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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1981



Full Table of Content

Rothamsted Yields of the Field Experiments 1981

Rothamsted Research

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Rothamsted Experimental Station

Harpenden

Lawes Agricultural Trust

YIELDS

of the

FIELD

EXPERIMENTS

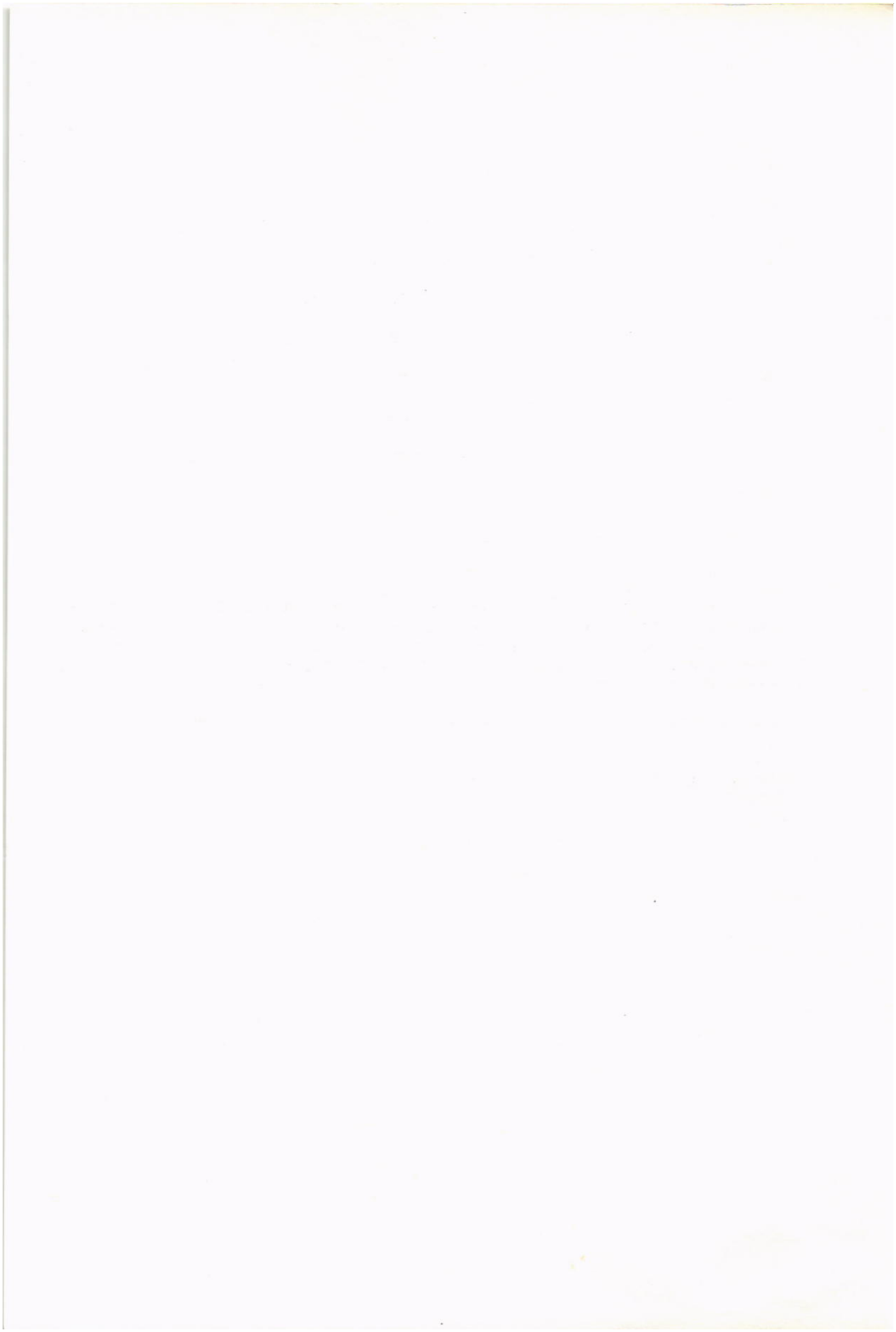
1981

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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CONVENTIONS 1981

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

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

For the classical and some long-term experiments reference is made to 'Details' - 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 fertilisers, sprays etcl 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 fertilisers indicated thus - (20:10:10) = compound fertiliser (20% N, 10% P2O5, 10% K2O), 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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81/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 138th year, w. wheat, fallow, potatoes. The 14th year of the rotations.

For previous years see 'Details' 1967 & 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-80/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00434
	1	0.00798
	2,3,5 & 6	0.00659
	9	0.00694
Potatoes:	7	0.00659

Treatments:

Whole plots

PLOT	Plot	Fertilisers 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	-
17NO+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	NO+3 1/2(PK (Na) Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK (Na) Mg)+
19C	19	C	C	-
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg	-

(A) Alternating

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

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81/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		1968	69	70	71	72	73	74	75	76	77	78	79	80	81
SC0/W30	Section 0	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W15	Section 1	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC2/W1	Section 2	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W
SC3/W2	Section 3	W	W	F	W	W	F	W	W	F	W	W	F	W	W
-	Section 4	W	P	BE	W	P	BE	W	P	BE	W	P	P	W	F
SC5/W3	Section 5	W	F	W	W	F	W	W	F	W	W	F	W	W	W
SC6/W4	Section 6	F	W	W	F	W	W	F	W	W	F	W	W	W	W
POTATOES	Section 7	P	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P
-	Section 8*	W	W	W	W	F	W	W	W	W	W	W	W	W	F
SC9/W23	Section 9	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 & 9. Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.

Standard applications:
W. wheat: Manures: Sections 0 and 5 only: Chalk at 2.9 t. Weedkillers: (Not applied to section 8): Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Section 9 only: Glyphosate at 1.5 l in 250 l. Fungicides: Prochloraz at 0.4 l in 250 l. Prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 250 l applied on two occasions; to sections 0,1,2,3 and plots 01,21,22 and 03 of sections 5 and 6 on the first and second occasions and to remaining wheat on the second occasion only. (Rain was believed to have washed off the first application).

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81/R/BK/1

Potatoes: Weedkillers: Linuron at 1.1 kg and paraquat at 0.6 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied on five occasions, with pirimicarb. Insecticides: Phorate at 1.7 kg at planting. Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.
Fallow: Manures: Chalk at 2.9 t to section 4 only.

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: 8 Sept, 1980. FYM applied: 10 Sept. Ploughed: 11 Sept. Rolled: 15 Sept.
CROPPED SECTIONS: W. wheat: Glyphosate applied: 2 Sept, 1980. Rotary harrowed: 30 Sept. Seed sown: 1 Oct. Chlortoluron applied: 3 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 21 Apr. Prochloraz applied alone: 5 May. Prochloraz, maneb, and zineb applied: 19 June, 22 June. Combine harvested: 19 Aug.
potatoes: Chisel ploughed: 16 Jan, 1981. Spring-tine cultivated: 16 Apr. N applied: 17 Apr. Spike rotary cultivated, potatoes planted: 13 May. Weedkillers applied: 1 June. Fungicide applied with pirimicarb: 23 June, 1 July, 13 July, 27 July, and 11 Aug. Ridged: 9 July. Haulm mechanically destroyed: 24 Aug. Desiccant applied: 25 Aug. Lifted: 14 Sept.
FALLOW: Chalk applied: 4 Sept, 1980. Chisel ploughed section 4 only: 6 Jan, 1981. Chisel ploughed section 8 only: 16 Jan. Spring-tine cultivated four times: 16 Apr, 30 June, 20 July, 11 Aug. Rotary harrowed: 15 May. Ploughed twice: 16 June, 16 July. Heavy spring-tine cultivated: 19 June.

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81/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC2/W1	SC3/W2	SC5/W3	SC6/W4	SC1/W15	SC9/W23	SC0/W30	MEAN
01DN2PK	8.03	8.53	8.62	8.46	*	*	*	8.41
21DN2	8.50	8.64	10.13	8.71	8.57	8.95	8.47	8.85
22D	8.70	6.56	7.68	5.91	7.71	7.99	7.29	7.41
030	3.81	1.29	1.27	1.12	1.66	1.49	1.71	1.76
05F	4.01	1.33	1.09	1.20	1.62	1.74	1.41	1.77
06N1F	6.54	4.47	4.17	3.33	4.28	4.69	4.45	4.56
07N2F	8.16	6.36	6.12	4.91	6.39	6.45	5.81	6.32
08N3F	8.55	7.45	6.01	6.24	6.36	6.77	6.14	6.79
09N4F	8.37	7.78	7.59	7.35	6.96	7.29	6.55	7.41
10N2	5.39	5.01	3.43	3.81	3.72	2.79	3.54	3.96
11N2P	6.34	5.77	5.19	4.30	3.58	3.14	3.31	4.52
12N2PNA	6.18	5.80	5.58	4.40	4.58	3.98	4.47	5.00
13N2PK	7.76	6.39	6.06	5.08	6.20	6.88	5.64	6.29
14N2PKMG	7.58	6.00	5.83	5.23	6.28	6.08	5.76	6.11
15N3F	8.09	7.17	6.95	6.40	6.71	6.71	6.52	6.94
16N2F	7.49	6.16	5.82	5.62	5.93	6.25	5.69	6.14
17N0+3FH	7.86	6.84	6.58	6.36	6.50	6.71	6.20	6.72
18N1+3FH	8.29	6.72	7.27	6.98	6.72	6.74	6.94	7.09
19C	6.67	3.76	4.06	3.09	4.25	4.84	4.09	4.40
20NKMG	*	*	*	*	3.07	*	3.78	3.43

GRAIN MEAN DM% 83.9

STRAW TONNES/HECTARE

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

SECTION PLOT	SC2/W1	SC1/W15	MEAN
01DN2PK	7.68	*	7.68
21DN2	9.39	7.60	8.50
22D	8.64	5.96	7.30
030	2.35	1.00	1.68
05F	2.81	0.89	1.85
06N1F	5.21	2.83	4.02
07N2F	6.11	3.76	4.94
08N3F	6.52	3.85	5.19
09N4F	6.97	3.96	5.46
10N2	2.44	2.38	2.41
11N2P	3.84	1.97	2.90
12N2PNA	3.92	2.84	3.38
13N2PK	6.15	4.01	5.08
14N2PKMG	5.11	4.39	4.75
15N3F	6.02	4.43	5.23
16N2F	5.40	3.74	4.57
17N0+3FH	5.55	4.25	4.90
18N1+3FH	6.00	4.33	5.17
19C	4.07	2.76	3.42
20NKMG	*	1.93	1.93

STRAW MEAN DM% 90.8

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81/R/BK/1

POTATOES

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

	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM(1.5 INCH) RIDDLE
01DN2PK	27.7	95.4
21DN2	29.9	92.3
22D	21.9	93.5
030	5.4	82.5
05F	10.4	87.5
06N1F	13.9	90.2
07N2F	17.0	89.2
08N3F	22.6	91.6
09N4F	25.4	88.9
10N2	5.6	75.4
11N2P	8.0	71.7
12N2PNA	10.1	75.3
13N2PK	14.4	86.6
14N2PKMG	18.0	88.0
15N3F	21.6	90.7
16N2F	20.3	91.4
17N3FH	19.0	89.5
18N3FH	19.3	91.5
19C	13.1	87.4

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81/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 130th year, s. barley.

For previous years see 'Details' 1967 & 1973, Station Report for 1966 and 74-80/R/HB/2.

Treatments: All combinations of:-
1. MANURE Fertilisers, 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
---14F	None	-	-	14 after fallow
-P-14F	None	P	-	14 after fallow
--K14F	None	K(Na)Mg	-	14 after fallow
-PK14F	None	PK(Na)Mg	-	14 after fallow
A--14F	A	-	-	14 after fallow
AP-14F	A	P	-	14 after fallow
A-K14F	A	K(Na)Mg	-	14 after fallow
APK14F	A	PK(Na)Mg	-	14 after fallow
N----14F	N	-	-	14 after fallow
NP---14F	N	P	-	14 after fallow
N-K--14F	N	K(Na)Mg	-	14 after fallow
NPK--14F	N	PK(Na)Mg	-	14 after fallow
N--S-14F	N	Si	Si omitted	14 after fallow
NP-S-14F	N	P Si	"	14 after fallow
N-KS-14F	N	K(Na)MgSi	"	14 after fallow
NPKS-14F	N	PK(Na)MgSi	"	14 after fallow
N---S3BE	N	-	Si added	3 after beans
NP--S3BE	N	P	"	3 after beans
N-K-S3BE	N	K(Na)Mg	"	3 after beans
NPK-S3BE	N	PK(Na)Mg	"	3 after beans
N--SS3BE	N	Si	-	3 after beans
NP-SS3BE	N	P Si	-	3 after beans
N-KSS3BE	N	K(Na)MgSi	-	3 after beans
NPKSS3BE	N	PK(Na)MgSi	-	3 after beans
C(--)14F	C	-	PKMg omitted	14 after fallow
C(P-)14F	C	P	"	14 after fallow
C(-K)14F	C	K(Na)Mg	"	14 after fallow
C(PK)14F	C	PK(Na)Mg	"	14 after fallow
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(--)3BE	C	-	"	3 after beans
C(P-)3BE	C	P	"	3 after beans
C(-K)3BE	C	K(Na)Mg	"	3 after beans
C(PK)3BE	C	PK(Na)Mg	"	3 after beans
C(--)3PO	C	-	"	3 after potatoes
C(P-)3PO	C	P	"	3 after potatoes
C(-K)3PO	C	K(Na)Mg	"	3 after potatoes
C(PK)3PO	C	PK(Na)Mg	"	3 after potatoes

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81/R/HB/2

D14F	None	D	PKMg omitted	14 after fallow
(D)14F	(D)	-	"	14 after fallow
(A)14F	(Ashes)	-	"	14 after fallow
-14F	None	-	"	14 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 fertiliser (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 — Fertilisers other than magnesium:

551AN2PK	Plot 551 AN2PK	14th barley
561--PK	Plot 561 --PK	14th barley
571NN2--	Plot 571 NN2	14th barley
581NN2--	Plot 581 NN2	14th barley

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

2. MGNESIUM — Magnesium fertiliser (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 plots in 3rd barley after potatoes.

Basal applications: Weedkillers: Paraquat at 0.84 kg ion in 250 l. Mecoprop with ioxynil and bromoxynil (as 'Brittox' at 2.5 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: Georgie, sown at 160 kg.

Cultivations, etc.:- Paraquat applied: 1 Sept, 1980. Chalk applied: 7 Oct. P, K, and silicate of soda applied: 1 Dec. FYM applied, ploughed: 3 Dec. Spring-tine cultivated, seed sown: 17 Feb, 1981. N applied: 21 Apr. 'Brittox' applied: 12 May. Combine harvested: 17 and 18 Aug.

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81/R/HB/2

BARLEY

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
MANURE					
---14F	1.19	1.50	1.87	1.69	1.56
-P-14F	1.55	3.93	3.63	3.02	3.03
--K14F	1.26	1.95	3.05	3.41	2.42
-PK14F	1.57	4.12	4.77	5.01	3.87
A--14F	0.79	0.95	1.66	1.75	1.29
AP-14F	2.03	3.20	3.07	3.08	2.84
A-K14F	1.02	1.74	2.48	2.59	1.96
APK14F	1.57	4.08	5.07	4.75	3.87
N----14F	0.56	1.55	1.40	1.75	1.31
NP---14F	1.97	4.03	4.29	3.49	3.45
N-K--14F	1.13	1.89	2.79	3.22	2.26
NPK--14F	1.96	4.30	5.02	4.68	3.99
N--S-14F	1.70	1.97	3.32	3.69	2.67
NP-S-14F	2.06	4.05	4.34	3.92	3.59
N-KS-14F	1.55	3.69	3.91	4.39	3.39
NPKS-14F	1.98	3.84	5.20	5.61	4.16
N---S3BE	2.17	2.79	3.63	3.91	3.12
NP--S3BE	2.62	4.76	5.15	4.83	4.34
N-K-S3BE	1.80	3.67	3.89	4.48	3.46
NPK-S3BE	2.39	4.87	5.70	5.19	4.54
N--SS3BE	2.12	3.12	4.04	4.18	3.37
NP-SS3BE	2.63	4.68	5.39	4.83	4.38
N-KSS3BE	2.26	4.10	4.76	4.58	3.93
NPKSS3BE	2.25	4.78	5.47	5.25	4.44
C(--)14F	1.70	3.26	4.08	3.42	3.11
C(P-)14F	1.78	4.27	4.58	3.65	3.57
C(-K)14F	2.12	3.99	4.36	4.86	3.83
C(PK)14F	2.06	4.20	4.78	4.78	3.96
C(--)4BE	2.28	3.77	4.08	4.17	3.58
C(P-)4BE	1.42	4.01	4.23	4.17	3.46
C(-K)4BE	1.35	3.77	4.94	4.50	3.64
C(PK)4BE	1.70	4.55	4.95	4.94	4.03
C(--)3BE	2.20	4.13	4.44	4.38	3.79
C(P-)3BE	2.11	4.42	5.08	4.36	3.99
C(-K)3BE	2.27	3.98	5.15	5.01	4.10
C(PK)3BE	2.98	4.78	5.57	5.23	4.64
C(--)3PO	1.77	3.79	4.10	4.14	3.45
C(P-)3PO	2.06	3.77	4.58	4.09	3.63
C(-K)3PO	2.06	4.20	4.85	4.71	3.96
C(PK)3PO	2.42	4.19	5.06	5.37	4.26
D14F	4.45	6.12	5.54	5.37	5.37
(D)14F	1.50	2.72	3.64	5.09	3.24
(A)14F	1.26	2.43	4.19	3.31	2.80
-14F	0.78	2.16	2.33	2.31	1.90
MEAN	1.87	3.59	4.19	4.12	3.44

GRAIN MEAN DM% 86.6

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81/R/HB/2

BARLEY

STRAW TONNES/HECTARE

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

N MANURE	0	48	96	144	MEAN
---14F	0.61	0.60	0.81	0.60	0.66
-P-14F	0.41	1.23	1.64	1.21	1.12
--K14F	0.40	0.79	1.00	1.20	0.85
-PK14F	0.39	1.83	2.03	2.42	1.67
A--14F	0.41	0.41	0.60	0.82	0.56
AP-14F	0.81	1.01	1.23	1.02	1.02
A-K14F	0.40	0.61	0.80	1.00	0.70
APK14F	0.76	1.84	2.68	2.47	1.94
D14F	2.37	2.70	2.44	2.19	2.42
(D)14F	0.51	1.30	1.07	2.17	1.26
(A)14F	0.54	1.07	1.63	1.33	1.14
-14F	0.52	0.79	0.79	0.79	0.72
MEAN	0.68	1.18	1.39	1.44	1.17

STRAW MEAN DM% 88.9

PLOT AREA HARVESTED 0.00007

GRAIN TONNES/HECTARE

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

MANURE MGNESIUM	551AN2PK	561--PK	571NN2--	581NN2--	MEAN
0	4.32	0.36	2.53	1.39	2.15
35	4.50	0.49	2.42	1.83	2.31
MEAN	4.41	0.43	2.47	1.61	2.23

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00306

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81/R/WF/3

WHEAT AND FALLOW

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

The 126th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-80/R/WF/3.

Whole plot dimensions: 9.60 x 52.1.

Treatments:

PLOT	Plot number and phase of fallowing cycle (up to 1981):-								
-	Plot 1	F	W	F	W	F	W	F	F	F
2 FALL 1	Plot 2	W	F	W	F	F	F	W	F	W
-	Plot 3	F	F	F	W	F	W	F	W	F
4 FALL 3	Plot 4	W	F	W	F	W	F	F	F	W
-	Plot 5	F	W	F	F	F	W	F	W	F
6 FALL 1	Plot 6	F	F	W	F	W	F	W	F	W
-	Plot 7	F	W	F	W	F	F	F	W	F
8 FALL 1	Plot 8	W	F	F	F	W	F	W	F	W

W = w. wheat, F = fallow.

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

Cultivations, etc.:-
Wheat plots: Ploughed, rotary harrowed, seed sown: 1 Oct, 1980. Combine harvested: 19 Aug, 1981.
Fallow plots: Ploughed: 1 Oct, 1980; 17 June, 1981; 16 July. Heavy spring-tine cultivated, and spring-tine cultivated: 18 Apr, 1981. Rotary harrowed: 15 May. Heavy spring-tine cultivated: 19 June. Spring-tine cultivated: 1 July, 20 July, 11 Aug.

GRAIN TONNES/HECTARE

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

PLOT	2 FALL 1	4 FALL 3	6 FALL 1	8 FALL 1	MEAN
	1.07	1.52	1.10	0.89	1.15

GRAIN MEAN DM% 82.8

STRAW TONNES/HECTARE

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

PLOT	2 FALL 1	4 FALL 3	6 FALL 1	8 FALL 1	MEAN
	0.76	1.04	0.83	0.62	0.81

STRAW MEAN DM% 91.2

PLOT AREA HARVESTED 0.01483

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81/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 126th year, s. barley.

For previous years see 'Details' 1967, 1973 and 74-80/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 fertiliser (kg N) (basal until 1975, on a cyclic system since 1976):

0
48
96
144

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

Basal applications: Weedkillers: Dicamba with 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, sown at 160 kg.

Cultivations, etc.:- Ploughed: 5 Dec, 1980. Spring-tine cultivated, seed sown: 18 Feb, 1981. N applied: 16 Apr. Weedkiller applied: 30 May. Combine harvested: 18 Aug.

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81/R/EX/4

GRAIN TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.82	1.29	1.03	1.64	1.19
2-	0.15	0.49	0.37	0.61	0.40
3D	3.58	3.75	4.16	3.46	3.74
4D	2.54	3.05	2.99	3.81	3.10
5N	0.87	1.21	0.70	1.07	0.96
6N*	0.20	0.49	1.24	0.30	0.56
7NMIN	2.44	3.06	3.26	2.83	2.90
8N*MIN	1.22	1.32	1.92	2.72	1.80
9P	2.66	4.37	3.42	3.47	3.48
10MIN	1.05	1.70	2.45	2.38	1.90
MEAN	1.55	2.07	2.15	2.23	2.00

GRAIN MEAN DM% 88.7

STRAW TONNES/HECTARE

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

N	0	48	96	144	MEAN
PLOTFERT(01)					
1-	0.29	0.44	0.29	0.66	0.42
2-	0.07	0.22	0.22	0.29	0.20
3D	0.65	1.99	2.27	1.91	1.71
4D	0.51	1.24	1.10	1.54	1.10
5N	0.22	0.44	0.29	0.29	0.31
6N*	0.00	0.15	0.22	0.15	0.13
7NMIN	0.51	1.25	1.55	1.47	1.20
8N*MIN	0.22	0.65	0.81	0.89	0.64
9P	0.59	1.68	1.83	1.77	1.47
10MIN	0.36	0.73	0.87	1.09	0.76
MEAN	0.34	0.88	0.94	1.01	0.79

STRAW MEAN DM% 92.1

SUB PLOT AREA HARVESTED 0.00728

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81/R/PG/5

PARK GRASS

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

The 126th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-80/R/PG/5.

Treatments:

Whole plots

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

N1, N2, N3:	48, 96, 144 kg N as sulphate of ammonia
N1*, N2*:	48, 96 kg N as nitrate of soda (30 kg N to Plot 20, 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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81/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: 12 Nov, 1980. FYM applied: 4 Dec. Remaining mineral fertilisers applied: 18 Dec. Sulphate of ammonia applied: 5 May, 1981. Nitrate of soda applied: 7 May. Cut: 10 June, 12 Nov.

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81/R/PG/5

1ST CUT (10/6/81) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	2.44	2.51	2.12	1.46	2.13
O(D)	2.54	2.70	2.48	1.75	2.37
O/PLOT3	1.95	2.55	1.37	1.47	1.83
P	2.59	3.20	2.47	2.42	2.67
N2P	3.41	3.78	3.80	3.34	3.58
N1MIN	5.70	5.73			5.71
MIN	5.03	5.14	2.93	2.27	3.85
PNAMG	2.63	2.66	2.66	2.59	2.64
N2MIN	5.68	5.48	4.68	4.37	5.05
N2PNAMG	3.48	3.32	3.62	3.05	3.37
N3MIN	5.02	4.64	5.09	3.75	4.63
N3MINSI	4.79	4.47	4.57	3.93	4.44
O/PLOT12	3.27	2.94	1.82	1.95	2.50
D/F	5.11	5.49	5.12	4.15	4.97
N2*MIN	4.86	5.04	5.29	5.14	5.09
MIN(N2*)	4.57	5.00	2.58	2.59	3.69
N1*MIN	5.16	4.90	4.27	3.97	4.57
N1*	2.91	3.12	3.06	1.70	2.70
N2KNAMG0			1.10	1.35	1.22
N2KNAMG2	2.36				2.36
N2KNAMG1	2.88	2.62			2.75
D0	4.75				4.75
D2	5.29				5.29
D1	4.73				4.73
D/N*PK0	4.36				4.36
D/N*PK2	5.07				5.07
D/N*PK1	4.92				4.92

1ST CUT MEAN DM% 20.7

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81/R/PG/5

2ND CUT (12/11/81) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	1.75	2.44	0.72	1.10	1.50
O(D)	2.08	2.55	1.95	1.85	2.11
O/PLOT3	1.83	2.34	1.13	1.50	1.70
P	2.39	2.56	1.86	1.73	2.13
N2P	1.73	1.97	1.37	1.71	1.69
N1MIN	2.99	2.80			2.89
MIN	3.08	3.31	2.09	1.56	2.51
PNAMG	1.82	1.85	1.95	1.86	1.87
N2MIN	2.82	3.25	1.71	1.57	2.34
N2PNAMG	1.83	1.90	1.41	1.24	1.59
N3MIN	3.05	2.55	2.23	2.66	2.62
N3MINSI	3.38	3.40	2.90	3.70	3.34
O/PLOT12	1.91	1.65	1.72	1.78	1.76
D/F	3.85	3.83	2.79	2.42	3.22
N2*MIN	2.21	2.95	2.94	2.70	2.70
MIN(N2*)	2.99	3.28	1.71	1.99	2.49
N1*MIN	2.73	2.94	2.85	2.40	2.73
N1*	2.15	2.42	3.11	2.20	2.47
N2KNAMG0			0.66	0.21	0.43
N2KNAMG2	2.34				2.34
N2KNAMG1	2.19	2.77			2.48
D0	3.28				3.28
D2	3.65				3.65
D1	3.23				3.23
D/N*PK0	3.15				3.15
D/N*PK2	3.32				3.32
D/N*PK1	2.92				2.92

2ND CUT MEAN DM% 31.7

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81/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 12th year of revised scheme, w. beans, w. wheat.

For previous years see 'Details' 1967 and 1973, and 74-80/R/AG/6.

Treatments: All combinations of:-

Whole plots

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

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

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

2. RN CROP — Rotation 1848-1951 and crop in 1981:

F/BEANS	With fallow: Roots (turnips or swedes), s. barley, fallow, w. wheat 1848-1951. W. beans (after w. wheat 1980)
L/WHEAT	With legume: Roots, s. barley, legume (clover or beans), w. wheat 1848-1951. W. wheat (after s. beans 1980)

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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81/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	4.19	4.96	2.84	2.57	3.64
0(D)	4.62	5.25	4.43	3.60	4.48
0/PLOT3	3.78	4.89	2.50	2.97	3.54
P	4.97	5.76	4.34	4.14	4.80
N2P	5.14	5.76	5.17	5.04	5.28
N1MIN	8.69	8.52			8.61
MIN	8.11	8.46	5.01	3.84	6.36
PNAMG	4.45	4.51	4.60	4.45	4.51
N2MIN	8.50	8.73	6.40	5.94	7.39
N2PNAMG	5.31	5.22	5.03	4.29	4.96
N3MIN	8.07	7.19	7.32	6.41	7.25
N3MINSI	8.17	7.87	7.47	7.63	7.79
0/PLOT12	5.18	4.59	3.54	3.73	4.26
D/F	8.96	9.32	7.91	6.57	8.19
N2*MIN	7.08	7.99	8.23	7.84	7.78
MIN(N2*)	7.56	8.28	4.29	4.58	6.18
N1*MIN	7.88	7.83	7.11	6.37	7.30
N1*	5.07	5.53	6.17	3.90	5.17
N2KNAMGO			1.76	1.56	1.66
N2KNAMG2	4.70				4.70
N2KNAMG1	5.06	5.39			5.23
DO	8.03				8.03
D2	8.94				8.94
D1	7.96				7.96
D/N*PKO	7.51				7.51
D/N*PK2	8.39				8.39
D/N*PK1	7.84				7.84

TOTAL OF 2 CUTS MEAN DM% 26.2

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81/R/AG/6

Sixteenth plots

5. P_2O_5 64 K_2O 64

Rates of 1964 treatments (kg):

P_2O_5 to P-test half plots	K_2O to K-test half plots
0	0
500	315
1000	630
2000	1260

Thirty second plots

6.

On P-test half plots:
To RN CROP F/BEANS. Residues of P_2O_5 applied 1970-72 (total, kg) and fresh dressings in 1979 and 1981 (total, 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/WHEAT. Residues of P_2O_5 applied 1970-72 (total, kg) and in 1980 (kg):

P_2O_5 720

(0)0
(375)150

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

K_2O 761

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

To RN CROP L/WHEAT. Residues of K_2O applied 1973-76 (total, kg) and in 1980 (kg):

K_2O 760

(0)0
(870)300

NOTE: (1) Chalk was applied at 5.0 t on 6 Oct, 1980 to all plots of OLDRESD NPKNAMGC and to two of the half plots of OLDRESD PKNAMG - those with 1964RESD P on w. beans and K on w. wheat.

Standard applications:
W. wheat: Manures: 'Nitro-Chalk' at 580 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop at 3.0 l and isoproturon at 2.1 kg in 250 l. Fungicides: Prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 250 l.

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W. beans: Weedkillers: Glyphosate at 1.5 kg in 900 l. Paraquat at 0.70 kg ion in 250 l. Trietazine at 1.2 kg with simazine at 0.17 kg in 250 l. Fungicide: Benomyl at 0.55 kg in 250 l applied twice, with the insecticide on the second occasion. Nematicide: Aldicarb at 4.0 kg, combine drilled. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat: Flanders, sown at 200 kg.
W. beans: Throws MS, sown at 180 kg.

Cultivations, etc.:-
W. wheat: Disc harrowed twice, seed sown: 8 Oct, 1980. Chlortoluron applied: 14 Oct. N applied: 10 Apr, 1981. Mecoprop and isoproturon applied: 21 Apr. Fungicides applied: 19 June. Combine harvested: 26 Aug.
W. beans: Glyphosate applied: 4 Sept, 1980. Paraquat applied: 26 Sept. Disc harrowed twice: 8 Oct. Seed sown: 1 Nov. Trietazine and simazine applied: 4 Nov. Fungicide applied: 27 Mar, 1981. Fungicide & insecticide applied: 12 June. Combine harvested: 1 Sept.

