TREATMNT
SED	2.52

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

STRATUM	DF	SE	CV%
BLOCK.WP	90	8.72	14.6

PLOT AREA HARVESTED 0.00100

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82/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 17th year, w. wheat.

For previous years see 66/C/30(t), 67/C/23(t), 68/C/39, 69-81/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: 8.53 x 18.3.

Treatments: On each site, combinations of:-

Whole plots

1. VARIETY	Varieties:
AVALON	
NORMAN	
2. AUT N	Nitrogen fertilizer to the seedbed in autumn on 13 Oct, 1981:
0	None
50	50 kg as (13:13:13)
3. PATHCONT	Pest and pathogen control:
NONE	None
FULL	Benomyl at 0.28 kg in 220 l on 1 Apr, 1982 Propiconazole at 0.12 kg with pirimicarb at 0.14 kg in 220 l on 26 May Carbendazim, maneb and tridemorph (as 'Cosmic' at 3.9 kg) with captafol at 1.1 kg and pirimicarb at 0.14 kg in 220 l on 30 June

Sub plots

4 N RATE — Total nitrogen fertilizer applied in spring (kg N) as 'Nitro-Chalk':

After wheat	After beans
130	70
160	100
190	130
220	160

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82/S/CS/1

5. N TIME — Times of applying spring nitrogen fertilizer:

SINGLE	All on 21 April, 1982
DIVIDED	40 kg N on 24 March, remainder on 21 April

plus whole plot treatments as above but given no spring nitrogen

NOTES: (1) AUT N 0 plots received 50 kg P_2O_5 and 50 kg K_2O as (0:20:20) to the seedbed.
(2) Muriate of potash was applied at 380 kg to stubble after beans, but not to stubble after wheat, on 2 Sept, 1981.

Basal applications: Weedkillers: Chlortoluron at 3.5 kg in 220 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with 'Wheatclene' (1.3 kg of solid (metoxuron and simazine) plus 1.3 l of liquid (barban)) in 220 l.

Seed: Varieties sown at 380 seeds per m^2 .

Cultivations, etc.: Ploughed: 10 Sept, 1981. Seed sown: 13 Oct. Chlortoluron applied: 14 Oct. Mecoprop, bromoxynil and ioxynil with 'Wheatclene' applied: 1 Apr, 1982. Combine harvested: 11 Aug.

NOTE: Plots were sampled in autumn and spring for mineral N content of soil (to 90 cm depth) and for nitrate content of crop. N content of grain and N content of straw (except after wheat) were determined at harvest.

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82/S/CS/1 WHEAT AFTER WHEAT

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	50	MEAN
VARIETY			
AVALON	5.19	6.19	5.69
NORMAN	7.87	8.28	8.07
MEAN	6.53	7.23	6.88

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	5.60	5.78	5.69
NORMAN	7.81	8.33	8.07
MEAN	6.70	7.06	6.88

PATHCONT	NONE	FULL	MEAN
AUT N			
0	6.23	6.82	6.53
50	7.18	7.29	7.23
MEAN	6.70	7.06	6.88

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	5.47	5.91	5.69
NORMAN	7.89	8.25	8.07
MEAN	6.68	7.08	6.88

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	6.23	6.82	6.53
50	7.13	7.34	7.23
MEAN	6.68	7.08	6.88

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	6.60	6.81	6.70
FULL	6.76	7.35	7.06
MEAN	6.68	7.08	6.88

N RATE	130	160	190	220	MEAN
VARIETY					
AVALON	5.06	5.38	5.94	6.38	5.69
NORMAN	7.43	7.90	8.32	8.64	8.07
MEAN	6.24	6.64	7.13	7.51	6.88

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82/S/CS/1 WHEAT AFTER WHEAT

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	130	160	190	220	MEAN
AUT N					
0	5.94	6.36	6.69	7.11	6.53
50	6.55	6.91	7.56	7.92	7.23
MEAN	6.24	6.64	7.13	7.51	6.88

N RATE	130	160	190	220	MEAN
PATHCONT					
NONE	6.04	6.47	6.95	7.37	6.70
FULL	6.45	6.80	7.31	7.66	7.06
MEAN	6.24	6.64	7.13	7.51	6.88

N RATE	130	160	190	220	MEAN
N TIME					
SINGLE	6.01	6.40	6.97	7.35	6.68
DIVIDED	6.48	6.87	7.29	7.68	7.08
MEAN	6.24	6.64	7.13	7.51	6.88

NO SPRING NITROGEN

AUT N	0	50	MEAN
VARIETY			
AVALON	1.14	2.08	1.61
NORMAN	2.68	3.64	3.16
MEAN	1.91	2.86	2.39

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	1.59	1.63	1.61
NORMAN	3.05	3.27	3.16
MEAN	2.32	2.45	2.39

PATHCONT	NONE	FULL	MEAN
AUT N			
0	1.71	2.12	1.91
50	2.93	2.79	2.86
MEAN	2.32	2.45	2.39

GRAND MEAN 5.98

GRAIN MEAN DM% 87.5

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82/S/CS/1 WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	50	MEAN
VARIETY			
AVALON	9.44	10.01	9.73
NORMAN	10.08	10.12	10.10
MEAN	9.76	10.06	9.91

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	9.42	10.03	9.73
NORMAN	9.64	10.56	10.10
MEAN	9.53	10.29	9.91

PATHCONT	NONE	FULL	MEAN
AUT N			
0	9.48	10.04	9.76
50	9.58	10.54	10.06
MEAN	9.53	10.29	9.91

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	9.63	9.83	9.73
NORMAN	10.08	10.12	10.10
MEAN	9.85	9.97	9.91

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	9.69	9.83	9.76
50	10.01	10.11	10.06
MEAN	9.85	9.97	9.91

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	9.48	9.58	9.53
FULL	10.23	10.36	10.29
MEAN	9.85	9.97	9.91

N RATE	70	100	130	160	MEAN
VARIETY					
AVALON	9.24	9.55	10.07	10.05	9.73
NORMAN	9.54	10.13	10.38	10.34	10.10
MEAN	9.39	9.84	10.22	10.19	9.91

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82/S/CS/1 WHEAT AFTER BEANS

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	70	100	130	160	MEAN
AUT N					
0	9.20	9.77	10.00	10.08	9.76
50	9.58	9.91	10.45	10.30	10.06
MEAN	9.39	9.84	10.22	10.19	9.91

N RATE	70	100	130	160	MEAN
PATHCONT					
NONE	9.20	9.41	9.89	9.62	9.53
FULL	9.58	10.26	10.56	10.77	10.29
MEAN	9.39	9.84	10.22	10.19	9.91

N RATE	70	100	130	160	MEAN
N TIME					
SINGLE	9.32	9.89	10.06	10.15	9.85
DIVIDED	9.46	9.79	10.39	10.24	9.97
MEAN	9.39	9.84	10.22	10.19	9.91

NO SPRING NITROGEN

AUT N	0	50	MEAN
VARIETY			
AVALON	6.81	7.95	7.38
NORMAN	7.39	8.75	8.07
MEAN	7.10	8.35	7.72

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	7.30	7.45	7.38
NORMAN	7.77	8.38	8.07
MEAN	7.54	7.91	7.72

PATHCONT	NONE	FULL	MEAN
AUT N			
0	6.95	7.25	7.10
50	8.12	8.58	8.35
MEAN	7.54	7.91	7.72

GRAND MEAN 9.47

GRAIN MEAN DM% 87.5

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82/S/CS/1 WHEAT AFTER BEANS

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	50	MEAN
VARIETY			
AVALON	3.85	4.56	4.21
NORMAN	4.38	5.00	4.69
MEAN	4.11	4.78	4.45

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	4.21	4.20	4.21
NORMAN	4.51	4.86	4.69
MEAN	4.36	4.53	4.45

PATHCONT	NONE	FULL	MEAN
AUT N			
0	3.94	4.28	4.11
50	4.78	4.77	4.78
MEAN	4.36	4.53	4.45

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	3.96	4.46	4.21
NORMAN	4.47	4.90	4.69
MEAN	4.21	4.68	4.45

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	3.81	4.41	4.11
50	4.61	4.95	4.78
MEAN	4.21	4.68	4.45

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	4.19	4.54	4.36
FULL	4.24	4.82	4.53
MEAN	4.21	4.68	4.45

N RATE	70	100	130	160	MEAN
VARIETY					
AVALON	3.92	3.99	4.42	4.49	4.21
NORMAN	4.62	4.74	4.58	4.80	4.69
MEAN	4.27	4.37	4.50	4.65	4.45

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82/S/CS/1 WHEAT AFTER BEANS

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	70	100	130	160	MEAN
AUT N					
0	3.90	4.26	3.94	4.35	4.11
50	4.64	4.48	5.06	4.94	4.78
MEAN	4.27	4.37	4.50	4.65	4.45

N RATE	70	100	130	160	MEAN
PATHCONT					
NONE	4.14	4.23	4.47	4.61	4.36
FULL	4.40	4.50	4.53	4.68	4.53
MEAN	4.27	4.37	4.50	4.65	4.45

N RATE	70	100	130	160	MEAN
N TIME					
SINGLE	4.07	4.22	4.18	4.38	4.21
DIVIDED	4.47	4.51	4.82	4.91	4.68
MEAN	4.27	4.37	4.50	4.65	4.45

NO SPRING NITROGEN

AUT N	0	50	MEAN
VARIETY			
AVALON	3.23	3.93	3.58
NORMAN	3.33	4.21	3.77
MEAN	3.28	4.07	3.67

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	3.67	3.49	3.58
NORMAN	3.43	4.11	3.77
MEAN	3.55	3.80	3.67

PATHCONT	NONE	FULL	MEAN
AUT N			
0	3.06	3.49	3.28
50	4.03	4.10	4.07
MEAN	3.55	3.80	3.67

GRAND MEAN 4.29

STRAW MEAN DM% 83.8

SUBPLOT AREA HARVESTED 0.00126

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82/R/WW/1 and 82/W/WW/1

WINTER WHEAT

VARIETIES

Object: To study a selection of the newer varieties of w. wheat and the effects of nitrogen, growth regulator and fungicide on them on land in rotation (pathogen free) and after wheat and barley (pathogen infected) - Rothamsted White Horse I (pathogen free RH) and West Barnfield II (pathogen infected RD), Woburn Horsepool (pathogen free WH).

Sponsors: R. Moffitt, R.J. Gutteridge, N. Magan.

Design: Single replicate of 4 whole plots split into 10 (8 for WH).

Whole plot dimensions: (RH, RD) 3.0 x 12 (WH) 6.0 x 12.

Treatments: All combinations of:-

Whole plots

1. GROWREG — Growth regulator:

NONE	None
CHLORMEQ	Chlormequat at 1.7 l in 250 l (RH, RD), 2.0 l in 280 l (WH)

2. FUNGCIDE — Fungicides:

NONE
APPLIED

Sub plots

3. VARIETY — Varieties:

AQUILA	Aquila
AVALON	Avalon
FENMAN	Fenman
FLANDERS	Flanders
GUARDIAN	Guardian
LONGBOW	Longbow
NORMAN	Norman
RAPIER	Rapier
M HUNT O	Maris Huntsman once-grown at Rothamsted, given no foliar fungicide in 1981
M HUNT F	Maris Huntsman once-grown at Rothamsted, given foliar fungicide in 1981

NOTES: (1) Maris Huntsman was sown on the Rothamsted sites only.
(2) The fungicides were prochloraz at 0.4 kg in 250 l (RH, RD), 280 l (WH). Carbendazim with maneb and tridemorph (as 'Cosmic' at 4 kg) in 250 l on all sites. Captafol at 1.2 kg in 250 l on all sites.

Basal applications:
White Horse I (RH): Manures: N at 125 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l, glyphosate at 1.4 kg in 250 l.

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82/R/WW/1 and 82/W/WW/1

West Barnfield II (RD): Manures: N at 190 kg as 'Nitro-Chalk'. Weedkillers: Paraquat at 0.56 kg ion in 220 l, methabenzthiazuron at 1.6 kg in 250 l.
Horsepool (WH): Manures: N at 125 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: White Horse I (RH), West Barnfield II (RD): Varieties sown at 210 kg. Horsepool (WH): Varieties sown at 200 kg.

Cultivations, etc.:-
White Horse I (RH): Spring-tine cultivated: 16 Oct, 1981. Heavy spring-tine cultivated: 22 Oct, 24 Oct. Rotary harrowed, seed sown: 27 Oct. 'Brittox' applied: 16 Apr, 1982. N applied: 23 Apr. Prochloraz, chlormequat applied: 5 May. 'Cosmic' and captafol applied: 14 June. Glyphosate applied: 10 Aug. Combine harvested: 22 Aug.
West Barnfield II (RD): Disced: 23 Sept, 1981. Paraquat applied: 23 Oct. Rotary harrowed, seed sown: 24 Oct. Methabenzthiazuron applied: 26 Oct. N applied: 23 Apr, 1982. Prochloraz, chlormequat applied: 5 May. 'Cosmic' and captafol applied: 14 June. Combine harvested: 22 Aug.
Horsepool (WH): Deep-tine cultivated three times: Once 29 Oct, 1981, twice 30 Oct. Rotary cultivated, seed sown: 3 Nov. 'Brittox' applied: 16 Apr, 1982. N applied: 27 Apr. Prochloraz, chlormequat applied: 8 May. 'Cosmic' captafol and pirimicarb applied: 15 June. Combine harvested: 19 Aug.

NOTE: Two plots on Horsepool (WH) were sprayed in error, those with treatment combinations:

GROWREG	FUNGCIDE	VARIETY
NONE	NONE	FLANDERS
NONE	NONE	FENMAN

Estimated values were used in the analysis

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82/R/WW/1 WHITE HORSE I (R)
HEALTHY SITE
GRAIN TONNES/HECTARE

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

FUNGCIDE VARIETY	NONE	APPLIED	MEAN
AQUILA	7.96	8.82	8.39
AVALON	7.02	7.49	7.25
FENMAN	6.78	7.54	7.16
FLANDERS	7.06	7.90	7.48
GUARDIAN	7.86	9.36	8.61
LONGBOW	7.46	8.65	8.06
NORMAN	6.53	7.80	7.16
RAPIER	8.32	9.26	8.79
M HUNT O	7.76	8.06	7.91
M HUNT F	7.62	8.10	7.86
MEAN	7.44	8.30	7.87

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	8.50	8.28	8.39
AVALON	7.19	7.32	7.25
FENMAN	7.07	7.26	7.16
FLANDERS	7.34	7.62	7.48
GUARDIAN	8.47	8.75	8.61
LONGBOW	8.17	7.94	8.06
NORMAN	7.13	7.20	7.16
RAPIER	8.70	8.87	8.79
M HUNT O	7.69	8.13	7.91
M HUNT F	7.44	8.27	7.86
MEAN	7.77	7.96	7.87

GROWREG FUNGCIDE	NONE	CHLORMEQ	MEAN
NONE	7.34	7.53	7.44
APPLIED	8.20	8.40	8.30
MEAN	7.77	7.96	7.87

FUNGCIDE	NONE		APPLIED	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
VARIETY				
AQUILA	7.81	8.11	9.19	8.46
AVALON	7.00	7.03	7.37	7.60
FENMAN	6.87	6.68	7.26	7.83
FLANDERS	7.14	6.98	7.54	8.25
GUARDIAN	7.63	8.09	9.31	9.41
LONGBOW	7.56	7.36	8.78	8.52
NORMAN	6.35	6.71	7.91	7.69
RAPIER	8.13	8.50	9.27	9.24
M HUNT O	7.58	7.95	7.81	8.31
M HUNT F	7.33	7.91	7.56	8.64

GRAIN MEAN DM% 84.5

SUB PLOT AREA HARVESTED 0.00245

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82/R/WW/1 W.BARNFIELD II (R)
DISEASED SITE
GRAIN TONNES/HECTARE

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

FUNGCIDE VARIETY	NONE	APPLIED	MEAN
AQUILA	7.28	8.44	7.86
AVALON	6.90	8.00	7.45
FENMAN	7.03	8.23	7.63
FLANDERS	7.42	8.71	8.07
GUARDIAN	6.65	9.30	7.98
LONGBOW	7.31	9.72	8.51
NORMAN	6.58	8.62	7.60
RAPIER	6.81	9.36	8.09
M HUNT O	7.69	9.02	8.36
M HUNT F	7.63	8.69	8.16
MEAN	7.13	8.81	7.97

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	8.19	7.53	7.86
AVALON	7.32	7.58	7.45
FENMAN	7.86	7.40	7.63
FLANDERS	8.17	7.97	8.07
GUARDIAN	7.74	8.22	7.98
LONGBOW	8.74	8.29	8.51
NORMAN	7.42	7.78	7.60
RAPIER	8.38	7.79	8.09
M HUNT O	7.90	8.82	8.36
M HUNT F	7.63	8.69	8.16
MEAN	7.94	8.01	7.97

GROWREG FUNGCIDE	NONE	CHLORMEQ	MEAN
NONE	6.95	7.32	7.13
APPLIED	8.92	8.70	8.81
MEAN	7.94	8.01	7.97

FUNGCIDE	NONE		APPLIED	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
VARIETY				
AQUILA	7.14	7.43	9.25	7.63
AVALON	6.72	7.09	7.93	8.07
FENMAN	7.16	6.90	8.56	7.89
FLANDERS	7.18	7.67	9.15	8.28
GUARDIAN	6.45	6.86	9.03	9.58
LONGBOW	7.55	7.07	9.92	9.51
NORMAN	6.35	6.81	8.50	8.74
RAPIER	6.94	6.68	9.82	8.91
M HUNT O	7.09	8.30	8.70	9.33
M HUNT F	6.90	8.36	8.36	9.03

GRAIN MEAN DM% 83.9

SUB PLOT AREA HARVESTED 0.00244

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82/W/WW/1 HORSEPOOL (W)

GRAIN TONNES/HECTARE

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

FUNGCIDE VARIETY	NONE	APPLIED	MEAN
AQUILA	7.81	9.41	8.61
AVALON	8.87	8.26	8.56
FENMAN	9.33	8.94	9.13
FLANDERS	8.44	10.90	9.67
GUARDIAN	7.05	8.94	8.00
LONGBOW	7.97	8.91	8.44
NORMAN	7.63	8.85	8.24
RAPIER	8.67	9.23	8.95
MEAN	8.22	9.18	8.70

GROWREG VARIETY	NONE	CHLORMEQ	MEAN
AQUILA	9.35	7.87	8.61
AVALON	7.86	9.26	8.56
FENMAN	9.48	8.79	9.13
FLANDERS	9.10	10.24	9.67
GUARDIAN	7.47	8.52	8.00
LONGBOW	8.58	8.30	8.44
NORMAN	9.17	7.31	8.24
RAPIER	9.48	8.42	8.95
MEAN	8.81	8.59	8.70

GROWREG FUNGCIDE	NONE	CHLORMEQ	MEAN
NONE	8.94	7.51	8.22
APPLIED	8.69	9.67	9.18
MEAN	8.81	8.59	8.70

FUNGCIDE	NONE		APPLIED	
GROWREG	NONE	CHLORMEQ	NONE	CHLORMEQ
VARIETY				
AQUILA	9.41	6.21	9.28	9.53
AVALON	9.14	8.60	6.59	9.92
FENMAN	*	8.39	8.68	9.19
FLANDERS	*	8.40	9.73	12.07
GUARDIAN	7.35	6.75	7.59	10.29
LONGBOW	7.85	8.10	9.32	8.50
NORMAN	8.97	6.29	9.37	8.33
RAPIER	10.04	7.30	8.92	9.54

GRAIN MEAN DM% 83.7

SUB PLOT AREA HARVESTED 0.00330

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82/R/WW/2

WINTER WHEAT

GROWTH AND YIELD ON A CONTRASTED SITE

Object: To compare the effects of some of the factors tested in 82/W/WW/2 on the growth and yield of w. wheat on a contrasted site - Pastures.

Sponsors: F.V. Widdowson, P.J. Welbank, A.H. Weir.

Design: Half replicate of 2^5 + 24 extra plots.

Whole plot dimensions: 3.0 x 15.2.

Treatment: Combinations of the following (all sown to variety Avalon):

1.	SOWDATE	Dates of sowing:
	22 SEPT	22 September, 1981
	22 OCT	22 October
2.	TOTAL N	Total amount of N fertilizer (kg N) as 'Nitro-Chalk':
	70	30 on the first date, 40 on the second
	140	100 on the first date, 40 on the second
3.	N TIME	Timing of fertilizer application:
	EARLY	9 Mar, 1982, 11 May
	LATE	16 Apr, 24 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 7.1 kg worked into seedbed

Plus all combinations of the following (all unirrigated, given aldicarb, sown to Avalon):

1.	TOTAL NX	Total amount of N fertilizer (kg N) as 'Nitro-Chalk':
	0	None
	35	None on the first date, 35 on the second
	70	30 on the first date, 40 on the second
	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
2.	S DATE N	Dates of sowing and timing of N application:
	22 SEP NE	Sown 22 Sept N applied as N TIME EARLY
	22 OCT NL	Sown 22 Oct N applied as N TIME LATE

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82/R/WW/2

plus all combinations of the following (all unirrigated and given aldicarb):

1. VARIETYX Varieties:

   AVALON
   HUSTLER

2. SOATE NX Dates of sowing and timing of N application:

   SE 5NE Sown 22 Sept, 140 kg N applied as N TIME EARLY (Quadruplicated)
   SL 5NL Sown 22 Oct, 140 kg N applied as N TIME LATE (Duplicated)

Basal applications: Manures: (0:14:28) at 360 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.0 l) in 340 l, applied with the growth regulator. Fungicides: Benomyl at 0.56 kg in 340 l. Propiconazole at 0.12 kg in 340 l. Insecticides: Pirimicarb at 0.14 kg in 340 l. Omethoate at 0.64 l in 340 l. Growth regulator: Chlormequat at 0.8 kg.

Seed: Hustler, dressed chlorfenvinphos, sown at 170 kg.
Avalon, dressed chlorfenvinphos, sown at 200 kg.

Cultivations, etc.:- Deep-tine cultivated twice, PK applied: 17 Sept, 1981. Aldicarb applied for SOWDATE 22 SEPT, rotary harrowed, seed sown: 22 Sept. Aldicarb applied for SOWDATE 22 OCT, rotary harrowed, seed sown: 22 Oct. Chlortoluron applied: 28 Oct. Mecoprop, bromoxynil and ioxynil with the growth regulator applied to SOWDATE 22 SEPT plots: 23 Mar, 1982. Benomyl applied: 25 Mar. Omethoate applied: 14 Apr. Mecoprop, bromoxynil and ioxynil with the growth regulator applied to SOWDATE 22 OCT plots: 19 Apr. Propiconazole applied: 26 May. Pirimicarb applied: 14 June. Combine harvested: 20 Aug. Previous crops: W. oats 1980, potatoes 1981.

NOTES: (1) Light interception, dry weight, leaf area and N content of the above-ground crop were measured on several occasions. Stem nitrate levels were also measured on three occasions during spring.
(2) Soil samples, to measure mineral N content, were taken on five occasions during winter and spring.