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81/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	2.18	2.72	3.14	2.15	2.36	1.55
	500	2.29	3.02	2.62	2.96	2.75	2.75
	1000	2.25	2.63	2.74	3.36	2.89	2.28
	2000	2.03	2.64	2.36	1.95	2.96	3.02
GRASS	0	2.04	2.72	1.95	2.35	2.49	2.69
	500	2.64	2.93	2.96	2.42	3.15	3.01
	1000	2.64	2.34	2.49	2.56	3.16	2.56
	2000	2.92	2.77	2.74	2.81	3.27	2.46

GRAIN MEAN DM% 85.7

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	1.80	2.19	3.17	2.41	2.28	2.56
	315	1.58	2.48	2.29	3.15	2.61	2.47
	630	2.42	3.03	3.22	2.48	2.76	2.29
	1260	2.42	2.18	2.62	3.48	3.02	2.29
GRASS	0	1.64	2.41	1.87	2.88	1.53	2.28
	315	1.96	2.71	2.08	2.55	1.67	2.62
	630	2.26	2.25	2.14	2.88	2.28	2.74
	1260	2.27	2.34	2.62	2.08	2.88	2.54

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED (OLDRESD NONE) 0.00150

PLOT AREA HARVESTED (REMAINDER) 0.00134

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81/R/AG/6

WHEAT P PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	P205 720	(0)0	(375)150	(0)0	(375)150	(0)0	(375)150
PREVCROP	P205 64						
ARABLE	0	6.52	7.11	5.75	6.46	4.57	3.66
	500	5.48	6.22	5.61	6.73	4.32	4.77
	1000	6.20	6.14	6.31	7.26	5.74	5.80
	2000	7.16	7.30	6.80	7.29	5.30	5.49
GRASS	0	4.67	7.06	4.76	6.93	1.64	4.14
	500	6.41	7.40	4.90	6.47	5.47	4.71
	1000	6.61	6.90	6.95	5.90	5.20	5.48
	2000	6.72	7.03	6.32	4.53	4.15	4.36

GRAIN MEAN DM% 84.6

SPRING WHEAT K PLOTS

GRAIN TONNES/HECTARE

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

	OLDRESD	NONE		PKNAMG		NPKNAMGC	
	K20 760	(0)0	(870)300	(0)0	(870)300	(0)0	(870)300
PREVCROP	K20 64						
ARABLE	0	6.57	7.51	5.90	6.10	5.25	5.68
	315	5.37	5.51	5.84	6.25	5.03	5.63
	630	6.44	6.44	5.87	6.13	4.84	5.60
	1260	6.77	6.89	6.39	6.94	5.31	5.86
GRASS	0	4.99	6.58	3.65	5.32	2.48	4.50
	315	6.12	7.59	4.69	6.41	4.09	5.16
	630	5.64	7.09	4.93	5.61	4.38	5.70
	1260	6.94	7.50	5.32	5.74	4.32	4.93

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED (OLDRESD NONE) 0.00128

PLOT AREA HARVESTED (REMAINDER) 0.00144

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81/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 seventh year of Italian ryegrass on the rest of the experiment.

For previous years see 'Details' 1967 & 1973 and 74-80/R/BN/7.

Plot dimensions: Ryegrass: 10.7 x 55.9.

Treatments to ryegrass: All combinations of:-

Whole plots

1. MANURE	Fertilisers and organic manures:
DN	D N
DNPK	D N P K
NPKMG	N P K (Na) Mg
NP	N P
NPK	N P K
NPMG	N P (Na) Mg
N	N

N: 100 kg N before first cut, 75 kg N after first cut. 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) Yields were taken only from half plots cropped with sugar beet in 1973.
(2) P K and D treatments were applied to Sections 1 and 2 (fallow) until 1980 but not since.

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81/R/BN/7

Cultivations, etc.:-
Ryegrass: P applied: 24 Nov, 1980. K applied: 25 Nov. N applied: 20 Mar, 1981. Cut: 1 June, 10 Nov. N applied: 5 June.
Fallow: Ploughed: 13 Nov, 1980. Heavy spring-tine cultivated: 17 Apr, 1981. Spring-tine cultivated: 18 Apr, 1 July. Rotary harrowed: 15 May, 16 June. Rotary cultivated: 20 July. Thistle bar cultivated: 12 Sept.

1ST CUT (1/6/81) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	6.14	5.70	5.37	4.93	5.53
DNPK	6.36	6.34	6.11	5.66	6.12
NPKMG	5.00	4.82	4.90	5.03	4.94
NP	3.87	2.79	2.73	3.13	3.13
NPK	5.48	5.07	5.36	5.04	5.24
NPMG	4.53	3.18	3.49	3.69	3.72
N	3.12	2.37	2.49	2.55	2.63
MEAN	4.93	4.32	4.35	4.29	4.47

MANURE NKMG 3.89

GRAND MEAN 4.45

1ST CUT MEAN DM% 22.6

2ND CUT (10/11/81) DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	2.93	3.04	3.12	3.18	3.07
DNPK	3.09	3.16	3.48	3.77	3.38
NPKMG	2.51	2.65	2.81	2.84	2.70
NP	1.69	1.70	1.99	1.87	1.81
NPK	2.38	2.65	3.13	1.98	2.54
NPMG	2.06	1.77	1.79	1.45	1.77
N	1.87	1.83	1.52	1.24	1.62
MEAN	2.36	2.40	2.55	2.33	2.41

MANURE NKMG 1.97

GRAND MEAN 2.40

2ND CUT MEAN DM% 36.7

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81/R/BN/7

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

NFORMRES MANURE	NS	SA	SA/CM	CM	MEAN
DN	9.07	8.74	8.49	8.11	8.60
DNPK	9.45	9.50	9.58	9.43	9.49
NPKMG	7.50	7.47	7.70	7.87	7.64
NP	5.56	4.49	4.72	5.00	4.94
NPK	7.86	7.72	8.49	7.02	7.77
NPMG	6.60	4.95	5.28	5.14	5.49
N	4.99	4.21	4.01	3.80	4.25
MEAN	7.29	6.73	6.89	6.62	6.88

MANURE NKMG 5.86

GRAND MEAN 6.85

TOTAL OF 2 CUTS MEAN DM% 29.6

SUB PLOT AREA HARVESTED 0.00568

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81/R/GC/8

GARDEN CLOVER

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

Sponsor: J. McEwen.

The 128th year, red clover.

For previous years see 'Details' 1967 & 1973, and 74-80/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 29 Sept, 1980; 30 Oct, 27 Nov, 29 Dec, and 28 Jan, 1981.

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: 8 Oct, 1980. N and aldicarb applied: 20 Mar, 1981. Cut and N applied: 1 June, 14 July, 18 Aug. Cut: 6 Oct.

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

1ST CUT (1/6/81) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	5.47	7.14	6.30

1ST CUT MEAN DM% 11.6

2ND CUT (14/7/81) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	5.11	5.04	5.08

2ND CUT MEAN DM% 13.7

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81/R/GC/8

3RD CUT (18/8/81) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	2.75	2.87	2.81

3RD CUT MEAN DM% 12.4

4TH CUT (6/10/81) DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	2.19	2.33	2.26

4TH CUT MEAN DM% 14.3

TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

FUNGCIDE	NONE	BENOMYL	MEAN
	15.52	17.38	16.45

TOTAL OF 4 CUTS MEAN DM% 13.0

PLOT AREA HARVESTED 0.0001O

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81/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 82nd year, grass, w. wheat.

For previous years see 'Details' 1967 & 1973, and 74-80/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 was ploughed in autumn 1980 and added to the arable rotation area. Remaining treatments to grass in 1981 were:

TREATMENT 1899-1965	OLDTREAT Grass 1966-79	NEWTREAT Grass 1966-81
	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 P205 as single superphosphate. Since 1966 50 kg P205 as triple superphosphate
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)

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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 divided into three for three phases of the four-course rotation w. barley, potatoes, beans, w. wheat. Whole plot treatments were continued as for NEWTREAT grass except w. beans were not given N and plots previously given farmyard manure received phosphate fertiliser. In 1981 all blocks and the new area ploughed from grass were sown to w. wheat. All combinations of the following were tested:

Whole plots

Blocks

1. PREVCROP Crops in 1980:

WHEAT
BARLEY
POTATOES
GRASS

2. MANURE

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

Symbols as above except N = 40 kg at sowing

Sub plots

3. N Nitrogen fertiliser (kg N) in spring:

80
120
160
200

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

Whole plots

1. MANURE (as for w. wheat 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 fertiliser (kg N) in spring:

80
120
160
200

Standard applications:
Both arable sections: Manures: N at 40 kg to seedbed, as 'Nitro-Chalk'. Weedkillers: Chlortoluron at 5.6 l in 220 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l, applied with the benomyl. Fungicides: Benomyl at 0.28 kg. Carbendazim with maneb and tridemorph (as 'Cosmic' at 3.9 kg), applied with captafol at 1.0 kg and the insecticide in 280 l. Carbendazim at 0.25 kg with maneb at 1.61 kg and captafol at 1.0 kg in 280 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat (arable section other than subsoiling test section): Virtue, sown at 375 seeds per square metre.
W. wheat (subsoiling test section): Avalon, sown at 375 seeds per square metre.

Cultivations, etc.:-
Grass section: P, K and bonemeal applied: 19 Feb, 1981. N applied: 14 Apr. Cut: 11 June, 6 Aug. N applied: 19 June.
Both arable sections: Ploughed: 19 Sept, 1980. 'Brittox' & benomyl applied: 7 Apr, 1981. N applied: 14 Apr. 'Cosmic', captafol & insecticide applied: 28 May. Carbendazim, maneb, captafol and insecticide applied: 9 July. Combine harvested: 21 Aug.
Arable section (other than subsoiling test section): Potato site cleared, P, K and bonemeal applied: 25 Sept, 1980. N applied, seed sown: 9 Oct. Chlortoluron applied: 10 Oct.
Subsoiling test section: N applied, seed sown: 29 Sept, 1980. Chlortoluron applied: 30 Sept.

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81/S/RN/1 GRASS

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

MANURE	1ST CUT(11/6/81)	2ND CUT(6/8/81)	TOTAL OF 2 CUTS
(D)N	6.33	4.62	10.95
BN	6.07	3.65	9.72
(N)P2N	6.34	3.82	10.16
(P)P1N	5.48	3.78	9.26
(K)P2KN	5.68	3.99	9.67
(-)P2N	5.76	3.82	9.58
(PK)P1KN	6.68	4.14	10.82
(NK)P2KN	6.76	3.96	10.72
(NP)P1N	5.89	3.80	9.69
(NPK)P1KN	6.69	4.17	10.86
MEAN	6.17	3.97	10.14
MEAN DM%	23.7	52.2	37.9

PLOT AREA HARVESTED 0.00095

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81/S/RN/1-2

WINTER WHEAT

GRAIN TONNES/HECTARE

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

PREVCROP MANURE	WHEAT	BARLEY	POTATOES	GRASS	MEAN
(D)P2N	9.19	8.70	9.67	7.80	8.84
BN N	8.98	8.15	8.76	6.23	8.03
(N)P2N	8.86	8.14	9.10	5.94	8.01
(P)P1N	8.99	8.57	8.81	6.47	8.21
(K)P2KN	9.20	8.42	9.74	8.28	8.91
(-)P2N	9.24	8.14	9.49	6.30	8.29
(PK)P1KN	9.20	8.20	9.38	8.10	8.72
(NK)P2KN	9.09	8.45	9.91	7.76	8.80
(NP)P1N	8.92	8.22	9.09	5.76	8.00
(NPK)P1KN	7.79	8.33	9.04	7.54	8.18
MEAN	8.95	8.33	9.30	7.02	8.40

N MANURE	80	120	160	200	MEAN
(D)P2N	8.67	8.59	8.90	9.19	8.84
BN N	7.85	7.97	8.06	8.23	8.03
(N)P2N	7.90	8.01	8.04	8.09	8.01
(P)P1N	7.84	8.52	7.90	8.59	8.21
(K)P2KN	8.47	8.87	9.12	9.17	8.91
(-)P2N	7.90	8.46	8.59	8.22	8.29
(PK)P1KN	8.19	8.70	9.23	8.77	8.72
(NK)P2KN	8.55	8.64	9.11	8.91	8.80
(NP)P1N	7.56	8.22	8.15	8.06	8.00
(NPK)P1KN	8.38	7.36	8.40	8.57	8.18
MEAN	8.13	8.33	8.55	8.58	8.40

N PREVCROP	80	120	160	200	MEAN
WHEAT	8.28	8.58	9.32	9.61	8.95
BARLEY	7.84	8.50	8.51	8.48	8.33
POTATOES	9.13	9.23	9.50	9.33	9.30
GRASS	7.28	7.02	6.87	6.91	7.02
MEAN	8.13	8.33	8.55	8.58	8.40

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81/S/RN/1-2

WINTER WHEAT

GRAIN TONNES/HECTARE

MANURE	PREVCROP \ N	80	120	160	200
(D)P2N	WHEAT	8.39	8.73	9.63	10.02
	BARLEY	8.97	8.83	8.25	8.74
	POTATOES	9.78	8.97	10.24	9.68
	GRASS	7.55	7.85	7.47	8.34
BN N	WHEAT	8.38	8.63	9.02	9.90
	BARLEY	7.26	8.60	8.56	8.17
	POTATOES	8.86	8.69	8.64	8.85
	GRASS	6.92	5.95	6.04	6.01
(N)P2N	WHEAT	8.01	8.36	9.31	9.78
	BARLEY	8.06	8.26	7.99	8.24
	POTATOES	8.55	9.58	9.28	8.98
	GRASS	6.98	5.85	5.56	5.38
(P)P1N	WHEAT	8.30	8.87	8.58	10.22
	BARLEY	7.82	9.48	8.93	8.07
	POTATOES	8.77	9.23	8.71	8.54
	GRASS	6.45	6.50	5.39	7.52
(K)P2KN	WHEAT	8.41	9.27	9.05	10.07
	BARLEY	7.50	8.45	8.95	8.76
	POTATOES	9.28	9.65	10.07	9.95
	GRASS	8.70	8.12	8.39	7.90
(-)P2N	WHEAT	8.27	9.36	9.68	9.65
	BARLEY	7.45	8.50	8.30	8.31
	POTATOES	9.14	9.63	9.65	9.56
	GRASS	6.74	6.35	6.75	5.36
(PK)P1KN	WHEAT	7.70	9.28	9.95	9.85
	BARLEY	7.49	7.90	8.70	8.71
	POTATOES	9.33	9.31	9.60	9.28
	GRASS	8.24	8.28	8.67	7.22
(NK)P2KN	WHEAT	8.73	8.82	9.61	9.22
	BARLEY	8.25	8.07	8.50	8.98
	POTATOES	9.29	9.78	10.79	9.78
	GRASS	7.93	7.89	7.54	7.67
(NP)P1N	WHEAT	7.91	9.11	9.43	9.25
	BARLEY	7.98	8.11	8.16	8.63
	POTATOES	9.02	9.53	8.95	8.84
	GRASS	5.33	6.12	6.07	5.51
(NPK)P1KN	WHEAT	8.67	5.40	9.00	8.11
	BARLEY	7.60	8.84	8.71	8.16
	POTATOES	9.31	7.91	9.10	9.85
	GRASS	7.93	7.30	6.80	8.15

GRAIN MEAN DM% 83.2

SUB PLOT AREA HARVESTED 0.00079

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81/S/RN/1-3

WINTER WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT MANURE	CNVNTIAL	SUBDUG	SUBDUG+F	MEAN
(D)P2N	10.28	10.14	10.33	10.25
BN N	9.32	9.70	9.86	9.63
(N)P2N	10.08	9.91	10.00	10.00
(P)P1N	9.97	9.71	10.20	9.96
(K)P2KN	9.62	9.38	9.37	9.46
(-)P2N	10.13	10.06	10.14	10.11
(PK)P1KN	9.77	9.69	9.75	9.74
(NK)P2KN	10.02	9.82	10.06	9.97
(NP)P1N	9.56	9.40	9.46	9.47
(NPK)P1KN	9.64	10.07	10.04	9.92
MEAN	9.84	9.79	9.92	9.85

N MANURE	80	120	160	200	MEAN
(D)P2N	9.48	10.00	10.53	10.98	10.25
BN N	8.64	9.67	10.41	9.79	9.63
(N)P2N	9.15	10.07	10.00	10.77	10.00
(P)P1N	8.94	9.59	10.35	10.98	9.96
(K)P2KN	8.80	8.79	9.63	10.61	9.46
(-)P2N	9.12	9.81	10.51	11.00	10.11
(PK)P1KN	8.48	9.60	10.25	10.63	9.74
(NK)P2KN	8.37	9.92	10.37	11.20	9.97
(NP)P1N	8.18	9.63	9.79	10.28	9.47
(NPK)P1KN	9.02	9.56	9.95	11.15	9.92
MEAN	8.82	9.66	10.18	10.74	9.85

N TREATMNT	80	120	160	200	MEAN
CNVNTIAL	8.92	9.82	10.06	10.56	9.84
SUBDUG	8.79	9.46	9.93	10.96	9.79
SUBDUG+F	8.74	9.71	10.54	10.70	9.92
MEAN	8.82	9.66	10.18	10.74	9.85

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81/S/RN/1-3

WINTER WHEAT

GRAIN TONNES/HECTARE

MANURE	N / TREATMNT	80	120	160	200
(D)P2N	CNVNTIAL	9.57	10.25	10.52	10.78
	SUBDUG	9.26	9.61	10.08	11.59
	SUBDUG+F	9.61	10.15	10.99	10.57
BN N	CNVNTIAL	8.61	9.81	10.47	8.39
	SUBDUG	8.72	9.50	10.08	10.50
	SUBDUG+F	8.59	9.71	10.67	10.49
(N)P2N	CNVNTIAL	9.70	10.15	9.61	10.87
	SUBDUG	9.31	9.75	9.50	11.06
	SUBDUG+F	8.43	10.30	10.89	10.38
(P)P1N	CNVNTIAL	9.21	9.45	9.96	11.26
	SUBDUG	8.14	9.51	10.37	10.83
	SUBDUG+F	9.46	9.80	10.71	10.84
(K)P2KN	CNVNTIAL	9.28	9.12	9.71	10.37
	SUBDUG	8.50	8.65	9.61	10.74
	SUBDUG+F	8.61	8.58	9.57	10.72
(-)P2N	CNVNTIAL	9.07	10.15	10.50	10.79
	SUBDUG	9.12	9.75	10.67	10.69
	SUBDUG+F	9.16	9.52	10.36	11.51
(PK)P1KN	CNVNTIAL	8.31	9.76	10.52	10.50
	SUBDUG	8.16	9.73	10.47	10.41
	SUBDUG+F	8.97	9.31	9.75	10.97
(NK)P2KN	CNVNTIAL	8.47	10.08	10.17	11.35
	SUBDUG	8.42	9.81	9.98	11.10
	SUBDUG+F	8.23	9.88	10.97	11.16
(NP)P1N	CNVNTIAL	8.00	10.25	9.90	10.08
	SUBDUG	8.99	8.63	8.81	11.17
	SUBDUG+F	7.55	10.02	10.67	9.59
(NPK)P1KN	CNVNTIAL	8.98	9.16	9.26	11.16
	SUBDUG	9.31	9.68	9.78	11.51
	SUBDUG+F	8.77	9.83	10.82	10.77

GRAIN MEAN DM% 84.4

SUB PLOT AREA HARVESTED 0.00082

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81/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.

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

The 12th year of revised scheme, w. wheat, w. beans.

For previous years see 'Details' 1967 & 1973, and 74-80/S/RN/2.

Whole plot dimensions: 5.49 x 39.8.

Treatments: From 1899-1964 the experiment tested farmyard manure and nitrogen and phosphate fertilisers applied to a rotation of crops. Since 1965 the treatments have been changed to evaluate old residues of P (from FYM and superphosphate) and new residues from treatments applied 1965-1967. All crops of the rotation - potatoes, 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 & 1981. Combinations of the following treatments are tested:

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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81/S/RN/2

W. wheat in 1981 tested in addition to 1:

Sub plots

2. P — Phosphate (total P2O5 applied in each period (kg)):

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

and some of the combinations of 2 with:-

3. N — Nitrogen fertiliser in spring (kg N) in addition to 40 kg N at sowing:

80
120
160
200

NOTES: (1) Yields were not taken for w. beans.
(2) 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.

Standard applications: All crops: K_2O at 150 kg as muriate of potash.
W. wheat: Manures: Weedkillers: Isoproturon at 2.5 l in 220 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l. Fungicides: Carbendazim with maneb and tridemorph (as 'Cosmic' at 3.9 kg) applied with captafol at 1.0 kg and with the insecticide in 280 l. Carbendazim at 0.25 kg with maneb at 1.6 kg and captafol at 1.0 kg applied with the insecticide in 280 l. Insecticide: Pirimicarb at 0.14 kg.
W. beans: Fungicide: Benomyl at 0.56 kg in 280 l.

Seed: W. wheat: Hustler, sown at 170 kg.
W. beans: Throws MS, sown at 180 kg.

Cultivations, etc.:-
Both crops: Muriate of potash applied: 27 Aug, 1980. Ploughed: 29 Aug.
W. wheat: Seed sown, isoproturon applied: 24 Sept, 1980. 'Brittox' applied: 7 Apr, 1981. Test N applied: 13 Apr. 'Cosmic', captafol and insecticide applied: 28 May. Carbendazim, maneb, captafol and insecticide applied: 9 July. Combine harvested: 21 Aug.
W. beans: Test P applied: 27 Aug, 1980. Seed sown: 9 Oct. Benomyl applied: 25 Mar, 1981. Combine harvested: 21 Aug.

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81/S/RN/2

WHEAT

GRAIN TONNES/HECTARE

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

RESIDUE	N P	80	120	160	200
(0)0	(0)(0)0			6.83	8.03
(0)0	(0)(3)0	7.85	7.26		
(0)0	(1)(3)1	7.13		8.48	
(0)0	(2)(3)1		8.19		8.32
(0)0	(3)(3)0		7.75		7.82
(D)0	(0)(0)0	7.49	8.29		
(D)0	(0)(3)0			8.19	8.13
(D)0	(1)(3)1		9.07		8.94
(D)0	(2)(3)1	8.13		8.81	
(D)0	(3)(3)0	7.92		8.86	
(DP)0	(0)(0)0			8.90	9.52
(DP)0	(0)(3)0	8.24	8.19		
(DP)0	(1)(3)1	8.22		8.97	
(DP)0	(2)(3)1		8.87		8.37
(DP)0	(3)(3)0		8.08		9.23
(DP)D2	(0)(0)0	8.20	8.62		
(DP)D2	(0)(3)0			9.37	10.02
(DP)D2	(1)(3)1	8.73		9.63	
(DP)D2	(2)(3)1		8.37		9.29
(DP)D2	(3)(3)0		8.73		8.73
(DP)D2P1	(0)(0)0			9.84	9.08
(DP)D2P1	(0)(3)0	8.92	9.97		
(DP)D2P1	(1)(3)1	9.23		9.71	
(DP)D2P1	(2)(3)1		8.42		10.41
(DP)D2P1	(3)(3)0		8.73		8.73
(DP)P1	(0)(0)0			10.07	9.23
(DP)P1	(0)(3)0	9.15	9.42		
(DP)P1	(1)(3)1		8.76		9.76
(DP)P1	(2)(3)1	8.45		8.96	
(DP)P1	(3)(3)0	8.73		8.73	
(DP)P2	(0)(0)0	8.52	8.06		
(DP)P2	(0)(3)0			8.68	9.10
(DP)P2	(1)(3)1		9.91		9.44
(DP)P2	(2)(3)1	8.36		10.18	
(DP)P2	(3)(3)0	8.73		8.73	
(DP52)0	(0)(0)0	8.45	8.22		
(DP52)0	(0)(3)0			9.29	9.39
(DP52)0	(1)(3)1		7.85		8.24
(DP52)0	(2)(3)1	7.95		9.40	
(DP52)0	(3)(3)0	8.01		9.67	

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00075

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81/R/RN/1 and 81/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 33rd year, old grass, leys, s. oats, potatoes, s. beans, s. barley, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-80/R/RN/1&2.

The experiment is duplicated on:-

HIGHFIELD — A site with much organic matter initially (ploughed out from permanent grass) (81/R/RN/1)

FOSTERS — A site with little organic matter initially (81/R/RN/2)

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

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

LU = lucerne, LC = clover-grass ley, no nitrogen fertiliser, LN = all-grass ley with much nitrogen fertiliser, H = 1-year seeds hay, SB = sugar beet, O = 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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81/R/RN/1 and 81/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 3rd test crop w. wheat in the museum blocks:-

Sub plots

FYMRES68 Farmyard manure residues, last applied 1968:

NONE None
FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertiliser in 1981 (kg N as 'Nitro-Chalk'):

0
50
100
150

Additional treatments to 1st & 2nd test crops w. wheat in the new sequence blocks:

Sub plots

N Nitrogen fertiliser in 1981 (kg N as 'Nitro-Chalk'):

0
50
100
150

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81/R/RN/1 and 81/R/RN/2

Standard applications:
- Museum blocks:
  - 3rd Treatment crops:
    - Lucerne: Manures: (0:14:28) at 810 kg.
    - All-grass ley and clover-grass ley: Manures: (0:14:28) at 540 kg.
    - All grass-ley only: Manures: (25:0:16) at 300 kg in spring and after each cut except the last.
    - Oats: Manures: (20:10:10) at 350 kg, combine drilled. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 250 l, applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.
  - 3rd Test crop:
    - Wheat: (0:20:20) at 250 kg, combine drilled. Weedkillers: Glyphosate at 1.5 l in 900 l. Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.
    - Reseeded grass and old grass: Manures: (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:
  - 2nd Treatment crops:
    - Lucerne: Manures: (0:14:28) at 720 kg.
    - Clover-grass ley and ryegrass: (0:14:28) at 720 kg. (25:0:16) at 300 kg in spring, and, to ryegrass only, after each cut except the last.
    - Potatoes: Manures: (10:10:15+4.5 Mg) at 1960 kg. Weedkiller: Metribuzin at 0.98 kg in 220 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times, with insecticide on the first five occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.
    - S. barley: Manures: (20:10:10) at 350 kg, combine drilled. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 250 l, applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.
  - 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.
    - S. beans: Weedkiller: Simazine at 1.2 kg in 250 l. Fungicide: Benomyl at 0.55 kg in 250 l, applied with the pirimicarb. Insecticides: Phorate at 2.2 kg, combine drilled. Pirimicarb at 0.14 kg.
    - W. wheat: Manures: (0:20:20) at 250 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.
  - 1st Test crops:
    - W. wheat:
    - After all sequences: Manures: (0:20:20) at 250 kg, combine drilled. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.
    - After GRASS/OG: Weedkillers: Glyphosate at 1.5 kg in 220 l.

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81/R/RN/1 and 81/R/RN/2

2nd Test crops:
W. wheat: Manures: (0:20:20) at 250 kg, combine drilled.
Weedkillers: Glyphosate at 1.5 kg in 900 l. Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed:
Museum blocks:
Oats: Peniarth, sown at 190 kg.
Wheat: Flanders, sown at 200 kg.
New sequence blocks:
Potatoes: Pentland Crown.
S. barley: Georgie, sown at 160 kg.
S. beans: Minden, sown at 260 kg.
W. wheat: Flanders, sown at 200 kg.

Cultivations, etc.:-
Museum blocks:
3rd Treatment crops:
Lucerne: PK applied: 20 Nov, 1980. Cut: 4 June, 1981, 10 Aug, 6 Nov.
All-grass ley and clover-grass ley: PK applied: 20 Nov, 1980. NK applied to all-grass half plots only: 27 Mar, 1981, 8 June, 10 Aug. Cut: 3 June, (Highfield only), 4 June (Fosters only), 5 Aug, 3 Nov.
Oats: Ploughed: 30 Dec, 1980. Spring-tine cultivated: 18 Feb, 1981. Seed sown: 19 Feb. Rolled: 10 Apr. Weedkiller applied: 12 May. Combine harvested: 18 Aug.
3rd Test crops:
Wheat: Glyphosate applied: 4 Sept, 1980. Ploughed: 2 Oct. Spring-tine cultivated twice: 3 Oct, 4 Oct. Seed sown: 8 Oct. Chlortoluron applied: 13 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 22 Apr. Combine harvested: 24 Aug (Fosters only), 25 Aug (Highfield only).
Reseeded grass and old grass: PK applied: 20 Nov, 1980. NK applied to all grass half-plots only: 27 Mar, 1981, 8 June, 10 Aug. Cut: 3 June (Highfield only), 4 June (Fosters only), 5 Aug, 10 Aug.
New sequence blocks:
2nd Treatment crops:
Lucerne: PK applied: 20 Nov, 1980. Cut: 4 June, 1981, 5 Aug (Fosters only), 7 Aug (Highfield only), 6 Nov.
Clover-grass ley and ryegrass: PK applied: 20 Nov, 1980. NK to ryegrass plots only: 27 Mar, 1981, 8 June, 10 Aug. Cut: 4 June, 5 Aug (Fosters only), 7 Aug (Highfield only), 6 Nov.

Potatoes: Ploughed: 20 Nov, 1980. NPK + Mg applied, spike rotary cultivated, planted: 24 Apr, 1981. Weedkiller applied: 1 June. Fungicide applied: 22 June, 1 July, 13 July, 27 July, 11 Aug and 24 Aug. Haulm mechanically destroyed: 12 Sept. Desiccant applied: 25 Sept. Lifted: 6 Oct.
S. barley: Ploughed: 20 Nov, 1980. Spring-tine cultivated: 18 Feb, 1981. Seed sown: 19 Feb. Weedkillers applied: 12 May. Combine harvested: 18 Aug.

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3rd Treatment crops:
Lucerne: PK applied: 20 Nov, 1981. Cut: 4 June, 1981, 5 Aug (Fosters only), 7 Aug (Highfield only).
Clover-grass ley and ryegrass: PK applied: 20 Nov, 1980. NK applied: 27 Mar, 1981. NK applied to ryegrass only plots: 8 June. Cut: 4 June, 5 Aug (Fosters only), 7 Aug (Highfield only).
S. beans: Chisel ploughed twice: 30 Dec, 1980. Spring-tine cultivated: 18 Feb, 1981. Seed sown: 19 Feb. Weedkiller applied: 9 Apr. Fungicide applied: 18 June. Combine harvested: 8 Sept.
W. wheat: Ploughed: 2 Oct, 1980. Spring-tine cultivated: 4 Oct. Seed sown: 8 Oct. Chlortoluron applied: 13 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 22 Apr. Combine harvested: 24 Aug (Fosters only), 25 Aug (Highfield only).

1st Test crops:
W. wheat:
After lucerne, clover-grass ley and ryegrass (except GRASS/OG): Ploughed: 4 Aug, 1980, (Fosters only), 5 Aug (Highfield only). Disc harrowed twice: 21 Aug, 12 Sept. Spring-tine cultivated twice: 2 Oct, 4 Oct. Seed sown: 8 Oct.
After GRASS/OG: Glyphosate applied: 7 Aug, 1980. Seed direct drilled, and disc harrowed in: 8 Oct.
After w. wheat and s. beans: Ploughed: 2 Oct. Spring-tine cultivated: 4 Oct. Seed sown: 8 Oct.
Subsequent operations to all sequences: Chlortoluron applied: 13 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 22 Apr. Combine harvested: 24 Aug (Fosters only), 25 Aug (Highfield only).

2nd Test crop:
W. wheat:
All sequences except GRASS/OG: Glyphosate applied: 4 Sept, 1980. Ploughed: 2 Oct (Fosters only), 3 Oct (Highfield only). Spring-tine cultivated: 4 Oct. Seed sown: 8 Oct.
GRASS/OG only: Glyphosate applied: 4 Sept. Seed direct drilled & harrowed in: 8 Oct.
Subsequent operations to all sequences: Chlortoluron applied: 13 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 22 Apr. Combine harvested: 24 Aug (Fosters only), 25 Aug (Highfield only).

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MUSEUM BLOCKS

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD	FOSTERS
CLOVER-GRASS LEY		
TOTAL OF 3 CUTS	6.03	7.16
MEAN DM%	22.9	22.5
ALL GRASS LEY		
TOTAL OF 3 CUTS	12.69	12.36
MEAN DM%	24.2	24.4
LUCERNE		
TOTAL OF 3 CUTS	11.6	12.2
MEAN DM%	20.9	20.4

OLD GRASS

TOTAL OF 3 CUTS

	HIGHFIELD	
	C	N
33RD EXPTL YEAR		
BLOCKS 1 & 4	5.71	10.83
BLOCK 2	4.60	11.45
MEAN DM%	23.0	20.8

RESEEDED GRASS

TOTAL OF 3 CUTS

	HIGHFIELD			FOSTERS		
	BLOCKS	C	N	BLOCKS	C	N
33RD EXPTL YEAR	1 & 4	5.85	11.45	1 & 3	7.58	12.34
33RD EXPTL YEAR (SEEDED 1949 RESEEDED 1973)	2 & 3	7.36	12.59	2 & 4	6.88	11.86
MEAN DM%		21.2	22.2		20.8	22.6

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81/R/RN/1

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	6.87	7.26	6.89	6.25	6.82
CLOGRA	4.93	5.78	5.77	5.83	5.58
GRASS/G	4.51	6.03	5.87	6.03	5.61
ARABLE/A	5.91	7.08	6.87	6.89	6.69
ARABLE/R	5.06	5.88	5.84	6.09	5.72
GRASS/OG	4.52	5.97	5.87	5.62	5.49
MEAN	5.30	6.33	6.18	6.12	5.98

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.288	0.151	0.431
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.370

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.288	4.8
BLOCK.WP.SP	18	0.370	6.2

GRAIN MEAN DM% 83.0

SUB PLOT AREA HARVESTED 0.00322

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WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	5.17	6.80	7.50	7.07	6.64
CLOGRA	5.73	7.00	7.14	7.35	6.81
GRASS/G	6.10	6.99	7.51	7.31	6.98
ARABLE/A	5.12	6.93	7.49	7.41	6.74
ARABLE/R	5.41	6.69	7.32	7.40	6.70
GRASS/OG	5.51	6.35	6.93	6.47	6.32
MEAN	5.51	6.80	7.31	7.17	6.70

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.382	0.133	0.474
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.325

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.382	5.7
BLOCK.WP.SP	18	0.325	4.9

GRAIN MEAN DM% 82.4

SUB PLOT AREA HARVESTED 0.00322

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WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES68					
NONE	5.64	6.53	6.38	5.89	6.11
FYM	5.79	6.69	6.68	5.77	6.23
MEAN	5.72	6.61	6.53	5.83	6.17

N	0	50	100	150	MEAN
FYMRES68					
NONE	4.32	6.52	6.83	6.78	6.11
FYM	5.03	6.48	6.79	6.64	6.23
MEAN	4.67	6.50	6.81	6.71	6.17

N	0	50	100	150	MEAN
ROTATION					
LUCERNE	4.39	5.84	6.71	5.94	5.72
CLOGRA	5.39	7.09	7.04	6.94	6.61
GRASS	5.43	6.96	6.62	7.11	6.53
ARABLE	3.48	6.09	6.88	6.86	5.83
MEAN	4.67	6.50	6.81	6.71	6.17

	N	0	50	100	150
FYMRES68	ROTATION				
NONE	LUCERNE	3.83	5.97	6.71	6.07
	CLOGRA	4.77	7.41	7.17	6.76
	GRASS	4.87	6.88	6.48	7.30
	ARABLE	3.80	5.80	6.98	7.00
FYM	LUCERNE	4.96	5.71	6.70	5.81
	CLOGRA	6.01	6.76	6.90	7.11
	GRASS	5.99	7.04	6.76	6.91
	ARABLE	3.17	6.39	6.79	6.72

GRAIN MEAN DM% 80.2

PLOT AREA HARVESTED 0.00663

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81/R/RN/2

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
SEQUENCE					
LUCERNE	8.52	8.48	8.58	8.77	8.59
CLOGRA	7.19	7.73	8.32	8.30	7.88
GRASS/G	5.92	7.01	7.72	8.28	7.23
ARABLE/A	5.68	7.47	7.56	8.69	7.35
ARABLE/R	5.42	6.55	7.07	7.39	6.61
MEAN	6.55	7.45	7.85	8.29	7.53

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.400	0.141	0.484
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.315

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.400	5.3
BLOCK.WP.SP	15	0.315	4.2

GRAIN MEAN DM% 79.5

SUB PLOT AREA HARVESTED 0.00322

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81/R/RN/2

WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N SEQUENCE	0	50	100	150	MEAN
LUCERNE	5.29	7.39	7.99	8.35	7.25
CLOGRA	5.76	7.85	8.00	8.75	7.59
GRASS/G	6.22	7.82	8.10	8.09	7.56
ARABLE/A	4.52	6.01	7.37	7.97	6.47
ARABLE/R	5.07	6.30	7.89	7.95	6.80
MEAN	5.37	7.07	7.87	8.22	7.13

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

TABLE	SEQUENCE	N	SEQUENCE N
SED	0.172	0.106	0.268
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEQUENCE			0.237

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.172	2.4
BLOCK.WP.SP	15	0.237	3.3

GRAIN MEAN DM% 79.0

SUB PLOT AREA HARVESTED 0.00322

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WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

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

ROTATION	LUCERNE	CLOGRA	GRASS	ARABLE	MEAN
FYMRES68					
NONE	6.56	7.01	7.02	6.29	6.72
FYM	6.67	7.07	7.12	6.34	6.80
MEAN	6.62	7.04	7.07	6.31	6.76

N	0	50	100	150	MEAN
FYMRES68					
NONE	4.91	6.77	7.41	7.78	6.72
FYM	4.96	6.59	7.64	8.00	6.80
MEAN	4.94	6.68	7.53	7.89	6.76

N	0	50	100	150	MEAN
ROTATION					
LUCERNE	5.21	6.41	7.29	7.55	6.62
CLOGRA	5.33	7.07	7.75	8.00	7.04
GRASS	5.20	6.88	7.92	8.28	7.07
ARABLE	4.00	6.38	7.14	7.74	6.31
MEAN	4.94	6.68	7.53	7.89	6.76

N	0	50	100	150
FYMRES68	ROTATION				
NONE	LUCERNE	4.97	6.46	7.11	7.68
	CLOGRA	5.47	7.09	7.77	7.71
	GRASS	4.71	7.47	7.65	8.26
	ARABLE	4.50	6.08	7.11	7.46
FYM	LUCERNE	5.46	6.35	7.47	7.42
	CLOGRA	5.20	7.06	7.74	8.29
	GRASS	5.68	6.30	8.19	8.29
	ARABLE	3.50	6.67	7.17	8.01

GRAIN MEAN DM% 78.3

PLOT AREA HARVESTED 0.00663

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81/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, G.A. Salt.

The 44th year, leys, s. barley, s. beans, w. wheat.

For previous years see 'Details' 1967 & 1973 and 74-80/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 (ALT) were changed to test eight-year leys:

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

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The new scheme started by sowing these new leys in spring 1976 on four phases and in spring 1977 on the fifth phase (2nd test crop in 1976). Initially some of the long term leys are ploughed up in less than eight years ALT LN 3, ALT LC 3, depending on the starting point in relation to the test crop, to ensure that ultimately eight-year leys will be available for each test crop period.

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. FYMRES65 — Farmyard manure residues, last applied 1965:

   NONE — None
   FYM — 38 tonnes on each occasion

1/8 plots

3. N — Nitrogen fertiliser (kg N):

   0
   63
   126
   189

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

whole plots

1. ROTATION — Rotations:

   ALT LN 3
   LN 3
   ALT LC 3
   LC 3
   AF
   AB

1/2 plots

2. FYMRES64 — Farmyard manure residues, last applied 1964:

   NONE — None
   FYM — 38 tonnes on each occasion

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1/8 plots

3. N Nitrogen fertiliser (kg N):

0
50
100
150

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	126	50
LC	113	113
AF	188	251
AB	276	301
Ex-alternating rotations		
LN 8 ploughed for w. wheat	251	251
LN 8 not ploughed	188	138
LC 8 ploughed for w. wheat	13	0
LC 8 not ploughed	126	25

Standard applications:-

Grass ley and clover/grass, 1st year: Manures: (0:14:28) at 540 kg. N at 75 kg as 'Nitro-Chalk' to grass ley only.

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 540 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 540 kg. K_2O at 48 kg in spring and 43 kg after the first cut.

S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. N at 40 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l applied with fungicide to 1st treatment crop. Dicamba with mecoprop and MCPA (as 'Herrisol' at 4.9 l) in 280 l applied with fungicide to 2nd treatment crop. Fungicide: Tridemorph at 0.53 kg.

S. beans, 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkiller: Simazine at 0.84 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l on two occasions.

W. wheat, 1st test crop: Manures: (0:20:20) at 310 kg. Weedkiller: Chlortoluron at 5.6 l in 300 l, mecoprop at 2.5 l with isoproturon at 2.5 l in 280 l. Fungicide: Triadimefon with captafol (as 'Bayleton CF' at 2 kg) in 280 l.

S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t. (0:20:20) at 300 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l with fungicide. Fungicide: Tridemorph at 0.53 kg.

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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: Flanders, sown at 200 kg.

Cultivations, etc.:- Treatment crops:
Grass ley and clover/grass ley, 1st year: Ploughed: 6 Nov, 1980. Spring-tine cultivated: 8 Apr, 1981. Rotary cultivated, PK applied, N applied to grass ley only: 7 May. Spring-tine cultivated with crumbler attached, seeds sown: 8 May. Topped: 29 June, 20 July. Cut: 26 Aug.
Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Corrective K applied to 4th year only: 3 Oct, 1980. Magnesian limestone applied to 5th year only: 24 Oct. PK applied: 3 Dec. NK applied to grass ley: 19 Mar, 1981, 24 June. K applied to clover/grass ley: 19 Mar, 26 June. Cut: 15 June, 26 Aug.
S. barley, 1st and 2nd treatment crops: Ploughed: 6 Nov, 1980. NPK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Rotary cultivated with crumbler attached, seed sown: 6 Apr. Weedkillers and fungicide applied 1st treatment crop: 15 May, 2nd treatment crop: 1 June. N applied: 3 June. Combine harvested: 17 Aug.
S. beans, 3rd treatment crop: Ploughed: 5 Nov, 1980. PK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Rotary cultivated with crumbler attached, seed sown: 6 Apr. Weedkiller applied: 7 Apr. Insecticide applied: 18 June, 27 July. Combine harvested: 3 Sept.
Fallow, 1st and 2nd treatment years: Ploughed: 6 Nov, 1980. Spring-tine cultivated: 8 Apr, 1981. Deep-tine cultivated: 21 Aug.
Test Crops:
W. wheat, 1st test crop: Ploughed: 12 Sept, 1980. Disced: 29 Sept. Spring-tine cultivated with crumbler attached: 30 Sept. Corrective K applied: 3 Oct. PK applied, aldicarb applied, harrowed: 6 Oct. Rotary cultivated, seed sown: 7 Oct. Chlortoluron applied: 8 Oct. N applied: 3 Apr, 1981. Mecoprop with isoproturon applied: 22 Apr. Fungicide applied: 20 June. Combine harvested: 19 Aug.
S. barley, 2nd test crop: Magnesian limestone applied: 24 Oct, 1980. Ploughed: 6 Nov. PK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Aldicarb applied, rotary cultivated with crumbler attached, seed sown: 6 Apr. N applied: 14 Apr. Weedkiller and fungicide applied: 15 May. Combine harvested: 17 Aug.

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81/W/RN/3

BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

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

N	0	50	100	150	MEAN
FYMRES64					
NONE	3.69	5.83	7.09	6.80	5.85
FYM	3.77	6.25	7.06	6.93	6.00
MEAN	3.73	6.04	7.07	6.86	5.93

ROTATION	ALT LN 3	LN 3	ALT LC 3	LC 3	AF	AB	MEAN
FYMRES64							
NONE	6.42	6.38	6.96	6.56	4.42	4.38	5.85
FYM	6.98	6.90	6.92	6.51	4.12	4.59	6.00
MEAN	6.70	6.64	6.94	6.53	4.27	4.48	5.93

ROTATION	ALT LN 3	LN 3	ALT LC 3	LC 3	AF	AB	MEAN
N							
0	4.42	5.12	5.08	4.51	1.65	1.59	3.73
50	7.02	7.10	7.02	6.77	3.79	4.54	6.04
100	7.46	8.00	7.89	7.78	5.64	5.67	7.07
150	7.87	6.33	7.78	7.07	5.99	6.13	6.86
MEAN	6.70	6.64	6.94	6.53	4.27	4.48	5.93

	ROTATION	ALT LN 3	LN 3	ALT LC 3	LC 3	AF	AB
FYMRES64	N						
NONE	0	3.78	5.03	5.13	4.78	1.86	1.53
	50	6.68	7.04	6.76	6.76	3.74	4.00
	100	7.59	7.98	8.25	7.50	5.78	5.47
	150	7.62	5.46	7.71	7.20	6.28	6.51
FYM	0	5.07	5.22	5.02	4.24	1.44	1.65
	50	7.37	7.16	7.28	6.78	3.84	5.08
	100	7.34	8.01	7.54	8.07	5.51	5.87
	150	8.12	7.20	7.86	6.93	5.70	5.75

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00251

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81/W/RN/3

WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

N	0	63	126	189	MEAN
FYMRES65					
NONE	4.58	6.91	7.69	7.41	6.65
FYM	5.17	6.91	7.95	7.79	6.96
MEAN	4.88	6.91	7.82	7.60	6.80

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
FYMRES65							
NONE	6.60	7.31	7.49	6.76	5.85	5.89	6.65
FYM	6.95	7.12	7.49	6.87	6.54	6.76	6.96
MEAN	6.78	7.21	7.49	6.82	6.19	6.32	6.80

ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB	MEAN
N							
0	4.71	5.82	6.47	5.35	3.06	3.84	4.88
63	6.52	7.52	7.84	6.70	6.32	6.59	6.91
126	8.03	8.12	7.98	7.69	7.61	7.49	7.82
189	7.83	7.40	7.68	7.53	7.78	7.39	7.60
MEAN	6.78	7.21	7.49	6.82	6.19	6.32	6.80

	ROTATION	LN 8	LN 3	LC 8	LC 3	AF	AB
FYMRES65	N						
NONE	0	4.05	5.82	6.23	5.38	2.78	3.24
	63	6.66	7.69	7.75	6.71	6.24	6.42
	126	7.94	8.16	8.31	7.28	7.16	7.30
	189	7.75	7.55	7.68	7.68	7.20	6.61
FYM	0	5.38	5.82	6.71	5.32	3.35	4.43
	63	6.39	7.34	7.92	6.68	6.40	6.75
	126	8.13	8.07	7.66	8.11	8.05	7.68
	189	7.92	7.26	7.68	7.38	8.37	8.16

GRAIN MEAN DM% 83.1

PLOT AREA HARVESTED 0.00260

https://doi.org/10.23637/ERADOC-1-35 *pp 65*

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81/R/RN/5

ARABLE REFERENCE PLOTS

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

Sponsor: F.V. Widdowson.

The 26th 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 25th 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 69-80/R/RN/5.

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

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilisers and farmyard manure:

MANURE

Original plots

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

N1, 2 (kg N): 20, 40 (ley): 80, 160 (w. barley, w. wheat and w. oats): 125, 250 (potatoes and permanent grass) as 'Nitro-Chalk'
P: 63 kg P_2O_5 as superphosphate
K: 250 kg K_2O as muriate of potash
D: 38 tonnes FYM (permanent grass): 100 tonnes (to potatoes only - 50 tonnes to potatoes and kale until 1980): none to other crops

NOTE: Since 1977 all w. wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts. Before 1976 potatoes tested 0 v 82 kg MgO on sub plots, dressing balanced-up after harvest before w. wheat.

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Additional plots

MANURE	Fertilisers in 1980, 1981 and in previous years:
1980-81	Until 1979
0	0
N2PK	N2 PK
N2PKMG	N2 PK MG CA
N2PKS	N2 PK CA S
N2PKMGS	N2 PK MG S
N1PKMGS	N2 PK CA MG S
N3PKMGS	N2 PK CA MG S TE

N: In 1980 & 1981: N1: 20 kg (ley), 80 kg (w. wheat, w. barley & w. oats), 160 kg (potatoes). N2: 30 kg (ley), 120 kg (w. wheat, w. barley & w. oats), 240 kg (potatoes). N3: 40 kg (ley), 160 kg (w. wheat, w. barley & 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 P_2O_5 as potassium dihydrogen phosphate

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

MG: 126 kg MgO as magnesium chloride

CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given CA received calcium carbonate at 7.5 t, except 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 & Fe.

NOTES: (1) For all rates of N to w. oats 40 kg N of the total dressing was applied to the seedbed, the remainder in April.
(2) For all rates of N to w. wheat and w. barley 40 kg N of the total dressing was applied in March to wheat, in February to barley, the remainder in April.
(3) N dressings to potatoes were divided equally between seedbed and June.

Standard applications:
Original plots only: Manures: Chalk at 3.8 t.
Original and additional plots:
All cereals: Weedkillers: Ioxynil at 0.32 kg with mecoprop at 0.95 kg on the first occasion, ioxynil at 0.42 kg with mecoprop at 1.26 kg on the second occasion, applied in 280 l with the tridemorph on both occasions. Fungicides: Tridemorph at 0.53 kg. Benomyl at 0.28 kg in 280 l.
W. barley: Additional fungicides: Tridemorph at 0.53 kg with benodanil at 1.1 kg in 280 l. Insecticide (additional plots only): Dimethoate at 0.67 l in 280 l.
W. wheat: Additional fungicides: Carbendazim with maneb and tridemorph (as 'Cosmic' at 3.9 kg) plus captafol at 1.1 l in 280 l. Carbendazim at 0.28 kg with zineb at 1.8 kg and captafol at 1.1 l in 280 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

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Potatoes: Weedkillers: Linuron at 0.93 l with paraquat at 0.28 kg ion in 280 l. Fungicides: Mancozeb at 1.3 kg in 280 l applied three times, with insecticide on the first occasion. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. barley: Igri, sown at 200 kg.
Grass-clover ley: RVP Italian ryegrass and Hungarapoly red clover.
Potatoes: Maris Piper.
W. wheat: Virtue, sown at 200 kg.
W. oats: Pennal, sown at 200 kg.

Cultivations, etc.:-
W. barley: Chalk applied to original plots only: 23 Sept, 1980. Dug by hand: 8 Sept (additional plots), 30 Sept (original plots). Minerals applied, raked in, seed sown: 18 Sept (additional plots), 1 Oct (original plots). Dimethoate applied (additional plots): 23 Oct. Weedkillers and tridemorph applied: 24 Nov. First part N applied to additional plots: 3 Feb, 1981. Benomyl applied: 11 Feb. Weedkillers and tridemorph applied: 26 Mar. Remaining N applied: 9 Apr. Benodanil and tridemorph applied: 13 May. Harvested by hand: 27 July.

Grass-clover ley: Harrowed, seed sown: 18 Aug, 1980. Chalk applied to original plots, minerals applied to all plots: 15 Oct. N applied: 17 Mar, 1981. Cut: 27 May, 13 July, 9 Sept.
Potatoes: Chalk applied to original plots: 15 Oct, 1980. FYM applied to original plots, minerals applied, plots dug by hand: 22 Oct. N applied (first half on additional plots), rotary cultivated, raked, potatoes planted, and ridged by hand: 1 May, 1981. Weedkillers applied: 21 May. Second half N applied to additional plots: 3 June. Fungicide and insecticide applied: 25 June. Fungicide applied: 30 July, 17 Aug. Plots given neither K nor FYM harvested by hand: 17 Aug. Remaining plots harvested by hand: 16 Sept.
W. wheat: Chalk applied to original plots, minerals applied, dug by hand: 22 Sept, 1980. Raked by hand, seed sown: 26 Sept. Weedkillers and tridemorph applied: 24 Nov. Benomyl applied: 11 Feb, 1981. First part N applied to additional plots: 17 Mar. Weedkillers and tridemorph applied: 26 Mar. Remaining N applied: 16 Apr. 'Cosmic' and captafol applied: 29 May. Carbendazim, zineb and captafol applied: 29 June. Harvested by hand: 13 Aug.
W. oats: Dug by hand: 10 Sept, 1980. Chalk applied to original plots: 17 Sept. Minerals applied, first part N applied to additional plots, seed sown: 18 Sept. Weedkillers and tridemorph applied: 24 Nov. Benomyl applied: 11 Feb, 1981. Weedkillers and tridemorph applied: 26 Mar. Remaining N applied: 16 Apr. Harvested by hand: 30 July.
Permanent grass: Chalk and minerals applied: 15 Oct, 1980. FYM applied: 3 Feb, 1981. N applied: 17 Mar, 27 May, 13 July. Cut: 27 May, 13 July, 9 Aug, 28 Oct.

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81/R/RN/5

GREAT FIELD IV (R):ORIGINAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT:		BARLEY:		LEY : DRY MATTER			
	GRAIN	STRAW	GRAIN	STRAW	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE								
0	4.26	3.99	2.86	2.15	2.13	2.53	3.07	7.73
N1	2.77	3.82	3.56	3.91	3.06	2.57	2.51	8.15
P	5.49	5.32	2.31	2.16	1.88	1.68	1.86	5.43
N1P	1.94	2.69	1.22	2.83	2.90	1.27	1.00	5.17
K	5.57	5.05	3.33	2.88	2.44	2.68	3.21	8.33
N1K	6.90	6.68	5.71	4.35	3.49	2.75	3.39	9.63
PK	5.85	5.57	3.91	3.52	3.48	4.52	4.88	12.88
N1PK	8.84	7.85	7.55	6.83	4.25	3.56	4.59	12.40
N2PK	9.24	9.22	7.05	8.23	4.95	3.08	3.87	11.89
D	7.43	7.08	4.98	4.47	3.88	3.57	4.68	12.13
N1PKD	9.79	9.80	7.13	8.94	5.57	3.59	5.28	14.43
N2PKD	9.72	11.37	6.15	8.17	6.22	3.47	4.28	13.96
MEAN DM%	80.5	58.3	79.4	65.8	20.8	23.1	20.0	21.6

	OATS:		POTATOES: TOTAL TUBERS	PERMANENT GRASS : DRY MATTER				
	GRAIN	STRAW		1ST CUT	2ND CUT	3RD CUT	4TH CUT	TOTAL OF 4 CUTS
MANURE								
0	3.53	4.95	8.5	1.18	0.93	0.56	0.15	2.82
N1	6.77	7.46	13.5	2.44	1.38	1.26	0.60	5.68
P	3.78	6.11	20.8	1.23	0.95	0.55	0.10	2.84
N1P	6.84	8.52	11.9	2.76	1.45	1.31	0.52	6.05
K	3.70	5.66	27.3	1.16	0.88	0.77	0.24	3.05
N1K	6.20	8.58	37.5	2.77	1.99	1.66	0.43	6.85
PK	4.42	6.84	42.3	1.47	1.17	0.83	0.34	3.82
N1PK	6.88	10.95	50.4	3.90	1.92	1.71	0.44	7.97
N2PK	6.49	12.41	57.3	5.49	2.55	2.83	0.76	11.64
D	5.43	8.77	52.3	6.26	1.99	1.56	0.78	10.59
N1PKD	6.74	11.71	60.7	6.24	2.93	2.80	0.80	12.77
N2PKD	7.05	12.95	66.5	5.75	3.59	2.90	1.03	13.27
MEAN DM%	79.3	54.3		21.0	29.4	34.1	24.4	27.2

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81/R/RN/5

GREAT FIELD IV (R): ADDITIONAL PLOTS

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

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	BARLEY: GRAIN	BARLEY: STRAW	OATS: GRAIN	OATS: STRAW	POTATOES: TOTAL TUBERS
MANURES							
0	3.62	4.15	2.25	2.21	4.84	5.62	8.3
N2PK	6.93	7.91	6.62	7.71	6.42	14.94	58.8
N2PKMG	8.90	9.22	5.99	6.89	7.74	11.95	53.8
N2PKS	8.52	8.98	6.66	7.18	7.31	12.90	45.0
N2PKMGS	7.49	8.18	4.84	5.65	6.54	14.65	59.2
N1PKMGS	8.76	9.58	5.90	5.94	6.49	11.14	53.4
N3PKMGS	7.20	8.18	6.95	8.79	5.87	13.26	60.4
MEAN DM%	80.8	63.4	84.0	82.7	82.3	64.8	

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURES				
0	2.52	2.20	2.34	7.07
N2PK	5.65	3.14	3.21	12.00
N2PKMG	5.17	4.12	4.83	14.12
N2PKS	5.17	4.22	4.65	14.04
N2PKMGS	5.40	4.01	4.54	13.95
N1PKMGS	5.04	3.42	3.78	12.23
N3PKMGS	5.12	3.82	4.13	13.07
MEAN DM%	20.6	22.8	21.7	21.4

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81/W/RN/6

ARABLE REFERENCE PLOTS

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

Sponsor: F.V. Widdowson.

The 22nd year, w. barley, w. oats.

For previous years see 60/B/3(t), 61-65/B/2, 66/B/2(t), 67/B/2(t), 68/B/3(t), 69/W/RN/6, 70/W/RN/6(t) and 71-80/W/RN/6.

Design: Blocks of 12 plots for each crop. Barley and oats one third replicate of 3 x 12 x 3 in 3 blocks of 12 plots.

Whole plot dimensions: 2.74 x 2.13.

Treatments: All combinations of:-

Blocks

1. CROP — Crops in 1981 and previous crops:

   W. oats after w. barley in 1980:

   - OW(OW) — After w. oats in 1979 (arable since 1960)
   - OW(BS) — After s. barley in 1979 (arable since 1960)
   - OW(BS G) — After s. barley in 1979 (grass 1960-73, arable thereafter)

   W. barley after w. oats in 1980:

   - BW(P) — After potatoes in 1979
   - BW(SB) — After sugar beet in 1979
   - BW(L) — After one-year ley in 1979

Plots

2. MANURE(79) — Fertilisers and farmyard manure (until 1979, none in 1980 & 1981):

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

N1,2 (kg N): 31.5, 63 (ley): 63, 126 (s. barley and w. oats): 126, 252 (sugar beet and potatoes): 188, 376 (permanent grass) as ammonium nitrate.
P: P2O5 at 63 kg as triple superphosphate.

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K: K20 at 252 kg as potassium bicarbonate.
D: Farmyard manure at 25 tonnes (permanent grass): 50 tonnes (sugar beet and potatoes): none to other crops.

and some of the combinations of 1 & 2 with:

3.	N 81	Nitrogen fertiliser (kg N) (cumulative to 1980):
	90	25 kg N to seedbed, 30 kg N in March, 35 kg N in April
	120	25 kg N to seedbed, 40 kg N in March, 55 kg N in April
	150	25 kg N to seedbed, 50 kg N in March, 75 kg N in April

NOTE: The block in permanent grass was discontinued in 1981.

Standard applications:
Both crops: Weedkillers: Ioxynil at 0.32 kg and mecoprop at 0.94 kg in 280 l, ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l, on both occasions with tridemorph. Fungicides: Tridemorph at 0.53 kg, benomyl at 0.28 kg in 280 l.
W. oats: Insecticides: Phorate at 2 kg as granules, pirimicarb at 0.14 kg in 280 l. Fungicides: Carbendazim, tridemorph and maneb (as 'Cosmic' at 3.9 kg) with the pirimicarb.
W. barley: Fungicides: Benodanil at 1.1 kg with tridemorph at 0.53 kg in 280 l.

Seed: W. oats: Pennal, sown at 210 kg.
W. barley: Igri, dressed with ethirimol, sown at 190 kg.

Cultivations, etc.:-
W. oats and w. barley: Rotary cultivated: 15 Sept, 1980. Weedkillers and tridemorph applied: 25 Nov, 26 Mar, 1981. Second N applied: 18 Mar. Benomyl applied: 26 Mar. Third N applied: 24 Apr.
W. barley only: First N applied, seed sown: 15 Sept, 1980. Benodanil with tridemorph applied: 13 May, 1981. Harvested: 21 July.
W. oats: First N applied, phorate applied, raked in, seed sown: 2 Oct, 1980. 'Cosmic' and pirimicarb applied: 1 June, 1981. Harvested: 11 Aug.

NOTE: N, P and K contents of grain were measured.