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82/R/WW/2

MAIN FACTORIAL PLOTS

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

GRAND MEAN 7.62

SOWDATE	22 SEPT	22 OCT
	7.91	7.34

TOTAL N	70	140
	7.38	7.86

N TIME	EARLY	LATE
	7.66	7.59

IRRIGATN	NONE	FULL
	7.66	7.58

AUT PEST	NONE	ALDICARB
	7.60	7.65

EXTRA PLOTS

TOTAL NX S DATE N	0	35	70	105	140	175	MEAN
22 SEPT NE	6.54	7.86	7.25	7.86	8.20	9.06	7.80
22 OCT NL	5.85	7.25	6.71	7.06	7.72	7.54	7.02
MEAN	6.20	7.56	6.98	7.46	7.96	8.30	7.41

SDATE NX VARIETY	SE 5NE	SL 5NL	MEAN
AVALON	8.49	6.93	7.97
HUSTLER	9.13	7.02	8.43
MEAN	8.81	6.98	8.20

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

TABLE	SOWDATE	TOTAL N	N TIME	IRRIGATN
SED	0.158	0.158	0.158	0.158

TABLE	AUT PEST
SED	0.158

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

STRATUM	DF	SE	CV%
WP	10	0.315	4.1

GRAIN MEAN DM% 81.3

PLOT AREA HARVESTED 0.00241

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82/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 I (BC - light land) and Broad Mead II (BM - heavy land).

Sponsors: F.V. Widdowson, P.J. Welbank, A.H. Weir.

Design: Half replicate of 2^6, arranged as 16 whole plots split into 2 sub plots, plus 20 extra sub plots (BC) 32 whole plots, plus 20 extra plots (BM).

Whole plot dimensions: 3.00 x 30.5 (BC)
3.00 x 15.2 (BM)

Treatments: Combinations of:-

Whole plots

1. SOWDATE — Dates of sowing:

23 SEPT	23 September, 1981
23 OCT	23 October

Sub plots (BC), whole plots (BM)

2. WINTER N — Amounts of nitrogen fertilizer applied, as 'Nitro-Chalk', on 1 Feb, 1982 (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
120	30
180	90

4. N TIME — Times of applying spring fertilizer:

EARLY	All except 40 kg N (BC), 30 kg N (BM) on 11 Mar; remainder on 11 May
LATE	All except 40 kg N (BC), 30 kg N (BM) on 15 Apr; remainder on 25 May

5. IRRIGATN — Irrigation:

NONE	None
FULL	Full (112.5 mm BC, 137.5 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 5.0 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:

23 SEPT NE	Sown 23 Sept, N applied at N TIME EARLY (timing and division as above)
23 OCT NL	Sown 23 Oct, N applied at N TIME LATE (timing and division as above)

Sub plots (BC), whole plots (BM)

2. N SCALE — Amounts of nitrogen fertilizer applied in spring (kg N):

BC	BM
0	0
90	0
150	60
180	90
210	120
240	150

Plus all combinations of the following (all given 180 kg N (BC), 90 kg N (BM) in spring, aldicarb and winter nitrogen):

Whole plots

1. SDATE NX — Dates of sowing and times of applying nitrogen fertilizer:

BC	BM	
SE 180E	SE 90E	Sown 23 Sept, N applied at N TIME EARLY (duplicated on BM only)
SL 180L	SL 90L	Sown 23 Oct, N applied at N TIME LATE (duplicated on BM only)

Sub plots (BC), whole plots (BM)

2. IRRIG X — Irrigation:

NONE	None
FULL	Full to lessen a deficit of 25 mm to 12.5 mm

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Irrigation was applied as follows (mm water):

Butt Close I (BC)		Broad Mead II (BM)	
17 May	12.5	18 May	12.5
18 May	12.5	19 May	12.5
19 May	12.5	20 May	25
20 May	12.5	21 May	25
2 June	12.5	1 June	12.5
8 June	12.5	10 June	12.5
12 July	12.5	13 July	12.5
13 July	12.5	14 July	12.5
19 July	12.5	20 July	12.5
Total	112.5	Total	137.5

Standard applications:
Butt Close I (BC) and Broad Mead II (BM): Manures: (0:14:28) at 360 kg. Chelated manganese applied on two occasions (as 'Vytel' at 2.8 l on the first and 1.4 l on the second occasion) in 280 l to (BM) only. Weedkillers: Chlortoluron at 5.6 l in 280 l, mecoprop (as 'Herrifex DS' at 4.2 l on two occasions to (BM) only and at 4.9 l to both) in 280 l. Fungicides: Benomyl at 0.24 kg in 280 l, triadimefon with captafol (as 'Bayleton CF' 2.0 kg) in 280 l on two occasions the second with the pirimicarb. Insecticides: Omethoate at 0.64 l in 280 l, pirimicarb at 0.14 kg in 280 l. Growth regulator: Chlormequat at 1.4 kg in 280 l.

Seed: Avalon, sown at 200 kg.

Cultivations, etc.:-
Butt Close I (BC): Deep-tine cultivated: 20 Aug, 1981. Spring-tine cultivated: 10 Sept. Previous crops: S. barley 1980, potatoes 1981.
Broad Mead II (BM): Heavy spring-tine cultivated twice: 10 Sept, 1981. Mecoprop applied: 19 Nov, 23 Mar, 1982. Manganese applied: 17 May, 7 June. Previous crops: W. wheat 1980, potatoes 1981.
(BC) and (BM): PK applied: 11 Sept, 1981. Aldicarb applied, rotary cultivated and seed sown for SOWDATE 23 SEPT: 23 Sept. Aldicarb applied, rotary cultivated and seed sown for SOWDATE 23 OCT: 23 Oct. Chlortoluron applied: 28 Oct. Growth regulator applied to SOWDATE 23 SEPT: 26 Mar, 1982, SOWDATE 23 OCT: 22 Apr. Mecoprop applied: 26 Mar. Omethoate applied: 5 Apr. Benomyl applied: 22 Apr. 'Bayleton CF' applied, with the pirimicarb on the second occasion: 2 June, 14 June. Combine harvested: 12 Aug.

NOTE: Measurements were made of plant and shoot numbers, dry weight of tops and ears, leaf area and N, P and K 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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82/W/WW/2 BUTT CLOSE I (BC)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

N RATE	120	180	MEAN
SOWDATE			
23 SEPT	6.89	8.26	7.57
23 OCT	6.49	8.38	7.43
MEAN	6.69	8.32	7.50

N TIME	EARLY	LATE	MEAN
SOWDATE			
23 SEPT	7.56	7.59	7.57
23 OCT	7.55	7.32	7.43
MEAN	7.55	7.45	7.50

N TIME	EARLY	LATE	MEAN
N RATE			
120	6.56	6.81	6.69
180	8.54	8.09	8.32
MEAN	7.55	7.45	7.50

WINTER N	0	60	MEAN
SOWDATE			
23 SEPT	6.91	8.23	7.57
23 OCT	6.92	7.95	7.43
MEAN	6.91	8.09	7.50

WINTER N	0	60	MEAN
N RATE			
120	6.17	7.21	6.69
180	7.66	8.97	8.32
MEAN	6.91	8.09	7.50

WINTER N	0	60	MEAN
N TIME			
EARLY	7.02	8.08	7.55
LATE	6.81	8.10	7.45
MEAN	6.91	8.09	7.50

IRRIGATN	NONE	FULL	MEAN
SOWDATE			
23 SEPT	7.34	7.80	7.57
23 OCT	6.98	7.88	7.43
MEAN	7.16	7.84	7.50

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82/W/WW/2 BUTT CLOSE I (BC)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

IRRIGATN N RATE	NONE	FULL	MEAN
120	6.39	6.99	6.69
180	7.93	8.70	8.32
MEAN	7.16	7.84	7.50

IRRIGATN N TIME	NONE	FULL	MEAN
EARLY	7.18	7.92	7.55
LATE	7.14	7.76	7.45
MEAN	7.16	7.84	7.50

IRRIGATN WINTER N	NONE	FULL	MEAN
0	6.74	7.09	6.91
60	7.58	8.60	8.09
MEAN	7.16	7.84	7.50

AUT PEST SOWDATE	NONE	ALDICARB	MEAN
23 SEPT	7.59	7.56	7.57
23 OCT	7.21	7.65	7.43
MEAN	7.40	7.60	7.50

AUT PEST N RATE	NONE	ALDICARB	MEAN
120	6.42	6.96	6.69
180	8.38	8.25	8.32
MEAN	7.40	7.60	7.50

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	7.48	7.62	7.55
LATE	7.32	7.58	7.45
MEAN	7.40	7.60	7.50

AUT PEST WINTER N	NONE	ALDICARB	MEAN
0	6.95	6.88	6.91
60	7.85	8.33	8.09
MEAN	7.40	7.60	7.50

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82/W/WW/2 BUTT CLOSE I (BC)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

AUT PEST IRRIGATN	NONE	ALDICARB	MEAN
NONE	6.89	7.43	7.16
FULL	7.91	7.78	7.84
MEAN	7.40	7.60	7.50

EXTRA PLOTS

N SCALE S DATE N	0	90	150	180	210	240	MEAN
23 SEPT NE	1.98	5.58	5.51	8.57	7.73	8.95	6.39
23 OCT NL	1.78	5.01	7.85	7.05	8.13	6.55	6.06
MEAN	1.88	5.30	6.68	7.81	7.93	7.75	6.22

IRRIG X SDATE NX	NONE	FULL	MEAN
SE 180E	7.83	8.62	8.23
SL 180L	7.54	8.29	7.92
MEAN	7.69	8.46	8.07

GRAND MEAN 7.29

SED FOR TABLES EXCEPT THOSE INVOLVING S DATE N, N SCALE, SDATE NX, IRRIG X AND WINT NX ARE

MARGINS OF 2 WAY TABLES	0.161
TWO WAY TABLES	0.228

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

STRATUM	DF	SE	CV%
WP	10	0.456	6.1

GRAIN MEAN DM% 85.3

PLOT AREA HARVESTED 0.00202

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82/W/WW/2 BROAD MEAD II (BM)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

N RATE	30	90	MEAN
SOWDATE			
23 SEPT	7.77	8.67	8.22
23 OCT	7.56	7.96	7.76
MEAN	7.67	8.31	7.99

N TIME	EARLY	LATE	MEAN
SOWDATE			
23 SEPT	8.21	8.24	8.22
23 OCT	7.73	7.78	7.76
MEAN	7.97	8.01	7.99

N TIME	EARLY	LATE	MEAN
N RATE			
30	7.78	7.55	7.67
90	8.16	8.47	8.31
MEAN	7.97	8.01	7.99

WINTER N	0	30	MEAN
SOWDATE			
23 SEPT	8.05	8.39	8.22
23 OCT	7.64	7.87	7.76
MEAN	7.85	8.13	7.99

WINTER N	0	30	MEAN
N RATE			
30	7.61	7.73	7.67
90	8.09	8.54	8.31
MEAN	7.85	8.13	7.99

WINTER N	0	30	MEAN
N TIME			
EARLY	7.84	8.10	7.97
LATE	7.86	8.16	8.01
MEAN	7.85	8.13	7.99

IRRIGATN	NONE	FULL	MEAN
SOWDATE			
23 SEPT	8.09	8.36	8.22
23 OCT	7.91	7.60	7.76
MEAN	8.00	7.98	7.99

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82/W/WW/2 BROAD MEAD II (BM)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

IRRIGATN N RATE	NONE	FULL	MEAN
30	7.56	7.77	7.67
90	8.44	8.19	8.31
MEAN	8.00	7.98	7.99

IRRIGATN N TIME	NONE	FULL	MEAN
EARLY	7.85	8.09	7.97
LATE	8.15	7.87	8.01
MEAN	8.00	7.98	7.99

IRRIGATN WINTER N	NONE	FULL	MEAN
0	7.79	7.91	7.85
30	8.21	8.06	8.13
MEAN	8.00	7.98	7.99

AUT PEST SOWDATE	NONE	ALDICARB	MEAN
23 SEPT	7.97	8.48	8.22
23 OCT	7.48	8.04	7.76
MEAN	7.72	8.26	7.99

AUT PEST N RATE	NONE	ALDICARB	MEAN
30	7.51	7.83	7.67
90	7.94	8.69	8.31
MEAN	7.72	8.26	7.99

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	7.72	8.22	7.97
LATE	7.73	8.29	8.01
MEAN	7.72	8.26	7.99

AUT PEST WINTER N	NONE	ALDICARB	MEAN
0	7.59	8.11	7.85
30	7.86	8.41	8.13
MEAN	7.72	8.26	7.99

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82/W/WW/2 BROAD MEAD II (BM)

MAIN FACTORIAL PLOTS

GRAIN TONNES/HECTARE

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

AUT PEST IRRIGATN	NONE	ALDICARB	MEAN
NONE	7.75	8.24	8.00
FULL	7.69	8.27	7.98
MEAN	7.72	8.26	7.99

EXTRA PLOTS

N SCALE S DATE N	0	60	90	120	150	MEAN
23 SEPT NE	7.22	8.25	7.58	8.95	8.71	7.99
23 OCT NL	7.55	8.21	6.90	8.76	7.83	7.80
MEAN	7.39	8.23	7.24	8.85	8.27	7.89

IRRIG X SDATE NX	NONE	FULL	MEAN
SE 90E	8.06	8.56	8.31
SL 90L	7.91	8.39	8.15
MEAN	7.99	8.48	8.23

GRAND MEAN 8.00

SED FOR TABLES EXCEPT THOSE INVOLVING S DATE N, N SCALE, SDATE NX AND IRRIG X ARE

MARGINS OF 2 WAY TABLES	0.190
TWO WAY TABLES	0.269

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

STRATUM	DF	SE	CV%
WP	10	0.539	6.7

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00202

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82/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 - Gt. Knott I.

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: P.B. Barraclough, D.S. Jenkinson, A.H. Weir, P.J. Welbank, F.V. Widdowson.

Design: Half replicate of 2^8 + 46 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 1979, w. wheat 1980, s. barley 1981
OATS	Potatoes 1979, w. wheat 1980, s. oats 1981

Whole plots

2. SOWDATE — Dates of sowing:

22 SEP	22 September, 1981
22 OCT	22 October

3. TOTAL N — Total amount of N fertilizer (kg N) as 'Nitro-Chalk':

150
220

4. N TIME — Timing of nitrogen fertilizer applications:

EARLY	2 February, 1982, 9 March, 10 May
LATE	9 March, 13 April, 24 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 23 March for SOWDATE 22 SEPT and 16 April for SOWDATE 22 OCT

6. SPR FUNG — Spring fungicide:

NONE	None
BENOMYL	Benomyl at 0.25 kg on 24 March

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7. SUM FUNG — Summer fungicide:

NONE	None
PROPICON	Propiconazole at 0.125 kg on 26 May and 24 June

8. PESTCIDE — Autumn and summer pesticides:

NONE	None
ALD+PIR	Aldicarb at 7 kg worked into seedbed + pirimicarb at 0.14 kg on 14 June

Plus all combinations of the following (all given chlormequat chloride + choline chloride, benomyl, propiconazole, aldicarb, pirimicarb; the plots sown 22 Sept were given N timed early and plots sown 22 Oct given N timed late):

Blocks

1. PRECROPX — Previous cropping:

BARLEY	Potatoes 1979, w. wheat 1980, s. barley 1981
OATS	Potatoes 1979, w. wheat 1980, s. oats 1981

Whole plots

2. SOWDATEX — Dates of sowing:

22 SEPT	22 September, 1981
22 OCT	22 October

3. TOTAL NX — Total amount of N fertilizer (kg N) as 'Nitro-Chalk':

0
115
185
255

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, benomyl, propiconazole, aldicarb and pirimicarb):

Blocks

1. PRECROPI — Previous cropping:

BARLEY	Potatoes 1979, w. wheat 1980, s. barley 1981
OATS	Potatoes 1979, w. wheat 1980, s. oats 1981

Whole plots

2. SOWDATEI — Dates of sowing:

22 SEPT	22 September, 1981
22 OCT	22 October

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3. TOTAL NI — Total amount of N fertilizer (kg N) as 'Nitro-Chalk':

   150
   220

4. N TIMEI — Timing of fertilizer application:

   EARLY — 3 February, 9 March, 10 May
   LATE — 9 March, 13 April, 24 May

5. AUT NI — Autumn applied N fertilizer:

   NONE — None
   AUT N — 40 kg N of the total N, applied to seedbed instead of in spring

Plus six extra treatments (all, except SE NONE, given chlormequat chloride + choline chloride, benomyl, propiconazole, aldicarb, pirimicarb):

EXTRA

SE GREGX	Sown 22 Sept, after barley given additional chlormequat chloride + choline chloride (as '5 C Cycocel' at 1.0 l) at Zadoks GS 13/21 on 26 Nov, 1981, and 220 kg N at N TIME EARLY (duplicated)
SL GREGX	Sown 22 Oct, after barley given additional chlormequat chloride + choline chloride (as 5 C Cycocel' at 1.0 l) at Zadoks GS 13/21 on 10 Feb, 1982 and 220 kg N at N TIME LATE (duplicated)
SE FAL	Sown 22 Sept after fallow and given 220 kg N at N TIME EARLY (triplicated)
SL FAL	Sown 22 Oct after fallow and given 220 kg N at N TIME LATE (triplicated)
SE OEXTR	Sown 22 Sept after oats and given 220 kg N at N TIME EARLY
SE NONE	Sown 22 Sept after oats

NOTE: 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.

Basal applications: Manures: (0:14:28) at 540 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.0 l) in 340 l.

Seed: Avalon, sown at 210 kg.

Cultivations, etc.:- Ploughed: 10 Sept, 1981. Deep-tine cultivated, disced: 14 Sept. PK applied, spring-tine cultivated: 16 Sept. Aldicarb applied for SOWDATE 22 SEPT, rotary harrowed, seed sown: 22 Sept. Aldicarb applied for SOWDATE 22 OCT, rotary harrowed, seed sown: 22 Oct. Chlortoluron applied: 24 Oct. Mecoprop, bromoxynil and ioxynil applied to SOWDATE 22 SEPT: 23 Mar, 1982. Mecoprop, bromoxynil and ioxynil applied to SOWDATE 22 OCT: 16 Apr. Combine harvested PREVCROP BARLEY plots: 10 Aug. Combine harvested PREVCROP OATS plots: 20 Aug.

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NOTE: Soil was sampled for nematodes, wheat bulb fly larvae, 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, growth stage, aphids, foliar diseases and general microflora. Light interception, dry weight, leaf area, and N and K content of the above-ground crop and stem nitrate were measured on several occasions. Volunteer oats were scored in July.

GRAIN TONNES/HECTARE

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

SOWDATE	22 SEPT	22 OCT	MEAN
PREVCROP			
BARLEY	4.89	5.15	5.02
OATS	8.09	8.26	8.17
MEAN	6.49	6.70	6.60

TOTAL N	150	220	MEAN
PREVCROP			
BARLEY	4.74	5.30	5.02
OATS	7.89	8.46	8.17
MEAN	6.31	6.88	6.60

TOTAL N	150	220	MEAN
SOWDATE			
22 SEPT	6.20	6.78	6.49
22 OCT	6.42	6.98	6.70
MEAN	6.31	6.88	6.60

N TIME	EARLY	LATE	MEAN
PREVCROP			
BARLEY	5.59	4.45	5.02
OATS	8.40	7.95	8.17
MEAN	6.99	6.20	6.60

N TIME	EARLY	LATE	MEAN
SOWDATE			
22 SEPT	6.96	6.03	6.49
22 OCT	7.03	6.37	6.70
MEAN	6.99	6.20	6.60

N TIME	EARLY	LATE	MEAN
TOTAL N			
150	6.60	6.02	6.31
220	7.38	6.38	6.88
MEAN	6.99	6.20	6.60

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GRAIN TONNES/HECTARE

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

GRTH REG PREVCROP	NONE	CHLORMEQ	MEAN
BARLEY	5.07	4.96	5.02
OATS	8.15	8.19	8.17
MEAN	6.61	6.58	6.60

GRTH REG SOWDATE	NONE	CHLORMEQ	MEAN
22 SEPT	6.56	6.42	6.49
22 OCT	6.67	6.74	6.70
MEAN	6.61	6.58	6.60

GRTH REG TOTAL N	NONE	CHLORMEQ	MEAN
150	6.38	6.25	6.31
220	6.85	6.91	6.88
MEAN	6.61	6.58	6.60

GRTH REG N TIME	NONE	CHLORMEQ	MEAN
EARLY	7.07	6.91	6.99
LATE	6.15	6.25	6.20
MEAN	6.61	6.58	6.60

SPR FUNG PREVCROP	NONE	BENOMYL	MEAN
BARLEY	4.94	5.10	5.02
OATS	8.12	8.23	8.17
MEAN	6.53	6.66	6.60

SPR FUNG SOWDATE	NONE	BENOMYL	MEAN
22 SEPT	6.36	6.62	6.49
22 OCT	6.70	6.71	6.70
MEAN	6.53	6.66	6.60

SPR FUNG TOTAL N	NONE	BENOMYL	MEAN
150	6.25	6.37	6.31
220	6.81	6.96	6.88
MEAN	6.53	6.66	6.60

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82/R/WW/3

GRAIN TONNES/HECTARE

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

SPR FUNG N TIME	NONE	BENOMYL	MEAN
EARLY	6.86	7.12	6.99
LATE	6.19	6.21	6.20
MEAN	6.53	6.66	6.60

SPR FUNG GRTH REG	NONE	BENOMYL	MEAN
NONE	6.57	6.66	6.61
CHLORMEQ	6.49	6.67	6.58
MEAN	6.53	6.66	6.60

SUM FUNG PREVCROP	NONE	PROPICON	MEAN
BARLEY	4.89	5.15	5.02
OATS	8.05	8.29	8.17
MEAN	6.47	6.72	6.60

SUM FUNG SOWDATE	NONE	PROPICON	MEAN
22 SEPT	6.40	6.58	6.49
22 OCT	6.55	6.86	6.70
MEAN	6.47	6.72	6.60

SUM FUNG TOTAL N	NONE	PROPICON	MEAN
150	6.17	6.45	6.31
220	6.77	6.99	6.88
MEAN	6.47	6.72	6.60

SUM FUNG N TIME	NONE	PROPICON	MEAN
EARLY	6.93	7.06	6.99
LATE	6.02	6.39	6.20
MEAN	6.47	6.72	6.60

SUM FUNG GRTH REG	NONE	PROPICON	MEAN
NONE	6.55	6.68	6.61
CHLORMEQ	6.40	6.76	6.58
MEAN	6.47	6.72	6.60

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GRAIN TONNES/HECTARE

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

SUM FUNG / SPR FUNG	NONE	PROPICON	MEAN
NONE	6.44	6.62	6.53
BENOMYL	6.51	6.82	6.66
MEAN	6.47	6.72	6.60

PESTCIDE / PREVCROP	NONE	ALD+PIR	MEAN
BARLEY	5.24	4.79	5.02
OATS	8.16	8.19	8.17
MEAN	6.70	6.49	6.60

PESTCIDE / SOWDATE	NONE	ALD+PIR	MEAN
22 SEPT	6.67	6.31	6.49
22 OCT	6.73	6.67	6.70
MEAN	6.70	6.49	6.60

PESTCIDE / TOTAL N	NONE	ALD+PIR	MEAN
150	6.42	6.21	6.31
220	6.99	6.78	6.88
MEAN	6.70	6.49	6.60

PESTCIDE / N TIME	NONE	ALD+PIR	MEAN
EARLY	7.12	6.86	6.99
LATE	6.28	6.12	6.20
MEAN	6.70	6.49	6.60

PESTCIDE / GRTH REG	NONE	ALD+PIR	MEAN
NONE	6.75	6.48	6.61
CHLORMEQ	6.65	6.50	6.58
MEAN	6.70	6.49	6.60

PESTCIDE / SPR FUNG	NONE	ALD+PIR	MEAN
NONE	6.59	6.47	6.53
BENOMYL	6.81	6.52	6.66
MEAN	6.70	6.49	6.60

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GRAIN TONNES/HECTARE

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

PESTCIDE	NONE	ALD+PIR	MEAN
SUM FUNG			
NONE	6.61	6.33	6.47
PROPICON	6.79	6.65	6.72
MEAN	6.70	6.49	6.60

SOWDATE	22 SEPT		22 OCT	
TOTAL N	150	220	150	220
PREVCROP				
BARLEY	4.57	5.21	4.90	5.39
OATS	7.83	8.35	7.94	8.57

SOWDATE	22 SEPT		22 OCT	
N TIME	EARLY	LATE	EARLY	LATE
PREVCROP				
BARLEY	5.50	4.28	5.67	4.62
OATS	8.41	7.77	8.39	8.13

TOTAL N	150		220	
N TIME	EARLY	LATE	EARLY	LATE
PREVCROP				
BARLEY	5.11	4.36	6.06	4.55
OATS	8.09	7.68	8.71	8.21

TOTAL N	150		220	
N TIME	EARLY	LATE	EARLY	LATE
SOWDATE				
22 SEPT	6.52	5.88	7.39	6.17
22 OCT	6.69	6.16	7.37	6.59

SOWDATE	22 SEPT		22 OCT	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	5.04	4.74	5.11	5.19
OATS	8.09	8.10	8.22	8.29

TOTAL N	150		220	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	4.85	4.62	5.30	5.31
OATS	7.90	7.87	8.41	8.51

TOTAL N	150		220	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
SOWDATE				
22 SEPT	6.39	6.01	6.74	6.83
22 OCT	6.37	6.48	6.97	6.99

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
PREVCROP				
BARLEY	5.78	5.39	4.37	4.53
OATS	8.37	8.43	7.94	7.96

N TIME	EARLY		LATE	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
SOWDATE				
22 SEPT	7.16	6.76	5.97	6.08
22 OCT	6.99	7.07	6.34	6.41

N TIME	EARLY		LATE	
GRTH REG	NONE	CHLORMEQ	NONE	CHLORMEQ
TOTAL N				
150	6.75	6.45	6.00	6.04
220	7.39	7.37	6.31	6.45

SOWDATE	22 SEPT		22 OCT	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
PREVCROP				
BARLEY	4.67	5.11	5.21	5.08
OATS	8.05	8.14	8.18	8.33

TOTAL N	150		220	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
PREVCROP				
BARLEY	4.66	4.81	5.22	5.39
OATS	7.84	7.94	8.39	8.53

TOTAL N	150		220	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
SOWDATE				
22 SEPT	6.07	6.33	6.65	6.91
22 OCT	6.43	6.41	6.96	7.00

N TIME	EARLY		LATE	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
PREVCROP				
BARLEY	5.47	5.70	4.41	4.49
OATS	8.26	8.54	7.97	7.93

N TIME	EARLY		LATE	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
SOWDATE				
22 SEPT	6.78	7.14	5.94	6.11
22 OCT	6.95	7.11	6.44	6.31

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
TOTAL N				
150	6.44	6.76	6.06	5.98
220	7.29	7.48	6.33	6.44

GRTH REG	NONE		CHLORMEQ	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
PREVCROP				
BARLEY	4.97	5.18	4.91	5.01
OATS	8.17	8.14	8.06	8.33

GRTH REG	NONE		CHLORMEQ	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
SOWDATE				
22 SEPT	6.52	6.60	6.20	6.64
22 OCT	6.62	6.72	6.78	6.70

GRTH REG	NONE		CHLORMEQ	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
TOTAL N				
150	6.28	6.47	6.22	6.27
220	6.86	6.85	6.76	7.07

GRTH REG	NONE		CHLORMEQ	
SPR FUNG	NONE	BENOMYL	NONE	BENOMYL
N TIME				
EARLY	6.98	7.17	6.75	7.07
LATE	6.16	6.15	6.22	6.27

SOWDATE	22 SEPT		22 OCT	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	4.80	4.98	4.98	5.32
OATS	7.99	8.19	8.12	8.40

TOTAL N	150		220	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	4.59	4.88	5.20	5.41
OATS	7.76	8.01	8.35	8.58

TOTAL N	150		220	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
22 SEPT	6.05	6.35	6.74	6.82
22 OCT	6.30	6.55	6.80	7.16

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	5.58	5.59	4.20	4.70
OATS	8.28	8.52	7.83	8.07

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
22 SEPT	6.95	6.96	5.84	6.21
22 OCT	6.91	7.15	6.19	6.56

N TIME	EARLY		LATE	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
150	6.60	6.60	5.75	6.29
220	7.26	7.51	6.28	6.48

GRTH REG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	5.05	5.10	4.73	5.20
OATS	8.04	8.27	8.07	8.32

GRTH REG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
22 SEPT	6.48	6.64	6.31	6.53
22 OCT	6.61	6.72	6.48	6.99

GRTH REG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
150	6.29	6.47	6.06	6.43
220	6.81	6.90	6.73	7.09

GRTH REG	NONE		CHLORMEQ	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
N TIME				
EARLY	7.00	7.15	6.86	6.96
LATE	6.10	6.21	5.93	6.56

SPR FUNG	NONE		BENOMYL	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
PREVCROP				
BARLEY	4.89	4.99	4.89	5.30
OATS	7.99	8.24	8.12	8.35

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GRAIN TONNES/HECTARE

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

SPR FUNG	NONE		BENOMYL	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
SOWDATE				
22 SEPT	6.35	6.36	6.44	6.81
22 OCT	6.52	6.87	6.57	6.84

SPR FUNG	NONE		BENOMYL	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
TOTAL N				
150	6.16	6.34	6.19	6.55
220	6.72	6.89	6.82	7.09

SPR FUNG	NONE		BENOMYL	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
N TIME				
EARLY	6.76	6.97	7.10	7.15
LATE	6.12	6.27	5.92	6.50

SPR FUNG	NONE		BENOMYL	
SUM FUNG	NONE	PROPICON	NONE	PROPICON
GRTH REG				
NONE	6.64	6.50	6.46	6.86
CHLORMEQ	6.24	6.73	6.55	6.79

SOWDATE	22 SEPT		22 OCT	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	5.25	4.53	5.24	5.06
OATS	8.09	8.10	8.23	8.29

TOTAL N	150		220	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	4.93	4.54	5.56	5.05
OATS	7.90	7.88	8.42	8.50

TOTAL N	150		220	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
22 SEPT	6.41	5.99	6.93	6.63
22 OCT	6.42	6.42	7.04	6.92

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	5.86	5.31	4.63	4.28
OATS	8.38	8.42	7.93	7.96

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
22 SEPT	7.08	6.83	6.25	5.80
22 OCT	7.16	6.90	6.31	6.44

N TIME	EARLY		LATE	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
150	6.77	6.44	6.06	5.98
220	7.48	7.29	6.50	6.26

GRTH REG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	5.39	4.76	5.10	4.83
OATS	8.11	8.20	8.21	8.18

GRTH REG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
22 SEPT	6.74	6.39	6.60	6.24
22 OCT	6.76	6.57	6.71	6.77

GRTH REG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
150	6.54	6.22	6.29	6.20
220	6.96	6.75	7.02	6.80

GRTH REG	NONE		CHLORMEQ	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	7.23	6.92	7.01	6.81
LATE	6.26	6.05	6.30	6.19

SPR FUNG	NONE		BENOMYL	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	5.06	4.82	5.42	4.77
OATS	8.12	8.12	8.20	8.26

SPR FUNG	NONE		BENOMYL	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
22 SEPT	6.52	6.19	6.82	6.43
22 OCT	6.66	6.74	6.81	6.60

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GRAIN TONNES/HECTARE

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

SPR FUNG	NONE		BENOMYL	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
150	6.43	6.07	6.40	6.34
220	6.75	6.86	7.22	6.69

SPR FUNG	NONE		BENOMYL	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	7.04	6.69	7.20	7.04
LATE	6.14	6.24	6.42	6.00

SPR FUNG	NONE		BENOMYL	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
GRTH REG				
NONE	6.61	6.53	6.88	6.44
CHLORMEQ	6.57	6.41	6.74	6.60

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
PREVCROP				
BARLEY	5.21	4.57	5.28	5.01
OATS	8.02	8.09	8.30	8.29

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SOWDATE				
22 SEPT	6.66	6.14	6.68	6.49
22 OCT	6.57	6.53	6.90	6.81

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
TOTAL N				
150	6.38	5.97	6.45	6.44
220	6.85	6.69	7.12	6.86

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
N TIME				
EARLY	7.11	6.75	7.13	6.98
LATE	6.12	5.91	6.44	6.33

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
GRTH REG				
NONE	6.64	6.46	6.86	6.51
CHLORMEQ	6.59	6.21	6.72	6.80

SUM FUNG	NONE		PROPICON	
PESTCIDE	NONE	ALD+PIR	NONE	ALD+PIR
SPR FUNG				
NONE	6.55	6.33	6.63	6.61
BENOMYL	6.68	6.34	6.95	6.70

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GRAIN TONNES/HECTARE

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

SOWDATEX	22 SEPT	22 OCT	MEAN
PRECROPX			
BARLEY	3.62	3.65	3.64
OATS	6.78	6.97	6.87
MEAN	5.20	5.31	5.26

TOTAL NX	0	115	185	255	MEAN
PRECROPX					
BARLEY	0.71	3.57	4.66	5.61	3.64
OATS	3.12	7.32	8.15	8.90	6.87
MEAN	1.92	5.45	6.41	7.25	5.26

TOTAL NX	0	115	185	255	MEAN
SOWDATEX					
22 SEPT	1.72	4.90	6.92	7.25	5.20
22 OCT	2.11	5.99	5.89	7.25	5.31
MEAN	1.92	5.45	6.41	7.25	5.26

	TOTAL NX	0	115	185	255
PRECROPX	SOWDATEX				
BARLEY	22 SEPT	0.66	2.92	5.54	5.37
	22 OCT	0.76	4.22	3.79	5.84
OATS	22 SEPT	2.78	6.89	8.30	9.14
	22 OCT	3.47	7.75	7.99	8.67

SOWDATEI	22 SEPT	22 OCT	MEAN
PRECROPI			
BARLEY	4.64	4.88	4.76
OATS	7.47	7.86	7.67
MEAN	6.06	6.37	6.21

TOTAL NI	150	220	MEAN
PRECROPI			
BARLEY	4.43	5.09	4.76
OATS	7.35	7.99	7.67
MEAN	5.89	6.54	6.21

TOTAL NI	150	220	MEAN
SOWDATEI			
22 SEPT	6.08	6.04	6.06
22 OCT	5.71	7.03	6.37
MEAN	5.89	6.54	6.21

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GRAIN TONNES/HECTARE

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

N TIMEI	EARLY	LATE	MEAN
PRECROPI			
BARLEY	5.35	4.17	4.76
OATS	8.11	7.23	7.67
MEAN	6.73	5.70	6.21

N TIMEI	EARLY	LATE	MEAN
SOWDATEI			
22 SEPT	6.56	5.56	6.06
22 OCT	6.89	5.85	6.37
MEAN	6.73	5.70	6.21

N TIMEI	EARLY	LATE	MEAN
TOTAL NI			
150	6.24	5.54	5.89
220	7.21	5.86	6.54
MEAN	6.73	5.70	6.21

AUT NI	NONE	AUT N	MEAN
PRECROPI			
BARLEY	5.08	4.44	4.76
OATS	7.71	7.63	7.67
MEAN	6.39	6.03	6.21

AUT NI	NONE	AUT N	MEAN
SOWDATEI			
22 SEPT	6.34	5.77	6.06
22 OCT	6.44	6.29	6.37
MEAN	6.39	6.03	6.21

AUT NI	NONE	AUT N	MEAN
TOTAL NI			
150	6.28	5.51	5.89
220	6.51	6.56	6.54
MEAN	6.39	6.03	6.21

AUT NI	NONE	AUT N	MEAN
N TIMEI			
EARLY	6.57	6.88	6.73
LATE	6.21	5.19	5.70
MEAN	6.39	6.03	6.21

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GRAIN TONNES/HECTARE

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

	EXTRA
SE GREGX	5.09
SL GREGX	6.03
SE FAL	9.44
SL FAL	9.00
SE OEXTR	8.54
SE NONE	4.95

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

SED APPLY TO MAIN FACTORIAL PLOTS ONLY

MARGINS OF TWO FACTOR TABLES 0.109*
TWO FACTOR TABLES 0.154**
THREE FACTOR TABLES 0.217**

* NOT INCLUDING PREVCROP
** WITHIN SAME LEVEL OF PREVCROP ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP	33	0.615	9.3

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00210

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WINTER WHEAT

NITRIFICATION INHIBITORS

Object: To study the effects of nitrification inhibitors on the yield and nitrogen uptake of w. wheat - Woburn The Pightle.

Sponsors: G.A. Rodgers, A. Penny.

Design: 2 randomised blocks of 21 plots.

Whole plot dimensions: 4.0 x 12.0.

Treatments: 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 (2.0 kg for etridiazole and nitrapyrin; 10.0 kg for dicyandiamide)
DOUBLE	Double (4.0 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':

EXTRA
0
35
70

NOTE: Nitrification inhibitors were applied on 7 Oct, 1981.

Basal applications: Manures: (0:20:20) at 310 kg. Weedkillers: Glyphosate at 2.0 kg in 280 l. Chlortoluron at 5.6 l in 280 l. Fungicides: Benomyl at 0.24 kg in 280 l applied with the growth regulator. Carbendazim with maneb and tridemorph (as 'Cosmic' at 4 kg) in 280 l applied with captafol at 1.2 kg and insecticide. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 l.

Seed: Avalon, sown at 190 kg.

Cultivations, etc.:- Glyphosate applied: 15 Aug, 1981. Dead grass burnt: 9 Sept. Ploughed: 10 Sept. Disced: 28 Sept, 6 Oct. PK applied: 29 Sept. Spring-tine cultivated with crumbler attached: 7 Oct.

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Seed sown: 8 Oct. Chlortoluron applied: 15 Oct. Growth regulator and benomyl applied: 27 Apr, 1982. 'Cosmic', captafol and insecticide applied: 15 June. Combine harvested: 17 Aug. Previous crops: Grass 1980 and 1981.

NOTES: (1) Soil samples were taken in October and then at 21 day intervals until April and again in July for ammonium and nitrate analyses.
(2) Plant samples were taken in April, July and at maturity for estimates of total N and dry matter.
(3) Uptake of 15_N labelled dicyandiamide was measured in July.

GRAIN TONNES/HECTARE

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

I FORM / N RATE	DICYANDI	ETRIDIAZ	NITRAPYR	MEAN
0	9.60	9.29	9.49	9.46
35	9.39	9.00	9.06	9.15
70	9.36	9.56	9.14	9.35
MEAN	9.45	9.29	9.23	9.32

I RATE / N RATE	SINGLE	DOUBLE	MEAN
0	9.45	9.47	9.46
35	9.17	9.13	9.15
70	9.17	9.54	9.35
MEAN	9.26	9.38	9.32

I RATE / I FORM	SINGLE	DOUBLE	MEAN
DICYANDI	9.03	9.87	9.45
ETRIDIAZ	9.55	9.02	9.29
NITRAPYR	9.21	9.25	9.23
MEAN	9.26	9.38	9.32

N RATE / I RATE / I FORM	SINGLE	DOUBLE
0 DICYANDI	9.14	10.05
0 ETRIDIAZ	9.63	8.95
0 NITRAPYR	9.59	9.39
35 DICYANDI	9.09	9.69
35 ETRIDIAZ	9.02	8.98
35 NITRAPYR	9.40	8.72
70 DICYANDI	8.84	9.88
70 ETRIDIAZ	10.01	9.12
70 NITRAPYR	8.66	9.62

EXTRA	0	35	70	MEAN
	9.70	9.27	9.00	9.33

GRAND MEAN 9.32

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82/W/WW/3

GRAIN TONNES/HECTARE

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

TABLE	N RATE	I FORM	I RATE	N RATE I FORM
SED	0.193	0.193	0.157	0.333

TABLE	N RATE I RATE	I FORM I RATE	N RATE I FORM I RATE & EXTRA	EXTRA
SED	0.272	0.272	0.472	0.472

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

STRATUM	DF	SE	CV%
BLOCK.WP	20	0.472	5.1

GRAIN MEAN DM% 81.5

STRAW TONNES/HECTARE

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

I FORM / N RATE	DICYANDI	ETRIDIAZ	NITRAPYR	MEAN
0	6.00	5.12	5.23	5.45
35	5.06	4.42	4.66	4.71
70	5.84	6.05	5.68	5.86
MEAN	5.63	5.20	5.19	5.34

I RATE / N RATE	SINGLE	DOUBLE	MEAN
0	5.42	5.48	5.45
35	4.70	4.73	4.71
70	5.36	6.35	5.86
MEAN	5.16	5.52	5.34

I RATE / I FORM	SINGLE	DOUBLE	MEAN
DICYANDI	5.00	6.26	5.63
ETRIDIAZ	5.28	5.11	5.20
NITRAPYR	5.20	5.19	5.19
MEAN	5.16	5.52	5.34

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82/W/WW/3

STRAW TONNES/HECTARE

***** TABLES OF MEANS

N RATE	I RATE / I FORM	SINGLE	DOUBLE
0	DICYANDI	5.64	6.36
	ETRIDIAZ	5.23	5.01
	NITRAPYR	5.41	5.06
35	DICYANDI	4.69	5.44
	ETRIDIAZ	4.98	3.85
	NITRAPYR	4.43	4.90
70	DICYANDI	4.69	6.99
	ETRIDIAZ	5.64	6.47
	NITRAPYR	5.76	5.61

EXTRA	0	35	70	MEAN
	5.54	4.37	5.30	5.07

GRAND MEAN 5.30

STRAW MEAN DM% 73.5

PLOT AREA HARVESTED 0.00252

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82/R/WW/4

WINTER WHEAT

SEED RATES & 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 - White Horse I.

Sponsors: J. McEwen, R. Moffitt.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 4.27 x 8.08.

Treatments: All combinations of:-

1. SD RATE — Seed rates (kg):

67
200

2. EARLY N — Nitrogen fertilizer applied 11 Feb, 1982 (kg N) as 'Nitro-Chalk':

0
25
50
75

3. APRIL N — Nitrogen fertilizer applied 13 Apr, 1982 (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, 1982 (kg N):

150
175
200

Basal applications: Weedkillers: Paraquat at 0.56 kg ion in 220 l. Methabenzthiazuron at 1.6 kg in 250 l. Fungicides: Propiconazole at 0.12 kg in 250 l. Carbendazim, maneb and tridemorph (as 'Cosmic' at 4.0 kg) with captafol at 1.2 kg applied with the pirimicarb in 250 l. Insecticides: Omethoate at 0.64 kg in 250 l. Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 kg in 250 l.

Seed: Flanders.

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82/R/WW/4

Cultivations, etc.:- Heavy spring-tine cultivated twice: 28 Aug, 1981. Paraquat applied: 23 Sept. Heavy spring-tine cultivated: 29 Sept. Spring-tine cultivated: 13 Oct. Seed sown: 14 Oct. Methabenzthiazuron applied: 17 Oct. Omethoate applied: 5 Apr, 1982. Growth regulator applied: 27 Apr. Propiconazole applied: 26 May. Carbendazim, maneb, tridemorph with captafol and pirimicarb applied: 15 June. Combine harvested: 21 Aug. Previous crops: W. beans 1980 and W. oats 1981.

NOTES: (1) Plant counts were made in February, shoot counts in April and ear counts in June.
(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	6.80	7.62	7.15	7.15	7.18
200	7.73	7.23	8.30	7.66	7.73
MEAN	7.26	7.43	7.72	7.40	7.45

APRIL N	75	100	125	MEAN
SD RATE				
67	7.06	7.16	7.32	7.18
200	7.31	7.72	8.16	7.73
MEAN	7.19	7.44	7.74	7.45

APRIL N	75	100	125	MEAN
EARLY N				
0	7.09	7.18	7.52	7.26
25	6.94	7.47	7.86	7.43
50	7.39	7.39	8.39	7.72
75	7.33	7.70	7.18	7.40
MEAN	7.19	7.44	7.74	7.45

	APRIL N	75	100	125
SD RATE	EARLY N			
67	0	6.85	6.72	6.83
	25	7.73	7.47	7.66
	50	6.87	6.70	7.89
	75	6.80	7.75	6.89
200	0	7.33	7.65	8.20
	25	6.16	7.48	8.06
	50	7.92	8.09	8.89
	75	7.85	7.65	7.48

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82/R/WW/4

GRAIN TONNES/HECTARE

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

APRIL NX / SD RATEX	150	175	200	MEAN
67	6.82	6.45	8.28	7.18
200	8.24	7.39	7.68	7.77
MEAN	7.53	6.92	7.98	7.48

GRAND MEAN 7.46

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

TABLE	SD RATE	EARLY N	APRIL N	SD RATE EARLY N
SED	0.216	0.305	0.264	0.431

TABLE	SD RATE APRIL N	EARLY N APRIL N	SD RATE EARLY N APRIL N	SD RATEX
SED	0.373	0.528	0.747	0.431

TABLE	APRIL NX	SD RATEX APRIL NX
	0.528	0.747

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.747	10.0

GRAIN MEAN DM% 84.1

PLOT AREA HARVESTED 0.00252

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82/W/WW/4

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 - Woburn Gt. Hill III.

Sponsors: D.C. Griffiths, R.T. Plumb, J.A. Pickett.

Design: 4 blocks of 5 plots.

Whole plot dimensions: 4.0 x 12.0.

Treatments:

TREATMNT	Application of insecticides or alarm pheromone:
NONE	None (duplicated)
PHER AR	'ADD' (a derivative of beta-farnesene) repeated sprays in autumn
PERMET A	Permethrin at 0.05 kg as a spray on 6 Nov, 1981
PHORA SD	Phorate as a seed dressing at 2 g per kg of seed

NOTE: 'ADD' was applied at 4.0 kg on 13 Oct, 1981, 6 Nov and 30 Nov and at 8.0 kg on 21 Oct.