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81/W/RN/6

WINTER BARLEY

GRAIN TONNES/HECTARE

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

CROP MANURE(79)	BW(P)	BW(SB)	BW(L)	MEAN
0	3.76	4.45	3.37	3.86
N1	3.24	3.25	2.20	2.90
P	2.85	4.33	1.33	2.84
N1P	1.57	3.65	1.51	2.25
K	6.86	6.13	5.98	6.32
N1K	7.16	6.00	5.40	6.19
PK	6.91	6.20	6.43	6.51
N1PK	6.75	6.12	6.35	6.41
N2PK	5.54	7.25	5.60	6.13
D	6.11	7.07	6.12	6.43
N1PKD	5.92	6.69	4.98	5.86
N2PKD	6.23	5.99	5.17	5.80
MEAN	5.24	5.59	4.54	5.12

N 81 MANURE(79)	90	120	150	MEAN
0	4.45	3.76	3.37	3.86
N1	2.20	3.25	3.24	2.90
P	4.33	2.85	1.33	2.84
N1P	1.51	3.65	1.57	2.25
K	6.13	6.86	5.98	6.32
N1K	5.40	6.00	7.16	6.19
PK	6.20	6.91	6.43	6.51
N1PK	6.35	6.12	6.75	6.41
N2PK	5.54	5.60	7.25	6.13
D	6.11	6.12	7.07	6.43
N1PKD	5.92	4.98	6.69	5.86
N2PKD	6.23	5.17	5.99	5.80
MEAN	5.03	5.11	5.24	5.12

GRAIN MEAN DM% 83.4

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81/W/RN/6

WINTER BARLEY

STRAW TONNES/HECTARE

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

CROP MANURE(79)	BW(P)	BW(SB)	BW(L)	MEAN
0	5.04	5.01	5.33	5.13
N1	4.40	4.48	3.72	4.20
P	6.19	5.40	3.92	5.17
N1P	5.20	4.92	2.68	4.27
K	7.69	6.21	8.13	7.35
N1K	7.81	7.39	6.66	7.29
PK	8.20	6.95	8.87	8.01
N1PK	9.08	7.62	7.63	8.11
N2PK	6.53	8.46	7.90	7.63
D	7.23	8.57	8.26	8.02
N1PKD	7.49	9.44	7.28	8.07
N2PKD	7.77	9.38	6.88	8.01
MEAN	6.89	6.99	6.44	6.77

N 81 MANURE(79)	90	120	150	MEAN
0	5.01	5.04	5.33	5.13
N1	3.72	4.48	4.40	4.20
P	5.40	6.19	3.92	5.17
N1P	2.68	4.92	5.20	4.27
K	6.21	7.69	8.13	7.35
N1K	6.66	7.39	7.81	7.29
PK	6.95	8.20	8.87	8.01
N1PK	7.63	7.62	9.08	8.11
N2PK	6.53	7.90	8.46	7.63
D	7.23	8.26	8.57	8.02
N1PKD	7.49	7.28	9.44	8.07
N2PKD	7.77	6.88	9.38	8.01
MEAN	6.11	6.82	7.38	6.77

STRAW MEAN DM% 72.1

PLOT AREA HARVESTED 0.00050

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81/W/RN/6

WINTER OATS

GRAIN TONNES/HECTARE

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

CROP	OW(OW)	OW(BS)	OW(BS G)	MEAN
MANURE(79)				
0	4.57	2.86	3.90	3.78
N1	3.06	3.24	3.94	3.41
P	4.42	2.56	2.69	3.23
N1P	2.29	3.36	4.07	3.24
K	4.68	4.31	5.85	4.95
N1K	4.25	4.58	4.73	4.52
PK	5.29	5.19	5.15	5.21
N1PK	3.53	4.71	4.19	4.14
N2PK	5.70	3.95	5.56	5.07
D	5.59	4.83	5.72	5.38
N1PKD	5.46	3.64	5.35	4.82
N2PKD	5.44	4.41	4.43	4.76
MEAN	4.52	3.97	4.63	4.38

N 81	90	120	150	MEAN
MANURE(79)				
0	2.86	4.57	3.90	3.78
N1	3.94	3.24	3.06	3.41
P	2.56	4.42	2.69	3.23
N1P	4.07	3.36	2.29	3.24
K	4.31	4.68	5.85	4.95
N1K	4.73	4.58	4.25	4.52
PK	5.19	5.29	5.15	5.21
N1PK	4.19	4.71	3.53	4.14
N2PK	5.70	5.56	3.95	5.07
D	5.59	5.72	4.83	5.38
N1PKD	5.46	5.35	3.64	4.82
N2PKD	5.44	4.43	4.41	4.76
MEAN	4.50	4.66	3.96	4.38

GRAIN MEAN DM% 83.6

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81/W/RN/6

WINTER OATS

STRAW TONNES/HECTARE

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

CROP MANURE(79)	OW(OW)	OW(BS)	OW(BS G)	MEAN
0	5.94	2.96	5.91	4.94
N1	5.37	3.23	4.33	4.31
P	6.63	3.28	4.82	4.91
N1P	5.24	4.55	4.77	4.86
K	8.65	5.09	9.50	7.75
N1K	7.65	6.60	5.92	6.72
PK	8.57	7.43	9.66	8.56
N1PK	9.06	7.27	6.83	7.72
N2PK	8.97	6.70	7.99	7.89
D	8.30	10.51	11.38	10.06
N1PKD	8.68	8.49	11.37	9.52
N2PKD	8.88	9.33	10.17	9.46
MEAN	7.66	6.29	7.72	7.22

N 81 MANURE(79)	90	120	150	MEAN
0	2.96	5.94	5.91	4.94
N1	4.33	3.23	5.37	4.31
P	3.28	6.63	4.82	4.91
N1P	4.77	4.55	5.24	4.86
K	5.09	8.65	9.50	7.75
N1K	5.92	6.60	7.65	6.72
PK	7.43	8.57	9.66	8.56
N1PK	6.83	7.27	9.06	7.72
N2PK	8.97	7.99	6.70	7.89
D	8.30	11.38	10.51	10.06
N1PKD	8.68	11.37	8.49	9.52
N2PKD	8.88	10.17	9.33	9.46
MEAN	6.29	7.70	7.69	7.22

STRAW MEAN DM% 68.5

PLOT AREA HARVESTED 0.00050

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81/R/RN/7

RESIDUAL PHOSPHATE

Object: Originally to study the fresh and residual effects of phosphate fertiliser on the yields of three arable crops grown in rotation. From 1974 the effects on ley and on yield and pathogens of continuous w. wheat were studied. Since 1980 only ley has been included - Great Field IV and Sawyers I.

Sponsors: G.E.G. Mattingly.

The 22nd year, ley.

For previous years see 'Details' 1967 and 1973 and 74-80/R/RN/7.

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

Whole plot dimensions:
Great Field IV: 4.27 x 18.3
Sawyers I: 4.27 x 20.1

Treatments:

P205	Rates and frequency of applying phosphate:-
NONE	0
	Annual dressings, kg P205:
29 ANN	29
57 ANN	57
115 ANN	115
172 ANN	172
	Triennial dressings, kg P205 (last applied 1978):
86 TRI	86
172 TRI	172
	Six-yearly dressings, kg P205 (last applied 1973):
344 SIX	344
688 SIX	688
1032 SIX	1032
	Single dressing, kg P205 (applied autumn 1959):
376 G(1)	376 as Gafsa rock phosphate
376 S(1)	376 as granular superphosphate

NOTES: (1) From 1974 the original rotation of potatoes, s. barley, swedes on both fields was changed. Blocks after barley were sown to w.wheat on Sawyers I, to ley on Great Field IV. In 1978 & 1979 one series was sown to ley each year on Sawyers I. In 1980 & 1981 the remaining series on Sawyers I was fallowed.

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(2) Since 1960 all phosphate has been applied as superphosphate.
(3) The six-yearly dressings were applied half in autumn before ploughing, half in spring.

Standard application:
Leys: Manures: K_2O at 250 kg as muriate of potash.

Cultivations, etc.:-
All Leys: K applied: 24 Nov, 1980.
Leys (Gt. Field IV only): Test P applied: 13 Feb. Cut: 1 June, 5 Aug, 4 Nov.
Leys (Sawyers I only): Test P applied: 25 Feb, 1981. Cut: 2 June, 7 Aug, 4 Nov.
Fallow: Ploughed: 8 Dec, 1980. Rotary cultivated: 16 June, 1981. Spring-tine cultivated: 1 July.

GT. FIELD IV

SERIES I LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (1/6/81)	CUT 2 (5/8/81)	CUT 3 (4/11/81)	TOTAL OF 3 CUTS
P205				
NONE	2.42	2.27	0.80	5.49
29 ANN	3.83	2.12	1.05	7.00
57 ANN	4.30	2.17	1.09	7.56
115 ANN	4.48	1.94	1.41	7.83
172 ANN	5.52	2.34	1.40	9.26
86 TRI	4.10	2.29	1.06	7.45
172 TRI	4.20	2.41	1.34	7.95
344 SIX	4.19	2.41	1.19	7.80
688 SIX	4.58	2.08	1.36	8.02
1032 SIX	4.67	2.59	1.48	8.74
376 G(1)	2.80	2.49	0.96	6.24
376 S(1)	2.89	2.51	0.93	6.34
MEAN	4.00	2.30	1.17	7.47
MEAN DM%	17.2	21.9	23.7	20.9

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81/R/RN/7 GREAT FIELD IV

SERIES II LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (1/6/81)	CUT 2 (5/8/81)	CUT 3 (4/11/81)	TOTAL OF 3 CUTS
P205				
NONE	1.47	2.65	0.76	4.88
29 ANN	4.15	2.59	1.34	8.08
57 ANN	4.77	2.62	1.15	8.54
115 ANN	4.65	2.63	1.23	8.50
172 ANN	5.10	3.20	1.33	9.63
86 TRI	2.97	2.79	1.04	6.80
172 TRI	4.76	2.89	1.12	8.78
344 SIX	3.78	2.78	1.09	7.65
688 SIX	5.01	2.98	1.38	9.37
1032 SIX	4.51	3.06	1.36	8.93
376 G(1)	2.06	2.83	0.87	5.77
376 S(1)	2.15	2.71	0.79	5.65
MEAN	3.78	2.81	1.12	7.71
MEAN DM%	8.6	23.7	21.8	21.4

SERIES III LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (1/6/81)	CUT 2 (5/8/81)	CUT 3 (4/11/81)	TOTAL OF 3 CUTS
P205				
NONE	2.31	2.61	0.44	5.35
29 ANN	5.68	2.83	0.82	9.33
57 ANN	5.40	2.43	0.97	8.80
115 ANN	5.64	2.95	1.09	9.68
172 ANN	5.48	2.49	1.21	9.18
86 TRI	4.49	2.29	0.77	7.55
172 TRI	4.72	2.89	0.94	8.55
344 SIX	4.75	2.73	0.71	8.20
688 SIX	4.33	2.49	0.84	7.67
1032 SIX	5.10	2.41	0.95	8.47
376 G(1)	3.12	2.35	0.78	6.25
376 S(1)	1.95	2.70	0.52	5.17
MEAN	4.41	2.60	0.84	7.85
MEAN DM%	9.8	24.3	21.4	21.8

PLOT AREA HARVESTED 0.00186

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81/R/RN/7 SAWYERS I

SERIES II LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (2/6/81)	CUT 2 (7/8/81)	CUT 3 (4/11/81)	TOTAL OF 3 CUTS
P205				
NONE	3.68	1.25	0.66	5.58
29 ANN	4.51	1.48	0.68	6.68
57 ANN	4.67	1.39	0.69	6.76
115 ANN	5.41	1.18	0.63	7.22
172 ANN	5.95	1.05	0.54	7.54
86 TRI	4.14	1.31	0.58	6.03
172 TRI	4.47	1.45	0.68	6.61
344 SIX	4.35	1.49	0.64	6.48
688 SIX	4.39	1.52	0.70	6.61
1032 SIX	4.98	1.53	0.63	7.14
376 G(1)	3.65	1.35	0.43	5.43
376 S(1)	3.58	1.48	0.45	5.52
MEAN	4.48	1.37	0.61	6.47
SED*	0.288	0.123	0.102	0.410
CV%	6.4	8.9	16.7	6.3
MEAN DM%	18.4	18.4	22.2	19.7

* NOTE STRATUM STANDARD ERROR (11 df) is also equal to this figure

SERIES III LEY

DRY MATTER TONNES/HECTARE

	CUT 1 (2/6/81)	CUT 2 (7/8/81)	CUT 3 (4/11/81)	TOTAL OF 3 CUTS
P205				
NONE	3.29	1.21	0.59	5.08
29 ANN	5.03	1.04	0.31	6.38
57 ANN	5.37	1.18	0.34	6.89
115 ANN	5.40	0.90	0.27	6.57
172 ANN	5.53	0.97	0.15	6.66
86 TRI	4.74	0.97	0.28	5.99
172 TRI	4.85	0.97	0.36	6.19
344 SIX	4.68	1.01	0.44	6.12
688 SIX	5.21	1.07	0.37	6.65
1032 SIX	5.09	1.08	0.36	6.54
376 G(1)	3.72	1.12	0.44	5.28
376 S(1)	3.83	1.18	0.38	5.39
MEAN	4.73	1.06	0.36	6.14
SED*	0.170	0.057	0.073	0.125
CV%	3.6	5.4	20.4	2.0
MEAN DM%	19.5	20.3	23.0	20.9

PLOT AREA HARVESTED 0.00204

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81/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, G.V. Dyke, J.A. Currie.

The 21st year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-80/R/RN/8.

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

Whole plot dimensions: 12.8 x 12.2.

Treatments: All combinations of:-

Whole plots

1. CULTIVTN — Primary cultivations annually:

   PLOUGH — Ploughed: 24 Sept, 1980
   ROTA DIG — Cultivated by rotary digger: 23 Sept
   DEEPTINE — Deep-tine cultivated: 23 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 & w. barley 1981):

   NONE
   HORMONE

4. WEEDKLLR(81) — Paraquat weedkiller to preceding cereal stubbles: 19 Sept, 1980.

   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, but differing in cultivations for preceding crop:

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81/R/RN/8

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

NOTE: Paraquat was applied at 0.84 kg ion in 250 l.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkillers: Chlortoluron at 4.4 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Fungicide: Prochloraz at 0.4 l in 250 l.

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

Cultivations, etc.:- EXTRA plots direct drilled, remaining plots rotary harrowed, seed sown: 25 Sept, 1980. Chlortoluron applied: 27 Sept. N applied: 16 Apr, 1981. 'Brittox' applied: 21 Apr. Fungicide applied: 5 May. Combine harvested: 3 Aug.

EXTRA PLOTS ONLY

GRAIN TONNES/HECTARE

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

WEEDKLLR(75)	EXTRA	DD(SP T)	DD(SH P)	DD(PL)	MEAN
	NONE	6.67	5.92	6.11	6.23
	HORMONE	6.94	5.82	6.71	6.49
	MEAN	6.80	5.87	6.41	6.36

GRAIN MEAN DM% 84.4

SUB PLOT AREA HARVESTED 0.00347

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81/R/RN/8

OMITTING EXTRA PLOTS

GRAIN TONNES/HECTARE

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

CULTIVTN WEEDCNTL(76)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
MECHANCL	6.01	6.17	6.67	6.28
RESIDUAL	6.40	6.21	5.97	6.19

CULTIVTN WEEDKLLR(75)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
NONE	6.25	6.25	6.09	6.19
HORMONE	6.30	6.14	6.31	6.25

CULTIVTN WEEDKLLR(81)	PLOUGH	ROTA DIG	DEEPTINE	MEAN
NONE	6.39	6.25	6.24	6.29
PARAQUAT	6.15	6.14	6.16	6.15
MEAN	6.27	6.20	6.20	6.22

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

TABLE	CULTIVTN	WEEDCNTL(76)	WEEDKLLR(75)	WEEDKLLR(81)
SED	0.229	0.198	0.063	0.063

TABLE	CULTIVTN WEEDCNTL(76)	CULTIVTN WEEDKLLR(75)	CULTIVTN WEEDKLLR(81)	
SED	0.396			MIN REP
	0.343	0.241	0.241	MAX-MIN
	0.280			MAX REP
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CULTIVTN		0.109	0.109	

	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	0.396	6.4
BLOCK.WP.SP	10	0.189	3.0

GRAIN MEAN DM% 84.1

SUB PLOT AREA HARVESTED 0.00347

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81/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: G.E.G. Mattingly.

The 17th year, s. barley, s. beans, ley.

For previous years see 'Details' 1973 and 74-80/W/RN/12.

Design for s. barley: 2 blocks of 6 plots split into 8
s. beans: 2 blocks of 4 plots
1st, 2nd & 3rd 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. In 1981 two blocks were sown to s. barley to complete the testing of residues built up in the preliminary period (these blocks also included ley sown in 1980). The remaining two blocks were sown to s. beans & ley (and also included ley sown in 1979), starting a new phase accumulating organic residues.

S. barley tested all combinations of:

Whole plots

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

FYM	Farmyard manure
STRAW	Straw
FERT-FYM	Fertilisers equivalent to FYM
FERT-STR	Fertilisers equivalent to straw
CLOVRLEY	Clover/grass ley, no N
GRASSLEY	Grass ley with N for each cut

Sub plots

2. N — Fertiliser nitrogen (kg N):

S. BARLEY

0
30
60
90
120
150
180
210

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S. beans tested:

MANURE	Organic manures and fertilisers in 1981, cumulative 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 year leys tested:

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

2nd & 3rd year leys tested:

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

Standard applications:
S. barley: Manures: P_2O_5 at 110 kg as superphosphate, K_2O at 60 kg as muriate of potash. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l with the fungicide. Fungicide: Tridemorph at 0.53 kg.
S. beans: Weedkiller: Simazine at 0.84 kg in 280 l. Insecticides: Phorate at 5.6 kg, pirimicarb at 0.14 kg in 280 l on two occasions.
Clover/grass leys, 1st, 2nd and 3rd years: Manures: (0:14:28) at 1000 kg, MgO at 50 kg as kieserite. N at 50 kg to 1st year and 60 kg to 2nd year as 'Nitro-Chalk'.

Seed: S. barley: Georgie, dressed with ethirimol, sown at 160 kg.
S. beans: Minden, sown at 220 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.:-
S. barley: Ploughed in sugar beet tops: 11 Dec, 1980. P and K applied: 16 Feb, 1981. Spring-tine cultivated: 18 Feb. Spring-tine cultivated with crumbler attached, seed sown: 27 Feb. N applied: 26 Mar. Weedkillers and fungicide applied: 15 Apr. Combine harvested: 17 Aug.
S. beans: Mg applied: 3 Dec, 1980. PK applied: 4 Dec. Organic manures applied: 16 Jan, 1981. PK and Mg applied: 16 Feb. Spring-tine cultivated: 18 Feb. Phorate applied, rotary cultivated with crumbler attached, seed sown: 6 Apr. Weedkiller applied: 7 Apr. Pirimicarb applied: 18 June, 27 July. Combine harvested: 3 Sept.
1st year clover/grass ley: Ploughed: 16 Jan, 1981. PK and Mg applied: 16 Feb. Spring-tine cultivated twice: 18 Feb, 8 Apr. Rotary cultivated, N applied: 7 May. Seeds sown: 13 May. Topped twice: 25 June, 20 July. Cut: 8 Sept.

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2nd year clover/grass ley: Mg applied: 3 Dec, 1980. PK applied: 4 Dec.
N applied: 13 May, 1981. Cut: 10 June, 8 Sept.
3rd year clover/grass ley: Mg applied: 3 Dec, 1980. PK applied: 4 Dec.
Cut: 12 June, 1981, 8 Sept.

SPRING BARLEY

GRAIN TONNES/HECTARE

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

N / MANURE	0	30	60	90	120	150	180	210	MEAN
FYM	3.44	4.47	6.59	6.36	7.21	6.49	5.84	5.22	5.70
STRAW	3.84	5.73	6.73	7.48	6.46	6.81	5.95	5.64	6.08
FERT-FYM	2.39	4.17	5.56	6.12	5.50	5.64	5.27	5.16	4.98
FERT-STR	3.57	4.79	6.20	6.83	7.17	7.00	5.73	5.52	5.85
CLOVRLEY	4.14	5.80	6.89	7.12	7.07	6.48	5.88	5.84	6.15
GRASSLEY	3.58	5.35	5.90	6.82	6.80	5.68	6.03	5.36	5.69
MEAN	3.49	5.05	6.31	6.79	6.70	6.35	5.78	5.46	5.74

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

TABLE	MANURE	N	MANURE N
SED	0.604	0.157	0.704
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.386

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.604	10.5
BLOCK.WP.SP	42	0.386	6.7

GRAIN MEAN DM% 88.0

STRAW TONNES/HECTARE

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

N / MANURE	0	30	60	90	120	150	180	210	MEAN
FYM	1.50	2.40	4.84	4.94	6.02	4.88	6.55	5.33	4.56
STRAW	1.81	3.02	4.45	5.32	6.40	6.31	7.80	6.65	5.22
FERT-FYM	1.37	2.19	3.30	4.90	5.18	4.93	4.80	5.04	3.97
FERT-STR	1.64	2.79	4.01	5.39	5.93	6.17	6.05	5.68	4.71
CLOVRLEY	1.71	2.82	4.50	5.48	5.95	5.67	5.67	6.35	4.77
GRASSLEY	1.63	2.43	4.54	5.88	6.28	5.22	6.16	6.91	4.88
MEAN	1.61	2.61	4.27	5.32	5.96	5.53	6.17	5.99	4.68

STRAW MEAN DM% 77.5

SUB PLOT AREA HARVESTED 0.00168

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81/W/RN/12

SPRING BEANS

GRAIN TONNES/HECTARE

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

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	MEAN
	1.74	2.00	1.57	1.53	1.71

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

TABLE	MANURE
SED	0.212

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

STRATUM	DF	SE	CV%
BLOCK.WP	3	0.212	12.4

GRAIN MEAN DM% 75.4

PLOT AREA HARVESTED 0.02471

1ST YEAR LEY

1ST CUT (8/9/81) DRY MATTER TONNES/HECTARE

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

PREV LEY	LC(LC)	LC(LN)	MEAN
	2.74	2.58	2.66

1ST CUT MEAN DM% 20.8

PLOT AREA HARVESTED 0.00265

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81/W/RN/12 2ND YEAR LEY

1ST CUT (10/6/81) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	4.28	4.67	4.48

1ST CUT MEAN DM% 17.5

2ND CUT (8/9/81) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	2.19	2.46	2.32

2ND CUT MEAN DM% 25.2

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	6.47	7.13	6.80

TOTAL OF 2 CUTS MEAN DM% 21.3

PLOT AREA HARVESTED 0.00265

3RD YEAR LEY

1ST CUT (12/6/81) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	6.22	6.10	6.16

1ST CUT MEAN DM% 24.7

2ND CUT (8/9/81) DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	1.29	0.69	0.99

2ND CUT MEAN DM% 27.4

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

PREV MAN	LC(GM)	LC(PT)	MEAN
	7.51	6.79	7.15

TOTAL OF 2 CUTS MEAN DM% 26.0
PLOT AREA HARVESTED 0.00265

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81/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 16th year, w. wheat, ley.

For previous years see 'Details' 1973 and 74-80/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 planned:-

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: Chalk at 7.5 t. (10:23:23) at 280 kg. N at 150 kg as 'Nitro-Chalk'. Weedkillers: Glyphosate at 1.5 l in 280 l. Chlortoluron at 4.5 l in 300 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.4 l) in 280 l. Fungicide: Triadimefon with captafol (as 'Bayleton CF' at 2.0 kg) in 280 l.

1st year ley: Manures: Chalk at 7.5 t. (10:23:23) at 300 kg. N at 65 kg as 'Nitro-Chalk'. Weedkiller: Glyphosate at 1.5 l in 280 l.

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

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81/W/RN/13

Cultivations, etc.:-

W. wheat: Glyphosate applied: 9 Sept, 1980. Chalk applied: 11 Sept. Ploughed: 16 Sept. Spring-tine cultivated: 25 Sept. Spring-tine cultivated with crumbler attached, rotary cultivated after barley only: 30 Sept. Seed sown: 1 Oct. Chlortoluron applied: 3 Oct. N applied: 10 Apr, 1981. 'Brittox' applied: 22 Apr. Fungicide applied: 20 June. Combine harvested: 19 Aug.

1st year ley: Glyphosate applied: 9 Sept, 1980. Chalk applied: 11 Sept. Ploughed: 16 Sept. Spring-tine cultivated, NPK applied: 25 Sept. Seeds sown: 26 Sept. N applied: 7 May, 1981. Cut: 11 June, 8 Sept.

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81/W/RN/14

LONG TERM PHOSPHATE

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

Sponsor: G.E.G. Mattingly.

The 14th year, clover/grass ley.

For previous years see 68/B/8(t), 69/W/RN/14, 70/W/RN/14(t), 71/W/RN/14(t), 72/W/RN/14(t) and 73-80/W/RN/14.

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

Whole plot dimensions: 8.53 x 15.8.

Treatments: All combinations of:-

Whole plots

1. P2O5RES(73) — Residues of superphosphate applied autumn 1967 and spring 1973 (kg P2O5):

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

Sub plots

2. P2O5 81 — Superphosphate in 1980 & 1981 in addition to residues, applied in three equal dressings 1970-72, (kg P2O5):

(0)0	None
(376)114	376 total applied 1970-72, 57 in 1980, 57 in 1981.

Basal applications: Manures: MgO at 30 kg as kieserite and K_2O at 240 kg as muriate of potash in winter. (25:0:16) at 390 kg in spring and 360 kg after the first cut.

Cultivations, etc.:- Mg applied: 3 Dec, 1980. K applied: 4 Dec. P treatments and NK applied: 19 Mar, 1981. Cut: 17 June, 26 Aug. NK applied: 25 June.

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81/W/RN/14

1ST CUT(17/6/81) DRY MATTER TONNES/HECTARE

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

P205RES(73)	0	360	720	1440	2160	MEAN
P205 81						
0(0)	7.94	8.57	7.68	7.01	7.00	7.69
(376)114	7.95	8.44	7.83	7.03	7.72	7.82
MEAN	7.95	8.50	7.75	7.02	7.36	7.75

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

TABLE	P205RES(73)	P205 81	P205RES(73) P205 81	
SED	0.471		0.601	MIN REP
	0.408	0.216	0.520	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.528	MIN REP
			0.374	MAX REP

P205RES(73)
MAX REP 0
MAX-MIN 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	26	0.815	10.5
BLOCK.WP.SP	31	0.915	11.8

1ST CUT MEAN DM% 23.5

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81/W/RN/14
2ND CUT (26/8/81)DRY MATTER TONNES/HECTARE

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

P205RES(73)	0	360	720	1440	2160	MEAN
P205 81						
0(0)	3.11	3.16	3.31	3.49	3.28	3.24
(376)114	3.30	3.43	3.49	3.43	3.37	3.39
MEAN	3.21	3.30	3.40	3.46	3.33	3.32

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

TABLE	P205RES(73)	P205 81	P205RES(73) P205 81	
SED	0.126		0.177	MIN REP
	0.109	0.071	0.153	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.175	MIN REP
			0.123	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.218	6.6
BLOCK.WP.SP	31	0.302	9.1

2ND CUT MEAN DM% 22.4

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

P205RES(73)	0	360	720	1440	2160	MEAN
P205 81						
0(0)	11.05	11.73	10.98	10.49	10.28	10.93
(376)114	11.25	11.87	11.31	10.46	11.09	11.21
MEAN	11.15	11.80	11.15	10.48	10.69	11.07

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

TABLE	P205RES(73)	P205 81	P205RES(73) P205 81	
SED	0.431		0.589	MIN REP
	0.374	0.231	0.510	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
P205RES(73)			0.567	MIN REP
			0.401	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	26	0.747	6.7
BLOCK.WP.SP	31	0.982	8.9

TOTAL OF 2 CUTS MEAN DM% 22.9 PLOT AREA HARVESTED 0.00145

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81/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 eighth year, s. barley.

For previous years see 74-80/W/RN/16.

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

Whole plot dimensions: 4.27 x 2.59.

Treatments: All combinations of:-

Series

1. PREVCROP — Previous cropping (1974-1977) (all in barley 1978, 1979 & 1980):

P B B B	W. wheat, sugar beet, s. barley, potatoes
W B B B	Sugar beet, s. barley, potatoes, w. wheat
S B B B	S. barley, potatoes, w. wheat, sugar beet
B B B B	Potatoes, w. wheat, sugar beet, s. barley

Plots

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

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

NOTES: (1) The rates of P and K were 1930 kg 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.

Basal applications: Manures: (20:10:10) at 540 kg. Weedkillers: Patches of perennial grass weeds were treated with glyphosate (concentration 0.07 l in 10 l of water) by knapsack sprayer. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with the fungicide in 280 l. Fungicide: Ethirimol (as 'Milgo E' at 0.7 l).

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

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81/W/RN/16

Cultivations, etc.:- Glyphosate applied: 17 Sept, 1980. Ploughed: 21 Nov. NPK applied: 20 Feb, 1981. Spring-tine cultivated with crumbler attached, seed sown: 27 Feb. 'Brittox' with the fungicide applied: 6 May. Hand harvested: 29 Aug.

GRAIN TONNES/HECTARE

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

PK SUB / PREVCROP	- - -	- - S	P K T	P K S	MEAN
P B B B	3.96	4.06	4.01	3.92	3.99
W B B B	4.24	4.24	3.84	4.40	4.18
S B B B	2.97	2.42	3.23	3.08	2.92
B B B B	3.75	3.67	4.60	3.73	3.94
MEAN	3.73	3.60	3.92	3.78	3.76

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

TABLE	PK SUB	PREVCROP* PK SUB
SED	0.163	0.327

* ONLY WHEN COMPARING MEANS WITH SAME LEVELS OF PREVCROP

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.141	3.8
BLOCK.WP.SP	24	0.400	10.6

GRAIN MEAN DM% 85.3

STRAW TONNES/HECTARE

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

PK SUB / PREVCROP	- - -	- - S	P K T	P K S	MEAN
P B B B	3.12	3.28	3.07	3.43	3.23
W B B B	3.29	3.41	2.77	3.32	3.20
S B B B	2.40	2.54	2.81	2.69	2.61
B B B B	2.79	3.00	3.38	3.14	3.08
MEAN	2.90	3.06	3.01	3.15	3.03

STRAW MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00063

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81/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 & 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 first year, potatoes, s. barley, s. beans, w. wheat.

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

Whole plot dimensions: 3.0 x 14.

Treatments to each series:

TREATMNT	Extra P & K and primary cultivation tool:			
	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	(six plots)
P2 - S	63	0 to subsoil	" " "	
P3 - S	125	0 " "	" " "	
P4 - S	250	0 " "	" " "	
P5 - S	500	0 " "	" " "	(duplicated)
P6 - S	1000	0 " "	" " "	
- K2 S	0	31 " "	" " "	
- K3 S	0	63 " "	" " "	
- K4 S	0	125 " "	" " "	
- K5 S	0	250 " "	" " "	(duplicated)
- K6 S	0	350 " "	" " "	
P1 K1 S	31	16 " "	" " "	
P1 K3 S	31	63 " "	" " "	
P2 K2 S	63	31 " "	" " "	
P3 K1 S	125	16 " "	" " "	
P3 K3 S	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 " "	" " "	

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 & K this was distributed ahead of the rotary cultivator.

(2) The topsoil PK dressing was equally divided before and after ploughing.

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(3) Treatments shown are those for the first year only and provide for comparisons of frequency of application.
(4) The rate of 350 kg K_2O applied was in error for 500 kg K_2O.

Standard applications:
All crops: Weedkillers: Glyphosate at 1.5 l in 250 l.
Potatoes: Manures: (10:10:15 + 4.5 Mg) at 1960 kg. Weedkillers: Linuron at 1.13 with paraquat at 0.4 kg ion in 250 l. Fungicides: Mancozeb at 1.4 kg in 250 l applied six times, with pirimicarb on the first five. Insecticide: Pirimicarb at 0.14 kg.
S. barley: Manures: (20:10:10) at 450 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg. Prochloraz at 0.4 l in 250 l.
S beans: Weedkiller: Simazine at 1.2 kg in 250 l. Fungicide: Benomyl at 0.55 kg in 250 l applied with the pirimicarb. Insecticides: Phorate at 5.6 kg. Pirimicarb at 0.14 kg.
W. wheat: Manures: (0:20:20) at 310 kg, 'Nitro-Chalk' at 560 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Fungicides: Prochloraz at 0.4 l in 250 l applied twice, with maneb at 1.2 kg and zineb at 0.13 kg on the second occasion.

Seed: Potatoes: Pentland Crown.
S. barley: Triumph, seed dressed with ethirimol, sown at 160 kg.
S. beans: Minden, sown at 280 kg.
W. wheat: Flanders, sown at 200 kg.