Basal applications: Manures: (0:14:28) at 1000 kg. N at 30 kg and at 190 kg as 'Nitro-Chalk'. Weedkillers: Methabenzthiazuron at 1.6 kg in 280 l; isoproturon at 2.1 kg in 280 l. Fungicides: Prochloraz at 0.39 kg in 280 l; propiconazole at 0.12 kg in 280 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: Aquila, sown at 190 kg.

Cultivations, etc.:- Straw burnt: 26 Aug, 1981. Disced: 27 Aug, 1 Sept. PK applied: 4 Sept. N applied: 17 Sept. Spring-tine cultivated: 18 Sept. Spring-tine cultivated with crumbler attached, seed sown: 22 Sept. Methabenzthiazuron applied: 25 Sept. N applied: 14 Apr, 1982. Isoproturon applied: 16 Apr. Prochloraz applied: 25 Apr. Propiconazole and insecticide applied: 14 June. Combine harvested: 30 July. Previous crops: Phaseolus 1980, w. wheat 1981.

NOTE: Numbers of soil fauna were estimated from pitfall traps; numbers of aphids were counted from October 1981 to May 1982 and virus assessments were made during the season.

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82/W/WW/4

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	PHER AR	PERMET A	PHORA SD	MEAN
	4.61	4.27	5.15	4.66	4.66

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

TABLE	TREATMNT	
SED	0.744	MIN REP
	0.645	MAX-MIN

	TREATMNT
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	13	1.052	22.6

GRAIN MEAN DM% 83.7

PLOT AREA HARVESTED 0.00247

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82/R/WW/5

WINTER WHEAT

NUARIMOL AND TAKE-ALL

Object: To study the effects of nuarimol on the incidence of take-all and on the yield of w. wheat - New Zealand.

Sponsor: G.L. Bateman.

Design: 5 randomised blocks of 5 plots.

Whole plot dimensions: 2.13 x 12.2.

Treatments:

FUN CULT	Fungicide and methods of incorporation:
NONE	None
NU EC PL	Nuarimol e.c. applied to stubble 1981 and ploughed in
NU EC LH	Nuarimol e.c. lightly rotary harrowed into seedbed
NU EC DC	Nuarimol e.c. deeply rotary cultivated into seedbed
NU WP DC	Nuarimol w.p. deeply rotary cultivated into seedbed

NOTE: Nuarimol was applied at 2.2 kg.

Basal applications: Manures: (0:14:28) at 320 kg. 'Nitro-Chalk' at 560 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Glyphosate at 1.4 kg in 250 l. Fungicides: Carbendazim, maneb and tridemorph (as 'Cosmic' at 4.0 kg) with captafol at 1.2 kg applied with the insecticide in 250 l. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 kg in 250 l.

Seed: Avalon, untreated, sown at 200 kg.

Cultivations, etc.:- Ploughed: 1 Oct, 1981. PK applied: 26 Oct. Rotary harrowed, seed sown: 28 Oct. Chlortoluron applied: 29 Oct. N applied: 22 Apr, 1982. Growth regulator applied: 27 Apr. Fungicides and insecticide applied: 15 June. Glyphosate applied: 10 Aug. Combine harvested: 21 Aug. Previous crops: W. wheat 1980 and 1981.

NOTE: Take-all and foot rots were assessed in early May, early June and mid-July.

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82/R/WW/5

GRAIN TONNES/HECTARE

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

FUN CULT	NONE	NU EC PL	NU EC LH	NU EC DC	NU WP DC	MEAN
	9.23	9.12	9.11	9.15	9.38	9.20

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

TABLE	FUN CULT
SED	0.207

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.328	3.6

GRAIN MEAN DM% 84.6

PLOT AREA HARVESTED 0.00176

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82/R/WW/6

WINTER WHEAT

FUNGICIDES AND MICROFLORA

Object: To study the effects of a range of fungicides and times of application on the colonisation of fungi on flag leaves and developing ears and on the yield of w. wheat - Geescroft.

Sponsor: N. Magan.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments: All combinations of:-

1. E FUNG — Early-applied fungicides:

NONE	None
CARB+MAN	Carbendazim at 0.25 kg plus maneb at 1.6 kg applied on 26 May

2. L FUNG A — Late-applied fungicides:

BE+MN+MZ	Benomyl at 0.56 kg, plus maneb at 0.78 kg, and mancozeb at 0.78 kg
CAPTAFOL	Captafol at 1.4 kg
CARB+MAN	Carbendazim at 0.25 kg plus maneb at 1.6 kg
IMAZALIL	Imazalil at 0.39 kg
PROCHLOR	Prochloraz at 0.40 l

3. LFNGDATE — Dates of applying late fungicide:

M	10 June, 1982
L	16 June

plus two extra treatments not given L FUNG:

L FUNG 0

NONE	No early-applied fungicide (duplicated)
CARB+MAN	Carbendazim at 0.25 kg plus maneb at 1.6 kg applied on 26 May (duplicated)

NOTE: Treatment sprays were applied in 340 l.

Basal applications: Manures: 'Nitro-Chalk' applied at 480 kg. Weedkillers: Mecoprop (as 'Methoxone' at 5.0 l) with isoproturon at 2.0 kg in 250 l.

Seed: Maris Huntsman, sown at 190 kg.

Cultivations, etc.:- Spring-tine cultivated: 8 Oct, 1981. Heavy spring-tine cultivated twice: 12 Oct. Spring-tine cultivated, rotary harrowed, seed sown: 13 Oct. Weedkillers applied: 15 Apr, 1982. N applied: 23 Apr. Combine harvested: 11 Aug. Previous crops: W. beans 1980, potatoes 1981.

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82/R/WW/6

NOTE: Grain and leaf microflora, especially Alternaria and Cladosporium, were assessed fortnightly from June to August.

GRAIN TONNES/HECTARE

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

L FUNG A / E FUNG	BE+MN+MZ	CAPTAFOL	CARB+MAN	IMAZALIL	PROCHLOR	MEAN
NONE	8.14	8.37	7.98	7.63	7.98	8.02
CARB+MAN	8.64	8.17	8.45	8.29	8.39	8.39
MEAN	8.39	8.27	8.22	7.96	8.19	8.20

LFNGDATE / E FUNG	M	L	MEAN
NONE	8.16	7.89	8.02
CARB+MAN	8.38	8.39	8.39
MEAN	8.27	8.14	8.20

LFNGDATE / L FUNG A	M	L	MEAN
BE+MN+MZ	8.20	8.58	8.39
CAPTAFOL	8.30	8.25	8.27
CARB+MAN	8.38	8.05	8.22
IMAZALIL	8.07	7.84	7.96
PROCHLOR	8.40	7.97	8.19
MEAN	8.27	8.14	8.20

E FUNG / LFNGDATE / L FUNG A	M	L
NONE / BE+MN+MZ	7.91	8.37
NONE / CAPTAFOL	8.50	8.25
NONE / CARB+MAN	8.32	7.64
NONE / IMAZALIL	7.65	7.60
NONE / PROCHLOR	8.39	7.58
CARB+MAN / BE+MN+MZ	8.48	8.80
CARB+MAN / CAPTAFOL	8.09	8.25
CARB+MAN / CARB+MAN	8.44	8.46
CARB+MAN / IMAZALIL	8.49	8.08
CARB+MAN / PROCHLOR	8.42	8.36

L FUNG 0	NONE	CARB+MAN	MEAN
	8.07	7.75	7.91

GRAND MEAN 8.16

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82/R/WW/6

GRAIN TONNES/HECTARE

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

TABLE	L FUNG O	E FUNG	L FUNG A	LFNGDATE
SED	0.364	0.163	0.258	0.163

TABLE	E FUNG L FUNG A	E FUNG LFNGDATE	L FUNG A LFNGDATE	E FUNG L FUNG A LFNGDATE
SED	0.364	0.230	0.364	0.515

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

STRATUM	DF	SE	CV%
BLOCK.WP	25	0.515	6.3

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00204

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82/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 - Geescroft.

Sponsors: N. Wilding, G.J.W. Dean.

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
EN INTAC	Erynia neoaphidis applied as intact, dried, fungus-killed aphids at 2.5 kg on 15 June and 22 June
EN GRND	Erynia neoaphidis applied as ground, dried, fungus-killed aphids at 2.5 kg on 15 June and 22 June
PS 25 MY	Pirimicarb at 0.14 kg, standard formulation on 25 May
PS 8 JN	Pirimicarb at 0.14 kg, standard formulation on 8 June
PM 25 MY	Pirimicarb at 0.14 kg, microencapsulated on 25 May
PM 8 JN	Pirimicarb at 0.14 kg, microencapsulated on 8 June

Basal applications: Manures: 'Nitro-Chalk' applied at 480 kg. Weedkillers: Mecoprop (as 'Methoxone M' at 5.0 l) with isoproturon at 2.0 kg in 250 l.

Seed: Maris Huntsman, sown at 190 kg.

Cultivations, etc.:- Spring-tine cultivated: 8 Oct, 1981. Heavy spring-tine cultivated twice: 12 Oct. Spring-tine cultivated, rotary harrowed, seed sown: 13 Oct. Weedkillers applied: 15 Apr, 1982. N applied: 23 Apr. Combine harvested: 11 Aug. Previous crops: W. beans 1980, potatoes 1981.

NOTE: Aphid numbers were counted weekly during June and July. Samples of living aphids were taken to determine proportions of those infected with Erynia.

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82/R/WW/9

GRAIN TONNES/HECTARE

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

APH CONT	
NONE	7.09
EN INTAC	7.79
EN GRND	7.92
PS 25 MY	7.54
PS 8 JN	7.82
PM 25 MY	7.49
PM 8 JN	7.07
MEAN	7.53

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

TABLE	APH CONT
SED	0.652

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.798	10.6

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00139

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82/R/WW/14

WINTER WHEAT

Object: To study the effects of methods of applying benomyl on the incidence of eyespot and on the yield of w. wheat - Meadow.

Sponsors: G.R. Cayley, D.C. Griffiths, T. Fox.

Design: 4 randomised blocks of 3 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

SPRAYERS	Sprayers used to apply benomyl:
NONE	No spray applied
ELECSTAT	Electrostatic sprayer
HYDRAUL	Standard hydraulic sprayer

NOTE: Benomyl was applied at 0.25 kg on 21 Apr, 1982, in 4.6 l for ELECTSTAT, in 490 l for HYDRAUL.

Basal applications: Manures: (0:14:28) at 320 kg. 'Nitro-Chalk' at 670 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with isoproturon at 2.0 kg in 250 l.

Seed: Avalon, sown at 190 kg.

Cultivations, etc.:- Ploughed: 17 Oct, 1981. PK applied, rotary harrowed, seed sown: 26 Oct. Weedkillers applied: 14 Apr, 1982. N applied: 22 Apr. Combine harvested: 11 Aug. Previous crops: W. wheat 1980 and 1981.

NOTES: Eyespot (Pseudocercosporella herpotrichoides) and sharp eyespot (Rhizoctonia cerealis) were assessed and plant samples were analysed for chemical residues.

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82/R/WW/14

GRAIN TONNES/HECTARE

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

SPRAYERS	NONE	ELECSTAT	HYDRAUL	MEAN
	5.85	6.04	6.17	6.02

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

TABLE	SPRAYERS
SED	0.157

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.222	3.7

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00204

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82/R/WS/1

SPRING WHEAT

INSECTICIDES AND ALARM PHEROMONE

Object: To study the effects of an aphid alarm pheromone on the effectiveness of a contact aphicide - Long Hoos III 8.

Sponsors: D.C. Griffiths, J.A. Pickett.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.41 x 4.57.

Treatments:

TREATMENT	Aphicide, pheromone treatments and sprayers:
NONE	None
PHEROMON	Aphid alarm pheromone
PERMET C	Permethrin at 0.10 kg, applied by conventional sprayer
PH+PER C	Aphid alarm pheromone plus permethrin applied by conventional sprayer at 0.10 kg
PIRIM C	Pirimicarb at 0.15 kg applied by conventional sprayer
PIRIM E	Pirimicarb at 0.15 kg applied by electrostatic sprayer

NOTE: Treatments were applied on 30 June; insecticides in 60 l of water by electrostatic sprayer, in 460 l of water by conventional sprayer; pheromone at 5 g, in a solvent, by electrostatic sprayer.

Basal applications: Manures: 'Nitro-Chalk' at 450 kg. Weedkillers: Dicamba with mecoprop and MCPA, (as 'Banlene Plus' at 4.9 l) applied with the tridemorph in 340 l. Fungicides: Tridemorph at 0.53 kg, prochloraz at 0.39 kg in 340 l.

Seed: Timmo, sown at 180 kg.

Cultivations, etc.:- Ploughed: 29 Jan, 1982. Zig-zag harrowed, power harrowed, seed sown and N applied: 13 Apr. Weedkillers with tridemorph applied: 18 May. Prochloraz applied: 30 June. Combine harvested: 2 Sept. Previous crops: S. barley 1980, s. beans 1981.

NOTE: Aphids were counted five days after spray applications. Plants were analysed for insecticide residues after spraying.

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82/R/WS/1

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	PHEROMON	PERMET C	PH+PER C	PIRIM C	PIRIM E	MEAN
	5.22	4.94	5.16	5.27	4.94	5.04	5.10

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

TABLE	TREATMNT
SED	0.135

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.191	3.8

GRAIN MEAN DM% 81.9

PLOT AREA HARVESTED 0.00075

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82/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 - Pastures.

Sponsors: F.V. Widdowson, J.F. Jenkyn, R.T. Plumb, D.W. Lawlor, G.J.S. Ross, G.C. Scott.

Associate sponsor: B.R. Kerry.

Design: Quarter replicate of 2^8 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:
	22 SEP	22 September, 1981
	22 OCT	22 October
2.	N RATE	Rates of nitrogen fertilizer (kg N) as 'Nitro-Chalk':
	50	
	100	
3.	N TIME	Times of applying nitrogen fertilizer:
	22 MAR	22 March, 1982
	19 APR	19 April
4.	AUT PEST(1)	Autumn pesticide to seedbed:
	NONE	None
	ALDICARB	Aldicarb at 7.1 kg
5.	AUT PEST(2)	Autumn pesticide to seedlings:
	NONE	None
	CHLORPYR	Chlorpyrifos spray at 0.71 kg in 340 l on 13 Nov, 1981
6.	E FUNG	Early fungicides:
	NONE	None
	TFSD	Triadimenol and fuberidazole seed dressing
7.	L FUNG	Late fungicides:
	NONE	None
	PROCHLOR	Prochloraz spray at 0.4 l in 340 l, on 3 Feb, 1982, 26 Mar and 5 May

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8. GRTH REG — Growth regulator:

NONE	None
MEP+ETH	Mepiquat chloride + ethephon (as 'Terpal' at 2.46 l) in 280 l

plus two extra treatments given no nitrogen fertilizer, pesticides, fungicides or growth regulator:

EXTRA	
22 SEP 0	Sown 22 September
22 OCT 0	Sown 22 October

NOTE: (1) Aldicarb was applied just 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 30 April for the first sowing, and 13 May for the second.

Basal applications: Manures: (0:14:28) at 360 kg. Weedkillers: Methabenzthiazuron at 1.6 kg in 250 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.

Seed: Igri, sown at 140 kg.

Cultivations, etc.:- Heavy-tine cultivated twice, PK applied: 17 Sept, 1981. Aldicarb applied to SOWDATE 22 SEPT, rotary harrowed, seed sown: 22 Sept. Aldicarb applied to SOWDATE 22 OCT, rotary harrowed, seed sown: 22 Oct. Methabenzthiazuron applied: 28 Oct. Mecoprop, bromoxynil and ioxynil applied: 20 Apr, 1982. Combine harvested: 27 July. Previous crops: W. oats 1980, potatoes 1981.

NOTES: (1) Nitrate in the soil was measured five times during the season. Crop height and ear numbers were measured in June. Leaf diseases were assessed periodically.
(2) A cage was erected over the crop from late May to maturity to prevent damage by birds.