Cultivations, etc.:-
All crops: Glyphosate applied: 24 Sept, 1980. Treatments applied by double digger: 23-31 Oct. Half topsoil PK treatment applied & ploughed in: 10 Nov. Second half topsoil PK treatment applied: 11 Nov.
Potatoes: Chisel ploughed: 21 Nov, 1980. NPK applied: 14 Apr, 1981. Spike rotary cultivated, potatoes planted: 30 Apr. Weedkillers applied: 21 May. Fungicide with insecticide applied: 22 June, 1 July, 13 July, 27 July, and 12 Aug. Fungicide applied: 24 Aug. Haulm mechanically destroyed: 7 Oct. Lifted: 22 Oct.
S. barley: Chisel ploughed: 21 Nov, 1980. Spring-tine cultivated, NPK applied: 17 Feb, 1981. Spring-tine cultivated, seed sown by combined drill and rotary harrow: 18 Feb. Weedkillers and tridemorph applied: 12 May. Prochloraz applied: 8 July. Combine harvested: 17 Aug.
S. beans: Chisel ploughed: 21 Nov, 1980. Spring-tine cultivated: 17 Feb, 1981. Phorate applied, spring-tine cultivated, seed sown by combined drill and rotary harrow: 18 Feb. Weedkiller applied: 9 Apr. Pirimicarb and fungicide applied: 18 June. Combine harvested: 8 Sept.
W. wheat: Heavy spring-tine cultivated, PK applied, spring-tine cultivated: 11 Nov, 1980. Seed sown by combined drill and rotary harrow: 12 Nov. N applied: 13 Apr, 1981. Weedkillers applied: 22 Apr. Prochloraz applied: 5 May. Prochloraz applied with maneb and zineb: 19 June. Combine harvested: 24 Aug.

Previous crops: W. wheat 1979, s. barley 1980.

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81/R/RN/17

POTATOES SERIES I

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	
- - -	61.7
P6 K6 T	68.3
- - S	61.3
P2 - S	71.8
P3 - S	62.3
P4 - S	63.3
P5 - S	59.2
P6 - S	67.1
- K2 S	65.9
- K3 S	64.1
- K4 S	70.4
- K5 S	69.7
- K6 S	72.1
P1 K1 S	66.7
P1 K3 S	65.0
P2 K2 S	51.4
P3 K1 S	61.6
P3 K3 S	63.4
P3 K4 S	64.4
P4 K3 S	54.8
P4 K4 S	54.8
P4 K5 S	64.4
P4 K6 S	75.7
P5 K4 S	63.6
P5 K5 S	65.0
P5 K6 S	71.0
P6 K4 S	67.0
P6 K5 S	75.9
P6 K6 S	72.3
MEAN	64.7

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

TABLE	TREATMNT*
SED	4.58 MIN REP
	3.74 MAX-MIN

* SED APPLIES ONLY TO - - -,P6 K6 T,- - S,P5 - S,- K5 S,P4 K6 S and P5 K4 S.

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

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

STRATUM	DF	SE	CV%
WP	11	4.58	7.1

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81/R/RN/17

POTATOES SERIES I

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	
- - -	96.1
P6 K6 T	97.5
- - S	97.4
P2 - S	98.0
P3 - S	97.3
P4 - S	96.9
P5 - S	97.7
P6 - S	97.7
- K2 S	97.3
- K3 S	97.2
- K4 S	98.2
- K5 S	96.7
- K6 S	97.5
P1 K1 S	97.7
P1 K3 S	97.4
P2 K2 S	97.2
P3 K1 S	96.3
P3 K3 S	97.9
P3 K4 S	97.7
P4 K3 S	97.5
P4 K4 S	98.3
P4 K5 S	97.7
P4 K6 S	97.7
P5 K4 S	97.7
P5 K5 S	98.1
P5 K6 S	97.0
P6 K4 S	98.3
P6 K5 S	98.1
P6 K6 S	98.2
MEAN	97.5

PLOT AREA HARVESTED 0.00210

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81/R/RN/17 BARLEY SERIES II

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	5.86
P6 K6 T	7.30
- - S	6.44
P2 - S	6.37
P3 - S	6.39
P4 - S	7.05
P5 - S	6.74
P6 - S	6.95
- K2 S	6.44
- K3 S	6.67
- K4 S	6.37
- K5 S	6.82
- K6 S	6.88
P1 K1 S	5.57
P1 K3 S	6.34
P2 K2 S	6.78
P3 K1 S	6.72
P3 K3 S	6.81
P3 K4 S	6.50
P4 K3 S	7.06
P4 K4 S	6.99
P4 K5 S	7.01
P4 K6 S	7.07
P5 K4 S	6.78
P5 K5 S	7.08
P5 K6 S	6.98
P6 K4 S	7.33
P6 K5 S	7.00
P6 K6 S	6.92
MEAN	6.70

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

TABLE	TREATMNT*	
SED	0.374	MIN REP
	0.305	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	11	0.374	5.6

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00286

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81/R/RN/17

S. BEANS SERIES III

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	3.58
P6 K6 T	3.87
- - S	3.54
P2 - S	3.70
P3 - S	3.60
P4 - S	3.68
P5 - S	3.94
P6 - S	4.82
- K2 S	3.80
- K3 S	3.80
- K4 S	3.60
- K5 S	3.73
- K6 S	4.86
P1 K1 S	2.78
P1 K3 S	3.96
P2 K2 S	2.93
P3 K1 S	3.93
P3 K3 S	3.55
P3 K4 S	3.75
P4 K3 S	3.46
P4 K4 S	3.69
P4 K5 S	4.28
P4 K6 S	3.97
P5 K4 S	4.57
P5 K5 S	4.22
P5 K6 S	4.05
P6 K4 S	4.28
P6 K5 S	4.67
P6 K6 S	4.56
MEAN	3.87

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

TABLE	TREATMNT*	
SED	0.604	MIN REP
	0.493	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	11	0.604	15.6

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00341

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81/R/RN/17

WINTER WHEAT SERIES IV

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.67
P6 K6 T	7.11
- - S	7.28
P2 - S	7.56
P3 - S	7.74
P4 - S	7.45
P5 - S	7.90
P6 - S	8.27
- K2 S	7.60
- K3 S	7.19
- K4 S	6.88
- K5 S	7.46
- K6 S	8.13
P1 K1 S	7.18
P1 K3 S	3.43
P2 K2 S	7.54
P3 K1 S	7.87
P3 K3 S	7.06
P3 K4 S	8.36
P4 K3 S	6.88
P4 K4 S	7.30
P4 K5 S	7.41
P4 K6 S	7.71
P5 K4 S	7.85
P5 K5 S	7.06
P5 K6 S	8.14
P6 K4 S	7.66
P6 K5 S	5.89
P6 K6 S	7.77
MEAN	7.38

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

TABLE	TREATMNT*	
SED	0.485	MIN REP
	0.396	MAX-MIN

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

STRATUM	DF	SE	CV%
WP	11	0.485	6.6

GRAIN MEAN DM% 78.8

PLOT AREA HARVESTED 0.00286

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81/R/CS/10 and 81/W/CS/10

LONG TERM LIMING

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

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

The 20th year, s. oats.

For previous years see 'Details' 1967, 1973 and 74-80/R&W/CS/10.

Design: 2 randomised blocks of 16 plots.

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

1. CHALK — Ground chalk (tonnes CaCO3) (total applied 1962-78):

R	W
0	0
7	6
15	14
30	23

2. P K — P & K fertilisers applied (in addition to a basal dressing of 120 kg K in 1981):

(00)0	None
(0K)P1	K annually until 1978, 25 kg P in 1981
(P0)P1	P annually until 1978, 25 kg P in 1981
(PK)P3	P & K annually until 1978, 75 kg P in 1981

NOTES: (1) Until 1978 test P & K were applied cumulatively, rates varied with crop. None was applied in 1979 & 1980 (fallow).
(2) A sub plot test of Mg applied in earlier years has been ignored.

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 100 kg as kieserite. Weedkillers: Dicamba, mecoprop and MCPA (as 'Herrisol' 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 100 kg as kieserite. Weedkillers: Dicamba, mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 280 l with the fungicide. Fungicide: Tridemorph at 0.53 l.

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

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81/R/CS/10 and 81/W/CS/10

Cultivations, etc.:-
Sawyers I (R): Basal K and Mg applied: 1 Dec, 1980. P treatments applied, ploughed: 8 Dec. Rotary harrowed, seed sown: 13 Apr, 1981.
Weedkillers applied: 1 June. Combine harvested: 10 Sept.
Stackyard C (W): Ploughed: 13 Nov, 1980, 12 Dec. Basal K and Mg applied: 8 Dec. N applied, heavy spring-tine cultivated: 6 Apr, 1981. Spring-tine cultivated with crumbler attached: 8 Apr. Rotary cultivated, seed sown: 9 Apr. Weedkillers and fungicide applied: 1 June. Combine harvested: 3 Sept.

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

GRAIN TONNES/HECTARE

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

P K CHALK	(00)0	(0K)P1	(P0)P1	(PK)P3	MEAN
0	3.60	2.71	3.70	3.37	3.34
7	3.35	3.67	3.78	3.42	3.55
15	3.32	3.48	3.48	3.86	3.54
30	2.78	3.02	3.26	3.27	3.08
MEAN	3.26	3.22	3.55	3.48	3.38

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

TABLE	CHALK	P K	CHALK P K
SED	0.139	0.139	0.278

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.278	8.2

GRAIN MEAN DM% 82.3

PLOT AREA HARVESTED 0.00520

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

GRAIN TONNES/HECTARE

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

P K CHALK	(00)0	(0K)P1	(P0)P1	(PK)P3	MEAN
0	3.56	3.90	4.05	4.15	3.92
6	3.60	3.65	3.99	3.95	3.80
14	3.95	3.45	3.35	4.04	3.70
23	3.61	3.66	3.62	3.52	3.60
MEAN	3.68	3.66	3.75	3.92	3.75

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

TABLE	CHALK	P K	CHALK P K
SED	0.124	0.124	0.248

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.248	6.6

GRAIN MEAN DM% 82.5

PLOT AREA HARVESTED 0.00503

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81/W/CS/11

SOIL STRUCTURE

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

Sponsor: A.E. Johnston.

The 19th year, potatoes.

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 73-80/W/CS/11.

Design: Single replicate of 5 x 4.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

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

   0
   8
   55
   110
   165

2. N — Nitrogen fertiliser (kg N) cumulative to previous treatments:

   0
   100
   200
   300

Basal applications: Manures: P at 85 kg, as triple superphosphate, K at 300 kg, as potassium bicarbonate, Mg at 55 kg, as magnesium sulphate. Weedkillers: Linuron at 0.92 l with paraquat at 0.28 kg ion in 280 l. Fungicide: Mancozeb at 1.3 kg in 280 l with the insecticide on three occasions. Insecticide: Pirimicarb at 0.14 kg.

Seed: Maris Piper.

Cultivations, etc.:- P, K, Mg applied, hand dug: 10 Feb, 1981. N applied, potatoes planted: 30 Apr. Weedkillers applied: 21 May. Fungicide and insecticide applied: 25 June, 30 July, 17 Aug. Lifted: 15 Sept.

NOTE: Soil and crop samples were taken for N, P, K and Mg analysis.

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81/W/CS/11

TOTAL TUBERS TONNES/HECTARE

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

N PEAT	0	100	200	300	MEAN
0	28.3	38.7	51.7	55.2	43.5
8	32.9	49.5	44.9	53.8	45.3
55	36.8	53.4	48.6	58.6	49.3
110	23.4	51.7	56.9	59.4	47.8
165	35.1	53.7	53.5	63.2	51.4
MEAN	31.3	49.4	51.1	58.0	47.5

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

N PEAT	0	100	200	300	MEAN
0	62.5	74.6	77.4	87.5	75.5
8	63.6	80.7	78.1	80.6	75.7
55	71.1	74.6	79.7	84.8	77.6
110	55.3	78.6	81.9	85.5	75.3
165	63.2	74.5	79.3	86.4	75.8
MEAN	63.1	76.6	79.3	84.9	76.0

PLOT AREA HARVESTED 0.00065

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81/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 17th year, old grass.

For previous years see 'Details' 1973 and 74-80/R/CS/13.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 1.83 x 10.1.

Treatments

TOTAL N	Fertiliser nitrogen (kg N-total per annum applied in four equal dressings as (25:0:16)):
0(S)	0 (sprayed with ioxynil plus mecoprop to control legumes, duplicated)
0	0 (duplicated)
75	
150	
225	
300	
375	
450	

NOTE: Ioxynil at 0.42 kg with mecoprop at 1.3 kg in 280 l applied on 5 May, 1981.

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

Cultivations, etc.:- Test NK applied: 23 Feb, 1981, 14 May, 7 June, and 10 Sept. Basal P and Mg applied: 23 Feb. Cut: 14 May, 6 July, 10 Sept, 2 Nov.

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81/R/CS/13

1ST CUT (14/5/81) DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.35	1.36	1.46	2.13	2.84	3.61	3.57	4.07	2.11

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

TABLE	TOTAL N	
SED	0.126	MIN REP
	0.109	MAX-MIN
	0.089	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	0.179	8.5

1ST CUT MEAN DM% 20.6

2ND CUT (6/7/81)DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.84	2.79	2.84	3.23	3.61	4.06	4.00	4.18	2.92

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

TABLE	TOTAL N	
SED	0.208	MIN REP
	0.180	MAX-MIN
	0.147	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.294	10.1

2ND CUT MEAN DM% 23.5

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81/R/CS/13

3RD CUT(10/9/81)DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.78	2.33	2.14	2.31	2.90	3.17	3.20	3.25	2.32

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

TABLE	TOTAL N	
SED	0.146	MIN REP
	0.126	MAX-MIN
	0.103	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.206	8.9

3RD CUT MEAN DM% 22.8

4TH CUT(2/11/81)DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	0.27	0.24	0.52	0.61	0.66	0.83	0.85	0.86	0.54

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

TABLE	TOTAL N	
SED	0.110	MIN REP
	0.095	MAX-MIN
	0.078	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.155	29.0

4TH CUT MEAN DM% 19.8

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81/R/CS/13

TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

TOTAL N	0(S)	0	75	150	225	300	375	450	MEAN
	2.25	6.71	6.96	8.28	10.01	11.67	11.62	12.35	7.88

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

TABLE	TOTAL N	
SED	0.294	MIN REP
	0.255	MAX-MIN
	0.208	MAX REP

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.416	5.3

TOTAL OF 4 CUTS MEAN DM% 21.7

PLOT AREA HARVESTED 0.00086

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81/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 12th year, potatoes, w. wheat, s. barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-80/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
Series I	P	P	P*	SB	B	P	P*	W	B	P	P*	B	B
Series II	P	P	P	P*	SB	B	P	P*	W	B	P	P*	W
Series III	P	B	P	P	P*	SB	B	P	P*	W	B	P	P*
Series IV	P	B	P	P	P	P*	SB	B	P	P*	W	B	P

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

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

Treatments to s. barley (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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81/W/CS/34

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

1. NEMACIDE(81)	Nematicides applied 1981:
ALDICARB	Aldicarb
HOE00668	'HOE 00668'
RH 9358	'RH 9358'
2. RATE	Rates of nematicide (kg a.il):
2.8	
5.6	
11.2	

plus one untreated plot

RATE

NONE

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

1. NEMACIDE(78)	Residues of nematicides applied 1978:
BENDIOCA	Bendiocarb
THIOPHAN	Thiophanate methyl
TERBUFOS	Terbufos
2. RATE	Rates of nematicide (kg a.i.):
5	
10	
20	

plus one untreated plot

RATE

0.0

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81/W/CS/34

Standard applications:
Barley (Series I): Manures: (20:10:10) at 450 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with the fungicide in 280 l. Fungicide: Ethirimol (as 'Milgo E' at 1.3 l).
W. wheat (Series II): Manures: Magnesian limestone at 5.0 t. (10:23:23) at 260 kg. 'Nitro-Chalk' at 560 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 280 l.
Potatoes (Series III and Series IV): Manures: (10:10:15 + 4.5 Mg) at 2020 kg. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times, with the insecticide on the first five occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Undiluted BOV at 170 l.

Seed: Barley: Triumph, dressed with ethirimol, sown at 160 kg.
Wheat: Flanders, sown at 190 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
Barley (Series I): Ploughed: 23 Oct, 1980. NPK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Seed sown: 27 Feb. Weedkillers and fungicide applied: 1 May. Combine harvested: 4 Aug.
Wheat (Series II): Magnesian limestone applied: 14 Oct, 1980. Heavy spring-tine cultivated, NPK applied, spring-tine cultivated with crumbler attached, seed sown: 15 Oct. N applied: 8 Apr, 1981. Weedkillers applied: 21 Apr. Combine harvested: 24 Aug.
Potatoes (Series III & IV): Heavy spring-tine cultivated: 15 Oct, 1980 (Series III). Ploughed: 23 Oct (Series IV). Heavy spring-tine cultivated: 15 Apr, 1981. NPK with Mg applied: 17 Apr. Spring-tine cultivated: 22 Apr. Treatments applied (Series III), rotary cultivated, potatoes planted: 23 Apr. Grubbed: 15 May. Rotary ridged: 22 May. Grubbed and rotary ridged: 8 June. Fungicide with insecticide applied: 22 June, 3 July, 14 July, 28 July, 10 Aug. Fungicide applied: 27 Aug. Haulm desiccant applied: 6 Oct. Lifted: 14 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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81/W/CS/34

POTATOES SERIES III

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(81)	2.8	5.6	11.2	MEAN
ALDICARB	39.4	34.8	44.3	39.5
HOE00668	37.0	41.1	42.8	40.3
RH 9358	39.6	42.4	40.5	40.8
MEAN	38.7	39.4	42.5	40.2

RATE NONE 9.0

GRAND MEAN 37.1

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

TABLE	NEMACIDE(81)	RATE NEMACIDE(81) RATE & RATE NONE
SED	1.80	1.80	3.13

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	3.83	10.3

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(81)	1	2	4	MEAN
ALDICARB	92.6	91.2	93.7	92.5
HOE00668	91.4	93.6	94.0	93.0
RH 9358	91.9	93.8	92.8	92.8
MEAN	92.0	92.9	93.5	92.8

RATE NONE 81.1

GRAND MEAN 91.6

PLOT AREA HARVESTED 0.00130

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81/W/CS/34

POTATOES SERIES IV

TOTAL TUBERS TONNES/HECTARE

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

RATE NEMACIDE(78)	5	10	20	MEAN
BENDIOCA	15.1	16.5	25.8	19.1
THIOPHAN	17.1	11.8	16.8	15.2
TERBUFOS	14.0	15.8	22.7	17.5
MEAN	15.4	14.7	21.8	17.3

RATE 0.0 12.8

GRAND MEAN 16.8

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

TABLE	NEMACIDE(78)	RATE	NEMACIDE(78) RATE & RATE 0.0
SED	2.00	2.00	3.46

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	4.24	25.2

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

RATE NEMACIDE(78)	5	10	20	MEAN
BENDIOCA	81.8	83.2	88.7	84.6
THIOPHAN	81.0	71.7	83.5	78.7
TERBUFOS	84.4	81.6	89.5	85.1
MEAN	82.4	78.8	87.2	82.8

RATE 0.0 77.0

GRAND MEAN 82.2

PLOT AREA HARVESTED 0.00130

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81/W/CS/34

SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

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

NEMACIDE(80)	
NONE	4.57
BAS 1	4.90
BAS 2	4.68
BAS 4	5.43
CARBOF 2	5.13
ETHOP 4	5.01
FMC 2	4.97
OX 2	4.69
OX S1 2	4.78
OX S2 2	4.68
MEAN	4.89

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

TABLE	NEMACIDE(80)
SED	0.328

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.402	8.2

GRAIN MEAN DM% 82.4

PLOT AREA HARVESTED 0.00260

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81/W/CS/34

BARLEY SERIES I

GRAIN TONNES/HECTARE

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

RATE NEMACIDE(79)	SINGLE	DOUBLE	QUAD	MEAN
ALDICARB	3.81	4.31	3.94	4.02
CARBENDA	3.81	3.68	3.99	3.83
TERBUFOS	3.68	4.29	4.37	4.11
MEAN	3.77	4.09	4.10	3.99

RATE NONE 3.73

GRAND MEAN 3.96

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

TABLE	NEMACIDE(79)	RATE NEMACIDE(79)	RATE & RATE NONE
SED	0.180	0.180	0.312

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.383	9.7

GRAIN MEAN DM% 81.0

PLOT AREA HARVESTED 0.00251

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81/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 tenth year, w. wheat, s. barley.

For previous years see 72/W/CS/35(t) and 73-80/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
Series II	P	P	P*	SB	B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	B
Series III	P	P	P	P*	SB	B	P*	P	P	P*	W

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 two crops test residual effects.

Treatments:

Series II, s. barley 1981, 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 22[illegible]/g

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

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81/W/CS/35

plus two untreated plots per block

RATE

NONE

Series III, w. wheat 1981, 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

Standard applications:
S. barley (Series II): Manures: (20:10:10) at 450 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l with the fungicide. Fungicide: Tridemorph at 0.53 kg.
W. wheat (Series III): Manures: Magnesian limestone at 5.0 t. (10:23:23) at 260 kg. N at 150 kg as 'Nitro-Chalk'. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.4 l).

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

Cultivations, etc.:-
S. barley (Series II): Ploughed: 10 Nov, 1980. NPK applied: 19 Feb, 1981. Spring-tine cultivated with crumbler attached: 26 Feb. Seed sown: 27 Feb. Weedkillers with fungicide applied: 15 May. Combine harvested: 17 Aug.
W. wheat (Series III): Magnesian limestone applied: 14 Oct, 1980. Heavy spring-tine cultivated, NPK applied, spring-tine cultivated with crumbler attached, seed sown: 15 Oct. N applied: 10 Apr, 1981. Weedkillers applied: 22 Apr. Combine harvested: 19 Aug.

NOTE: Because of soil erosion the yields of three plots of s. barley, Series II, were lost, one untreated plot and two with treatment combinations

A NEM(79)	Telone	None
S NEM(79)	Oxamyl	Aldicarb
SNEMRATE	2.5	2.5

Estimated values were used in the analysis.

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81/W/CS/35

SERIES III WINTER WHEAT

GRAIN TONNES/HECTARE

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

SNEMRATE S NEM(80)	2.5	5.0	7.5	10.0	MEAN
ALDICARB	6.47	6.42	6.43	6.08	6.35
OXAMYL	6.06	6.04	6.59	6.19	6.22
MEAN	6.26	6.23	6.51	6.13	6.28

RATE NONE 5.71

GRAND MEAN 6.22

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

TABLE	S NEM(80)	SNEMRATE	S NEM(80) SNEMRATE & RATE NONE
SED	0.161	0.228	0.322

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

STRATUM	DF	SE	CV%
BLOCK.WP	60	0.645	10.4

MEAN DM% 83.9

PLOT AREA HARVESTED 0.00130

SERIES II SPRING BARLEY

GRAIN TONNES/HECTARE

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

S NEM(79) A NEM(79)	ALDICARB	OXAMYL	MEAN
NONE	5.39	5.45	5.42
TELONE	5.58	5.65	5.62
MEAN	5.48	5.55	5.52

SNEMRATE A NEM(79)	2.5	5.0	7.5	10.0	MEAN
NONE	5.24	5.30	5.41	5.73	5.42
TELONE	5.36	5.49	5.80	5.80	5.62
MEAN	5.30	5.40	5.61	5.76	5.52

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81/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	5.23	5.43	5.61	5.66	5.48
OXAMYL	5.37	5.37	5.61	5.86	5.55
MEAN	5.30	5.40	5.61	5.76	5.52

A NEM(79)	SNEMRATE S NEM(79)	2.5	5.0	7.5	10.0
NONE	ALDICARB	5.12	5.51	5.26	5.66
	OXAMYL	5.35	5.10	5.57	5.79
TELONE	ALDICARB	5.34	5.35	5.96	5.66
	OXAMYL	5.39	5.64	5.65	5.94

RATE NONE 5.22

GRAND MEAN 5.48

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

TABLE	A NEM(79)	S NEM(79)	SNEMRATE	A NEM(79) S NEM(79)
SED	0.142	0.142	0.200	0.200

TABLE	A NEM(79) SNEMRATE	S NEM(79) SNEMRATE	A NEM(79) S NEM(79) SNEMRATE
SED	0.283	0.283	0.400

SED FOR RATE NONE V ANY MEAN IN
A NEM(79).S NEM(79).SNEMRATE TABLE IS 0.347

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

STRATUM	DF	SE	CV%
BLOCK.WP	49	0.566	10.3

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00168

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81/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 11th year, forage maize.

For previous years see 71/W/CS/66(t), 72/W/CS/66(t) and 73-80/W/CS/66.

Design: 4 blocks of 2 plots split into 4.

Whole plot dimensions: 2.13 x 16.5.

Treatments: All combinations of:-

Whole plots

1. DAZOMET(79) Dazomet (kg per annum) cumulative 1971-79, residual 1980-81:

0
450

Sub plots

2. N Nitrogen fertiliser (kg N as 'Nitro-Chalk') cumulative 1971-81:

50	50 to seedbed
100	100 to seedbed
150	150 to seedbed
50+100	100 to seedbed, 50 four weeks before sowing (before 1978 this treatment received 100 to seedbed, 50 five weeks after emergence)

Basal applications: Manures: (0:14:28) at 630 kg. Weedkiller: Atrazine at 1.1 l in 280 l.

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

Cultivations, etc.:- Ploughed: 21 Nov, 1980. Early N applied: 15 Apr, 1981. Spring-tine cultivated: 22 Apr. PK applied: 23 Apr. Spring-tine cultivated with crumbler attached, weedkiller applied and harrowed in: 11 May. Seed sown: 12 May. Seedbed N applied: 14 May. Hand harvested: 13 Oct.

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

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81/W/CS/66

FORAGE DRY MATTER TONNES/HECTARE

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

DAZOMET(79)	N	50	100	150	50+100	MEAN
	0	13.09	15.38	15.86	16.27	15.15
	450	11.74	16.23	17.51	15.72	15.30
	MEAN	12.42	15.80	16.69	15.99	15.23

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

TABLE	DAZOMET(79)	N DAZOMET(79) N
SED	0.318	0.881 1.125
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:		
DAZOMET(79)		1.246

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	18	1.762	11.6

GRAIN MEAN DM% 29.3

SUB PLOT AREA HARVESTED 0.00039

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81/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 tenth year, s. barley, s. wheat, s. oats.

For previous years see 72/W/CS/99(t) and 73-80/W/CS/99.

Design: 2 randomised blocks of 9 plots, 5 of which are split into 2.

Whole plot dimensions: 5.34 x 15.2.

Treatments: All combinations of:-

Whole plots

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

	1968-71	72	73	74	75	76	77	78	79	80	81
B 8(S)	B	F	BE	B	B	B	B	B	B(S)	B	B
B 6	B	B	B	F	BE	B	B	B	B	B	B
B 5(SI)	B	B	B	B	F	BE	B	B	B(SI)	B	B
B 4(I)	B	B	B	B	B	F	BE	B	B(I)	B	B
W 7	B	B	F	BE	B	B	B	B	B	B	W

Sub plots

2. INOCULUM Take-all inoculum:

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

plus four extra plots testing crop sequences alone:

EXTRA

	1968-71	72	73	74	75	76	77	78	79	80	81
	B	F	B	B	B	B	B	B	F	BE	0
B 14	B	B	B	B	B	B	B	B	B	B	B
B 2	B	B	B	B	B	B	F	BE	0	B	B
B 1	B	B	B	B	B	B	B	F	BE	0	B

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

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81/W/CS/99

Standard applications:
All crops: Manures: (20:10:10) at 500 kg. N at 30 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 280 l with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: S. barley: Triumph, dressed with ethirimol, sown at 160 kg.
S. oats: Panema, sown at 180 kg.
S. wheat: Timmo, sown at 190 kg.

Cultivations, etc.:-
All crops: Ploughed: 21 Nov, 1980. NPK applied: 26 Feb, 1981. Spring-tine cultivated with crumbler attached: 27 Feb, 6 Apr. Rotary harrowed s. barley plots only: 6 Apr. S. barley and s. oats, seed sown: 6 Apr. Seed with inoculum treatment applied, rotary harrowed, and seed sown, s. wheat plots only: 7 Apr. Weedkillers with fungicide applied: 30 May. N applied: 1 June. Combine harvested, s. barley: 29 Aug, s. wheat: 2 Sept, s. oats: 3 Sept.

NOTES: (1) Soil samples were taken before treatments were applied for estimates of Heterodera avenae cysts and eggs and incidence of microflora.
(2) Plant samples were taken in July for incidence of take-all.

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81/W/CS/99

GRAIN TONNES/HECTARE

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

TREATMNT / INOCULUM	B 8(S)	B 6	B 5(SI)	B 4(I)	W 7	MEAN
0	3.13	3.71	2.47	3.67	2.19	3.03
I	2.67	4.04	2.75	2.86	1.44	2.75
MEAN	2.90	3.87	2.61	3.26	1.81	2.89

EXTRA	B 14	B 2	B 1	MEAN
	2.78	4.75	4.33	3.96

GRAND MEAN 3.29

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

TABLE	EXTRA	INOCULUM	TREATMNT	INOCULUM TREATMNT
SED	0.675	0.232	0.675	0.769

EXCEPT WHEN COMPARING MEANS WITHIN THE SAME LEVEL(S) OF:
TREATMNT 0.519

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.675	20.5
BLOCK.WP.SP	11	0.519	15.8

GRAIN MEAN DM% 83.6

SUB PLOT AREA HARVESTED 0.00193

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81/R/CS/130

EFFECTS OF EARTHWORM INOCULATION

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

Sponsor: J.R. Lofty.

The eighth year, ley.

For previous years see 74-80/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 on 1 Dec, 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: 18 Nov, 1980. NK applied: 20 Mar, 1981, 5 June, 11 Aug. Cut: 4 June, 5 Aug, 3 Nov.

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81/R/CS/130

1ST CUT (4/6/81) DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	5.03	5.20	5.04	5.81	5.27

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

TABLE	WORMSPEC
SED	0.560

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.686	13.0

1ST CUT MEAN DM% 20.3

2ND CUT(5/8/81)DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	2.19	2.06	2.45	2.45	2.29

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

TABLE	WORMSPEC
SED	0.288

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.353	15.4

2ND CUT MEAN DM% 28.8

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81/R/CS/130

3RD CUT(3/11/81)DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	1.15	1.17	1.24	0.99	1.14

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

TABLE	WORMSPEC
SED	0.153

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.188	16.5

3RD CUT MEAN DM% 29.7

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

WORMSPEC	NONE	ALLOLOBO	LUMBRICU	SIX SPEC	MEAN
	8.37	8.43	8.73	9.25	8.70

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

TABLE	WORMSPEC
SED	0.682

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.836	9.6

TOTAL OF 3 CUTS MEAN DM% 26.3

PLOT AREA HARVESTED 0.00046

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81/R/CS/133

CONTROL OF PATHOGENS

Object: To study the effects of a range of chemicals on incidence of pathogens and yield of continuous maize - Long Hoos VI/VII 6.

Sponsors: A.J. Barnard, K.E. Fletcher, D.J. Hooper, D. Hornby, R.T. Plumb, T.D. Williams, J.C. Wilson.

The eighth year, forage maize.

For previous years see 74-80/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 & 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 fertiliser (kg N):
	50	
	100	
	150	

NOTE: Treatment sprays were applied in 340 l.

Basal applications: Weedkillers: Atrazine at 1.7 kg plus paraquat at 0.42 kg ion in 340 l.

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

Cultivations, etc.:- Stover from the previous crop incorporated by rotary cultivator: 24 Oct, 1980. Ploughed: 4 Dec. Spring-tine cultivated: 1 June, 1981. Treatments applied, power harrowed, seed sown: 4 June. Weedkillers applied: 5 June. N applied: 17 June. Harvested by hand: 2 Nov.