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GRAIN TONNES/HECTARE

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

N RATE	50	100	MEAN
SOWDATE			
22 SEP	8.43	8.45	8.44
22 OCT	6.93	6.65	6.79
MEAN	7.68	7.55	7.62

N TIME	22 MAR	19 APR	MEAN
SOWDATE			
22 SEP	8.33	8.55	8.44
22 OCT	6.92	6.65	6.79
MEAN	7.63	7.60	7.62

N TIME	22 MAR	19 APR	MEAN
N RATE			
50	7.64	7.73	7.68
100	7.62	7.48	7.55
MEAN	7.63	7.60	7.62

AUT PEST(1)	NONE	ALDICARB	MEAN
SOWDATE			
22 SEP	8.37	8.52	8.44
22 OCT	6.85	6.73	6.79
MEAN	7.61	7.62	7.62

AUT PEST(1)	NONE	ALDICARB	MEAN
N RATE			
50	7.66	7.70	7.68
100	7.56	7.54	7.55
MEAN	7.61	7.62	7.62

AUT PEST(1)	NONE	ALDICARB	MEAN
N TIME			
22 MAR	7.63	7.62	7.63
19 APR	7.58	7.62	7.60
MEAN	7.61	7.62	7.62

AUT PEST(2)	NONE	CHLORPYR	MEAN
AUT PEST(1)			
NONE	7.67	7.55	7.61
ALDICARB	7.72	7.53	7.62
MEAN	7.69	7.54	7.62

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GRAIN TONNES/HECTARE

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

E FUNG	NONE	TFSD	MEAN
SOWDATE			
22 SEP	8.46	8.42	8.44
22 OCT	6.83	6.75	6.79
MEAN	7.64	7.59	7.62

E FUNG	NONE	TFSD	MEAN
N RATE			
50	7.71	7.66	7.68
100	7.58	7.51	7.55
MEAN	7.64	7.59	7.62

E FUNG	NONE	TFSD	MEAN
N TIME			
22 MAR	7.67	7.59	7.63
19 APR	7.62	7.58	7.60
MEAN	7.64	7.59	7.62

E FUNG	NONE	TFSD	MEAN
AUT PEST(1)			
NONE	7.75	7.47	7.61
ALDICARB	7.54	7.71	7.62
MEAN	7.64	7.59	7.62

E FUNG	NONE	TFSD	MEAN
AUT PEST(2)			
NONE	7.72	7.66	7.69
CHLORPYR	7.57	7.51	7.54
MEAN	7.64	7.59	7.62

L FUNG	NONE	PROCHLOR	MEAN
SOWDATE			
22 SEP	8.18	8.70	8.44
22 OCT	6.63	6.94	6.79
MEAN	7.41	7.82	7.62

L FUNG	NONE	PROCHLOR	MEAN
N RATE			
50	7.44	7.93	7.68
100	7.38	7.72	7.55
MEAN	7.41	7.82	7.62

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GRAIN TONNES/HECTARE

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

L FUNG	NONE	PROCHLOR	MEAN
N TIME			
22 MAR	7.40	7.86	7.63
19 APR	7.42	7.79	7.60
MEAN	7.41	7.82	7.62

L FUNG	NONE	PROCHLOR	MEAN
AUT PEST(1)			
NONE	7.39	7.83	7.61
ALDICARB	7.43	7.82	7.62
MEAN	7.41	7.82	7.62

L FUNG	NONE	PROCHLOR	MEAN
AUT PEST(2)			
NONE	7.45	7.94	7.69
CHLORPYR	7.37	7.71	7.54
MEAN	7.41	7.82	7.62

L FUNG	NONE	PROCHLOR	MEAN
E FUNG			
NONE	7.46	7.83	7.64
TFSD	7.36	7.82	7.59
MEAN	7.41	7.82	7.62

GRTH REG	NONE	MEP+ETH	MEAN
SOWDATE			
22 SEP	8.22	8.66	8.44
22 OCT	6.64	6.94	6.79
MEAN	7.43	7.80	7.62

GRTH REG	NONE	MEP+ETH	MEAN
N RATE			
50	7.54	7.82	7.68
100	7.32	7.78	7.55
MEAN	7.43	7.80	7.62

GRTH REG	NONE	MEP+ETH	MEAN
N TIME			
22 MAR	7.42	7.83	7.63
19 APR	7.44	7.77	7.60
MEAN	7.43	7.80	7.62

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GRAIN TONNES/HECTARE

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

GRTH REG AUT PEST(1)	NONE	MEP+ETH	MEAN
NONE	7.37	7.84	7.61
ALDICARB	7.49	7.76	7.62
MEAN	7.43	7.80	7.62

GRTH REG AUT PEST(2)	NONE	MEP+ETH	MEAN
NONE	7.48	7.90	7.69
CHLORPYR	7.38	7.70	7.54
MEAN	7.43	7.80	7.62

GRTH REG E FUNG	NONE	MEP+ETH	MEAN
NONE	7.48	7.81	7.64
TFSD	7.39	7.79	7.59
MEAN	7.43	7.80	7.62

GRTH REG L FUNG	NONE	MEP+ETH	MEAN
NONE	7.23	7.58	7.41
PROCHLOR	7.63	8.02	7.82
MEAN	7.43	7.80	7.62

EXTRA	22 SEP 0	22 OCT 0	MEAN
	6.96	6.65	6.81

GRAND MEAN 7.57

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

SED FOR ONE WAY TABLES (EXCEPT EXTRA) IS 0.067
SED FOR TWO WAY TABLES IS 0.094

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.267	3.5

GRAIN MEAN DM% 83.7

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STRAW TONNES/HECTARE

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

N RATE	50	100	MEAN
SOWDATE			
22 SEP	5.92	6.41	6.17
22 OCT	4.88	5.16	5.02
MEAN	5.40	5.78	5.59

N TIME	22 MAR	19 APR	MEAN
SOWDATE			
22 SEP	6.41	5.92	6.17
22 OCT	4.99	5.04	5.02
MEAN	5.70	5.48	5.59

N TIME	22 MAR	19 APR	MEAN
N RATE			
50	5.42	5.38	5.40
100	5.98	5.59	5.78
MEAN	5.70	5.48	5.59

AUT PEST(1)	NONE	ALDICARB	MEAN
SOWDATE			
22 SEP	6.14	6.19	6.17
22 OCT	5.04	4.99	5.02
MEAN	5.59	5.59	5.59

AUT PEST(1)	NONE	ALDICARB	MEAN
N RATE			
50	5.44	5.36	5.40
100	5.74	5.83	5.78
MEAN	5.59	5.59	5.59

AUT PEST(1)	NONE	ALDICARB	MEAN
N TIME			
22 MAR	5.79	5.61	5.70
19 APR	5.39	5.58	5.48
MEAN	5.59	5.59	5.59

AUT PEST(2)	NONE	CHLORPYR	MEAN
AUT PEST(1)			
NONE	5.66	5.53	5.59
ALDICARB	5.59	5.59	5.59
MEAN	5.63	5.56	5.59

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STRAW TONNES/HECTARE

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

E FUNG	NONE	TFSD	MEAN
SOWDATE			
22 SEP	6.10	6.24	6.17
22 OCT	5.05	4.98	5.02
MEAN	5.57	5.61	5.59

E FUNG	NONE	TFSD	MEAN
N RATE			
50	5.42	5.38	5.40
100	5.73	5.84	5.78
MEAN	5.57	5.61	5.59

E FUNG	NONE	TFSD	MEAN
N TIME			
22 MAR	5.69	5.72	5.70
19 APR	5.46	5.50	5.48
MEAN	5.57	5.61	5.59

E FUNG	NONE	TFSD	MEAN
AUT PEST(1)			
NONE	5.62	5.56	5.59
ALDICARB	5.53	5.66	5.59
MEAN	5.57	5.61	5.59

E FUNG	NONE	TFSD	MEAN
AUT PEST(2)			
NONE	5.55	5.70	5.63
CHLORPYR	5.60	5.51	5.56
MEAN	5.57	5.61	5.59

L FUNG	NONE	PROCHLOR	MEAN
SOWDATE			
22 SEP	5.94	6.40	6.17
22 OCT	4.82	5.21	5.02
MEAN	5.38	5.81	5.59

L FUNG	NONE	PROCHLOR	MEAN
N RATE			
50	5.25	5.55	5.40
100	5.51	6.06	5.78
MEAN	5.38	5.81	5.59

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STRAW TONNES/HECTARE

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

L FUNG	NONE	PROCHLOR	MEAN
N TIME			
22 MAR	5.43	5.97	5.70
19 APR	5.32	5.64	5.48
MEAN	5.38	5.81	5.59

L FUNG	NONE	PROCHLOR	MEAN
AUT PEST(1)			
NONE	5.34	5.84	5.59
ALDICARB	5.41	5.77	5.59
MEAN	5.38	5.81	5.59

L FUNG	NONE	PROCHLOR	MEAN
AUT PEST(2)			
NONE	5.38	5.87	5.63
CHLORPYR	5.38	5.74	5.56
MEAN	5.38	5.81	5.59

L FUNG	NONE	PROCHLOR	MEAN
E FUNG			
NONE	5.42	5.73	5.57
TFSD	5.34	5.88	5.61
MEAN	5.38	5.81	5.59

GRTH REG	NONE	MEP+ETH	MEAN
SOWDATE			
22 SEP	6.25	6.08	6.17
22 OCT	5.04	4.99	5.02
MEAN	5.64	5.54	5.59

GRTH REG	NONE	MEP+ETH	MEAN
N RATE			
50	5.48	5.32	5.40
100	5.81	5.76	5.78
MEAN	5.64	5.54	5.59

GRTH REG	NONE	MEP+ETH	MEAN
N TIME			
22 MAR	5.91	5.49	5.70
19 APR	5.38	5.59	5.48
MEAN	5.64	5.54	5.59

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STRAW TONNES/HECTARE

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

GRTH REG / AUT PEST(1)	NONE	MEP+ETH	MEAN
NONE	5.60	5.58	5.59
ALDICARB	5.69	5.50	5.59
MEAN	5.64	5.54	5.59

GRTH REG / AUT PEST(2)	NONE	MEP+ETH	MEAN
NONE	5.55	5.71	5.63
CHLORPYR	5.74	5.37	5.56
MEAN	5.64	5.54	5.59

GRTH REG / E FUNG	NONE	MEP+ETH	MEAN
NONE	5.65	5.50	5.57
TFSD	5.64	5.58	5.61
MEAN	5.64	5.54	5.59

GRTH REG / L FUNG	NONE	MEP+ETH	MEAN
NONE	5.46	5.29	5.38
PROCHLOR	5.83	5.79	5.81
MEAN	5.64	5.54	5.59

EXTRA	22 SEP 0	22 OCT 0	MEAN
	4.47	4.50	4.48

GRAND MEAN 5.53

STRAW MEAN DM% 87.8

PLOT AREA HARVESTED 0.00448

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82/W/B/1

WINTER & 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, Far Field I.

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: 6.0 x 8.0.

Treatments to W. BARLEY: All combinations of:-

Whole plots

1. SD WB — Seed dressings to w. barley:

NONE	None
TRI+FUB	Triadimenol + fuberidazole

2. FS WB — Foliar sprays to w. barley applied 14 Apr, 1982:

NONE	None
FENPROP	Fenpropimorph at 0.79 kg in 280 l
PROPICON	Propiconazole at 0.12 kg in 280 l

3. SD SB — Seed dressings to one adjacent plot of s. barley, other adjacent plot given no fungicides:

NONE	None
TRI+FUB	Triadimenol + fuberidazole

Sub plots

4. POSITION — Position of w. barley plots in relation to s. barley plots testing seed dressing:

S WEST	South west
N EAST	North east

Treatments to S. BARLEY: All combinations of:-

1. SD SB — Seed dressings to s. barley:

NONE	None
TRI+FUB	Triadimenol + fuberidazole

2. SD WB — Seed dressings to both adjacent plots of w. barley:

NONE	None
TRI+FUB	Triadimenol + fuberidazole

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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

Standard applications: Manures: N at 160 kg as 'Nitro-Chalk' to s. and w. barley. Weedkillers: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 4.9 l) in 280 l to s. barley only.

Seed: W. barley: Maris Otter, sown at 190 kg.
S. barley: Golden Promise, sown at 160 kg.

Cultivations, etc.:- Heavy spring-tine cultivated three times for w. barley: twice 17 Oct, 1981, once 28 Oct. Spring-tine cultivated with crumbler attached for w. barley: 19 Oct. Deep-tine cultivated for w. and s. barley: 23 Oct. W. barley seed sown with rotary cultivator and drill attached together: 3 Nov. Heavy spring-tine cultivated for s. barley: 25 Mar, 1982. N applied for w. and s. barley, spring-tine cultivated with crumbler attached for s. barley: 26 Mar. S. barley, seed sown: 27 Mar. Weedkillers applied for s. barley: 17 May. W. barley combine harvested: 28 July. S. barley combine harvested: 11 Aug. Previous crops: W. oats 1980, potatoes 1981.

NOTE: The incidence of barley powdery mildew (Erysiphe graminis f. sp. hordei) and leaf blotch (Rhynchosporium secalis) was measured for w. barley in April, and powdery mildew on s. barley in May, June and July. The sensitivity of powdery mildew to the fungicides was measured on w. barley in April, s. barley once in May and once in June.

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82/W/B/1

WINTER BARLEY

GRAIN TONNES/HECTARE

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

SD WB / SD SB	NONE	TRI+FUB	MEAN
NONE	5.91	6.42	6.16
TRI+FUB	5.83	6.03	5.93
MEAN	5.87	6.22	6.05

FS WB / SD SB	NONE	FENPROP	PROPICON	MEAN
NONE	6.17	6.17	6.14	6.16
TRI+FUB	5.90	5.84	6.06	5.93
MEAN	6.03	6.01	6.10	6.05

FS WB / SD WB	NONE	FENPROP	PROPICON	MEAN
NONE	5.85	5.70	6.05	5.87
TRI+FUB	6.21	6.31	6.15	6.22
MEAN	6.03	6.01	6.10	6.05

POSITION / SD SB	S WEST	N EAST	MEAN
NONE	6.24	6.09	6.16
TRI+FUB	6.09	5.77	5.93
MEAN	6.16	5.93	6.05

POSITION / SD WB	S WEST	N EAST	MEAN
NONE	6.02	5.73	5.87
TRI+FUB	6.31	6.13	6.22
MEAN	6.16	5.93	6.05

POSITION / FS WB	S WEST	N EAST	MEAN
NONE	6.24	5.83	6.03
FENPROP	6.02	6.00	6.01
PROPICON	6.24	5.96	6.10
MEAN	6.16	5.93	6.05

FS WB	NONE		FENPROP		PROPICON	
SD SB	NONE	TRI+FUB	NONE	TRI+FUB	NONE	TRI+FUB
SD WB						
NONE	5.87	5.84	5.78	5.63	6.07	6.04
TRI+FUB	6.47	5.95	6.57	6.06	6.21	6.08

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WINTER BARLEY

GRAIN TONNES/HECTARE

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

FS WB	NONE		FENPROP		PROPICON	
POSITION	S WEST	N EAST	S WEST	N EAST	S WEST	N EAST
SD WB						
NONE	6.10	5.61	5.82	5.59	6.13	5.97
TRI+FUB	6.38	6.04	6.22	6.41	6.34	5.95

SD SB	NONE		TRI+FUB	
POSITION	S WEST	N EAST	S WEST	N EAST
SD WB				
NONE	6.05	5.77	5.99	5.68
TRI+FUB	6.42	6.41	6.20	5.86

SD SB	NONE		TRI+FUB	
POSITION	S WEST	N EAST	S WEST	N EAST
FS WB				
NONE	6.32	6.02	6.16	5.63
FENPROP	6.21	6.14	5.83	5.86
PROPICON	6.18	6.10	6.29	5.83

	SD SB	NONE		TRI+FUB	
	POSITION	S WEST	N EAST	S WEST	N EAST
SD WB	FS WB				
NONE	NONE	6.08	5.66	6.12	5.56
	FENPROP	6.00	5.57	5.64	5.62
	PROPICON	6.06	6.08	6.20	5.87
TRI+FUB	NONE	6.56	6.38	6.20	5.71
	FENPROP	6.42	6.72	6.02	6.09
	PROPICON	6.30	6.12	6.39	5.78

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

TABLE	SD WB	FS WB	SD SB	POSITION
SED	0.098	0.120	0.098	0.087

TABLE	SD WB FS WB	SD WB SD SB	FS WB SD SB	SD WB POSITION
SED	0.170	0.139	0.170	0.131
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
SD WB				0.123

TABLE	FS WB POSITION	SD SB POSITION	SD WB FS WB SD SB	SD WB FS WB POSITION
SED	0.160	0.131	0.240	0.227
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
FS WB	0.151			
SD SB		0.123		
SD WB.FS WB				0.213

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WINTER BARLEY

GRAIN TONNES/HECTARE

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

TABLE	SD WB SD SB POSITION	FS WB SD SB POSITION	SD WB FS WB SD SB POSITION
SED	0.185	0.227	0.321
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SD WB.SD SB	0.174		
FS WB.SD SB		0.213	
SD WB.FS WB.SD SB			0.301

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.240	4.0
BLOCK.WP.SP	12	0.301	5.0

GRAIN MEAN DM% 85.2

SUB PLOT AREA HARVESTED 0.00230

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82/W/B/1

SPRING BARLEY

GRAIN TONNES/HECTARE

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

SD WB / SD SB	NONE	TRI+FUB	MEAN
NONE	5.97	5.60	5.79
TRI+FUB	5.53	5.46	5.50
MEAN	5.75	5.53	5.64

FS WB / SD SB	NONE	FENPROP	PROPICON	MEAN
NONE	5.87	5.40	6.09	5.79
TRI+FUB	4.99	6.33	5.17	5.50
MEAN	5.43	5.87	5.63	5.64

FS WB / SD WB	NONE	FENPROP	PROPICON	MEAN
NONE	5.78	5.75	5.73	5.75
TRI+FUB	5.07	5.99	5.53	5.53
MEAN	5.43	5.87	5.63	5.64

SD WB	NONE			TRI+FUB		
FS WB	NONE	FENPROP	PROPICON	NONE	FENPROP	PROPICON
SD SB						
NONE	6.48	5.02	6.42	5.25	5.78	5.76
TRI+FUB	5.09	6.48	5.03	4.89	6.19	5.30

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

TABLE	SD SB	SD WB	FS WB	SD SB SD WB
SED	0.248	0.248	0.304	0.351

TABLE	SD SB FS WB	SD WB FS WB	SD SB SD WB FS WB
SED	0.430	0.430	0.608

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.608	10.8

GRAIN MEAN DM% 88.8

PLOT AREA HARVESTED 0.00220

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82/R/B/2

WINTER BARLEY

RHYNCHOSPORIUM CONTROL IN A BALANCED DESIGN

Object: To study the effects of interference between plots of w. barley with different amounts of Rhynchosporium secalis - Bones Close.

Sponsors: J.F. Jenkyn, O.J. Stedman, A. Bainbridge, G.V. Dyke.

Design: A serially balanced sequence of 16 'blocks' of 5 plots with flanking plots at discontinuities necessitated by field layout.

Whole plot dimensions: 4.0 x 10.0.

Treatments:

TREATMNT	Straw inoculum and fungicide sprays:
0	None
INFSTRAW	Straw infected with R. secalis worked in to the seedbed
PROC A	Prochloraz on 1 February, 1982
PROC S	Prochloraz on 22 March
PROC AS	Prochloraz on 1 February and 22 March

NOTES: (1) Prochloraz was applied at 0.4 kg, in 450 l on 1 February, in 340 l on 22 Mar.
(2) Infected straw was applied at 575 kg worked in to the seedbed by rotary harrow.
(3) Methiocarb was applied at 0.22 kg on 4 Dec, 1981 to one of the 'blocks' most affected by slugs. A planned application to other blocks was prevented by prolonged severe weather.
(4) The effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was North East, 'right' was South West. The analysis presented assumes a Fourier curve with 4 terms, 2 sine and 2 cosine, to represent positional variation.

Basal applications: Manures: 'Nitro-Chalk' at 160 kg followed by 370 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Methabenzthiazuron at 1.6 kg in 250 l. Diquat at 0.5 kg ion in 250 l.

Seed: Maris Otter, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 16 Sept, 1981. Ploughed: 28 Sept. Spring-tine cultivated: 8 Oct. First N applied: 14 Oct. Seed sown: 15 Oct. Methabenzthiazuron applied: 16 Oct. Second N applied: 21 Apr, 1982. Diquat applied: 24 July. Combine harvested: 26 July. Previous crops: Grass 1980, w. wheat 1981.

NOTE: Leaf diseases were assessed at intervals between December and June.

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82/R/B/2

GRAIN TONNES/HECTARE

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

TREATMNT	0	INFSTRAW	PROC A	PROC S	PROC AS
	5.42	4.74	5.26	5.23	5.42

LHN TREATMNT	0	INFSTRAW	PROC A	PROC S	PROC AS
0		5.65	5.22	5.19	5.61
INFSTRAW	4.86		4.66	4.70	4.76
PROC A	5.62	5.19		5.12	5.10
PROC S	5.23	5.10	5.35		5.26
PROC AS	5.89	5.32	5.16	5.30	

RHN TREATMNT	0	INFSTRAW	PROC A	PROC S	PROC AS
0		5.32	5.39	5.52	5.44
INFSTRAW	4.88		4.64	4.66	4.79
PROC A	5.16	5.57		5.23	5.06
PROC S	5.20	5.26	5.01		5.48
PROC AS	5.54	5.33	5.57	5.24	

GRAND MEAN 5.21

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

TABLE	TREATMNT	TREATMNT LHN	TREATMNT RHN
SED	0.107	0.222	0.222

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

STRATUM	DF	SE	CV%
WP	41	0.301	5.8

GRAIN MEAN DM% 84.0

PLOT AREA HARVESTED 0.00275

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82/R/B/3

WINTER BARLEY

EFFECTS OF STRAW

Object: To compare the effects of inoculating the seedbed with wheat and barley straw on seedling growth, foliar diseases and on the yield of w. barley - Bones Close.

Sponsors: J.F. Jenkyn, O.J. Stedman, A. Bainbridge, G.V. Dyke.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 4.0 x 10.0.

Treatments:

STRAW	Straw inoculum to seedbed:
NONE	None (duplicated)
BARLEY O	Barley, unsterilised
BARLEY S	Barley, sterilised by steam
WHEAT O	Wheat, unsterilised

NOTES: (1) Plots, sown with Maris Otter, were surrounded by Igri, dressed with triadimenol plus fuberidazole, sown at 160 kg; 4 m at the sides of each plot and 26 m between blocks.
(2) Straw treatments were applied at 575 kg worked into the seedbed by rotary harrow.

Basal applications: Manures: 'Nitro-Chalk' at 160 kg followed by 370 kg. Weedkillers: Glyphosate at 1.4 kg in 250 l. Methabenzthiazuron at 1.6 kg in 250 l. Diquat at 0.5 kg ion in 250 l.

Seed: Maris Otter, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 16 Sept, 1981. Ploughed: 28 Sept. Spring-tine cultivated: 8 Oct. First N applied, rotary harrowed, seed sown: 14 Oct. Methabenzthiazuron applied: 16 Oct. Second N applied: 21 Apr, 1982. Diquat applied: 24 July. Combine harvested: 26 July. Previous crops: Grass 1980, w. wheat 1981.

NOTES: (1) Leaf diseases were assessed at intervals between December and June.
(2) Yields were taken from the inter plot surrounds sown with Igri. The mean value of the two Igri areas adjacent to each yield plot have been used to adjust the presented results.

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82/R/B/3

GRAIN TONNES/HECTARE

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

STRAW	NONE	BARLEY O	BARLEY S	WHEAT O	MEAN
	5.74	5.48	5.62	5.69	5.65

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

TABLE	STRAW	
SED	0.191	MIN REP
	0.166	MAX-MIN

	STRAW
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	12	0.266	4.7

GRAIN MEAN DM% 84.2

PLOT AREA HARVESTED 0.00275

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82/R/B/6 and 82/W/B/6

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), Sawyers II and Woburn (W), Horsepool Lane Close W.

Sponsor: R. Moffitt.

Design: 2 randomised blocks of 3 plots split into 8.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

Whole plots

1. N — Nitrogen fertilizer (kg N):

75
113
150

Sub plots

2. VARIETY — Varieties:

ATEM	Atem
ATHOS	Athos
CARNIVAL	Carnival
CLARET	Claret
KORU	Koru
MIXTURE	Mixture of Athos, Claret and Koru
REGENT	Regent
TRIUMPH	Triumph

Basal applications:
Sawyers II (R): Weedkillers: Dicamba with mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.
Horsepool Lane Close W. (W): Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Glyphosate at 2.0 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.

Seed: Sawyers II (R): Sown at 180 kg.
Horsepool Lane Close W. (W): Sown at 160 kg.

Cultivations, etc.:-
Sawyers II (R): Ploughed: 21 Jan, 1982. Spring-tine cultivated: 30 Mar. Rotary harrowed, seed sown: 3 Apr. N applied: 23 Apr. 'Poly-Farmon' and fungicide applied: 17 May. Combine harvested: 17 Aug. Previous crops: Potatoes 1980, w.wheat 1981.
Horsepool Lane Close W. (W): Heavy spring-tine cultivated twice, spring-tine cultivated with crumbler attached: 2 Apr, 1982. Seed sown: 3 Apr. N applied: 27 Apr. 'Brittox' applied: 17 May. Fungicide applied: 1 June. Glyphosate applied: 10 Aug. Combine harvested: 20 Aug. Previous crops: W. oats 1980, potatoes 1981.

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82/R/B/6 SAWYERS II (R)

GRAIN TONNES/HECTARE

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

N VARIETY	75	113	150	MEAN
ATEM	6.64	6.75	5.79	6.39
ATHOS	7.17	6.97	7.00	7.05
CARNIVAL	6.72	7.31	7.11	7.05
CLARET	7.52	7.03	6.86	7.14
KORU	7.61	6.26	5.95	6.60
MIXTURE	7.45	7.20	6.63	7.09
REGENT	7.51	6.73	6.37	6.87
TRIUMPH	7.53	7.78	7.27	7.53
MEAN	7.27	7.00	6.62	6.97

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

TABLE	N	VARIETY	N VARIETY
SED	0.158	0.185	0.338
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
N			0.320

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	21	0.320	4.6

GRAIN MEAN DM% 83.9

SUB PLOT AREA HARVESTED 0.00204

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82/W/B/6 HORSEPOOL LANE CLOSE (W)

GRAIN TONNES/HECTARE

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

N	75	113	150	MEAN
VARIETY				
ATEM	6.71	7.17	6.47	6.78
ATHOS	5.79	6.59	6.31	6.23
CARNIVAL	5.10	6.33	6.06	5.83
CLARET	7.54	6.90	6.38	6.94
KORU	4.91	5.10	5.05	5.02
MIXTURE	7.09	7.01	5.89	6.67
REGENT	6.54	6.76	6.30	6.53
TRIUMPH	6.19	6.20	6.52	6.30
MEAN	6.23	6.51	6.12	6.29

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

TABLE	N	VARIETY	N VARIETY
SED	0.662	0.345	0.867
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
N			0.598

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	21	0.598	9.5

GRAIN MEAN DM% 81.5

SUB PLOT AREA HARVESTED 0.00212

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82/R/B/7

SPRING BARLEY

CONTROL OF INSECTS

Object: To study the effects of fenitrothion and omethoate on insect pests and yields of s. barley sown on two dates - Webbs.

Sponsor: G.C. Scott.

Design: 4 randomised blocks of 11 plots.

Whole plot dimensions: 9.00 x 12.0.

Treatments:

SDTE INS	Sowing dates and insecticides:
SE NONE	Sown 15 Mar 1982, no insecticides
SE FEN R	Sown 15 Mar 1982, fenitrothion applied on 26 May, 15 June, 30 June
SE OME R	Sown 15 Mar 1982, omethoate applied on 26 May, 15 June, 30 June
SL NONE	Sown 16 Apr, no insecticides (duplicated)
SL FEN E	Sown 16 Apr, fenitrothion applied on 15 June
SL FEN L	Sown 16 Apr, fenitrothion applied on 30 June
SL FEN R	Sown 16 Apr, fenitrothion applied on 26 May, 15 June and 30 June
SL OME E	Sown 16 Apr, omethoate applied on 26 May
SL OME L	Sown 16 Apr, omethoate applied on 30 June
SL OME R	sown 16 Apr, omethoate applied on 26 May, 15 June, 30 June

NOTE: Fenitrothion was applied at 0.70 kg in 450 l. Omethoate was applied at 0.64 kg in 450 l.

Basal applications: Manures: Chalk at 5.0 t. FYM at 25 t. (20:10:10) at 630 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

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

Cultivations, etc.:- Chalk applied: 22 Oct, 1981. FYM applied: 4 Dec. Ploughed: 9 Dec. Early-sown plots rotary harrowed and sown: 15 Mar, 1982. NPK applied: 30 Mar. Late-sown plots rotary harrowed and sown: 16 Apr. Weedkillers and fungicide applied to early-sown plots: 15 May. Weedkillers and fungicide applied to late-sown plots: 21 May. All plots combine harvested: 19 Aug. Previous crops: Potatoes 1980, w. wheat 1981.

NOTES: (1) Aphids, thrips and stem borers were counted from the end of April to the middle of July. Components of yield were measured. Lodging was scored and straw counts were made.
(2) The yield for one plot with treatment combination SL OME L was lost. An estimated value was used in the analysis.

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82/R/B/7

GRAIN TONNES/HECTARE

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

SDTE	INS	
SE	NONE	7.04
SE	FEN R	7.05
SE	OME R	7.74
SL	NONE	5.47
SL	FEN E	5.82
SL	FEN L	5.91
SL	FEN R	6.19
SL	OME E	5.79
SL	OME L	5.68
SL	OME R	6.22
MEAN		6.22

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

TABLE	SDTE INS	
SED	0.230	MIN REP
	0.199	MAX-MIN

	SDTE INS
MAX-MIN	SL 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	30	0.325	5.2

GRAIN MEAN DM% 83.9

PLOT AREA HARVESTED 0.00245

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82/R/B/8

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 - Great Knott II.