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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81/R/CS/133

FORAGE MAIZE DRY MATTER TONNES/HECTARE

GRAIN TONNES/HECTARE

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

N	50	100	150	MEAN
CHEMICAL				
NONE	7.36	8.52	8.85	8.24
ALDICARB	8.57	8.58	8.80	8.65
BENOMYL	7.54	8.52	9.31	8.46
DAZOMET	8.63	8.85	10.30	9.26
PERMETH	7.35	9.25	8.52	8.37
PHORATE	7.44	8.46	8.45	8.11
PIRIMICA	7.42	7.85	8.96	8.08
BE+DA+PH	8.38	9.51	10.00	9.30
MEAN	7.78	8.67	9.12	8.52

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

TABLE	CHEMICAL	N	CHEMICAL N	
SED	0.413		0.783	MIN REP
	0.358	0.272	0.678	MAX-MIN
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CHEMICAL			0.815	MIN REP
			0.577	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	0.506	5.9
BLOCK.WP.SP	38	0.999	11.7

GRAIN MEAN DM% 20.8

SUB PLOT AREA HARVESTED 0.00059

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81/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 seventh year, s. barley.

For previous years see 74-80/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments, applied cumulatively 1974-79 except WEEDKLLR(1) - 1974 and 1976 only and WEEDKLLR(2) - 1980 and 1981 only:

All combinations of:-

1. FUNGCIDE	Fungicide:
NONE	None
BENOMYL	Benomyl at 4 kg to the seedbed
2. INSCTCDE	Insecticide:
NONE	None
CHLORFEN	Chlorfenvinphos at 2 kg to the seedbed
3. NEMACIDE	Nematicide:
NONE	None
ALDICARB	Aldicarb at 6 kg to the seedbed as granules
4. WEEDKLLR(1)	Weedkiller in spring:
NONE	None
CHLORTOL	Chlortoluron at 2 kg soon after sowing, applied 1974 and 1976 only
5. WEEDKLLR(2)	Weedkiller in autumn:
NONE	None
GLYPHOS	Glyphosate at 1.5 kg to stubble of 1979 and 1980 s. barley.

NOTE: Glyphosate was applied in 340 l on 25 Sept, 1980. Other treatments were applied on 8 Apr, 1981.

Basal applications: Manures: 'Nitro-Chalk' at 520 kg.

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

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81/R/CS/140

Cultivations, etc.:- Ploughed: 24 Nov, 1980. N applied, spring-tine cultivated: 20 Mar, 1981. Power harrowed, seed sown: 8 Apr. Combine harvested: 27 Aug.

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

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE	CHLORFEN	MEAN
FUNGCIDE			
NONE	6.04	6.19	6.12
BENOMYL	6.17	6.31	6.24
MEAN	6.10	6.25	6.18

NEMACIDE	NONE	ALDICARB	MEAN
FUNGCIDE			
NONE	5.98	6.26	6.12
BENOMYL	6.12	6.36	6.24
MEAN	6.05	6.31	6.18

NEMACIDE	NONE	ALDICARB	MEAN
INSCTCDE			
NONE	5.94	6.27	6.10
CHLORFEN	6.16	6.35	6.25
MEAN	6.05	6.31	6.18

WEEDKLLR(1)	NONE	CHLORTOL	MEAN
FUNGCIDE			
NONE	6.04	6.20	6.12
BENOMYL	6.22	6.26	6.24
MEAN	6.13	6.23	6.18

WEEDKLLR(1)	NONE	CHLORTOL	MEAN
INSCTCDE			
NONE	6.10	6.11	6.10
CHLORFEN	6.16	6.35	6.25
MEAN	6.13	6.23	6.18

WEEDKLLR(1)	NONE	CHLORTOL	MEAN
NEMACIDE			
NONE	5.86	6.24	6.05
ALDICARB	6.40	6.22	6.31
MEAN	6.13	6.23	6.18

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81/R/CS/140

GRAIN TONNES/HECTARE

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

WEEDKLLR(2)	NONE	GLYPHOS	MEAN
FUNGCIDE			
NONE	6.10	6.14	6.12
BENOMYL	6.25	6.22	6.24
MEAN	6.18	6.18	6.18

WEEDKLLR(2)	NONE	GLYPHOS	MEAN
INSCTCDE			
NONE	6.07	6.14	6.10
CHLORFEN	6.29	6.22	6.25
MEAN	6.18	6.18	6.18

WEEDKLLR(2)	NONE	GLYPHOS	MEAN
NEMACIDE			
NONE	6.01	6.08	6.05
ALDICARB	6.34	6.28	6.31
MEAN	6.18	6.18	6.18

WEEDKLLR(2)	NONE	GLYPHOS	MEAN
WEEDKLLR(1)			
NONE	6.16	6.10	6.13
CHLORTOL	6.19	6.26	6.23
MEAN	6.18	6.18	6.18

INSCTCDE	NONE		CHLORFEN	
NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
FUNGCIDE				
NONE	5.86	6.23	6.10	6.28
BENOMYL	6.02	6.31	6.21	6.41

INSCTCDE	NONE		CHLORFEN	
WEEDKLLR(1)	NONE	CHLORTOL	NONE	CHLORTOL
FUNGCIDE				
NONE	5.91	6.18	6.17	6.22
BENOMYL	6.30	6.03	6.14	6.48

NEMACIDE	NONE		ALDICARB	
WEEDKLLR(1)	NONE	CHLORTOL	NONE	CHLORTOL
FUNGCIDE				
NONE	5.85	6.11	6.23	6.29
BENOMYL	5.87	6.37	6.58	6.15

NEMACIDE	NONE		ALDICARB	
WEEDKLLR(1)	NONE	CHLORTOL	NONE	CHLORTOL
INSCTCDE				
NONE	5.79	6.09	6.42	6.12
CHLORFEN	5.93	6.39	6.38	6.31

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81/R/CS/140

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE		CHLORFEN	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
FUNGCIDE				
NONE	6.12	5.97	6.07	6.31
BENOMYL	6.01	6.32	6.50	6.13

NEMACIDE	NONE		ALDICARB	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
FUNGCIDE				
NONE	5.93	6.03	6.27	6.25
BENOMYL	6.10	6.13	6.41	6.32

NEMACIDE	NONE		ALDICARB	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
INSCTCDE				
NONE	5.82	6.06	6.32	6.23
CHLORFEN	6.21	6.10	6.36	6.34

WEEDKLLR(1)	NONE		CHLORTOL	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
FUNGCIDE				
NONE	6.09	5.99	6.10	6.29
BENOMYL	6.23	6.21	6.28	6.23

WEEDKLLR(1)	NONE		CHLORTOL	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
INSCTCDE				
NONE	6.04	6.17	6.09	6.12
CHLORFEN	6.28	6.04	6.29	6.40

WEEDKLLR(1)	NONE		CHLORTOL	
WEEDKLLR(2)	NONE	GLYPHOS	NONE	GLYPHOS
NEMACIDE				
NONE	5.80	5.92	6.23	6.25
ALDICARB	6.52	6.29	6.16	6.28

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

MARGINS OF TWO FACTOR TABLES	0.155
TWO FACTOR TABLES	0.220
THREE FACTOR TABLES	0.311

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

STRATUM	DF	SE	CV%
WP	6	0.439	7.1

GRAIN MEAN DM% 87.4

PLOT AREA HARVESTED 0.00075

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81/R/CS/165

SCLEROTINIA CONTROL

Object: To study the effects of two fungicides and paraquat on the incidence of Sclerotinia and on yield of red and white clover - Little Knott I.

Sponsor: J.F. Jenkyn.

The fourth year of treatments, red and white clover.

For previous years see 78-80/R/CS/165.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

1. VARIETY		Varieties and their resistance to Sclerotinia trifoliorum:
	BLANC WR	Blanca, white clover, resistant
	SABED WS	Sabeda, white clover, susceptible
	HUNGA RR	Hungaropoly, red clover, resistant
	SABTO RS	Sabtoron, red clover, susceptible
2. TREATMNT		Chemical sprays and timing (cumulative):
	NONE	None
	IPROD E	Iprodione early period, 26 Sept, 1980 and 4 Nov.
	IPROD M	Iprodione mid period, 4 Nov and 27 Nov.
	IPROD L	Iprodione late period, 27 Nov and 18 Dec.
	IPROD A	Iprodione all periods, 26 Sept, 4 Nov, 27 Nov, 18 Dec, 1980, 26 Jan, 1981
	BENOMY A	Benomyl all periods, 26 Sept, 4 Nov, 27 Nov, 18 Dec, 1980, 26 Jan, 1981
	PARAQ W	Paraquat, 27 Nov, 1979 and 2 Apr, 1981

plus two extra treatments (cumulative):

	EXTRA	
	SABED PS	Sabeda, sprayed paraquat in spring, 2 Apr, 1981
	SABTO PS	Sabtoron, sprayed paraquat in spring, 2 Apr

NOTES: (1) Chemical treatments were applied, in 340 l, as follows:- Iprodione at 0.50 kg, benomyl at 0.50 kg (both applied with 'Spreadite', a wetting agent, at 0.25 kg). Paraquat at 0.28 kg ion.

(2) On 27 Nov one of the replicates of the treatment combinations of HUNGA RR with NONE and IPROD M received paraquat in error and one of the replicates of the treatment combinations of HUNGA RR and SABTO RS with PARAQ W did not receive paraquat by the same error. The omitted treatment was applied on 8 Dec.

(3) The proportion of weeds to clover was assessed.

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81/R/CS/165

Basal applications: Manures: (0:14:28) at 540 kg. Weedkiller: Propyzamide at 0.7 kg in 340 l.

Cultivations, etc.:- Weedkiller applied: 26 Sept, 1980. PK applied: 4 Dec. Cut: 6 July, 1981.

1ST CUT (6/7/81) DRY MATTER TONNES/HECTARE

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

VARIETY / TREATMNT	BLANC WR	SABED WS	HUNGA RR	SABTO RS	MEAN
NONE	3.90	3.62	5.23	5.32	4.52
IPROD E	3.64	3.38	6.18	4.52	4.43
IPROD M	3.73	4.11	5.00	5.59	4.61
IPROD L	3.31	3.45	5.60	4.51	4.22
IPROD A	3.35	3.94	5.35	6.08	4.68
BENOMY A	4.55	4.67	5.32	6.02	5.14
PARQ W	3.60	4.21	5.07	4.54	4.35
MEAN	3.72	3.91	5.39	5.23	4.56

EXTRA	SABED PS	SABTO PS	MEAN
	3.49	3.87	3.68

GRAND MEAN 4.50

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

TABLE	EXTRA	TREATMNT	VARIETY	TREATMNT VARIETY & EXTRA
SED	0.735	0.368	0.278	0.735

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.735	16.3

1ST CUT MEAN DM% 22.2

PLOT AREA HARVESTED 0.00028

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81/W/CS/174

SOWING DATES AND CCN

Object: To study the residual effects of sowing date, a nematicide, a soil sterilant and previous cropping on the incidence of cereal cyst-nematode (Heterodera avenae) (CCN) and on the yield of s. oats in a soil known to contain a fungal parasite of the nematode - Woburn, Butt Close.

Sponsor: B.R. Kerry.

The seventh year, s. oats.

For previous years see 75/W/M/1 and 76-80/W/CS/174.

Design: Single replicate of 36 plots split into 2.

Whole plot dimensions: 2.13 x 6.70.

Treatments: All combinations of:-

Whole plots

1. CROP(76)	Crop (cumulative 1975-76):
WHEAT	
BARLEY	
OATS	
2. SOW DATE(76)	Sowing date (cumulative 1975-76):
AUTUMN	
SPRING	
3. NEMACIDE(78)	Nematicide (cumulative 1975-78):
NONE	None
OXAMYL	Oxamyl at 8.8 kg
4. CROP(78)	Crop in 1977 & 1978 (all spring sown)(all spring oats in 1979-81):
WHEAT	
BARLEY	
OATS	

Sub plots

5. STERILNT	Sterilant:
NONE	None
FORMALIN	Formalin at 3000 l in 109000 l. To SOW DATE SPRING in 1976 and 1978 only. To SOW DATE AUTUMN in 1977 only.

Basal applications: Manures: (20:10:10) at 500 kg, N at 70 kg as 'Nitro-Chalk'. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 280 l.

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81/W/CS/174

Irrigation (mm water):

12 June	15
19 June	20
25 June	20
1 July	12.5
2 July	12.5
9 July	23
16 July	23
30 July	22
Total	148

Seed: Peniarth, sown at 180 kg.

Cultivations, etc.:- Ploughed: 5 Jan, 1981. NPK applied: 27 Feb. Spring-tine cultivated with crumbler attached: 27 Feb, 6 Apr. Seed sown: 8 Apr. Weedkillers applied: 14 May. N applied: 20 May. Combine harvested: 28 Aug.

NOTE: Numbers of cereal cyst-nematodes in soil in April were counted.

GRAIN TONNES/HECTARE

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

SOW DATE(76)	AUTUMN	SPRING	MEAN
CROP(76)			
WHEAT	2.31	2.49	2.40
BARLEY	2.41	2.59	2.50
OATS	2.51	2.40	2.46
MEAN	2.41	2.49	2.45

NEMACIDE(78)	NONE	OXAMYL	MEAN
CROP(76)			
WHEAT	2.42	2.38	2.40
BARLEY	2.45	2.55	2.50
OATS	2.46	2.45	2.46
MEAN	2.44	2.46	2.45

NEMACIDE(78)	NONE	OXAMYL	MEAN
SOW DATE(76)			
AUTUMN	2.39	2.43	2.41
SPRING	2.50	2.49	2.49

CROP(78)	WHEAT	BARLEY	OATS	MEAN
CROP(76)				
WHEAT	2.31	2.58	2.31	2.40
BARLEY	2.42	2.53	2.54	2.50
OATS	2.49	2.66	2.22	2.46
MEAN	2.41	2.59	2.36	2.45

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81/W/CS/174

GRAIN TONNES/HECTARE

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

CROP(78) / SOW DATE(76)	WHEAT	BARLEY	OATS	MEAN
AUTUMN	2.44	2.48	2.30	2.41
SPRING	2.37	2.70	2.41	2.49
MEAN	2.41	2.59	2.36	2.45

CROP(78) / NEMACIDE(78)	WHEAT	BARLEY	OATS	MEAN
NONE	2.48	2.51	2.34	2.44
OXAMYL	2.33	2.68	2.37	2.46
MEAN	2.41	2.59	2.36	2.45

STERILNT / CROP(76)	NONE	FORMALIN	MEAN
WHEAT	2.47	2.33	2.40
BARLEY	2.59	2.40	2.50
OATS	2.51	2.40	2.46
MEAN	2.53	2.38	2.45

STERILNT / SOW DATE(76)	NONE	FORMALIN	MEAN
AUTUMN	2.50	2.32	2.41
SPRING	2.56	2.43	2.49
MEAN	2.53	2.38	2.45

STERILNT / NEMACIDE(78)	NONE	FORMALIN	MEAN
NONE	2.60	2.28	2.44
OXAMYL	2.45	2.47	2.46
MEAN	2.53	2.38	2.45

STERILNT / CROP(78)	NONE	FORMALIN	MEAN
WHEAT	2.48	2.33	2.41
BARLEY	2.71	2.47	2.59
OATS	2.38	2.33	2.36
MEAN	2.53	2.38	2.45

SOW DATE(76)	AUTUMN		SPRING	
NEMACIDE(78)	NONE	OXAMYL	NONE	OXAMYL
CROP(76)				
WHEAT	2.34	2.28	2.50	2.48
BARLEY	2.27	2.54	2.62	2.55
OATS	2.55	2.48	2.37	2.43

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81/W/CS/174

GRAIN TONNES/HECTARE

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

SOW DATE(76)	AUTUMN			SPRING		
CROP(78)	WHEAT	BARLEY	OATS	WHEAT	BARLEY	OATS
CROP(76)						
WHEAT	2.29	2.50	2.13	2.33	2.65	2.49
BARLEY	2.38	2.32	2.51	2.46	2.74	2.56
OATS	2.66	2.62	2.26	2.31	2.70	2.18

NEMACIDE(78)	NONE			OXAMYL		
CROP(78)	WHEAT	BARLEY	OATS	WHEAT	BARLEY	OATS
CROP(76)						
WHEAT	2.30	2.50	2.47	2.33	2.66	2.15
BARLEY	2.53	2.33	2.47	2.31	2.73	2.60
OATS	2.61	2.69	2.08	2.37	2.63	2.36

NEMACIDE(78)	NONE			OXAMYL		
CROP(78)	WHEAT	BARLEY	OATS	WHEAT	BARLEY	OATS
SOW DATE(76)						
AUTUMN	2.58	2.24	2.34	2.31	2.72	2.26
SPRING	2.38	2.77	2.34	2.36	2.63	2.49

SOW DATE(76)	AUTUMN		SPRING	
STERILNT	NONE	FORMALIN	NONE	FORMALIN
CROP(76)				
WHEAT	2.32	2.29	2.62	2.36
BARLEY	2.62	2.19	2.57	2.60
OATS	2.55	2.48	2.48	2.32

NEMACIDE(78)	NONE		OXAMYL	
STERILNT	NONE	FORMALIN	NONE	FORMALIN
CROP(76)				
WHEAT	2.58	2.26	2.36	2.40
BARLEY	2.63	2.26	2.55	2.54
OATS	2.60	2.32	2.43	2.48

NEMACIDE(78)	NONE		OXAMYL	
STERILNT	NONE	FORMALIN	NONE	FORMALIN
SOW DATE(76)				
AUTUMN	2.54	2.24	2.46	2.40
SPRING	2.67	2.32	2.44	2.54

CROP(78)	WHEAT		BARLEY		OATS	
STERILNT	NONE	FORMALIN	NONE	FORMALIN	NONE	FORMALIN
CROP(76)						
WHEAT	2.43	2.20	2.60	2.56	2.39	2.23
BARLEY	2.66	2.18	2.59	2.47	2.53	2.54
OATS	2.36	2.62	2.95	2.37	2.23	2.22

CROP(78)	WHEAT		BARLEY		OATS	
STERILNT	NONE	FORMALIN	NONE	FORMALIN	NONE	FORMALIN
SOW DATE(76)						
AUTUMN	2.59	2.30	2.52	2.45	2.38	2.22
SPRING	2.37	2.37	2.91	2.49	2.39	2.43

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81/W/CS/174

GRAIN TONNES/HECTARE

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

CROP(78)	WHEAT		BARLEY		OATS	
STERILNT	NONE	FORMALIN	NONE	FORMALIN	NONE	FORMALIN
NEMACIDE(78)						
NONE	2.67	2.29	2.72	2.29	2.42	2.26
OXAMYL	2.29	2.38	2.71	2.64	2.34	2.40

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

TABLE	CROP(76)	SOW DATE(76)	NEMACIDE(78)	CROP(78)
SED	0.070	0.057	0.057	0.070

TABLE	STERILNT	CROP(76) SOW DATE(76)	CROP(76) SOW DATE(76) NEMACIDE(78)	NEMACIDE(78)
SED	0.083	0.099	0.099	0.081

TABLE	CROP(76) CROP(78)	SOW DATE(76) CROP(78)	NEMACIDE(78) CROP(78)	CROP(76) STERILNT
SED	0.122	0.099	0.099	0.124
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROP(76)				0.145

TABLE	SOW DATE(76) STERILNT	NEMACIDE(78) STERILNT	CROP(78) STERILNT	CROP(76) SOW DATE(76) NEMACIDE(78)
SED	0.101	0.101	0.124	0.140
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
SOW DATE(76)	0.118			
NEMACIDE(78)		0.118		
CROP(78)			0.145	

TABLE	CROP(76) SOW DATE(76) CROP(78)	CROP(76) NEMACIDE(78) CROP(78)	CROP(76) NEMACIDE(78) CROP(78)	CROP(76) SOW DATE(76) STERILNT
SED	0.172	0.172	0.140	0.175
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROP(76).SOW DATE(76)				0.205

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81/W/CS/174

GRAIN TONNES/HECTARE

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

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

TABLE	CROP(76) NEMACIDE(78) STERILNT	SOW DATE(76) NEMACIDE(78) STERILNT	CROP(76) CROP(78) STERILNT	SOW DATE(76) CROP(78) STERILNT
SED	0.175	0.143	0.215	0.175
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
CROP(76).NEMACIDE(78)	0.205			
SOW DATE(76).NEMACIDE(78)		0.167		
CROP(76).CROP(78)			0.250	
SOW DATE(76).CROP(78)				0.205

TABLE	NEMACIDE(78) CROP(78) STERILNT
SED	0.175
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:	
NEMACIDE(78).CROP(78)	0.205

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

STRATUM	DF	SE	CV%
WP	4	0.172	7.0
WP.SP	16	0.354	14.5

GRAIN MEAN DM% 75.6

SUB PLOT AREA HARVESTED 0.00041

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81/R/CS/200 and 81/W/CS/200

FACTORS AFFECTING YIELD

Object: To study some of the factors limiting yield of grass, clover and lucerne - Rothamsted (R), Pastures and Woburn (W), Butt Furlong.

Sponsors: J.M. Day, I.F. Henderson, J.F. Jenkyn, A.E. Johnston, B.J. Legg, J. McEwen, R.T. Plumb, A.M. Spaull, J.F. Witty.

The fifth year, ryegrass, white clover, lucerne.

For previous years see 77-80/R&W/CS/200.

Design: Single replicate of 2 plots split into 50.

Whole plot dimensions: Pastures (R): 23.8 x 24.5.
Butt Furlong (W): 22.3 x 24.5.

Treatments: Combinations of:-

Whole plots

1. IRRIGATN — Irrigation:

NONE	None
FULL	Irrigated to reduce a soil moisture deficit of 25 mm to zero

Sub plots

2. TREATMNT — Treatments, combinations of:

Species:

- Ryegrass, S.23, (RG)
- Ryegrass, S.23 + Clover, Blanca (GB)
- Ryegrass, S.23 + Clover, S.100 (GS)
- Clover, Blanca (CL)
- Lucerne, Vertus (LU)

Cutting frequencies:

- Three times (3)
- Six times (6)

Amounts of nitrogen fertiliser (kg N total per annum, applied as (25:0:16)):

- 0, 100, 200, 300, 400, 500, 600 (N0, N1, N2, N3, N4, N5, N6)

Times of applying nitrogen fertiliser:

- Not applied (--), N0 only
- Divided equally between cuts (DE)
- In spring only (SP)
- Half in spring, half in summer (SS)

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81/R/CS/200 and 81/W/CS/200

Control of pathogens:

None (-)
Controlled (C)

The following combinations are tested:

RG6N0---	GB3N0--- (duplicated)	CL3N0--- (duplicated)
RG6N1DE-	GB3N1DE-	CL3N2DE- "
RG6N2DE-	GB3N2DE-	CL3N0--C "
RG6N3DE-	GB3N3DE-	CL3N2DEC "
RG6N4DE-	GB3N4DE-	
RG6N5DE-		LU3N0--- "
RG6N6DE-	GB3N0--C	LU3N0--C "
	GB3N1DEC	
GB6N0---	GB3N2DEC	
GB6N1DE-	GB3N3DEC	
GB6N2DE-	GB3N4DEC	
GB6N3DE-		
GB6N4DE-	GB3N1SP- (duplicated)	
	GB3N1SS- "	
GS6N0---	GB3N2SS "	
GS6N1DE-		
GS6N2DE-	RG3N2DE- "	
GS6N3DE-	RG3N2DEC "	
GS6N4DE-		

NOTES: (1) Pathogen control consisted of:- (1) Aldicarb at 10 kg applied in the spring except to LU 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 from October.

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

Pastures (R)		Butt Furlong (W)	
18 June	25	19 May	25
2 July	25	12 June	12.5
8 July	25	19 June	12.5
2 Sept	25	25 June	25
		9 July	20
Total	100	16 July	12.5
		5 Aug	12.5
		20 Aug	25
		3 Sept	25
		Total	170

(3) N0 plots received 192 kg K20, as muriate of potash, after the fourth cutting occasion.

Standard applications:
Pastures (R) All plots: Manures: (0:14:28) at 1070 kg. Weedkillers: Propyzamide at 0.70 kg in 700 l to CL and LU plots only. Dicamba with mecoprop and MCPA (as 'Tetralex Plus' at 4.2 l) in 340 l to RG plots only.

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81/R/CS/200 and 81/W/CS/200

Butt Furlong (W) All plots: Manures: Magnesian limestone at 2.5 t, (0:14:28) at 1080 kg. Propyzamide at 0.70 kg in 700 l to CL and LU plots only. Dicamba with mecoprop and MCPA (as 'Tetralex Plus' at 4.2 l) in 340 l to RG plots only.

Seed: S23 Perennial ryegrass alone sown at 20 kg.

S23 Perennial ryegrass sown at 10 kg either with Blanca white clover sown at 4 kg or with S.100 white clover at 4 kg.

Blanca white clover alone sown at 4 kg.

Lucerne, Vertus sown at 10 kg, inoculated with Rhizobium.

Pastures (R) sown: 20 May, 1977.

Butt Furlong (W) sown: 23 May, 1977.

Cultivations, etc.:-

Pastures (R): Methiocarb applied: 2 Oct, 1980; 6 Nov, 3 Dec, 7 Jan, 1981; 5 Feb, 8 Apr, 14 May, 10 June, 9 July, 4 Aug, 3 Sept. Propyzamide applied: 13 Oct, 1980. Benomyl applied: 4 Nov, 2 Dec, 6 Jan, 1981; 4 Feb. PK applied: 21 Oct, 1980. NK applied: 5 Mar, 1981. Aldicarb applied to all C plots except LU; phorate applied to C plots of LU: 19 Mar. Weedkillers applied to RG plots: 5 May. NK, benomyl and phorate applied: 12 May, 9 June, 7 July, 4 Aug, 1 Sept. '6 cut' plots cut: 12 May, 9 June, 7 July, 4 Aug, 1 Sept, 29 Sept. '3 cut' plots cut: 9 June, 4 Aug, 29 Sept.

Butt Furlong (W): Methiocarb applied: 2 Oct, 1980; 6 Nov, 3 Dec, 8 Jan, 1981; 5 Feb, 5 Mar, 10 Apr, 14 May, 10 June, 9 July, 6 Aug, 3 Sept. Propyzamide applied: 10 Oct, 1980. Magnesian limestone applied: 24 Oct. Benomyl applied: 4 Nov, 2 Dec, 6 Jan, 1981; 5 Feb. PK applied: 4 Dec, 1980. NK applied: 5 Mar, 1981. Aldicarb applied to all C plots except LU; phorate applied to C plots of LU: 19 Mar. Weedkillers applied to RG plots: 5 May. NK, benomyl and phorate applied: 13 May, 10 June, 8 July, 5 Aug, 2 Sept. '6 cut' plots cut: 13 May, 10 June, 8 July, 5 Aug, 2 Sept, 1 Oct. '3 cut' plots cut: 10 June, 5 Aug, 1 Oct.

NOTE: Assessments of pests and diseases were made during the season. Nitrogen percentages of crop produce were measured.