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: 9.0 x 12.0.

Treatments:

TREATMNT	Plot width (all 12m long) and fungicide treatment:
3M NONE	3m, no fungicide
3M TRID	3m, tridemorph spray at 0.53 kg on 21 May
9M NONE	9m, no fungicide

NOTES: (1) The above plots were each separated by 3m wide plots sprayed with tridemorph. Three extra plots, also treated with tridemorph, were included at each end of the experiment.
(2) The effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was East, 'right' was West.

Basal applications: Manures: (0:14:28) at 900 kg, 'Nitro-Chalk' at 480 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l. Paraquat and diquat (as 'Cleansweep' at 2.0 l) in 250 l.

Seed: Georgie, sown at 160 kg.

Cultivations, etc.:- Paraquat and diquat applied: 22 Oct, 1981. PK applied: 25 Nov. Ploughed: 10 Dec. Spring-tine cultivated, N applied: 30 Mar, 1982. Rotary harrowed, seed sown: 31 Mar. Dicamba, mecoprop and MCPA applied: 18 May. Combine harvested: 17 Aug. Previous crops: S. beans 1980, w. barley 1981.

NOTE: Mildew was assessed in early June and early July on all plots.

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82/R/B/8

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

TREATMNT	3M NONE	3M TRID	9M NONE
	5.72	6.62	5.39

LHN TREATMNT	3M NONE	3M TRID	9M NONE
3M NONE		5.64	5.80
3M TRID	6.61		6.64
9M NONE	5.41	5.38	

RHN TREATMNT	3M NONE	3M TRID	9M NONE
3M NONE		5.77	5.67
3M TRID	6.70		6.55
9M NONE	5.53	5.26	

GRAND MEAN 5.91

GRAIN MEAN DM% 84.0

PLOT AREA HARVESTED 0.00245

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82/R/B/9

SPRING BARLEY

INTERFERENCE BETWEEN PLOTS

Object: To study the influence of neighbouring plots, on the occurrence of mildew and on yield, for three single varieties and a mixture of them - Great Knott II.

Sponsor: J.F. Jenkyn.

Design: A serially balanced sequence of 9 'blocks' of 4 plots with flanking plots on the outsides and at a discontinuity necessitated by field layout.

Whole plot dimensions: 2.03 x 18.3.

Treatments:

VARIETY	Varieties:
ATHOS	Athos
CLARET	Claret
KORU	Koru
MIXTURE	Mixture of Athos, Claret and Koru

NOTE: The effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was East, 'right' was West.

Basal applications: Manures: (0:14:28) at 900 kg, 'Nitro-Chalk' at 480 kg. Weedkillers: Dicamba, mecoprop and MCPA (as 'Poly-Farmon' at 5.0 l) in 250 l. Paraquat and diquat (as 'Cleansweep' at 2.0 l) in 250 l.

Seed: All varieties sown at 160 kg.

Cultivations, etc.:- Paraquat and diquat applied: 22 Oct, 1981. PK applied: 25 Nov. Ploughed: 10 Dec. Spring-tine cultivated, N applied: 30 Mar, 1982. Rotary harrowed, seed sown: 31 Mar. Dicamba, mecoprop and MCPA applied: 18 May. Combine harvested: 17 Aug. Previous crops: S. beans 1980, w. barley 1981.

NOTE: Mildew was assessed on all plots in early June and early July.

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82/R/B/9

GRAIN TONNES/HECTARE

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

VARIETY	ATHOS	CLARET	KORU	MIXTURE
	6.34	6.90	5.34	6.28

LHN VARIETY	ATHOS	CLARET	KORU	MIXTURE
ATHOS		6.55	6.18	6.28
CLARET	6.94		6.90	6.85
KORU	5.11	5.72		5.20
MIXTURE	6.08	6.29	6.49	

RHN VARIETY	ATHOS	CLARET	KORU	MIXTURE
ATHOS		6.59	6.36	6.06
CLARET	6.88		6.73	7.07
KORU	5.43	5.30		5.30
MIXTURE	5.97	6.31	6.57	

GRAND MEAN 6.22

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

TABLE	VARIETY	VARIETY LHN	VARIETY RHN
SED	0.122	0.211	0.211

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

STRATUM	DF	SE	CV%
WP	16	0.259	4.2

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00373

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82/R/O/1

SPRING OATS

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.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.29 x 7.32.

Treatments:

TREATMNT	Aldicarb rates and row spacings:
	Sown in rows 12.7 cm (5 inches) apart:
O CR	No aldicarb
2 CR	Aldicarb at 1.25 kg per ha, applied equally to every row
4 CR	Aldicarb at 2.5 kg per ha, applied equally to every row
1 CR ALT	Aldicarb at 0.6 kg per ha, applied to alternate rows only
2 CR ALT	Aldicarb at 1.25 kg per ha, applied to alternate rows only
4 CR ALT	Aldicarb at 2.5 kg per ha, applied to alternate rows only
	Sown in 7.6 cm (3 inches) wide bands, centres of bands 25.4 cm (10 inches) apart:
O 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 360 kg. 'Nitro-Chalk' at 140 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l.

Seed: Maris Osprey, sown at 180 kg.

Cultivations, etc.:- Ploughed: 15 Oct, 1981. NPK applied: 23 Mar, 1982. Treatments applied, rotary harrowed, seed sown: 25 Mar. Weedkillers applied: 13 May. N applied by hand: 28 May. Combine harvested: 10 Aug. Previous crops: Mixed crops 1980, w. oats 1981.

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82/R/0/1

GRAIN TONNES/HECTARE

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

TREATMNT	
0 CR	3.47
2 CR	3.57
4 CR	3.59
1 CR ALT	3.34
2 CR ALT	3.44
4 CR ALT	3.67
0 WB	2.95
1 WB	3.13
2 WB	3.27
4 WB	3.17
MEAN	3.36

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

TABLE	TREATMNT
SED	0.139

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.171	5.1

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00093 (ROWS 12.7CM SPACING)
0.0111 (ROWS 7.6CM SPACING)

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82/R/BE/1

WINTER BEANS

EFFECTS OF PESTS AND PATHOGENS

Object: To assess the benefits from three amounts of pest and disease control on beans - Gt. Knott III.

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 (1.2 g of each per kg of seed)
	Phorate at 2.2 kg as granules to foliage on 2 Apr, 1982
FULL	Seed dressed with benomyl and thiram (1.2 g of each per kg of seed)
	Aldicarb at 10 kg on 23 Sept, 1981
	Benomyl at 0.56 kg and fosetyl-Al at 2.2 kg on 8 Feb
	Carbofuran at 2.24 kg on 2 Apr
	Benomyl at 0.56 kg on 14 Apr
	Benomyl at 0.56 kg on 5 May
	Propiconazole at 0.13 kg on 15 June

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 0.56 kg on 8 Feb and 14 Apr.

Basal applications: Weedkillers: Paraquat at 0.56 kg ion in 220 l. Propyzamide at 0.85 kg in 250 l. Fungicide: Benomyl at 0.55 kg in 250 l on two occasions.

Seed: Throws MS, sown at 250 kg.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 9 Sept, 1981 and once: 11 Sept. Paraquat applied: 22 Sept. Spring-tine cultivated, seedbed treatments applied, rotary harrowed, seed sown: 23 Sept. Propyzamide applied: 29 Sept. Basal benomyl applied twice: 19 May, 1982, 7 June. Combine harvested: 12 Aug. Previous crops: W. wheat 1980, s. barley 1981.

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 July. Migratory nematodes, root and foliar fungi, aphids, weevils, midges and viruses were counted at intervals during the season. N content of grain was measured.

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82/R/BE/1

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	2.97	2.99	3.04	3.00

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

TABLE	PATHCONT
SED	0.155

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.268	8.9

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED 0.00320

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82/R/BE/2

WINTER BEANS

CONTROL OF CHOCOLATE SPOT

Object: To study the effects of times and frequencies of application of two fungicides on the control of chocolate spot and on the yield of w. beans - Gt. Knott III.

Sponsors: A. Bainbridge, G.R. Cayley.

Design: 3 randomised blocks of 16 plots.

Whole plot dimensions: 5.33 x 10.0.

Treatments: All combinations of:-

1. FUNGCIDE Fungicides:

BENOMYL	Benomyl at 0.56 kg
PROCHLOR	Prochloraz at 0.50 kg

2. FUNGTIME Times and frequencies of applying fungicides:

1+5	Twice, on 25 Jan, 1982 and 11 May
5+7	Twice, on 11 May and 9 June
2	Once, on 19 Mar
3	Once, on 22 Apr
4	Once, on 29 Apr
6	Once, on 26 May
7	Once, on 9 June

plus one extra treatment:

EXTRA

NONE	None (duplicated)

Basal applications: Weedkillers: Propyzamide at 0.85 kg in 250 l. Paraquat at 0.56 kg ion in 220 l.

Seed: Throws MS, sown at 250 kg.

Cultivations, etc.:- Deep spring-tine cultivated twice: 9 Sept, 1981 and a third time: 11 Sept. Paraquat applied: 22 Sept. Spring-tine cultivated, seed sown: 23 Sept. Propyzamide applied: 29 Sept. Combine harvested: 12 Aug, 1982. Previous crops: W. barley 1980, s. barley 1981.

NOTE: Emergence counts were made in autumn and components of yield measured at maturity. Chocolate spot was assessed monthly throughout the growing season and leaf drop counts were made in mid-June.

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82/B/BE/2

GRAIN TONNES/HECTARE

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

FUNGCIDE FUNGTIME	BENOMYL	PROCHLOR	MEAN
1+5	2.73	2.49	2.61
5+7	2.60	2.38	2.49
2	2.36	2.36	2.36
3	2.44	2.49	2.47
4	2.58	2.41	2.50
6	2.94	2.44	2.69
7	2.45	2.48	2.47
MEAN	2.59	2.44	2.51

EXTRA NONE 2.45

GRAND MEAN 2.50

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

TABLE	FUNGTIME	FUNGCIDE	FUNGTIME FUNGCIDE
SED	0.078	0.042	0.111

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN FUNGTIME.FUNGCIDE TABLE IS 0.096

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

STRATUM	DF	SE	CV%
BLOCK.WP	31	0.135	5.4

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00320

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82/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. Knott III.

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 2 Apr, 1982
CS2 G A	Carbosulfan at 2.2 kg, as granules, applied to seedbed
CS2 G S	Carbosulfan at 2.2 kg, as granules, applied on 2 Apr
PER S S	Permethrin at 0.15 kg, as a spray, applied on 5 May
PH1 G S	Phorate at 1.1 kg, as granules, applied on 2 Apr
PH2 G S	Phorate at 2.2 kg, as granules, applied on 2 Apr

Basal applications: Weedkillers: Paraquat at 0.56 kg ion in 220 l. Propyzamide at 0.85 kg in 250 l. Fungicide: Benomyl at 0.55 kg in 250 l applied twice.

Seed: Throws MS, dressed with benomyl and thiram, sown at 250 kg.

Cultivations, etc.:- Deep spring-tine cultivated twice: 9 Sept, 1981 and once: 11 Sept. Paraquat applied: 22 Sept. Spring-tine cultivated, autumn granular treatments applied, rotary harrowed and seed sown: 23 Sept. Propyzamide applied: 29 Sept. Benomyl applied twice: 19 May, 1982, 7 June. Combine harvested: 12 Aug. Previous crops: W. wheat 1980, s. barley 1981.

NOTES: (1) Adult Sitona were assessed in mid-April and early June. Larvae were assessed in mid-June.
(2) Midge (Resseliella sp.) damage was assessed in stems in mid-June and soil cores were examined in August.

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82/R/BE/3

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE	CF2 G S	CS2 G A	CS2 G S	PER S S	PH1 G S	PH2 G S	MEAN
	3.28	3.58	3.30	3.47	3.56	3.53	3.22	3.42

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

TABLE	INSCTCDE
SED	0.154

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.218	6.4

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED 0.00293

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82/R/BE/5

WINTER AND SPRING 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. and s. beans - Highfield 0 and E III, Fosters 0 and E II.

Sponsor: A.G. Whitehead.

Design: For each crop: 2 randomised blocks of 15 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 1.25 kg	+	aldicarb at 1.25 kg	
AL2+AL2	Aldicarb at 2.5 kg	+	aldicarb at 2.5 kg	
AL1+TH1	Aldicarb at 1.25 kg	+	thiabendazole at 1.25 kg	
AL1+TH2	Aldicarb at 1.25 kg	+	thiabendazole at 2.5 kg	
AL1+TH4	Aldicarb at 1.25 kg	+	thiabendazole at 5.0 kg	
AL2+TH1	Aldicarb at 2.5 kg	+	thiabendazole at 1.25 kg	
AL2+TH2	Aldicarb at 2.5 kg	+	thiabendazole at 2.5 kg	
AL2+TH4	Aldicarb at 2.5 kg	+	thiabendazole at 5.0 kg	
TH1+TH1	Thiabendazole at 1.25 kg	+	thiabendazole at 1.25 kg	
TH2+TH2	Thiabendazole at 2.5 kg	+	thiabendazole at 2.5 kg	
TH4+TH4	Thiabendazole at 5.0 kg	+	thiabendazole at 5.0 kg	
CA1+CA1	Carbofuran at 1.25 kg	+	carbofuran at 1.25 kg	
CA2+CA2	Carbofuran at 2.5 kg	+	carbofuran at 2.5 kg	

NOTES: (1) To ensure the presence of stem nematode, infested straw was spread on both sites.
(2) Thiabendazole was applied in 7,650 l water.
(3) Post emergence treatments were applied to w. beans on 27 Apr, 1982, to s. beans on 27 May.

Basal applications:
W. beans: Highfield 0 and E III: Manures: Chalk at 3.8 t. (0:14:28) at 500 kg. Weedkiller: Simazine at 1.1 l in 280 l. Fungicide: Benomyl at 0.56 kg in 280 l applied on two occasions. Insecticide: Pirimicarb at 0.14 kg in 280 l applied on two occasions.
S. beans: Fosters 0 and E II: Manures: (0:14:28) at 500 kg. Weedkiller: Simazine at 1.1 l in 220 l. Fungicide: Benomyl at 0.56 kg in 280 l applied on two occasions. Insecticide: Pirimicarb at 0.14 kg in 270 l applied on two occasions.

Seed: Highfield 0 and E III: Throws MS, sown at 240 kg.
Fosters 0 and E II: Minden, sown at 250 kg.

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82/R/BE/5

Cultivations, etc.:-
Highfield O and E III: Chalk applied: 25 Sept, 1981. Infested straw applied: 9 Oct. Ploughed: 15 Oct. PK applied: 3 Nov. Rotary harrowed, seed sown, treatments applied: 5 Nov. Weedkiller and fungicide applied: 4 Jan, 1982. Fungicide applied: 26 May. Insecticide applied twice: 17 June and 7 July. Harvested by hand: 5 Aug. Previous crops: S. oats 1980, fallow 1981.
Fosters O and E II: Infested straw applied: 28 Oct, 1981. PK applied: 3 Jan, 1982. Rotary harrowed, seed sown, treatments applied: 24 Mar. Weedkiller applied: 26 Mar. Fungicide applied: 26 May. Insecticide applied: 17 June. Fungicide applied: 2 July. Insecticide applied: 7 July. Harvested by hand: 5 Aug. Previous crops: S. barley 1980, s. beans 1981.

NOTES: On Highfield O and E III counts were made of number of stems infested with stem nematode.
On Fosters O and E II counts were made only on untreated plots.

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82/R/BE/5 HIGHFIELD

GRAIN TONNES/HECTARE

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

NEMACIDE	
NONE	2.77
AL1+AL1	3.24
AL2+AL2	3.82
AL1+TH1	3.29
AL1+TH2	2.01
AL1+TH4	3.84
AL2+TH1	3.34
AL2+TH2	3.42
AL2+TH4	2.49
TH1+TH1	2.99
TH2+TH2	3.58
TH4+TH4	3.39
CA1+CA1	5.54
CA2+CA2	5.83
MEAN	3.49

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

TABLE	NEMACIDE	
SED	0.576	MIN REP
	0.499	MAX-MIN

	NEMACIDE
MIN REP	NONE
MAX-MIN	NONE V ANY OF THE REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.576	16.5

GRAIN MEAN DM% 82.5

PLOT AREA HARVESTED 0.00035

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82/R/BE/5 FOSTERS

GRAIN TONNES/HECTARE

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

NEMACIDE	
NONE	2.16
AL1+AL1	2.60
AL2+AL2	2.66
AL1+TH1	2.47
AL1+TH2	2.41
AL1+TH4	2.62
AL2+TH1	2.48
AL2+TH2	2.41
AL2+TH4	2.41
TH1+TH1	2.11
TH2+TH2	1.95
TH4+TH4	2.26
CA1+CA1	2.56
CA2+CA2	2.63
MEAN	2.39

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

TABLE	NEMACIDE	
SED	0.270	MIN REP
	0.234	MAX-MIN

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.270	11.3

GRAIN MEAN DM% 85.3

PLOT AREA HARVESTED 0.00035

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82/R/BE/6

WINTER BEANS

DISEASE CONTROL

Object: To study the effects of four fungicides on the control of diseases and on the yield of w. beans - Long Hoos VI/VII 5.

Sponsors: A. Bainbridge, G.R. Cayley, D.H. Lapwood.

Design: 3 randomised blocks of 7 plots.

Whole plot dimensions: 2.25 x 2.00.

Treatments:

FUNGCIDE	Fungicides and methods of application:
NONE	None
BENOM SD	Benomyl seed dressing
THIR SD	Thiram seed dressing
BE+TH SD	Benomyl + thiram seed dressing
PROCH SD	Prochloraz seed dressing
PROPI FS	Propiconazole foliar spray at 125 g in 300 l
BENOD FS	Benodanil foliar spray at 1.1 kg in 300 l

NOTES (1) Seed dressings were applied at 0.8 g per kg seed plus methyl cellulose sticker at 1.5 ml per kg seed.
(2) Foliar sprays were applied on 22 July, 1982 and 27 July.
(3) Seed was sown by hand in rows 25 cm apart, seed spaced 15 cm apart in the row.

Basal applications: Weedkillers: Paraquat at 0.84 kg ion in 340 l. Trietazine at 1.1 kg with simazine at 0.16 kg in 340 l. Insecticide: Permethrin at 62 g in 340 l on two occasions.

Seed: Throws MS, sown at 130 kg.

Cultivations, etc.:- Spring-tine cultivated: 3 Nov, 1981. Sown by hand: 5 Nov. Trietazine and simazine applied: 9 Nov. Paraquat applied: 9 Nov. Permethrin applied: 11 May, 1982 and 26 May. Harvested by hand: 7 Sept.

Previous crops: Potatoes 1980, fallow 1981.

NOTES: (1) Seedling emergence counts were made and foliar diseases were assessed.
(2) Yields of two plots were lost because they had been badly waterlogged. Both plots had treatment PROCH SD. Estimated values were used in the analysis.

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82/R/BE/6

GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE	BENOM SD	THIR SD	BE+TH SD	PROCH SD	PROPI FS	BENOD FS	MEAN
	5.95	5.55	6.39	6.17	5.48	5.49	5.67	5.81

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

TABLE	FUNGCIDE
SED	0.424

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.520	8.9

GRAIN MEAN DM% 80.3

PLOT AREA HARVESTED 0.00045

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82/R/BE/7

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 I.

Sponsors: J. McEwen, R. Bardner, A.J. Cockbain, J.M. Day, K.E. Fletcher, D.H. Lapwood, B.J. Legg, R.M. Webb, T.D. Williams, J.F. Witty, 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 25 mm)

Sub plots

2. PATHCONT — Pest and pathogen control:

STANDARD	None
ENHANCED	Phorate at 2.2 kg, combine drilled Pirimicarb at 0.14 kg on 15 June, 1982 Benomyl at 0.50 kg on 2 July
FULL	Aldicarb at 10 kg on 24 Mar Phorate at 2.2 kg, combine drilled Fosetyl-Al at 2.2 kg on 1 June Pirimicarb at 0.14 kg on 15 June Benomyl at 0.50 kg on 2 July Benomyl at 0.56 kg on 30 July Propiconazole at 0.13 kg on 30 July and on 13 Aug

Basal applications: Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l.

Seed: Minden, sown at 230 kg.

Cultivations, etc.:- Disced: 24 Sept, 1981. Ploughed: 29 Jan, 1982. Spring-tine cultivated twice: 23 Mar, 24 Mar. Rotary harrowed: 24 Mar. Seed sown: 25 Mar. Weedkillers applied: 27 Mar. Combine harvested: 2 Sept. Previous crops: S. barley 1980 and 1981.

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.

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82/R/BE/7

GRAIN TONNES/HECTARE

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

PATHCONT IRRIGATN	STANDARD	ENHANCED	FULL	MEAN
NONE	3.52	3.94	4.38	3.95
FULL	3.80	4.09	4.41	4.10
MEAN	3.66	4.01	4.40	4.02

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

TABLE	PATHCONT	IRRIGATN* PATHCONT
SED	0.085	0.120

* WITHIN THE SAME LEVEL OF IRRIGATN ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	12	0.170	4.2

GRAIN MEAN DM% 81.7

SUB PLOT AREA HARVESTED 0.00293

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82/R/BE/8

SPRING BEANS

VARIETIES AND BLRV

Object: To study the effects of full pest and pathogen control on four varieties differing in susceptibility to bean leaf roll virus (BLRV) - Claycroft.

Sponsor: A.J. Cockbain.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 4.27 x 9.14.

Treatments: All combinations of:-

1. VARIETY — Varieties:

BEAD	Maris Bead (field bean, resistant to BLRV)
MINDEN	Minden (field bean, sensitive to BLRV)
T WHITE	Threefold White (broad bean, sensitive to BLRV)
WEIRBOON	Weirboon (broad bean, tolerant to BLRV)

2. PATHCONT — Pest and pathogen control:

STANDARD	None
FULL	Phorate, pirimicarb and benomyl

NOTE: Rates of materials used in PATHCONT FULL were
Phorate at 4.5 kg and rotary harrowed in to the seedbed on 25 Mar, 1982
Pirimicarb at 0.14 kg in 340 l on 15 June
Benomyl at 0.5 kg in 340 l on 2 July

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Glyphosate at 1.4 kg in 250 l. Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l.

Cultivations, etc.:- Glyphosate applied: 4 Nov, 1981. Chalk applied: 10 Nov. Ploughed: 27 Nov. Spring-tine cultivated: 24 Mar, 1982. Seed sown: 26 Mar. Trietazine with simazine applied: 1 Apr. Combine harvested: 2 Sept. Previous crops: W. wheat 1980 and 1981.

NOTE: Plant counts were made at emergence. Pest and disease incidence and growth parameters were assessed throughout the season.

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82/R/BE/8

GRAIN TONNES/HECTARE

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

VARIETY PATHCONT	BEAD	MINDEN	T WHITE	WEIRBOON	MEAN
STANDARD	4.04	3.89	3.77	4.31	4.00
FULL	4.49	4.52	4.27	4.22	4.38
MEAN	4.26	4.20	4.02	4.27	4.19

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

TABLE	VARIETY	PATHCONT	VARIETY PATHCONT
SED	0.187	0.132	0.264

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.323	7.7

GRAIN MEAN DM% 78.8

PLOT AREA HARVESTED 0.00293

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82/R/BE/9

SPRING BEANS

PRECISION SOWING

Object: To study the effects of precision sowing and four seed rates on the yield of s. beans - W. Barnfield I.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 3 blocks of 8 plots, randomisation restricted.

Whole plot dimensions: 2.84 x 8.23.

Treatments: All combinations of:-

1. DRILL — Drills:

   STANDARD — Standard farm drill sowing seed irregularly
   PRECISN — Precision drill (Nodet Gougis) sowing seed evenly spaced

2. POPULATN — Plant populations (thousands per hectare):

	Target population	Populations achieved	
		STANDARD	PRECISN
3	300	299	306
4	400	391	376
5	500	506	458
6	600	588	511

NOTE: Seed was sown in rows spaced 36 cm (14 inches) apart.

Basal applications: Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l.

Seed: Minden.

Cultivations, etc.:- Disced: 24 Sept, 1981. Ploughed: 29 Jan, 1982. Spring-tine cultivated: 23 and 24 Mar. Seed sown: 25 Mar. Weedkillers applied: 27 Mar. Combine harvested: 2 Sept. Previous crops: S. barley 1980 and 1981.

NOTE: Establishment counts were made. Components of yield were measured at maturity.

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82/R/BE/9

GRAIN TONNES/HECTARE

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

POPULATN DRILL	3	4	5	6	MEAN
STANDARD	3.74	3.77	3.74	3.96	3.80
PRECISN	3.89	3.60	3.85	4.09	3.86
MEAN	3.82	3.69	3.79	4.02	3.83

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

TABLE	DRILL	POPULATN	DRILL POPULATN
SED	0.097	0.137	0.193

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.237	6.2

GRAIN MEAN DM% 81.7

PLOT AREA HARVESTED 0.00176

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82/R/BE/10

SPRING BEANS

CONTROL OF SITONA AND PRATYLENCHUS

Object: To study a range of materials and methods of application on the control of Sitona weevils and Pratylenchus nematodes and on the yield of s. beans - Delafield.

Sponsors: R. Bardner, K.E. Fletcher, D.C. Griffiths, R.M. Webb.

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

CHEMICAL	Chemicals, rates and methods of application:
NONE	None
AL BCE	Aldicarb, 10 kg, broadcast on 25 Mar, 1982 and worked into seedbed
CF 1 CD	Carbofuran, 1.7 kg, combine drilled
CF 2 CD	Carbofuran, 2.2 kg, combine drilled
CF 3 CD	Carbofuran, 3.2 kg, combine drilled
CF 2 BCL	Carbofuran, 2.2 kg, broadcast on foliage on 29 Apr
CS FS	Carbosulfan, 2.2 kg, foliar spray on 5 May
PH 1 CD	Phorate, 1.7 kg, combine drilled
PH 2 CD	Phorate, 2.2 kg, combine drilled
PH 3 CD	Phorate, 3.2 kg, combine drilled
PH 2 BCE	Phorate, 2.2 kg, broadcast on 25 Mar and worked into seedbed
PH 2 BCL	Phorate, 2.2 kg, broadcast on foliage on 29 Apr

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l.

Seed: Minden, sown at 270 kg.

Cultivations, etc.:- Chalk applied: 10 Nov, 1981. Ploughed: 19 Jan, 1982. Spring-tine cultivated twice: 23 Mar, 24 Mar. Seed sown: 26 Mar. Weedkillers applied: 27 Mar. Combine harvested: 2 Sept. Previous crops: S. wheat and s. barley 1980, s. barley 1981.

NOTE: Adult Sitona damage was assessed in late April and mid-May. Larvae were assessed in late June.

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82/R/BE/10

GRAIN TONNES/HECTARE

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

CHEMICAL	
NONE	4.07
AL BCE	4.09
CF 1 CD	4.11
CF 2 CD	4.43
CF 3 CD	4.18
CF 2 BCL	4.17
CS FS	4.36
PH 1 CD	4.27
PH 2 CD	4.16
PH 3 CD	4.19
PH 2 BCE	4.18
PH 2 BCL	4.23
MEAN	4.20

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

TABLE	CHEMICAL
SED	0.181

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

STRATUM	DF	SE	CV%
BLOCK.WP	33	0.256	6.1

GRAIN MEAN DM% 80.1

PLOT AREA HARVESTED 0.00293

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82/R/BE/12

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 VI/VII 5.

Sponsors: D.H. Lapwood, J. McEwen, D.P. Yeoman.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.03 x 3.05.

Treatments: All combinations of:-

1.	C S FUNG	Fungicide to control chocolate spot but not rust:
	NONE	None
	BENOMYL	Benomyl at 1.0 kg in 340 l on 2 July, 1982
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:
	TWICE	Twice on 9 July and 13 Aug
	THRICE	Thrice, on 9 July, 23 July and 13 Aug

plus one extra treatment:

EXTRA	
NONE	None (duplicated)

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.
Insecticide: Permethrin applied twice at 0.06 kg in 340 l.

Seed: Minden, sown at 270 kg.

Cultivations, etc.:- Muriate of potash applied: 12 Nov, 1981. Chalk applied: 27 Nov. Ploughed: 29 Jan, 1982. Spring-tine cultivated: 26 March. Spring-tine cultivated, power harrowed, seed sown: 29 Mar. Weedkillers applied: 14 Apr. Insecticide applied: 11 May, 26 May. Harvested by hand: 9 Sept. Previous crops: Potatoes 1980, fallow 1981.

NOTE: The incidence of chocolate spot and rust was assessed from early July until maturity. Components of yield were measured at maturity.

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82/R/BE/12
GRAIN TONNES/HECTARE

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

RUSTFUNG	MAN+MANC	PROPICON	MEAN
C S FUNG			
NONE	5.28	5.18	5.23
BENOMYL	5.65	5.60	5.62
MEAN	5.46	5.39	5.43

RFNGTIME	TWICE	THRICE	MEAN
C S FUNG			
NONE	5.06	5.40	5.23
BENOMYL	5.47	5.77	5.62
MEAN	5.27	5.59	5.43

RFNGTIME	TWICE	THRICE	MEAN
RUSTFUNG			
MAN+MANC	5.36	5.57	5.46
PROPICON	5.17	5.61	5.39
MEAN	5.27	5.59	5.43

	RFNGTIME	TWICE	THRICE
C S FUNG	RUSTFUNG		
NONE	MAN+MANC	5.05	5.50
	PROPICON	5.06	5.30
BENOMYL	MAN+MANC	5.67	5.63
	PROPICON	5.28	5.92

EXTRA NONE 4.51

GRAND MEAN 5.24

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

TABLE	C S FUNG	RUSTFUNG	RFNGTIME	C S FUNG RUSTFUNG
SED	0.138	0.138	0.138	0.195

TABLE	C S FUNG RFNGTIME	RUSTFUNG RFNGTIME	C S FUNG RUSTFUNG RFNGTIME
SED	0.195	0.195	0.276

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN
C S FUNG.RUSTFUNG.RFNGTIME TABLE IS 0.239

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

STRATUM	DF	SE	CV%
BLOCK.WP	19	0.338	6.5

GRAIN MEAN DM% 87.0 PLOT AREA HARVESTED 0.00015

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82/R/BE/13

SPRING BEANS

VARIETIES

Object: To compare agronomic characters and yields of six varieties of s. beans - Long Hoos VI/VII 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
RED TICK
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 1.0 kg with simazine at 0.14 kg in 340 l. Fungicides: Benomyl at 0.50 kg in 340 l; propiconazole at 0.12 kg in 340 l on two occasions. Insecticide: Permethrin at 62 g in 340 l applied twice.

Cultivations, etc.:- Muriate of potash applied: 12 Nov, 1981. Chalk applied: 27 Nov. Ploughed: 29 Jan, 1982. Spring-tine cultivated: 26 Mar. Spring-tine cultivated, power harrowed, seed sown: 29 Mar. Weedkillers applied: 14 Apr. Insecticide applied: 11 May, 26 May. Benomyl applied: 2 July. Propiconazole applied: 9 July, 13 Aug. Harvested by hand: 3 Sept. Previous crops: Potatoes 1980, fallow 1981.

NOTE: Plant counts were made after establishment. Components of yield were measured at maturity. N content of grain was measured.

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82/R/BE/13

GRAIN TONNES/HECTARE

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

VARIETY	ALFRED	BLAZE	EXELLE	MINDEN	RED TICK	TIGER	MEAN
	5.43	5.73	5.47	5.60	4.80	5.50	5.42

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

TABLE	VARIETY
SED	0.275

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.389	7.2

GRAIN MEAN DM% 86.8

PLOT AREA HARVESTED 0.00015

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82/R/BE/18

SPRING BEANS

EFFECTS OF SITONA

Object: To study the effects of Sitona applied at three different times on the yield of s. beans - Long Hoos III 5.

Sponsors: R. Bardner, K.E. Fletcher.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 1.90 x 1.83.

Treatments:

TREATMNT	Treatments, applied under insect-proof cages:
NONE	None
ALDICARB	Aldicarb worked into seedbed at 10 kg on 30 Mar, 1982, no Sitona added
SITONA E	Sitona added at crop emergence on 20 Apr
SITONA M	Sitona added at four-leaf stage on 16 May
SITONA L	Sitona added at start of flowering on 11 June

NOTE: Sitona were added at a rate of 860,000 per hectare.

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.

Seed: Minden, sown at 270 kg.

Cultivations, etc.:- Muriate of potash applied: 11 Nov, 1981. Chalk applied: 30 Nov. Ploughed: 29 Jan, 1982. Spring-tine cultivated, power harrowed, seed sown: 30 Mar. Rolled: 12 Apr. Trietazine and simazine applied: 14 Apr. Hand harvested: 25 Aug. Previous crops: Potatoes 1980, mixed cereals 1981.

NOTE: Leaf notching by adult Sitona lineatus was assessed in May and June and soil cores were examined for larval populations in early July. Plants were sampled in late August for components of yield.

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82/R/BE/18

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	ALDICARB	SITONA E	SITONA M	SITONA L	MEAN
	2.90	2.91	2.75	2.77	2.80	2.82

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

TABLE	TREATMNT
SED	0.118

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.167	5.9

GRAIN MEAN DM% 89.3

PLOT AREA HARVESTED 0.00042

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82/R/BE/19

SPRING BEANS

ROW SPACING AND METHODS OF APPLYING PHORATE

Object: To study the effects of rates and methods of applying phorate on the incidence of Sitona and on the yield of s. beans sown on wide or narrow rows - Claycroft.

Sponsors: R. Bardner, D.C. Griffiths, K.E. Fletcher.

Design: 4 randomised blocks of 9 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments: All combinations of:-

1. PHO RATE — Rates of phorate:

PHORATE1	1.7 kg
PHORATE2	2.2 kg

2. PHO METH — Methods of applying phorate:

BCAST N	Broadcast and rotary harrowed in to the seedbed, sown in rows 18 cm (7 inches) apart
CDRILL N	Combine drilled with seed, sown in rows 18 cm apart
CDRILL W	Combine drilled with seed, sown in rows 53 cm (21 inches) apart

plus three extra treatments:

EXTRA

0 0 N	No insecticide, seed sown in rows 18 cm apart
0 0 W	No insecticide, seed sown in rows 53 cm apart
TE1 BC N	Terbufos at 1.7 kg broadcast and rotary harrowed in to the seedbed, sown in rows 18 cm apart.

Basal applications: Manures: Chalk at 5.0 t. Glyphosate at 1.4 kg in 250 l. Trietazine at 1.0 kg with simazine at 0.14 kg.

Seed: Minden, sown at 270 kg.

Cultivations, etc.:- Glyphosate applied: 4 Nov, 1981. Chalk applied: 10 Nov. Ploughed: 27 Nov. Spring-tine cultivated: 24 Mar, 1982. Terbufos treatment applied: 25 Mar. Remaining broadcast treatments applied, rotary harrowed: 26 Mar. Seed sown: 27 Mar. Trietazine and simazine applied: 1 Apr. Combine harvested: 2 Sept. Previous crops: W. wheat 1980 and 1981.

NOTE: Adult Sitona damage was assessed in late April and mid-May. Larvae were assessed in late June.

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82/R/BE/19

GRAIN TONNES/HECTARE

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

PHO METH PHO RATE	BCAST N	CDRILL N	CDRILL W	MEAN
PHORATE1	3.51	3.69	3.76	3.65
PHORATE2	3.74	3.82	3.75	3.77
MEAN	3.62	3.75	3.75	3.71

EXTRA	0 0 N	0 0 W	TE1 BC N	MEAN
	3.73	3.44	3.59	3.59

GRAND MEAN 3.67

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

TABLE	EXTRA	PHO RATE	PHO METH	PHO RATE PHO METH & EXTRA
SED	0.212	0.123	0.150	0.212

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

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.300	8.2

GRAIN MEAN DM% 76.5

PLOT AREA HARVESTED 0.00293

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82/R/BE/20

SPRING BEANS

PIRIMIPHOS-METHYL AND STEM NEMATODE

Object: To study the effects of three rates of pirimiphos-methyl applied as a seed dressing on the occurrence of stem nematode, Sitona weevils and on the yield of s. beans - Highfield O and E VI N.

Sponsors: A.G. Whitehead, J. McEwen, D.P. Yeoman.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments:

PIRIM SD	Pirimiphos-methyl seed dressing (g per tonne of seed):
0	
2	
4	
20	

NOTE: Seed was sown by hand in rows 51 cm apart, seed spaced 5 cm apart in the row.

Basal applications: None.

Seed: Minden.

Cultivations, etc.:- Ploughed: 17 Nov, 1981. Spring-tine cultivated, power harrowed, sown: 26 Mar, 1982. Hand hoed: 12 May, 1 June. Harvested by hand: 7 Sept. Previous crops: S. barley 1980, fallow 1981.

NOTE: Plant counts were made after establishment. Stem nematode symptoms were assessed during the season. Weevil damage was assessed in May.

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82/R/BE/20

GRAIN TONNES/HECTARE

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

PIRIM SD	0	2	4	20	MEAN
	5.83	6.06	4.98	5.02	5.47

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

TABLE	PIRIM SD
SED	0.560

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.792	14.5

GRAIN MEAN DM% 83.3

PLOT AREA HARVESTED 0.00015

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82/R/PE/1 and 82/W/PE/1

PEAS

EFFECTS OF PESTS AND PATHOGENS

Object: To assess the benefits from three amounts of pest and disease control on peas - Rothamsted (R) Long Hoos III 3 and Woburn (W) Butt Close.

Sponsors: J. McEwen, A.J. Cockbain, K.E. Fletcher, D.H. Lapwood, A.G. Whitehead, D.P. Yeoman.

Design: 6 randomised blocks of 3 plots.

Whole plot dimensions: 4.27 x 7.62.

Treatments:

PATHCONT	Pest and pathogen control:
STANDARD	Thiram seed dressing
ENHANCED	Thiram seed dressing Phorate at 2.2 kg, combine drilled on 15 Apr, 1982 (R), 31 Mar (W)
FULL	Thiram seed dressing Aldicarb at 10 kg to seedbed on 15 Apr (R), 31 Mar (W)

Basal applications:
Long Hoos III 3 (R): Manures: Muriate of potash at 520 kg, chalk at 2.9 t. Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 340 l. Desiccant: Diquat at 0.59 kg ion in 340 l.
Butt Close (W): Manures: (0:18:36) at 260 kg. Weedkillers: Trietazine at 0.76 kg with simazine at 0.10 kg in 280 l.

Seed: (R) and (W): Filby, dressed thiram, sown at 250 kg.

Cultivations, etc.:-
Long Hoos III 3 (R): Muriate of potash applied: 11 Nov, 1981. Chalk applied: 30 Nov. Ploughed: 4 Feb, 1982. Spring-tine cultivated: 2 Apr. Rotary cultivated, seed sown, weedkillers applied: 15 Apr. Hand weeded: 3-4 Aug. Desiccant applied: 17 Aug. Combine harvested: 3 Sept. Previous crops: Potatoes 1980, s. barley 1981.
Butt Close (W): Heavy spring-tine cultivated twice, w. wheat sown: 10 Nov, 1981. Ploughed in w. wheat: 25 Feb. Spring-tine cultivated with crumbler attached, PK applied, rotary cultivated, seed sown: 31 Mar. Weedkillers applied: 5 Apr. Combine harvested: 10 Aug. Previous crops: S. barley 1980, potatoes 1981.

NOTE: Amounts of pests and diseases were assessed during the season. Nitrogen percentages of grain were measured.

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82/R/PE/1 LONG HOOS III (R)

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	2.42	3.38	3.52	3.11

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

TABLE	PATHCONT
SED	0.326

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.565	18.2

GRAIN MEAN DM% 84.7

PLOT AREA HARVESTED 0.00122

82/W/PE/1 BUTT CLOSE (W)

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	1.75	2.34	3.03	2.37

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

TABLE	PATHCONT
SED	0.534

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.925	39.0

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00122

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82/R/FE/1

FENUGREEK

N AND RHIZOBIUM

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 V 8.

Sponsor: D.P. Yeoman.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 2.29 x 7.62.

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 16 Apr, 1982
	150 F	150 at flowering, on 14 June
3.	INSCTCDE	Insecticide:
	NONE	None
	PERMETH	Permethrin foliar spray at 0.06 kg in 340 l on 17 May and 26 May

Basal applications: Manures: Chalk at 2.9 t. Muriate of potash at 520 kg. Weedkillers: Trifluralin at 0.81 kg in 340 l, MCPB at 2.3 kg in 340 l.

Seed: Barbara, sown at 22 kg.

Cultivations, etc.:- Muriate of potash applied: 12 Nov, 1981. Chalk applied: 27 Nov. Ploughed: 6 Jan, 1982. Spring-tine cultivated, trifluralin applied, spring-tine cultivated twice, seed sown: 16 Apr. MCPB applied: 7 June. Harvested by hand: 28 Oct. Previous crops: Potatoes 1980, s. wheat 1981.

NOTE: Plant counts were made after establishment. Because of prolonged wet weather during October grain germinated in the pod, yields of grain were unobtainable, total above-ground dry matter was substituted.

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82/R/FE/1

FORAGE DRY MATTER TONNES/HECTARE

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

N	0	150 S	150 F	MEAN
INOCULUM				
NONE	2.08	4.18	3.90	3.39
RHIZOBUM	3.45	3.53	4.00	3.66
MEAN	2.77	3.85	3.95	3.52

INSCTCDE	NONE	PERMETH	MEAN
INOCULUM			
NONE	3.26	3.51	3.39
RHIZOBUM	3.54	3.77	3.66
MEAN	3.40	3.64	3.52

INSCTCDE	NONE	PERMETH	MEAN
N			
0	2.56	2.97	2.77
150 S	3.98	3.72	3.85
150 F	3.67	4.23	3.95
MEAN	3.40	3.64	3.52

N	0		150 S		150 F	
INSCTCDE	NONE	PERMETH	NONE	PERMETH	NONE	PERMETH
INOCULUM						
NONE	2.02	2.15	4.34	4.01	3.43	4.37
RHIZOBUM	3.10	3.79	3.61	3.44	3.91	4.09

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

TABLE	INOCULUM	N	INSCTCDE	INOCULUM N
SED	0.294	0.360	0.294	0.509

TABLE	INOCULUM INSCTCDE	N INSCTCDE	INOCULUM N INSCTCDE
SED	0.416	0.509	0.720

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.720	20.5

GRAIN MEAN DM% 59.6

PLOT AREA HARVESTED 0.00021

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82/R/RA/1

WINTER OILSEED RAPE

ELECTROSTATIC SPRAYING

Object: To compare the effects of electrostatic and conventional sprayers on disease control and on yield of w. oilseed rape - Long Hoos VI/VII 3.

Sponsors: G.R. Cayley, C.J. Rawlinson, D.C. Griffiths, A.J. Arnold.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.54 x 6.10.

Treatments: All combinations of:-

1. SPRAYER — Spraying machine and rate of applying prochloraz:

CNVNTL 4	Conventional sprayer, applying 500 g
ELECTR 1	Electrostatic sprayer, applying 125 g
ELECTR 2	Electrostatic sprayer, applying 250 g
ELECTR 4	Electrostatic sprayer, applying 500 g

2. SPRADATE — Dates of spraying:

9NV	9 November, 1981
9NV+5AP	9 November and again on 5 April, 1982

plus one extra treatment not sprayed:

EXTRA	
NONE	None (duplicated)

NOTE: Treatments were applied in 4.3 l water by electrostatic sprayer and in 410 l water by conventional sprayer.

Basal applications: Manures: 'Nitro-Chalk' at 220 kg at sowing and at 670 kg in February. Weedkillers: 3, 6 - Dichloropicolinic acid at 0.07 kg with benazolin ethyl ester at 0.42 kg and propyzamide at 0.35 kg in 340 l.

Seed: Primor, sown at 6.7 kg.

Cultivations, etc.:- Spring-tine cultivated, N applied, seed sown: 3 Sept, 1981. Weedkiller applied: 5 Nov. N applied: 10 Feb, 1982. Cut and swathed: 22 July. Stationary combine threshed: 28 July. Previous crops: Mixed cereals 1980, fallow 1981.

NOTE: Phoma and light leaf spot were assessed on several occasions throughout the season. Growth analysis measurements were taken in spring. Insect populations and pod shattering were assessed during the season.

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82/R/RA/1

GRAIN (90% DRY MATTER) TONNES/HECTARE

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

SPRAYER SPRADATE	CNVNTL 4	ELECTR 1	ELECTR 2	ELECTR 4	MEAN
9NV	1.47	1.53	1.37	1.41	1.45
9NV+5AP	1.85	1.54	2.00	1.75	1.78
MEAN	1.66	1.54	1.68	1.58	1.62

NONE 1.17

GRAND MEAN 1.53

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

TABLE	SPRAYER	SPRADATE	SPRAYER SPRADATE
SED	0.099	0.070	0.140

SED FOR COMPARING NONE WITH ANY
ITEM IN SPRAYER.SPRADATE TABLE IS 0.121

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

STRATUM	DF	SE	CV%
BLOCK.WP	19	0.172	11.2

MEAN DM% 88.8

PLOT AREA HARVESTED 0.00155

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82/W/MA/1

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.

Design: 8 randomised blocks of 4 plots.

Whole plot dimensions: 2.13 x 4.57.

Treatments: All combinations of:-

1. ALDICARB Aldicarb (kg) to seedbed:

   0
   5

2. BENOMYL Benomyl (kg) to seedbed:

   0
   22

Basal applications: Manures: (20:10:10) at 750 kg. Weedkillers: Glyphosate at 1.5 kg in 280 l. Atrazine at 1.1 kg in 280 l. Insecticide: Chlorfenvinphos at 2.2 kg as granules.