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81/R/CS/200 PASTURES (R)

1ST CUTTING OCCASION (12/5/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.05	0.05	0.05
RG6N1DE-	0.25	0.16	0.20
RG6N2DE-	0.90	0.76	0.83
RG6N3DE-	0.74	0.77	0.76
RG6N4DE-	1.15	1.58	1.37
RG6N5DE-	2.04	2.09	2.07
RG6N6DE-	1.61	2.18	1.90
GB6NO---	0.51	0.33	0.42
GB6N1DE-	0.93	0.49	0.71
GB6N2DE-	0.98	1.09	1.04
GB6N3DE-	1.19	1.28	1.23
GB6N4DE-	1.30	1.13	1.22
GS6NO---	0.28	0.57	0.43
GS6N1DE-	0.63	1.00	0.82
GS6N2DE-	0.92	1.26	1.09
GS6N3DE-	1.17	1.51	1.34
GS6N4DE-	1.61	2.20	1.90
MEAN	0.96	1.09	1.02

1ST CUTTING OCCASION MEAN DM% 16.4

* USE STANDARD ERRORS ON FOLLOWING PAGES ONLY TO COMPARE TREATMNT LEVELS
GB3NO---,GB3N1SP-,GB3N1SS-,GB3N2SS-,RG3N2DE-,RG3N2DEC,
CL3NO---,CL3N2DE-,CL3NO--C,CL3N2DEC,LU3NO---,LU3NO--C
AND WITHIN THE SAME LEVEL OF IRRIGATN

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81/R/CS/200 PASTURES (R)
2ND CUTTING OCCASION (9/6/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.58	0.61	0.60
RG6N1DE-	1.37	0.93	1.15
RG6N2DE-	2.46	2.66	2.56
RG6N3DE-	4.12	3.54	3.83
RG6N4DE-	3.64	3.79	3.71
RG6N5DE-	3.81	3.16	3.48
RG6N6DE-	4.65	3.81	4.23
GB6NO---	2.84	2.60	2.72
GB6N1DE-	3.39	2.65	3.02
GB6N2DE-	3.83	3.29	3.56
GB6N3DE-	3.78	3.13	3.45
GB6N4DE-	3.22	4.18	3.70
GS6NO---	2.36	2.51	2.44
GS6N1DE-	2.76	2.56	2.66
GS6N2DE-	2.84	3.44	3.14
GS6N3DE-	2.78	3.22	3.00
GS6N4DE-	4.31	3.14	3.73
GB3NO---	3.53	1.45	2.49
GB3N1DE-	3.68	2.89	3.29
GB3N2DE-	3.91	2.91	3.41
GB3N3DE-	3.32	3.02	3.17
GB3N4DE-	4.03	3.56	3.79
GB3NO--C	4.69	4.70	4.70
GB3N1DEC	5.26	3.81	4.54
GB3N2DEC	4.41	5.02	4.72
GB3N3DEC	4.77	4.47	4.62
GB3N4DEC	5.81	3.46	4.63
GB3N1SP-	5.72	3.13	4.43
GB3N1SS-	4.35	2.58	3.46
GB3N2SS-	4.28	3.78	4.03
RG3N2DE-	4.07	3.71	3.89
RG3N2DEC	4.69	3.69	4.19
CL3NO---	1.52	1.29	1.41
CL3N2DE-	1.74	1.68	1.71
CL3NO--C	3.03	2.59	2.81
CL3N2DEC	3.37	2.56	2.96
LU3NO---	4.37	2.50	3.44
LU3NO--C	5.07	4.34	4.70
MEAN	3.68	2.99	3.34

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.343	0.485

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

STRATUM	DF	SE	CV%
WP.SP	24	0.485	14.5

2ND CUTTING OCCASION MEAN DM% 15.4

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81/R/CS/200 PASTURES (R)

3RD CUTTING OCCASION (7/7/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.32	0.29	0.30
RG6N1DE-	0.70	0.66	0.68
RG6N2DE-	1.39	1.15	1.27
RG6N3DE-	1.16	1.51	1.34
RG6N4DE-	1.41	1.76	1.59
RG6N5DE-	0.93	1.59	1.26
RG6N6DE-	0.25	1.32	0.78
GB6NO---	1.01	1.77	1.39
GB6N1DE-	1.10	1.35	1.22
GB6N2DE-	1.04	1.25	1.15
GB6N3DE-	0.90	1.34	1.12
GB6N4DE-	1.29	0.98	1.13
GS6NO---	1.10	1.27	1.18
GS6N1DE-	1.23	1.02	1.13
GS6N2DE-	1.07	1.27	1.17
GS6N3DE-	1.40	1.14	1.27
GS6N4DE-	0.37	1.32	0.85
MEAN	0.98	1.23	1.11

3RD CUTTING OCCASION MEAN DM% 19.9

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81/R/CS/200 PASTURES (R)
4TH CUTTING OCCASION (4/8/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.40	0.45	0.43
RG6N1DE-	0.77	0.78	0.78
RG6N2DE-	1.36	1.40	1.38
RG6N3DE-	2.05	1.95	2.00
RG6N4DE-	2.11	3.07	2.59
RG6N5DE-	1.77	3.77	2.77
RG6N6DE-	1.46	3.25	2.35
GB6NO---	1.42	2.15	1.78
GB6N1DE-	1.43	2.42	1.93
GB6N2DE-	1.73	2.60	2.17
GB6N3DE-	1.78	2.46	2.12
GB6N4DE-	2.11	3.38	2.74
GS6NO---	1.38	2.26	1.82
GS6N1DE-	1.45	2.36	1.91
GS6N2DE-	1.59	2.72	2.15
GS6N3DE-	1.73	2.82	2.27
GS6N4DE-	1.66	3.09	2.37
GB3NO---	2.83	3.43	3.13
GB3N1DE-	3.09	2.94	3.02
GB3N2DE-	3.04	2.67	2.86
GB3N3DE-	3.61	3.29	3.45
GB3N4DE-	3.88	3.47	3.68
GB3NO--C	3.34	3.93	3.64
GB3N1DEC	3.57	3.13	3.35
GB3N2DEC	3.72	3.85	3.79
GB3N3DEC	4.06	4.15	4.11
GB3N4DEC	3.64	4.93	4.28
GB3N1SP-	2.62	3.47	3.04
GB3N1SS-	2.69	2.93	2.81
GB3N2SS-	2.45	3.01	2.73
RG3N2DE-	3.00	3.52	3.26
RG3N2DEC	3.21	4.52	3.86
CL3NO---	2.28	2.38	2.33
CL3N2DE-	2.70	2.88	2.79
CL3NO--C	2.72	4.05	3.38
CL3N2DEC	3.05	3.46	3.26
LU3NO---	5.30	4.32	4.81
LU3NO--C	4.87	4.40	4.63
MEAN	2.67	3.16	2.92

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.355	0.502

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

STRATUM	DF	SE	CV%
WP.SP	24	0.502	17.2

4TH CUTTING OCCASION MEAN DM% 16.4

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81/R/CS/200 PASTURES (R)

5TH CUTTING OCCASION (1/9/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6N0---	0.25	0.61	0.43
RG6N1DE-	0.56	0.69	0.62
RG6N2DE-	1.19	1.15	1.17
RG6N3DE-	1.68	1.22	1.45
RG6N4DE-	2.22	2.06	2.14
RG6N5DE-	1.99	2.17	2.08
RG6N6DE-	2.16	2.22	2.19
GB6N0---	1.65	1.73	1.69
GB6N1DE-	1.65	1.71	1.68
GB6N2DE-	1.95	1.69	1.82
GB6N3DE-	2.00	1.90	1.95
GB6N4DE-	2.42	1.68	2.05
GS6N0---	1.60	1.59	1.59
GS6N1DE-	1.37	1.60	1.48
GS6N2DE-	1.15	1.69	1.42
GS6N3DE-	1.71	1.70	1.70
GS6N4DE-	2.30	1.91	2.11
MEAN	1.64	1.61	1.62

5TH CUTTING OCCASION MEAN DM% 17.9

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81/R/CS/200 PASTURES (R)
6TH CUTTING OCCASION (29/9/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.26	0.20	0.23
RG6N1DE-	0.19	0.38	0.28
RG6N2DE-	0.60	0.79	0.69
RG6N3DE-	0.77	1.27	1.02
RG6N4DE-	0.91	1.31	1.11
RG6N5DE-	0.68	1.72	1.20
RG6N6DE-	1.02	1.27	1.15
GB6NO---	0.59	1.00	0.79
GB6N1DE-	0.63	1.09	0.86
GB6N2DE-	0.64	1.27	0.95
GB6N3DE-	0.70	1.19	0.94
GB6N4DE-	0.77	1.28	1.02
GS6NO---	0.87	0.87	0.87
GS6N1DE-	0.75	0.96	0.86
GS6N2DE-	0.60	1.22	0.91
GS6N3DE-	0.51	1.32	0.91
GS6N4DE-	0.53	1.45	0.99
GB3NO---	1.96	1.71	1.84
GB3N1DE-	2.38	1.61	2.00
GB3N2DE-	2.05	1.58	1.82
GB3N3DE-	2.64	1.91	2.27
GB3N4DE-	2.60	2.38	2.49
GB3NO--C	2.28	2.43	2.35
GB3N1DEC	2.29	2.19	2.24
GB3N2DEC	2.53	2.13	2.33
GB3N3DEC	2.37	2.47	2.42
GB3N4DEC	2.65	2.24	2.45
GB3N1SP-	2.04	1.90	1.97
GB3N1SS-	2.01	1.76	1.89
GB3N2SS-	2.16	1.88	2.02
RG3N2DE-	1.88	2.66	2.27
RG3N2DEC	1.62	2.75	2.19
CL3NO---	1.31	1.54	1.43
CL3N2DE-	1.48	1.75	1.62
CL3NO--C	1.92	2.51	2.22
CL3N2DEC	2.24	2.23	2.23
LU3NO---	3.23	3.05	3.14
LU3NO--C	3.58	3.35	3.46
MEAN	1.67	1.83	1.75

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.199	0.281

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

STRATUM	DF	SE	CV%
WP.SP	24	0.281	16.0

6TH CUTTING OCCASION MEAN DM% 13.8

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81/R/CS/200 PASTURES (R)
TOTAL OF 6 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	1.87	2.20	2.04
RG6N1DE-	3.84	3.60	3.72
RG6N2DE-	7.88	7.91	7.89
RG6N3DE-	10.53	10.25	10.39
RG6N4DE-	11.45	13.57	12.51
RG6N5DE-	11.22	14.51	12.86
RG6N6DE-	11.15	14.05	12.60
GB6NO---	8.02	9.58	8.80
GB6N1DE-	9.12	9.70	9.41
GB6N2DE-	10.17	11.20	10.68
GB6N3DE-	10.35	11.28	10.82
GB6N4DE-	11.11	12.63	11.87
GS6NO---	7.58	9.08	8.33
GS6N1DE-	8.19	9.51	8.85
GS6N2DE-	8.17	11.60	9.88
GS6N3DE-	9.30	11.71	10.50
GS6N4DE-	10.78	13.12	11.95
GB3NO---	8.31	6.59	7.45
GB3N1DE-	9.16	7.45	8.30
GB3N2DE-	9.01	7.16	8.08
GB3N3DE-	9.57	8.22	8.90
GB3N4DE-	10.51	9.41	9.96
GB3NO--C	10.32	11.06	10.69
GB3N1DEC	11.12	9.13	10.12
GB3N2DEC	10.67	11.01	10.84
GB3N3DEC	11.21	11.09	11.15
GB3N4DEC	12.10	10.62	11.36
GB3N1SP-	10.38	8.50	9.44
GB3N1SS-	9.05	7.27	8.16
GB3N2SS-	8.88	8.67	8.78
RG3N2DE-	8.95	9.89	9.42
RG3N2DEC	9.52	10.96	10.24
CL3NO---	5.11	5.22	5.17
CL3N2DE-	5.92	6.30	6.11
CL3NO--C	7.66	9.15	8.41
CL3N2DEC	8.66	8.25	8.45
LU3NO---	12.91	9.86	11.39
LU3NO--C	13.51	12.08	12.80
MEAN	9.24	9.32	9.28

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.581	0.821

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

STRATUM	DF	SE	CV%
WP.SP	24	0.821	8.8

TOTAL OF 6 CUTTING OCCASIONS MEAN DM% 15.6 SUB PLOT AREA HARVESTED 0.00038

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81/W/CS/200 BUTT FURLONG (W)

1ST CUTTING OCCASION (13/5/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.07	0.08	0.07
RG6N1DE-	0.21	0.57	0.39
RG6N2DE-	0.80	0.82	0.81
RG6N3DE-	1.19	2.16	1.68
RG6N4DE-	2.10	2.31	2.20
RG6N5DE-	2.11	2.27	2.19
RG6N6DE-	2.75	2.68	2.72
GB6NO---	2.47	1.83	2.15
GB6N1DE-	2.13	2.27	2.20
GB6N2DE-	2.17	2.16	2.17
GB6N3DE-	2.84	2.09	2.47
GB6N4DE-	3.12	2.67	2.90
GS6NO---	1.89	2.54	2.21
GS6N1DE-	1.52	2.19	1.86
GS6N2DE-	1.26	1.52	1.39
GS6N3DE-	1.32	1.58	1.45
GS6N4DE-	1.98	2.45	2.21
MEAN	1.76	1.89	1.83

1ST CUTTING OCCASION MEAN DM% 19.2

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81/W/CS/200 BUTT FURLONG (W)
2ND CUTTING OCCASION (10/6/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.44	0.54	0.49
RG6N1DE-	1.09	1.43	1.26
RG6N2DE-	2.28	2.15	2.21
RG6N3DE-	2.60	3.17	2.88
RG6N4DE-	3.29	3.45	3.37
RG6N5DE-	3.15	4.28	3.71
RG6N6DE-	3.55	3.30	3.42
GB6NO---	2.51	3.22	2.86
GB6N1DE-	2.76	2.42	2.59
GB6N2DE-	2.71	2.30	2.50
GB6N3DE-	2.87	3.18	3.03
GB6N4DE-	2.45	2.91	2.68
GS6NO---	2.11	2.61	2.36
GS6N1DE-	2.66	2.78	2.72
GS6N2DE-	2.69	3.34	3.02
GS6N3DE-	2.47	3.14	2.81
GS6N4DE-	3.54	3.40	3.47
GB3NO---	3.59	3.59	3.59
GB3N1DE-	4.13	3.06	3.59
GB3N2DE-	4.32	3.91	4.12
GB3N3DE-	4.52	3.30	3.91
GB3N4DE-	2.95	3.47	3.21
GB3NO--C	3.40	4.60	4.00
GB3N1DEC	4.72	3.90	4.31
GB3N2DEC	4.03	4.10	4.07
GB3N3DEC	4.81	4.91	4.86
GB3N4DEC	5.29	6.77	6.03
GB3N1SP-	4.31	3.75	4.03
GB3N1SS-	3.80	3.24	3.52
GB3N2SS-	3.89	3.45	3.67
RG3N2DE-	4.57	5.78	5.18
RG3N2DEC	5.03	6.47	5.75
CL3NO---	3.63	3.26	3.45
CL3N2DE-	3.14	3.23	3.18
CL3NO--C	3.51	3.31	3.41
CL3N2DEC	3.98	3.76	3.87
LU3NO---	5.42	4.97	5.20
LU3NO--C	5.05	4.93	4.99
MEAN	3.62	3.70	3.66

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.419	0.593

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

STRATUM	DF	SE	CV%
WP.SP	24	0.593	16.2

2ND CUTTING OCCASION MEAN DM% 16.9

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81/W/CS/200 BUTT FURLONG (W)

3RD CUTTING OCCASION (8/7/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6N0---	0.17	0.24	0.21
RG6N1DE-	0.48	0.31	0.40
RG6N2DE-	0.62	0.86	0.74
RG6N3DE-	1.12	2.16	1.64
RG6N4DE-	1.19	2.39	1.79
RG6N5DE-	0.95	2.82	1.88
RG6N6DE-	1.28	2.48	1.88
GB6N0---	0.56	1.88	1.22
GB6N1DE-	0.95	2.16	1.55
GB6N2DE-	0.96	1.85	1.40
GB6N3DE-	1.06	1.89	1.47
GB6N4DE-	1.36	2.10	1.73
GS6N0---	0.51	1.57	1.04
GS6N1DE-	0.92	1.72	1.32
GS6N2DE-	0.77	1.78	1.28
GS6N3DE-	0.73	1.62	1.17
GS6N4DE-	1.02	2.70	1.86
MEAN	0.86	1.79	1.33

3RD CUTTING OCCASION MEAN DM% 24.7

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81/W/CS/200 BUTT FURLONG (W)
4TH CUTTING OCCASION (5/8/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.11	0.00	0.05
RG6N1DE-	0.15	0.08	0.11
RG6N2DE-	0.43	0.49	0.46
RG6N3DE-	0.59	1.38	0.99
RG6N4DE-	0.37	2.35	1.36
RG6N5DE-	0.51	2.73	1.62
RG6N6DE-	0.76	3.00	1.88
GB6NO---	1.00	2.33	1.66
GB6N1DE-	1.35	1.89	1.62
GB6N2DE-	1.19	2.13	1.66
GB6N3DE-	1.12	2.16	1.64
GB6N4DE-	1.12	2.31	1.71
GS6NO---	0.84	1.99	1.42
GS6N1DE-	0.73	1.78	1.25
GS6N2DE-	0.45	1.62	1.03
GS6N3DE-	0.52	1.64	1.08
GS6N4DE-	0.59	2.37	1.48
GB3NO---	2.06	2.55	2.30
GB3N1DE-	2.06	2.95	2.51
GB3N2DE-	1.98	3.14	2.56
GB3N3DE-	2.25	2.18	2.22
GB3N4DE-	2.46	2.31	2.39
GB3NO--C	2.34	3.84	3.09
GB3N1DEC	2.69	2.67	2.68
GB3N2DEC	3.19	3.06	3.13
GB3N3DEC	2.47	3.43	2.95
GB3N4DEC	3.05	4.08	3.56
GB3N1SP-	1.71	2.58	2.15
GB3N1SS-	2.09	2.13	2.11
GB3N2SS-	1.98	2.39	2.19
RG3N2DE-	0.95	2.29	1.62
RG3N2DEC	1.77	3.92	2.84
CL3NO---	2.05	2.40	2.23
CL3N2DE-	2.29	2.18	2.24
CL3NO--C	2.83	2.98	2.91
CL3N2DEC	2.57	3.20	2.88
LU3NO---	4.90	4.87	4.88
LU3NO--C	5.35	5.36	5.35
MEAN	1.91	2.63	2.27

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.219	0.309

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

STRATUM	DF	SE	CV%
WP.SP	24	0.309	13.6

4TH CUTTING OCCASION MEAN DM% 18.5

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81/W/CS/200 BUTT FURLONG (W)

5TH CUTTING OCCASION (2/9/81) DRY MATTER TONNES/HECTARE

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

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6N0---	0.06	0.08	0.07
RG6N1DE-	0.35	0.37	0.36
RG6N2DE-	0.55	0.78	0.66
RG6N3DE-	1.28	1.10	1.19
RG6N4DE-	1.54	1.38	1.46
RG6N5DE-	1.77	1.54	1.65
RG6N6DE-	2.06	1.36	1.71
GB6N0---	1.47	1.48	1.47
GB6N1DE-	1.67	1.20	1.43
GB6N2DE-	1.56	1.00	1.28
GB6N3DE-	1.67	1.31	1.49
GB6N4DE-	1.95	1.47	1.71
GS6N0---	1.44	1.55	1.50
GS6N1DE-	1.57	1.14	1.36
GS6N2DE-	0.86	1.20	1.03
GS6N3DE-	1.34	1.17	1.25
GS6N4DE-	1.24	1.18	1.21
MEAN	1.32	1.14	1.23

5TH CUTTING OCCASION MEAN DM% 18.7

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81/W/CS/200 BUTT FURLONG (W)
6TH CUTTING OCCASION (1/10/81) DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.05	0.10	0.07
RG6N1DE-	0.30	0.33	0.32
RG6N2DE-	0.57	0.52	0.54
RG6N3DE-	0.95	1.51	1.23
RG6N4DE-	0.96	1.70	1.33
RG6N5DE-	1.15	1.83	1.49
RG6N6DE-	0.96	1.60	1.28
GB6NO---	0.97	0.96	0.97
GB6N1DE-	0.68	0.77	0.72
GB6N2DE-	0.96	0.96	0.96
GB6N3DE-	1.06	0.81	0.93
GB6N4DE-	0.80	1.17	0.99
GS6NO---	0.87	1.05	0.96
GS6N1DE-	0.82	1.13	0.97
GS6N2DE-	0.93	1.26	1.09
GS6N3DE-	1.14	1.51	1.33
GS6N4DE-	1.16	1.37	1.26
GB3NO---	1.27	1.82	1.55
GB3N1DE-	1.41	1.58	1.50
GB3N2DE-	1.73	2.03	1.88
GB3N3DE-	1.79	1.53	1.66
GB3N4DE-	1.90	1.44	1.67
GB3NO--C	2.47	2.35	2.41
GB3N1DEC	2.04	2.17	2.11
GB3N2DEC	2.19	2.50	2.35
GB3N3DEC	1.99	2.57	2.28
GB3N4DEC	2.16	3.66	2.91
GB3N1SP-	1.51	1.25	1.38
GB3N1SS-	1.33	1.20	1.26
GB3N2SS-	1.83	1.57	1.70
RG3N2DE-	1.60	2.23	1.92
RG3N2DEC	2.04	2.91	2.47
CL3NO---	1.43	1.44	1.44
CL3N2DE-	1.31	1.59	1.45
CL3NO--C	2.03	2.29	2.16
CL3N2DEC	1.92	2.21	2.07
LU3NO---	3.01	3.10	3.05
LU3NO--C	3.06	2.95	3.00
MEAN	1.53	1.75	1.64

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.197	0.279

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

STRATUM	DF	SE	CV%
WP.SP	24	0.279	17.0

6TH CUTTING OCCASION MEAN DM% 13.2

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81/W/CS/200 BUTT FURLONG (W)
TOTAL OF 6 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE
***** TABLES OF MEANS *****

IRRIGATN TREATMNT	NONE	FULL	MEAN
RG6NO---	0.90	1.03	0.96
RG6N1DE-	2.58	3.10	2.84
RG6N2DE-	5.25	5.61	5.43
RG6N3DE-	7.73	11.48	9.60
RG6N4DE-	9.44	13.58	11.51
RG6N5DE-	9.63	15.47	12.55
RG6N6DE-	11.36	14.42	12.89
GB6NO---	8.97	11.71	10.34
GB6N1DE-	9.54	10.69	10.11
GB6N2DE-	9.55	10.39	9.97
GB6N3DE-	10.61	11.44	11.03
GB6N4DE-	10.80	12.63	11.72
GS6NO---	7.66	11.31	9.49
GS6N1DE-	8.22	10.74	9.48
GS6N2DE-	6.96	10.73	8.84
GS6N3DE-	7.53	10.67	9.10
GS6N4DE-	9.52	13.47	11.50
GB3NO---	6.92	7.96	7.44
GB3N1DE-	7.61	7.59	7.60
GB3N2DE-	8.03	9.09	8.56
GB3N3DE-	8.55	7.02	7.79
GB3N4DE-	7.32	7.22	7.27
GB3NO--C	8.21	10.79	9.50
GB3N1DEC	9.44	8.74	9.09
GB3N2DEC	9.41	9.67	9.54
GB3N3DEC	9.28	10.91	10.09
GB3N4DEC	10.50	14.51	12.50
GB3N1SP-	7.53	7.58	7.56
GB3N1SS-	7.22	6.56	6.89
GB3N2SS-	7.70	7.41	7.56
RG3N2DE-	7.11	10.30	8.71
RG3N2DEC	8.83	13.30	11.07
CL3NO---	7.11	7.11	7.11
CL3N2DE-	6.75	7.00	6.87
CL3NO--C	8.37	8.58	8.48
CL3N2DEC	8.47	9.17	8.82
LU3NO---	13.33	12.94	13.13
LU3NO--C	13.45	13.24	13.35
MEAN	8.40	9.73	9.07

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

TABLE	TREATMNT*	IRRIGATN* TREATMNT
SED	0.583	0.824

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

STRATUM	DF	SE	CV%
WP.SP	24	0.824	9.1

TOTAL OF 6 CUTTING OCCASIONS MEAN DM% 16.8 SUB PLOT AREA HARVESTED 0.00038

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81/R/CS/202

EFFECTS OF PHIALOPHORA

Object: To study the effects of ryegrass, oats and wheat, and of soil inoculation on populations of Phialophora radicicola graminicola (Prg) and on take-all (Gauemannomyces graminis) and yield of following w. wheat crops - Whittlocks.

Sponsors: E. Lester, D.B. Slope, R.J. Gutteridge.

The fifth year, w. wheat.

For previous years see 77-80/R/CS/202.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 2.67 x 6.10.

Treatments:

CRP INOC	Crops in 1977 (all w. wheat 1978 to 1981) and inoculation in 1977 and 1978:
GRASS	Ryegrass
GRASS(I)	Ryegrass + Prg inoculum 1977
OATS	S. oats
OATS(I)	S. oats + Prg inoculum 1977
OATS I	S. oats + Prg inoculum to 1978 w. wheat
OATS DI	S. oats + dummy inoculum (sand) to 1978 w. wheat
WHEAT	S. wheat
WHEAT(I)	S. wheat + Prg inoculum 1977

NOTE: Phialophora inoculum was a culture macerated in coarse sand. Coarse sand alone was applied as dummy inoculum.

Basal applications: Manures: (0:20:20) at 250 kg, combine drilled. 'Nitro-Chalk' at 480 kg. Weedkillers: Glyphosate at 1.5 l in 250 l. Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- Glyphosate applied: 1 Sept, 1980. Ploughed: 30 Sept. Rotary harrowed, seed sown: 1 Oct. Chlortoluron applied: 3 Oct. N applied: 13 Apr, 1981. 'Brittox' applied: 23 Apr. Combine harvested: 24 Aug.

NOTE: Estimates of take-all were made in April and early July. Bio-assays of soils for take-all were made after harvest.

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81/R/CS/202

GRAIN TONNES/HECTARE

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

CRP INOC	
GRASS	6.47
GRASS(I)	6.19
OATS	5.74
OATS(I)	5.74
OATS I	6.40
OATS DI	6.45
WHEAT	7.03
WHEAT(I)	6.95
MEAN	6.37

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

TABLE	CRP INOC
SED	0.411

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.503	7.9

GRAIN MEAN DM% 81.2

PLOT AREA HARVESTED 0.00116

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81/R/CS/203

SPECIES MIXTURES AND PHIALOPHORA

Object: To study the effects of lucerne, grass and clover, singly and in mixtures, and of soil inoculation on populations of Phialophora radicicola graminicola (Prg) and on take-all (Gaeumannomyces graminis) and yield of following w. wheat crops - Stubbings.

Sponsors: E. Lester, D.B. Slope, R.J. Gutteridge.

The fifth year, w. wheat.

For previous years see 79-80/R/CS/203.

Design: 4 randomised blocks of 9 plots, split into 4.

Whole plot dimensions: 4.27 x 27.1.

Treatments: All combinations of:-

1. Whole plots

CRP INOC	Crops in 1977 and 1978 (all w. wheat 1979 to 1981) and inoculation:-	
	1977	1978
C C	White clover	White clover
G G	Ryegrass	Ryegrass
GC GC	Ryegrass/white clover mixture	Ryegrass/white clover
LU LU	Lucerne	Lucerne
LU LU I	Lucerne	Lucerne + Prg inoculum to 1979 wheat
GLU GLU	Ryegrass/lucerne in alternate rows	Ryegrass/lucerne
W G	Spring wheat	Ryegrass, sown into spring wheat stubble
WG G	Spring wheat undersown with ryegrass	Ryegrass
WGI G	Spring wheat, inoculated Prg, undersown with ryegrass	Ryegrass

2. Sub plots

N	Nitrogen fertiliser (kg N) from 1979 to 1981, cumulative:
0	
50	
100	
150	

NOTE: The inoculum used for the I treatments was an agar culture of Prg mixed with sand. It was broadcast and power harrowed into the soil before sowing.

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Basal applications: Manures: (0:20:20) at 250 kg, combine drilled. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Fungicide: Prochloraz at 0.4 l in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- Ploughed: 29 Aug, 1980. Spring-tine cultivated: 30 Sept. Rotary harrowed: 1 Oct. Seed sown: 2 Oct. Chlortoluron applied: 3 Oct. N and 'Brittox' applied: 17 Apr, 1981. Fungicide applied: 3 June. Combine harvested: 25 Aug.

NOTE: Take-all was assessed in April and July. Bio-assays of soils for take-all were made after harvest.

GRAIN TONNES/HECTARE

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

N / CRP INOC	0	50	100	150	MEAN
C C	1.87	2.93	3.82	3.86	3.12
G G	3.16	4.97	4.86	4.64	4.41
GC GC	2.86	5.06	5.61	5.16	4.67
LU LU	1.94	3.06	3.20	3.12	2.83
LU LU I	1.83	2.89	3.50	3.74	2.99
GLU GLU	2.91	3.73	4.65	4.24	3.88
W G	2.83	4.15	3.92	4.41	3.83
WG G	2.90	4.43	4.70	4.64	4.17
WGI G	2.86	4.04	4.98	4.65	4.13
MEAN	2.57	3.92	4.36	4.27	3.78

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

TABLE	CRP INOC	N	CRP INOC N
SED	0.246	0.136	0.432
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
CRP INOC			0.409

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

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.349	9.2
BLOCK.WP.SP	81	0.579	15.3

GRAIN MEAN DM% 82.2

SUB PLOT AREA HARVESTED 0.00127

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81/R/CS/211

FACTORS AFFECTING EYESPOT

Object: To study the effects of a range of treatments on the incidence of eyespot (Pseudocercosporella herpotrichoides) and on the yield of w. wheat - Meadow.

Sponsors: R.D. Prew, A. Bainbridge.

The fourth year, w. wheat.

For previous years see 78-80/R/CS/211.

Design: 2 randomised blocks of 2 whole plots split into 6 sub plots split into 3 sub sub plots.

Whole plot dimensions: 94.0 x 9.14.

Treatments: All combinations of:-

Whole plots

1. STRAW		Treatment of straw in autumn (cumulative):
	BURNT	Burnt on site after spreading
	CARTED	Baled and carted off

Sub plots

2. DRILLING		Cultivations and drilling in autumn (cumulative):
	CNVNTIAL	Cultivated and conventionally drilled
	DIRECT	Uncultivated, direct drilled
3. BEN DATE		Dates of applying benomyl (first applied for 1981 crop):
	NEVER	Never
	14 OCT	14 October, 1980
	27 MAR	27 March, 1981

Sub sub plots

4. SEEDRATE (80)		Seed rates (kg) in 1979 & 1980, all sown at 200 kg in 1981:
	100	
	150	
	200	

NOTE: Benomyl was applied at 1.12 kg in 340 l on both occasions.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 500 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l, applied twice. Metoxuron at 4.4 kg in 250 l, applied twice. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Armada, sown at 200 kg.

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81/R/CS/211

Cultivations, etc.:- Paraquat applied: 1 Sept, 1980. Straw treatments applied: 8 Sept. 'DIRECT' plots disc harrowed: 12 Sept. 'CNVNTIAL' plots ploughed: 17 Sept. 'CNVNTIAL' plots heavy spring-tine cultivated: 19 Sept. Paraquat applied: 3 Oct. Disc harrowed twice: 9 Oct. Seed sown: 10 Oct. Metoxuron applied: 20 Nov and 27 Mar, 1981. N applied: 13 Apr. 'Brittox' applied: 22 Apr. Combine harvested: 26 Aug.

NOTE: Plants were assessed for infection with eyespot and the incidence of eyespot spores was measured throughout the year. Take-all (Gaeumannomyces graminis) was assessed at harvest.

GRAIN TONNES/HECTARE

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

DRILLING	CNVNTIAL	DIRECT	MEAN
STRAW			
BURNT	6.38	6.24	6.31
CARTED	6.55	5.52	6.03
MEAN	6.46	5.88	6.17

BEN DATE	NEVER	14 OCT	27 MAR	MEAN
STRAW				
BURNT	6.28	5.91	6.74	6.31
CARTED	5.80	5.82	6.48	6.03
MEAN	6.04	5.86	6.61	6.17

BEN DATE	NEVER	14 OCT	27 MAR	MEAN
DRILLING				
CNVNTIAL	6.48	6.28	6.64	6.46
DIRECT	5.61	5.45	6.58	5.88
MEAN	6.04	5.86	6.61	6.17

SEEDRATE(80)	100	150	200	MEAN
STRAW				
BURNT	6.40	6.10	6.44	6.31
CARTED	5.94	5.94	6.22	6.03
MEAN	6.17	6.02	6.33	6.17

SEEDRATE(80)	100	150	200	MEAN
DRILLING				
CNVNTIAL	6.51	6.36	6.52	6.46
DIRECT	5.83	5.68	6.14	5.88
MEAN	6.17	6.02	6.33	6.17

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81/R/CS/211

GRAIN TONNES/HECTARE

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

SEEDRATE(80)	100	150	200	MEAN
BEN DATE				
NEVER	5.98	5.85	6.30	6.04
14 OCT	5.80	5.69	6.10	5.86
27 MAR	6.71	6.52	6.59	6.61
MEAN	6.17	6.02	6.33	6.17

	BEN DATE	NEVER	14 OCT	27 MAR
STRAW	DRILLING			
BURNT	CNVNTIAL	6.46	6.11	6.57
	DIRECT	6.11	5.72	6.90
CARTED	CNVNTIAL	6.50	6.44	6.70
	DIRECT	5.11	5.19	6.26

	SEEDRATE(80)	100	150	200
STRAW	DRILLING			
BURNT	CNVNTIAL	6.54	6.15	6.45
	DIRECT	6.25	6.04	6.43
CARTED	CNVNTIAL	6.47	6.57	6.60
	DIRECT	5.40	5.32	5.84

	SEEDRATE(80)	100	150	200
STRAW	BEN DATE			
BURNT	NEVER	6.34	5.92	6.59
	14 OCT	6.00	5.70	6.04
	27 MAR	6.86	6.67	6.68
CARTED	NEVER	5.63	5.78	6.01
	14 OCT	5.61	5.68	6.16
	27 MAR	6.57	6.38	6.50

	SEEDRATE(80)	100	150	200
DRILLING	BEN DATE			
CNVNTIAL	NEVER	6.40	6.45	6.58
	14 OCT	6.23	6.15	6.45
	27 MAR	6.89	6.48	6.54
DIRECT	NEVER	5.56	5.25	6.02
	14 OCT	5.38	5.23	5.76
	27 MAR	6.54	6.57	6.63

		SEEDRATE(80)	100	150	200
STRAW	DRILLING	BEN DATE			
BURNT	CNVNTIAL	NEVER	6.61	6.08	6.69
		14 OCT	6.34	5.74	6.25
		27 MAR	6.68	6.63	6.41
	DIRECT	NEVER	6.07	5.75	6.50
		14 OCT	5.65	5.65	5.84
		27 MAR	7.03	6.72	6.95
CARTED	CNVNTIAL	NEVER	6.20	6.82	6.47
		14 OCT	6.13	6.55	6.65
		27 MAR	7.09	6.33	6.68
	DIRECT	NEVER	5.06	4.74	5.54
		14 OCT	5.10	4.80	5.67
		27 MAR	6.04	6.43	6.31

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81/R/CS/211

GRAIN TONNES/HECTARE

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

TABLE	DRILLING	BEN DATE	SEEDRATE(80)
SED	0.149	0.182	0.134

TABLE	STRAW* DRILLING	STRAW* BEN DATE	DRILLING BEN DATE	STRAW* SEEDRATE(80)
SED	0.211	0.258	0.258	0.190

TABLE	DRILLING SEEDRATE(80)	BEN DATE SEEDRATE(80)	STRAW* DRILLING BEN DATE	STRAW* DRILLING SEEDRATE(80)
SED	0.215	0.263	0.365	0.304
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
DRILLING	0.190			
BEN DATE		0.233		
STRAW.DRILLING				0.269

TABLE	STRAW* BEN DATE SEEDRATE(80)	DRILLING BEN DATE SEEDRATE(80)	STRAW* DRILLING BEN DATE SEEDRATE(80)
SED	0.372	0.372	0.526
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
STRAW.BEN DATE	0.329		
DRILLING.BEN DATE		0.329	
STRAW.DRILLING.BEN DATE			0.465

* WITHIN THE SAME LEVEL OF STRAW ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	10	0.365	5.9
BLOCK.WP.SP.SSP	24	0.465	7.5

GRAIN MEAN DM% 87.0

SUB PLOT AREA HARVESTED DRILLING DIRECT 0.00254

SUB PLOT AREA HARVESTED DRILLING CNVNTIAL 0.00258

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81/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 fourth year, s. beans, w. wheat.