Seed: Fronica, sown at 105,000 seeds per hectare.

Cultivations, etc.:- Glyphosate applied: 1 Oct, 1981. Ploughed: 25 Feb, 1982. Heavy spring-tine cultivated: 27 Apr. NPK applied: 29 Apr. Aldicarb and benomyl applied: 4 May. Rotary cultivated with crumbler attached, atrazine applied; seed sown: 5 May. Hand hoed, chlorfenvinphos applied: 28 May. Hand harvested: 28 Sept. Previous crops: Maize 1980, s. wheat 1981.

NOTE: Nematodes were assessed in soil samples taken before treatments were applied, in July, August and after harvest and in crop samples in June and July.

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82/W/MA/1

FORAGE DRY MATTER TONNES/HECTARE

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

BENOMYL / ALDICARB	0	22	MEAN
0	19.18	18.63	18.90
5	21.50	22.08	21.79
MEAN	20.34	20.35	20.35

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

TABLE	ALDICARB	BENOMYL	ALDICARB BENOMYL
SED	0.568	0.568	0.803

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

STRATUM	DF	SE	CV%
BLOCK.WP	21	1.607	7.9

GRAIN MEAN DM% 32.9

PLOT AREA HARVESTED 0.00049

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82/W/P/1

POTATOES

VARIETIES AND OXAMYL

Object: To study the effects of oxamyl on a range of varieties grown in land lightly infested with potato cyst nematode (Globodera rostochiensis) - Woburn Horsepool.

Sponsors: A.G. Whitehead, K. Evans.

Design: 3 randomised blocks of 20 plots.

Whole plot dimensions: 2.84 x 6.10.

Treatments: All combinations of:-

1. VARIETY — Varieties:

ANCHOR	Maris Anchor
BANNER	Arran Banner
CARA	Cara
CROFT	Croft
CROWN	Pentland Crown
DELL	Pentland Dell
DESIREE	Desiree
PEER	Maris Peer
PIPER	Maris Piper
RECORD	Record

2. OXAMYL — Oxamyl (kg):

0.0
5.6

Basal applications: Manures: (10:10:15+4.5 Mg) at 3360 kg. Weedkillers: Paraquat at 0.56 kg ion in 280 l. Linuron at 1.1 kg with paraquat at 0.28 kg ion in 280 l. Fungicides: Mancozeb at 1.4 kg in 280 l applied four times, with the insecticide on the first two occasions. Ofurace at 0.12 kg with maneb at 1.3 kg in 280 l applied twice, with the insecticide on the first occasion. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.59 kg ion in 280 l.

Cultivations, etc:- Deep-tine cultivated three times: Once 29 Oct, 1981, twice 30 Oct. W. wheat sown: 4 Nov. Paraquat applied to kill w. wheat: 3 Apr, 1982. Heavy spring-tine cultivated three times: 15 Apr, 16 Apr, 19 Apr. NPK with Mg applied: 17 Apr. Oxamyl applied, rotary cultivated twice: 20 Apr. Potatoes planted: 21 Apr. Rotary ridged: 17 May. Linuron with paraquat applied: 18 May. Mancozeb applied: 16 June, 2 July, 13 July, 23 Aug. Ofurace with maneb applied: 27 July, 11 Aug. Insecticide applied: 16 June, 2 July, 27 July. Haulm desiccant applied: 6 Oct. Lifted: 19 Oct.

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

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82/W/P/1

TOTAL TUBERS OVER 3.8 CM RIDDLE TONNES/HECTARE

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

OXAMYL	0.0	5.6	MEAN
VARIETY			
ANCHOR	46.9	59.6	53.2
BANNER	49.2	58.8	54.0
CARA	55.5	62.1	58.8
CROFT	49.2	58.2	53.7
CROWN	52.5	61.5	57.0
DELL	43.0	44.4	43.7
DESIREE	52.9	57.9	55.4
PEER	52.8	44.3	48.5
PIPER	48.5	63.6	56.1
RECORD	43.4	45.2	44.3
MEAN	49.4	55.6	52.5

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

TABLE	VARIETY	OXAMYL	VARIETY OXAMYL
SED	4.33	1.94	6.12

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	7.50	14.3

PLOT AREA HARVESTED 0.00087

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82/R/SW/1

SWEDES

ELECTROSTATIC SPRAY STUDY

Object: To compare the effects of electrostatic and conventional sprayers on disease control and on yield of swedes - Little Knott I.

Sponsors: A.J. Arnold, G.R. Cayley, P. Etheridge, D.C. Griffiths, B. Pye, F.T. Phillips, G.C. Scott.

Design: 4 randomised blocks of 9 plots.

Whole plot dimensions: 3.05 x 13.7.

Treatments: All combinations of:-

1. SPRAYER	Spraying machine:	
	CNVNTIAL	Conventional
	ELECTROS	Electrostatic
2. FUNGCIDE	Fungicides:	
	TRIADIME	Triadimefon
	NUARIMOL	Nuarimol
3. FUNGRATE	Rates of applying fungicides:	
	1	62 g triadimefon, 40 g nuarimol
	2	125 g triadimefon, 80 g nuarimol

plus one extra treatment not sprayed

EXTRA	
NONE	None (duplicated)

NOTE: The fungicides were applied in 6.0 l water by electrostatic sprayer and 320 l by conventional sprayer, on 4 Aug, 1982 and again on 8 Sept.

Basal applications: Manures: 'Nitro-Chalk' at 380 kg. (0:20:20) at 630 kg. Weedkiller: Trifluralin at 1.1 kg in 250 l.

Seed: Doon Major, sown at 2.0 kg.

Cultivations, etc.:- Ploughed: 22 Jan, 1982. Spring-tine cultivated: 5 Apr. N applied, PK applied: 26 Apr. Weedkiller applied, rotary harrowed: 5 May. Seed sown: 10 May. Plants singled: 14 June. Harvested: 22 Nov. Previous crops: Peas 1980, s. barley 1981.

NOTES: (1) Leaves were assessed for mildew infection at 6 and 15 days after the first spray application and the 4th leaf was assessed 15 days after the second application.
(2) The yields presented have been adjusted for an edge effect.

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82/R/SW/1

TOTAL TUBERS TONNES/HECTARE

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

FUNGCIDE SPRAYER	TRIADIME	NUARIMOL	MEAN
CNVNTIAL	51.4	50.5	50.9
ELECTROS	45.7	48.7	47.2
MEAN	48.5	49.6	49.1

FUNGRATE SPRAYER	1	2	MEAN
CNVNTIAL	53.8	48.1	50.9
ELECTROS	47.1	47.3	47.2
MEAN	50.5	47.7	49.1

FUNGRATE FUNGCIDE	1	2	MEAN
TRIADIME	49.0	48.0	48.5
NUARIMOL	51.9	47.4	49.6
MEAN	50.5	47.7	49.1

FUNGCIDE	TRIADIME		NUARIMOL	
FUNGRATE SPRAYER	1	2	1	2
CNVNTIAL	53.1	49.7	54.6	46.5
ELECTROS	44.9	46.4	49.2	48.3

EXTRA NONE 39.8

GRAND MEAN 47.2

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

TABLE	SPRAYER	FUNGCIDE	FUNGRATE	SPRAYER FUNGCIDE
SED	1.61	1.61	1.61	2.28

TABLE	SPRAYER FUNGRATE	FUNGCIDE FUNGRATE	SPRAYER FUNGCIDE FUNGRATE
SED	2.30	2.28	3.23

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

STRATUM	DF	SE	CV%
BLOCK.WP	27	4.49	9.5

PLOT AREA HARVESTED 0.00084

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82/R/M/1

MIXED 1

SOIL FUMIGATION, MYCORRHIZA AND P

Object: To study the effects on w. wheat and w. barley of applications of mycorrhizal inoculum, methyl bromide and phosphate fertilizer - Delharding.

Sponsors: J.G. Buwalda, D.P. Stribley, P.B. Tinker.

Design: 3 randomised blocks of 8 plots split into 2.

Whole plot dimensions: 3.0 x 4.4.

Treatments: All combinations of:-

Whole plots

1. CROP — Crops:

   W BARLEY
   W WHEAT

2. STERILNT — Soil sterilant:

   NONE — None
   METH BR — Methyl bromide at 900 kg

3. P — Rates of phosphate fertilizer (kg P), as superphosphate:

   0
   60

Sub plots

4. INOCULUM — Mycorrhizal inoculum:

   NONE — None
   G MOSSE — Glomus mosseae

NOTE: Inoculum was prepared by growing leeks in pots of soil infected with the mycorrhiza. After 20 weeks growth, soil and roots in the pots were chopped and applied to the seed furrows at 3.5 t per ha. Uninoculated plots received soil and roots at the same rate from pots growing uninfected leeks.

Basal applications: Manures: N at 30 kg and a further application at 100 kg as 'Nitro-Chalk'. K at 50 kg, as muriate of potash. Weedkiller: Chlortoluron at 5.6 l in 280 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: W. barley: Igri, sown at 350 seeds per m^2.
W. wheat: Avalon, sown at 350 seeds per m^2.

Cultivations, etc.:- Deep-tine cultivated: 16 June, 1981. P, K and first N applied: 5 Aug. Seed sown: 29 Sept. Weedkiller with the fungicide applied: 27 Oct. Second N applied: 2 Mar, 1982. Harvested by hand: 17 Aug. Previous crops: Fallow 1980 and 1981.

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82/R/M/1

NOTE: Plots were sampled five times during the season to assess mycorrhizal infection of roots and three times to measure P content of the leaves.

GRAIN TONNES/HECTARE

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

STERILNT	NONE	METH BR	MEAN
CROP			
W BARLEY	6.46	5.25	5.85
W WHEAT	8.49	7.15	7.82
MEAN	7.47	6.20	6.84

P	0	60	MEAN
CROP			
W BARLEY	4.80	6.90	5.85
W WHEAT	7.21	8.44	7.82
MEAN	6.00	7.67	6.84

P	0	60	MEAN
STERILNT			
NONE	6.88	8.07	7.47
METH BR	5.12	7.28	6.20
MEAN	6.00	7.67	6.84

INOCULUM	NONE	G MOSSE	MEAN
CROP			
W BARLEY	5.38	6.32	5.85
W WHEAT	7.16	8.48	7.82
MEAN	6.27	7.40	6.84

INOCULUM	NONE	G MOSSE	MEAN
STERILNT			
NONE	7.05	7.90	7.47
METH BR	5.49	6.90	6.20
MEAN	6.27	7.40	6.84

INOCULUM	NONE	G MOSSE	MEAN
P			
0	5.37	6.63	6.00
60	7.17	8.17	7.67
MEAN	6.27	7.40	6.84

	P	0	60
CROP	STERILNT		
W BARLEY	NONE	5.83	7.08
	METH BR	3.77	6.73
W WHEAT	NONE	7.93	9.05
	METH BR	6.48	7.83

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82/R/M/1

GRAIN TONNES/HECTARE

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

	INOCULUM	NONE	G MOSSE
CROP	STERILNT		
W BARLEY	NONE	6.03	6.88
	METH BR	4.73	5.77
W WHEAT	NONE	8.07	8.92
	METH BR	6.26	8.04

	INOCULUM	NONE	G MOSSE
CROP	P		
W BARLEY	0	4.27	5.33
	60	6.49	7.32
W WHEAT	0	6.48	7.93
	60	7.85	9.03

	INOCULUM	NONE	G MOSSE
STERILNT	P		
NONE	0	6.40	7.36
	60	7.70	8.44
METH BR	0	4.34	5.90
	60	6.64	7.91

		INOCULUM	NONE	G MOSSE
CROP	STERILNT	P		
W BARLEY	NONE	0	5.28	6.39
		60	6.79	7.38
	METH BR	0	3.26	4.27
		60	6.19	7.26
W WHEAT	NONE	0	7.53	8.34
		60	8.60	9.50
	METH BR	0	5.43	7.53
		60	7.09	8.56

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

TABLE	CROP	STERILNT	P	INOCULUM
SED	0.176	0.176	0.176	0.134

TABLE	CROP	CROP	STERILNT	CROP
	STERILNT	P	P	INOCULUM
SED	0.249	0.249	0.249	0.221
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROP				0.189

TABLE	STERILNT	P	CROP	CROP
	INOCULUM	INOCULUM	STERILNT	STERILNT
			P	INOCULUM
SED	0.221	0.221	0.352	0.313
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
STERILNT	0.189			
P		0.189		
CROP.STERILNT				0.268

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82/R/M/1

GRAIN TONNES/HECTARE

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

TABLE	CROP P INOCULUM	STERILNT P INOCULUM	CROP STERILNT P INOCULUM
SED	0.313	0.313	0.443
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
CROP.P	0.268		
STERILNT.P		0.268	
CROP.STERILNT.P			0.379

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.432	6.3
BLOCK.WP.SP	16	0.464	6.8

SUB PLOT AREA HARVESTED 0.00020

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82/R/M/6

MIXED 6

SOIL FUMIGATION, MYCORRHIZA AND P

Object: To study the effects on s. wheat and s. barley of applications of mycorrhizal inoculum, methyl bromide and phosphate fertilizer - Delharding.

Sponsors: J.G. Buwalda, D.P. Stribley, P.B. Tinker.

Design: 3 randomised blocks of 8 plots split into 2.

Whole plot dimensions: 3.0 x 4.4.

Treatments: All combinations of:-

Whole plots

1. CROP — Crops:

   S BARLEY
   S WHEAT

2. STERILNT — Soil sterilant:

   NONE — None
   METH BR — Methyl bromide at 900 kg

3. P — Rates of phosphate fertilizer (kg P), as superphosphate:

   0
   60

Sub plots

4. INOCULUM — Mycorrhizal inoculum:

   NONE — None
   G MOSSE — Glomus mosseae

NOTE: Inoculum was prepared by growing leeks in pots of soil infected with the mycorrhiza. After 20 weeks growth, soil and roots in the pots were chopped and applied to the seed furrows at 3.5 t per ha. Uninoculated plots received soil and roots at the same rate from pots growing uninfected leeks.

Basal applications: Manures: N at 125 kg as 'Nitro-Chalk' and K at 50 kg as muriate of potash. Weedkiller: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.8 l) in 280 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: S. wheat: Timmo, with no seed dressing, sown at 350 seeds per m^2.
S. barley: Triumph, with no seed dressing, sown at 350 seeds per m^2.

Cultivations, etc.:- Rotary cultivated: 27 July, 1981. N, P and K applied: 9 Mar, 1982. Seed sown: 16 Apr. Weedkiller with the fungicide applied: 21 May. Harvested by hand: 1 Sept. Previous crops: Fallow 1980 and 1981.

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82/R/M/6

NOTE: Plots were sampled five times during the season to assess mycorrhizal infection of roots and three times to measure P content of the leaves.

GRAIN TONNES/HECTARE

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

STERILNT	NONE	METH BR	MEAN
CROP			
S BARLEY	3.24	3.63	3.44
S WHEAT	4.66	2.74	3.70
MEAN	3.95	3.18	3.57

P	0	60	MEAN
CROP			
S BARLEY	2.63	4.24	3.44
S WHEAT	2.94	4.45	3.70
MEAN	2.79	4.35	3.57

P	0	60	MEAN
STERILNT			
NONE	3.03	4.87	3.95
METH BR	2.55	3.82	3.18
MEAN	2.79	4.35	3.57

INOCULUM	NONE	G MOSSE	MEAN
CROP			
S BARLEY	3.03	3.84	3.44
S WHEAT	3.41	3.98	3.70
MEAN	3.22	3.91	3.57

INOCULUM	NONE	G MOSSE	MEAN
STERILNT			
NONE	3.67	4.23	3.95
METH BR	2.77	3.60	3.18
MEAN	3.22	3.91	3.57

INOCULUM	NONE	G MOSSE	MEAN
P			
0	2.39	3.18	2.79
60	4.05	4.64	4.35
MEAN	3.22	3.91	3.57

	P	0	60
CROP	STERILNT		
S BARLEY	NONE	2.28	4.20
	METH BR	2.98	4.29
S WHEAT	NONE	3.77	5.54
	METH BR	2.12	3.36

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82/R/M/6

GRAIN TONNES/HECTARE

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

	INOCULUM	NONE	G MOSSE
CROP	STERILNT		
S BARLEY	NONE	2.91	3.58
	METH BR	3.16	4.11
S WHEAT	NONE	4.44	4.88
	METH BR	2.39	3.08

	INOCULUM	NONE	G MOSSE
CROP	P		
S BARLEY	0	2.21	3.05
	60	3.85	4.64
S WHEAT	0	2.57	3.32
	60	4.26	4.64

	INOCULUM	NONE	G MOSSE
STERILNT	P		
NONE	0	2.67	3.38
	60	4.67	5.07
METH BR	0	2.11	2.99
	60	3.44	4.21

		INOCULUM	NONE	G MOSSE
CROP	STERILNT	P		
S BARLEY	NONE	0	1.93	2.64
		60	3.89	4.52
	METH BR	0	2.50	3.46
		60	3.82	4.76
S WHEAT	NONE	0	3.42	4.13
		60	5.45	5.63
	METH BR	0	1.72	2.51
		60	3.06	3.65

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

TABLE	CROP	STERILNT	P	INOCULUM
SED	0.059	0.059	0.059	0.059

TABLE	CROP	CROP	STERILNT	CROP
	STERILNT	P	P	INOCULUM
SED	0.083	0.083	0.083	0.083
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROP				0.083

TABLE	STERILNT	P	CROP	CROP
	INOCULUM	INOCULUM	STERILNT	STERILNT
			P	INOCULUM
SED	0.083	0.083	0.118	0.117
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
STERILNT	0.083			
P		0.083		
CROP.STERILNT				0.117

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82/R/M/6

GRAIN TONNES/HECTARE

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

TABLE	CROP P INOCULUM	STERILNT P INOCULUM	CROP STERILNT P INOCULUM
SED	0.117	0.117	0.166
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
CROP.P	0.117		
STERILNT.P		0.117	
CROP.STERILNT.P			0.166

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.144	4.0
BLOCK.WP.SP	16	0.203	5.7

SUB PLOT AREA HARVESTED 0.00020

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METEOROLOGICAL RECORDS 1982 - 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	66 (+15)	2.2 (-0.7)	0.0	3.7	5.6
FEB	44 (-23)	4.0 (+0.6)	2.4	4.9	5.7
MAR	165 (+51)	5.6 (+0.4)	2.5	5.5	5.8
APR	172 (+22)	8.1 (+0.4)	3.8	8.1	7.2
MAY	221 (+28)	11.2 (+0.2)	6.7	11.1	9.2
JUNE	164 (-37)	15.4 (+1.4)	12.6	15.7	12.7
JULY	170 (-20)	16.3 (+0.5)	12.6	16.2	14.3
AUG	176 (-3)	15.9 (+0.2)	11.5	16.2	15.0
SEPT	160 (+15)	14.3 (+0.9)	11.9	14.6	14.3
OCT	73 (-30)	9.6 (+0.0)	8.5	11.7	12.8
NOV	66 (+4)	7.5 (+1.7)	6.2	9.6	11.1
DEC	54 (+9)	3.8 (+0.0)	2.1	5.4	8.0
YEAR*	1533 (+31)	9.5 (+0.5)	6.7	10.2	10.1

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	22	60 (-4)	15	67	10.1
FEB	15	34 (-15)	14	20	8.7
MAR	23	86 (+36)	19	55	11.7
APR	15	23 (-26)	6	5	8.9
MAY	11	64 (+9)	11	15	8.0
JUNE	0	116 (+59)	21	48	6.3
JULY	0	44 (-19)	9	4	7.7
AUG	0	44 (-20)	15	TRACE	7.5
SEPT	2	51 (-10)	12	9	6.0
OCT	9	134 (+60)	21	103	6.8
NOV	13	105 (+35)	24	84	10.1
DEC	22	77 (+10)	16	68	10.1
YEAR*	132	837(+114)	183	477	8.5

(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 1982 - WOBURN

(Departure from long-period means in brackets)

MONTH	Total sunshine: hours	Mean temperature: C Air(1)	Dew point	In ground under grass 30 cm	100 cm	Ground frosts (2)	Total rainfall: mm 12.7 cm (5in) gauge	Rain days (3)	Wind km per hour (4)
JAN	43 (-7)	2.1 (-1.1)	0.2	3.5	5.3	19	42 (-12)	13	9.2
FEB	33 (-31)	4.4 (+1.0)	4.7	4.9	5.9	15	26 (-15)	10	8.9
MAR	150 (+37)	5.8 (+0.4)	3.3	5.7	6.0	18	90 (+44)	20	11.5
APR	155 (+16)	8.1 (+0.1)	4.4	8.3	7.3	17	27 (-18)	7	7.2
MAY	204 (+21)	11.2 (+0.2)	7.1	11.7	9.3	9	44 (-10)	13	7.5
JUNE	135 (-60)	15.8 (+1.6)	12.7	16.8	13.2	0	106 (+55)	17	6.0
JULY	151 (-28)	16.3 (+0.3)	12.7	16.8	14.4	0	28 (-26)	8	7.2
AUG	157 (-14)	16.3 (+0.5)	11.7	16.8	15.2	0	45 (-18)	14	9.4
SEPT	151 (+15)	14.2 (+0.6)	11.5	14.9	14.6	0	31 (-20)	12	6.8
OCT	74 (-28)	10.1 (+0.1)	8.5	11.7	13.0	2	109 (+54)	17	7.5
NOV	57 (-4)	7.8 (+1.6)	5.9	9.4	11.3	10	80 (+18)	17	11.2
DEC	38 (-6)	4.0 (+0.1)	2.2	5.1	8.2	18	53 (-1)	12	11.2
YEAR*	1348 (-89)	9.7 (+0.5)	7.1	10.5	10.3	108	681 (+51)	160	8.6

METEOROLOGICAL RECORDS 1982 - SAXMUNDHAM

MONTH	Mean temperature: C 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	3.5 (-0.4)	2.8	3.4	23	36 (-20)	11	10.6
FEB	4.1 (-0.3)	2.8	4.4	13	23 (-19)	4	12.1
MAR	5.5 (-0.4)	3.9	5.4	17	48 (-1)	13	13.2
APR	7.9 (+0.6)	3.9	8.5	16	7 (-35)	7	9.8
MAY	11.6 (+1.4)	8.3	12.6	6	48 (+11)	10	8.2
JUNE	15.4 (+1.3)	12.8	16.5	0	67 (+23)	12	6.5
JULY	17.0 (+1.1)	13.3	18.2	0	17 (-31)	9	7.4
AUG	17.2 (+0.9)	13.3	18.1	0	49 (+11)	12	8.8
SEPT	15.6 (+1.5)	12.8	15.2	1	50 (-19)	14	8.3
OCT	10.5 (+0.2)	8.9	11.5	6	124 (+75)	24	9.5
NOV	8.5 (+1.8)	7.2	9.1	7	70 (+10)	17	15.9
DEC	4.4 (-0.3)	2.8	4.7	14	51 (-9)	13	11.8
YEAR*	10.1 (+0.6)	7.7	10.6	103	590 (-4)	146	10.2

(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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