For previous years see 78-80/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 1981:

	1978	1979	1980
W W W	W	W	W
W BE W	W	BE	W
W W BE	W	W	BE

BE = s. beans, W = w. wheat

NOTE: An additional crop sequence was in s. beans 1981, yields not taken.

Basal applications: Weedkillers: Glyphosate at 1.5 l in 250 l. Chlortoluron at 5.6 l in 250 l.

Standard applications:
- Wheat: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 350 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.
- Beans: Weedkiller: Simazine at 1.2 kg in 250 l. Insecticide: Phorate at 4.5 kg as granules, combine drilled. Pirimicarb at 0.14 kg in 250 l.

Seed: Wheat: Flanders, sown at 200 kg.
Beans: Minden, sown at 260 kg.

Cultivations, etc.:-
- All crops: Glyphosate applied: 24 Sept, 1980. Ploughed: 9 Oct. Rotary harrowed: 10 Oct. Chlortoluron applied: 14 Oct.
- Wheat: Seed sown: 13 Oct, 1980. N applied: 16 Apr, 1981. Weedkillers applied: 21 Apr. Combine harvested: 24 Aug.
- Beans: Spring-tine cultivated, seed sown: 19 Feb, 1981. Weedkiller applied: 9 Apr. Pirimicarb applied: 18 June. Combine harvested: 10 Sept.

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

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81/R/CS/212

GRAIN TONNES/HECTARE

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

PREVCROP	W W W	W BE W	W W BE	MEAN
	5.86	5.93	7.16	6.32

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

TABLE	PREVCROP
SED	0.275

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.337	5.3

GRAIN MEAN DM% 81.2

PLOT AREA HARVESTED 0.00434

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81/R/CS/216 and 81/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), P.T. Gooderham, I.B. Warboys, J.M. Wilkes (Wye College).

The fourth year, s. barley.

For previous years see 78-80/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:
OOO OO	Not subsoiled, no P or K
FOO FO	Farm standard, unwinged, subsoiler, no P or K, autumn 1977 & autumn 1979
NOO NO	N.C.A.E. winged subsoiler, no P or K, autumn 1977 & autumn 1979
NPK NO	N.C.A.E. winged subsoiler, P and K applied autumn 1977, subsoiled only autumn 1979
WOO OO	Wye double digger, no P or K, autumn 1977 only
WPK OO	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; fertiliser 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 1.5 l in 250 l. Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l with the fungicide. Fungicide: Tridemorph at 0.53 kg in 250 l.

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81/R/CS/216 and 81/W/CS/216

Road Piece (W): Manures: (20:10:10) at 560 kg. Weedkillers: Glyphosate at 1.0 l in 280 l, mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with the fungicide in 280 l. Fungicide: Ethirimol (as 'Milgo E' at 0.7 l).

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

Cultivations, etc.:-

Delharding (R): Glyphosate applied: 25 Sept, 1980. Ploughed: 12 Dec. NPK applied, rotary harrowed, seed sown: 13 Apr, 1981. 'Banlene Plus' with fungicide applied: 29 May. Combine harvested: 2 Sept.

Road Piece (W): Glyphosate applied: 26 Sept, 1980. Ploughed: 30 Oct. NPK applied: 20 Feb, 1981. Spring-tine cultivated with crumbler attached, seed sown: 27 Feb. 'Brittox' with fungicide applied: 1 May. Combine harvested: 3 Aug.

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81/R/CS/216 DELHARDING (R)

GRAIN TONNES/HECTARE

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

TREATMNT	000 00	F00 F0	N00 N0	NPK N0	W00 00	WPK 00	MEAN
	4.04	4.56	4.11	3.73	3.78	4.59	4.13

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

TABLE	TREATMNT
SED	0.484

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.592	14.3

GRAIN MEAN DM% 83.3

PLOT AREA HARVESTED 0.00260

81/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
	4.21	4.41	4.23	4.30	4.72	4.78	4.44

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

TABLE	TREATMNT
SED	0.258

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.316	7.1

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00251

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81/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 1981 - Gt. Field I.

Sponsor: C.J. Rawlinson.

Design: 4 randomised blocks of 6 plots.

The fourth year, s. barley.

For previous years see 78/R/RA/1 and 80/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 s. barley only was sown.

Basal applications: Manures: (20:10:10) at 340 kg, combine drilled. Weedkillers: Glyphosate at 1.5 l in 250 l. Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l.

Seed: Georgie, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 26 Sept, 1980. Ploughed: 28 Nov. Spring-tine cultivated: 7 Apr, 1981. Seed sown: 13 Apr. 'Banlene Plus' applied: 30 May. Combine harvested: 2 Sept.

NOTE: Mildew was assessed three times in June and July.

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81/R/CS/230

GRAIN TONNES/HECTARE

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

FUNGCIDE	- -	B1 B2	B2 B2	T1 T8	T2 T8	MEAN
	3.99	4.20	4.17	4.69	4.71	4.29

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

TABLE	FUNGCIDE	
SED	0.318	MIN REP
	0.275	MAX-MIN

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

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.450	10.5

GRAIN MEAN DM% 86.6

STRAW TONNES/HECTARE

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

FUNGCIDE	- -	B1 B2	B2 B2	T1 T8	T2 T8	MEAN
	2.62	2.61	2.79	3.08	3.06	2.80

STRAW MEAN DM% 87.6

PLOT AREA HARVESTED 0.00243

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81/R/CS/234

SEPTORIA STUDY

Object: To study the effects of preceding grass and of stubble persisting in grass on the epidemiology of Septoria nodorum and on the yield of a subsequent w. wheat crop - Whittlocks.

Sponsors: J.F. Jenkyn, J. King (M.A.F.F.).

The third year w. wheat, the first year of yields.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 9.14.

Treatments: All combinations of:-

1. CROP TRT(80) Crops and treatments 1979 & 1980:

GF GF	Ryegrass sown in spring 1979, continued in 1980, sprayed captafol fungicide in both years
GI G	Ryegrass sown in spring 1979, continued in 1980, inoculated with Septoria nodorum in 1979 only
W/GF GF	Ryegrass undersown in s. wheat in 1979, grass continued in 1980, sprayed captafol fungicide in both years
W/GI G	Ryegrass undersown in s. wheat in 1979, grass continued in 1980, inoculated with Septoria nodorum in 1979 only.

2. TREATMNT(81) Weedkiller and cultivations to grass in autumn 1980, drilling method to w. wheat:

OO PL CN	No weedkiller to grass, ploughed, conventionally drilled
PQ OO DD	Paraquat to grass, no cultivation, direct drilled
PQ PL CN	Paraquat to grass, ploughed, conventionally drilled
PQ RV CN	Paraquat to grass, rotary cultivated, conventionally drilled

plus one extra treatment (duplicated):

EXTRA

FA PL CN	Fallow in 1979 and 1980, ploughed autumn 1981, w. wheat conventionally drilled.

NOTES: (1) Captafol was applied at 1.41 kg in 340 l on 18 June, 1979, 23 July, 1979 and 9 June, 1980. Paraquat was applied at 0.84 kg ion in 250 l.

(2) Cultivations in autumn 1980 for TREATMNT(81) were as follows:

OO PL CN: Ploughed: 9 Sept, 1980. Disc harrowed twice: 10 Sept. Rotary harrowed, seed sown, spring-tine cultivated: 18 Sept

PQ OO DD: Paraquat applied: 24 Aug. Seed sown, disc harrowed: 19 Sept

PQ PL CN: Paraquat applied: 24 Aug. Ploughed: 9 Sept. Disc harrowed twice: 10 Sept. Rotary harrowed, seed sown, spring-tine cultivated: 18 Sept

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PQ RV CN: Paraquat applied: 24 Aug. Chisel ploughed twice: 9 Sept. Spike rotary cultivated: 10 Sept. Rotary cultivated, rotary harrowed, seed sown, spring-tine cultivated: 18 Sept.

(3) Septoria nodorum was inoculated by spraying a suspension of spores in 128 l on 1 June, 1979 and 18 July.

(4) Plot sides were separated by 4.27 m and plot ends by 10.7 m sown to s. oats 1979, fallow 1980 and w. barley 1981.

Basal applications, 1979: Manures: (20:14:14) at 380 kg. Weedkillers: Bromoxynil and ioxynil (as 'Oxytril CM' at 1.4 l) with mecoprop at 1.7 l in 220 l.

Seed 1979: Highbury, sown at 190 kg
Manod, sown at 170 kg
S23, sown at 22 kg

Cultivations, etc., 1979:- Chisel ploughed: 31 Oct, 1978, 2 Nov. Spring-tine cultivated twice, NPK applied: 20 Apr, 1979. Seed sown: 21 Apr. Weedkillers applied: 4 June. Combine harvested cereals: 6 Sept. Cut grass: 27 Sept. Previous crops: W. oats 1977, potatoes 1978.

Basal applications, 1980: Manures: (25:0:16) at 440 kg in spring and at 220 kg after each cut except the last.

Cultivations, etc., 1980:- First NK applied: 13 Mar, 1980. Fallow plots rotary cultivated: 23 Apr and 6 Aug. Grass cut twice: 5 June, 6 Aug. NK applied: 6 June.

Basal applications, 1981: Manures: Chalk at 7.5 t. Kieserite at 330 kg. (10:23:23) at 250 kg, combine drilled, 'Nitro-Chalk' at 580 kg. Weedkillers: Chlortoluron at 5.6 l in 250 l. Isoproturon at 2.1 l with mecoprop at 3.2 l in 250 l.

Seed, 1981: Flanders, sown at 200 kg.

Cultivations, etc., 1981:- Chalk applied: 2 Sept, 1980. Kieserite applied: 5 Sept. Chlortoluron applied: 13 Oct. N applied: 10 Apr, 1981. Isoproturon and mecoprop applied: 22 Apr. Combine harvested: 24 Aug.

NOTE: Septoria was assessed at intervals between February and July 1981.

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81/R/CS/234

GRAIN TONNES/HECTARE

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

TREATMNT(81) CROP TRT(80)	00 PL CN	PQ 00 DD	PQ PL CN	PQ RV CN	MEAN
GF GF	7.27	5.53	7.80	7.34	6.98
GI G	7.56	4.89	7.21	7.39	6.76
W/GF GF	7.29	5.74	7.79	7.42	7.06
W/GI G	7.64	5.17	7.70	7.68	7.05
MEAN	7.44	5.33	7.62	7.46	6.96

FA PL CN 8.31

GRAND MEAN 7.11

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

TABLE	CROP TRT(80)	TREATMNT(81)	CROP TRT(80) TREATMNT(81)
SED	0.169	0.169	0.338

SED FOR COMPARING FA PL CN WITH ANY ITEM IN CROP TRT(80).TREATMNT(81) TABLE IS 0.292

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

STRATUM	DF	SE	CV%
BLOCK.WP	35	0.414	5.8

MEAN DM% 80.8

PLOT AREA HARVESTED 0.00195

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81/W/CS/245

MINIMUM CULTIVATION AND DEEP PK

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

For previous year see 80/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 WB2	Series I, w. barley, second cereal after a break crop
	SER2 WW4	Series II, w. wheat, fourth cereal after a break crop
	SER3 WB4	Series III, w. barley, fourth 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. DRL DATE		Drills & sowing dates:
	DD 29SEP	Direct drilled w. barley on 29 Sept, 1980, w. wheat 30 Sept
	DD 9OCT	Direct drilled on 9 Oct
	CD 9OCT	Mouldboard ploughed autumn 1980, conventionally drilled on 9 Oct

Row plots:

4. N PATH		Nitrogen fertiliser in spring, and pathogen control:
	75 ENHD	75 kg N, enhanced pathogen control
	150 ENHD	150 kg N, enhanced pathogen control
	225 ENHD	225 kg N, enhanced pathogen control
	150 STND	150 kg N, standard pathogen control

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

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81/W/CS/245

EXTRA

TPK DL — PK applied to topsoil and mouldboard ploughed in 1979, direct drilled on 9 Oct, 1980

TPK CL — PK as above, mouldboard ploughed autumn 1980, conventionally drilled on 9 Oct, 1980

NOTES: (1) Rates of 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 & 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 300 l on 18 Apr and in 280 l on 5 June, 1981.

Basal applications: All series: Manures: (10:23:23) at 300 kg, combine drilled. Weedkillers: Paraquat at 0.56 kg ion in 300 l, chlortoluron at 4.5 l (early sowing) and 5.6 l (late sowing) in 300 l.
Series I & III: Growth regulator: Mepiquat chloride and ethephon (as 'Terpal' at 2.5 l) in 300 l.
Series II: Growth regulator: Chlormequat at 1.4 l in 280 l.

Seed: W. barley: Igri with methiocarb pellets, sown at 170 kg.
W. wheat: Flanders with methiocarb pellets, sown at 200 kg.

Cultivations, etc.:-
All plots:
Series I, w. barley: Wheat straw spread and burnt: 19 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 18 Apr. Combine harvested: 3 Aug.
Series II, w. wheat: Wheat straw spread and burnt: 19 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 10 Apr. Combine harvested: 18 Aug.
Series III, w. barley: Paraquat applied: 24 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 18 Apr. Combine harvested: 30 July.

CD 9 OCT: Series I and II: Ploughed: 25 Sept, 1980. Rolled: 26 Sept. Disced, three strokes: 27-28 Sept. Rotary cultivated: 30 Sept, 5 Oct. Series III: Ploughed: 1 Sept, 1980. Spike rotary cultivated with crumbler attached: 2 Sept. Rotary cultivated with crumbler attached: 25 Sept. All series: Chlortoluron applied: 10 Oct.

DD 29 SEP: DD 9 OCT: Series I and II: Paraquat applied: 25 Sept, 1980. Spring-tine cultivated: 26 Sept. All series: Chlortoluron applied to early sowing: 3 Oct. Paraquat applied: 8 Oct. Chlortoluron applied to late sowing: 10 Oct.

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

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81/W/CS/245

SERIES I WINTER BARLEY

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	7.02	6.72	7.01	6.92
150 ENHD	7.69	7.91	7.93	7.84
225 ENHD	8.31	8.50	8.21	8.34
150 STND	7.31	7.01	7.21	7.18
MEAN	7.59	7.53	7.59	7.57

DRL DATE N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	6.48	6.76	7.51	6.92
150 ENHD	7.76	7.77	8.01	7.84
225 ENHD	8.12	8.30	8.59	8.34
150 STND	6.90	7.16	7.47	7.18
MEAN	7.32	7.50	7.89	7.57

DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	7.37	7.42	7.97	7.59
--S	7.28	7.40	7.93	7.53
PKS	7.30	7.67	7.79	7.59
MEAN	7.32	7.50	7.89	7.57

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	6.67	7.79	7.79	7.09	7.34
TPK CL	7.73	7.72	8.62	7.66	7.93
MEAN	7.20	7.76	8.21	7.38	7.64

N PATH	DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	6.52	6.80	7.75
	--S	6.35	6.41	7.40
	PKS	6.57	7.09	7.37
150 ENHD	---	7.48	7.51	8.10
	--S	7.87	7.81	8.05
	PKS	7.92	7.98	7.87
225 ENHD	---	8.40	8.26	8.28
	--S	8.37	8.33	8.78
	PKS	7.60	8.31	8.72
150 STND	---	7.06	7.12	7.76
	--S	6.53	7.04	7.47
	PKS	7.13	7.31	7.19

GRAND MEAN 7.58

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81/W/CS/245

SERIES I WINTER BARLEY

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	0.734	0.299	0.299	0.356

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.356	0.519	0.873	0.617

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

STRATUM	DF	SE	CV%
WP1	9	0.519	6.8
WP1.WP2	27	0.386	5.1

GRAIN MEAN DM% 81.9

SUB PLOT AREA HARVESTED 0.00341

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81/W/CS/245

SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	4.67	5.02	5.38	5.02
150 ENHD	6.00	6.33	6.80	6.38
225 ENHD	6.15	6.37	6.53	6.35
150 STND	5.80	6.26	6.82	6.29
MEAN	5.66	5.99	6.39	6.01

DRL DATE N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	5.20	4.84	5.03	5.02
150 ENHD	6.51	6.34	6.28	6.38
225 ENHD	6.39	6.66	6.00	6.35
150 STND	6.32	6.35	6.21	6.29
MEAN	6.11	6.05	5.88	6.01

DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	6.21	5.32	5.44	5.66
--S	5.80	6.08	6.09	5.99
PKS	6.30	6.75	6.11	6.39
MEAN	6.11	6.05	5.88	6.01

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	3.98	5.79	5.04	5.42	5.06
TPK CL	4.63	5.45	5.42	5.03	5.13
MEAN	4.31	5.62	5.23	5.23	5.10

N PATH	DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	5.72	3.79	4.49
	--S	4.76	5.07	5.22
	PKS	5.13	5.65	5.37
150 ENHD	---	6.21	5.96	5.83
	--S	6.25	6.20	6.53
	PKS	7.07	6.85	6.48
225 ENHD	---	6.83	5.85	5.78
	--S	6.15	6.78	6.16
	PKS	6.20	7.34	6.06
150 STND	---	6.09	5.67	5.65
	--S	6.06	6.24	6.46
	PKS	6.80	7.14	6.52

GRAND MEAN 5.92

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81/W/CS/245

SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	1.264	0.516	0.516	0.538

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.538	0.894	1.318	0.932

* WITHIN THE SAME LEVEL OF N PATH ONLY

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

STRATUM	DF	SE	CV%
WP1	9	0.894	15.1
WP1.WP2	27	0.305	5.2

GRAIN MEAN DM% 86.7

SUB PLOT AREA HARVESTED 0.00341

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81/W/CS/245

SERIES III WINTER BARLEY

GRAIN TONNES/HECTARE

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

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	5.72	5.66	6.03	5.80
150 ENHD	6.60	6.67	6.80	6.69
225 ENHD	6.98	7.24	7.30	7.17
150 STND	6.79	5.96	6.27	6.34
MEAN	6.52	6.38	6.60	6.50

DRL DATE N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	5.56	5.55	6.29	5.80
150 ENHD	6.51	6.79	6.77	6.69
225 ENHD	7.25	7.23	7.04	7.17
150 STND	6.12	6.17	6.73	6.34
MEAN	6.36	6.43	6.71	6.50

DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	6.39	6.24	6.94	6.52
--S	6.41	6.30	6.44	6.38
PKS	6.29	6.77	6.74	6.60
MEAN	6.36	6.43	6.71	6.50

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	7.34	7.37	7.30	5.53	6.89
TPK CL	6.16	6.33	7.08	6.09	6.42
MEAN	6.75	6.85	7.19	5.81	6.65

N PATH	DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	5.49	5.22	6.44
	--S	5.98	5.46	5.54
	PKS	5.21	5.98	6.90
150 ENHD	---	6.44	6.60	6.75
	--S	6.84	6.53	6.63
	PKS	6.25	7.23	6.92
225 ENHD	---	7.16	7.02	6.76
	--S	7.27	7.11	7.34
	PKS	7.34	7.54	7.01
150 STND	---	6.46	6.10	7.81
	--S	5.55	6.08	6.24
	PKS	6.36	6.32	6.14

GRAND MEAN 6.52

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81/W/CS/245

SERIES III WINTER BARLEY

GRAIN TONNES/HECTARE

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

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	0.580	0.237	0.237	0.358

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.358	0.410	0.877	0.620

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

STRATUM	DF	SE	CV%
WP1	9	0.410	6.3
WP1.WP2	27	0.538	8.3

GRAIN MEAN DM% 86.9

SUB PLOT AREA HARVESTED 0.00341

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81/R/CS/246

EFFECTS OF SUBSOILING & DEEP PK

Object: To study the effects of thorough subsoil disturbance and the incorporation of P & 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, W. Day, R. Leigh, A.C.D. Newman, P.J. Taylor, P.J. Welbank, D.P. Yeoman.

The second year, s. barley.

For previous year see 80/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 fertiliser (kg N) to seedbed (cumulative to 1980):

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.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Glyphosate at 1.5 l in 250 l. Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l applied with the tridemorphl Fungicides: Tridemorph at 0.53 l. Prochloraz at 0.4 l in 250 l applied with maneb at 1.2 kg and zineb at 0.13 kg.

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

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81/R/CS/246

Cultivations, etc.:- Glyphosate applied: 26 Sept, 1980. Ploughed: 28 Nov. Spring-tine cultivated: 7 Apr, 1981. Test N applied, rotary harrowed, seed sown: 10 Apr. Weedkillers, and tridemorph applied: 30 May. Prochloraz, maneb and zineb applied: 1 July. Combine harvested: 1 Sept.

GRAIN TONNES/HECTARE
***** TABLES OF MEANS *****

N / PK SUB	0	40	80	120	MEAN
- - -	2.29	3.89	4.97	6.21	4.34
- - S	2.07	3.33	5.23	5.98	4.15
P - S	3.02	3.02	5.37	6.80	4.55
- K S	2.40	4.27	5.40	6.30	4.59
P K S	2.85	4.57	5.60	5.89	4.73
P K T	3.61	4.22	5.41	6.41	4.91
MEAN	2.65	3.88	5.28	6.26	4.52

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

TABLE	PK SUB	N	PK SUB N	
SED	0.334		0.668	MIN REP
	0.289	0.252	0.578	MAX-MIN
			0.472	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	0.668	14.8

GRAIN MEAN DM% 84.5

STRAW TONNES/HECTARE

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

N / PK SUB	0	40	80	120	MEAN
- - -	1.10	2.02	2.56	3.93	2.40
- - S	1.00	1.70	2.78	4.12	2.40
P - S	1.23	1.24	2.91	4.16	2.39
- K S	0.98	2.44	2.85	3.85	2.53
P K S	1.46	2.28	2.94	3.88	2.64
P K T	1.60	1.84	3.07	4.43	2.74
MEAN	1.21	1.94	2.81	4.04	2.50

STRAW MEAN DM% 90.6 PLOT AREA HARVESTED 0.00217

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81/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 second year, w. wheat.

For previous year see 80/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 (81) Forms of organic matter, cumulative for 1980 & 1981 crops:

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 for both years

Basal applications: Manures: Chalk at 7.5 t. (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l, applied twice. Isoproturon at 2.1 l with mecoprop at 3.2 l in 250 l. Fungicides: Prochloraz at 0.4 l in 250 l applied with maneb at 1.2 kg and zineb at 0.13 kg.

Seed: Flanders, sown at 180 kg.

Cultivations, etc.:- Paraquat applied: 1 Sept, 1980. Chalk applied: 2 Sept. Paraquat applied: 30 Sept. Seed sown: 7 Oct. Test FYM and straw applied: 11 Nov. N applied: 15 Apr, 1981. Isoproturon and mecoprop applied: 22 Apr. Fungicides applied: 22 June. Combine harvested: 24 Aug.

NOTE: Plots were sampled for earthworms in November.

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81/R/CS/247

GRAIN TONNES/HECTARE

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

ORG MATT(81) / WORMINOC(80)	NONE	STR	STR+FYM	MEAN
NONE	6.38	6.36	6.11	6.28
EVEN	6.57	5.82	6.14	6.18
CONC	6.44	6.07	6.16	6.22
MEAN	6.46	6.08	6.14	6.23

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

TABLE	WORMINOC(80)	ORG MATT(81)	WORMINOC(80) ORG MATT(81)
SED	0.170	0.170	0.295

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.361	5.8

GRAIN MEAN DM% 81.1

PLOT AREA HARVESTED 0.00244

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81/R/CS/250

CONTROL OF CEPHALOSPORIUM

Object: To study the effects of aldicarb, benomyl and HCH on the incidence of Cephalosporium Stripe (Cephalosporium gramineum) and on the yield of w. wheat - New Zealand.

Sponsors: R.J. Gutteridge, K.E. Fletcher.

The second year, w. wheat.

For previous year see 80/R/CS/250.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 2.67 x 6.10.

Treatments: All combinations of:-

1. CHEMICAL	Chemicals and methods of application:	
	ALDICARB	Aldicarb at 10 kg worked in to seedbed
	BENOMYL	Benomyl at 20 kg worked in to seedbed
	HCH	HCH seed dressing at 0.4 g per kg seed
2. YEARS	Harvest years of application:	
	1980+81	1980 and 1981 cumulative treatment
	1981	1981, none in 1980

plus one extra treatment:

EXTRA	
NONE	No chemical treatment in 1980 & 1981 (duplicated)

NOTES: (1) 1981 soil treatments were applied on 2 Oct, 1980.
(2) 1981 benomyl was applied as a drench in 11,200 l of water.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 390 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l. Chlortoluron at 5.6 l in 250 l. Fungicide: Prochloraz at 0.4 l in 250 l. Growth regulator: Chlormequat at 1.7 l in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- Paraquat applied: 19 Sept, 1980. Ploughed: 27 Sept. Spring-tine cultivated twice: 1 Oct. Treatments applied, spike rotary cultivated: 2 Oct. Seed sown: 3 Oct. Chlortoluron applied: 10 Oct. N applied: 16 Apr, 1981. Growth regulator applied: 24 Apr. Fungicide applied: 5 May. Combine harvested: 26 Aug.

NOTE: Incidence of Cephalosporium, take-all and Phialophora was measured in June. In April soil samples were examined for wireworm larvae, and plants for wireworm damage.

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81/R/CS/250

GRAIN TONNES/HECTARE

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

CHEMICAL YEARS	ALDICARB	BENOMYL	HCH	MEAN
1980+81	7.53	7.47	8.00	7.67
1981	7.86	8.22	7.72	7.93
MEAN	7.69	7.84	7.86	7.80

NONE 7.75

GRAND MEAN 7.79

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

TABLE	YEARS	CHEMICAL	YEARS CHEMICAL
SED	0.244	0.298	0.422

SED FOR NONE AGAINST ANY ITEM IN CHEMICAL.YEARS TABLE IS 0.365

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.517	6.6

GRAIN MEAN DM% 83.4

PLOT AREA HARVESTED 0.00161

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81/W/CS/253

LATE N

Object: To study the residual effects on w. wheat of a range of fertilisers applied to potatoes in 1980 - Woburn Lansome III.

Sponsors: F.V. Widdowson, A. Penny, T.M. Addiscott.

The second year, w. wheat.

For previous year see 80/W/CS/253.

Design: 3 randomised blocks of 16 plots.

Whole plot dimensions: 4.27 x 9.1.

Treatments: All combinations of:-

1. N FORM (80) Forms of nitrogen fertiliser in 1980:

AQ U	Aqueous urea, injected before planting
AQ U+CS2	Aqueous urea + carbon disulphide at 10 kg, injected before planting
AQ U+NIT	Aqueous urea + nitrapyrin at 1 kg, injected before planting
NC E	'Nitro-Chalk', all to the seedbed
NC E+L	'Nitro-Chalk', half to the seedbed, half in June
IBDU	Isobutylidene diurea, all to the seedbed

2. N RATE (80) Rates of nitrogen fertiliser in 1980 (kg N):

200
300

plus four extra treatments all given 'Nitro-Chalk' in 1980:

EXTRA

NC E100	At 100 kg N, all to the seedbed
NC E400	At 400 kg N, all to the seedbed
NC EL100	At 100 kg N, half to the seedbed, half in June
NC EL400	At 400 kg N, half to the seedbed, half in June

Basal applications: Manures: (0:20:20) at 310 kg. N at 120 kg as 'Nitro-Chalk'. Weedkillers: Isoproturon at 2.4 l in 280 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 280 l. Fungicides: Prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 280 l. Growth regulator: Chlormequat at 1.4 l in 280 l.

Seed: Flanders, sown at 190 kg.

Cultivations, etc.:- Heavy spring-tine cultivated: 15 Oct, 1980, 25 Oct. PK applied: 29 Oct. Seed sown, spring-tine cultivated in: 30 Oct. N applied: 9 Apr, 1981. Growth regulator applied: 20 Apr. Weedkillers applied: 22 Apr. Fungicides applied: 18 June. Combine harvested: 24 Aug.

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81/W/CS/253

GRAIN DRY MATTER TONNES/HECTARE

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

N RATE(80)	200	300	MEAN
N FORM(80)			
AQ U	7.35	7.86	7.61
AQ U+CS2	7.79	7.86	7.83
AQ U+NIT	7.16	8.06	7.61
NC E	7.59	8.06	7.82
NC E+L	7.85	7.71	7.78
IBDU	7.56	7.51	7.54
MEAN	7.55	7.84	7.70

EXTRA	NC E100	NC E400	NC EL100	NC EL400	MEAN
	7.26	7.75	7.86	7.26	7.53

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

TABLE	EXTRA	N FORM(80)	N RATE(80)	N FORM(80) N RATE(80) & EXTRA
SED	0.458	0.324	0.187	0.458

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.560	7.3

GRAIN MEAN DM% 82.5

PLOT AREA HARVESTED 0.00279

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81/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 fertiliser to s. wheat in 1980 - Delharding.

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

The second year, w. barley.

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 980 kg

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

0
15
30
60

Sub plots

3. INOCULUM(80) Mycorrhizal inoculum in 1980:

NONE	None
G MOSSE	Glomus mosseae

NOTES: (1) Treatments were applied to s. wheat in 1980, grain yields were not taken.
(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) Irrigation was applied as 25 mm water on 19 May, 1980.

Standard applications:
S. wheat (1980): Manures: Dolomitic limestone at 12.5 t. N at 125 kg as 'Nitro-Chalk', K at 50 kg as muriate of potash, Mg at 100 kg as kieserite.
W. barley (1981): Manures: N at 30 kg as 'Nitro-Chalk' and K at 19 kg as muriate of potash to the seed bed. N at 100 kg as 'Nitro-Chalk' in spring. Weedkillers: Paraquat at 1.1 kg ion on the first occasion, at 0.7 kg ion on the second. Isoproturon at 2.5 l in 280 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

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81/R/CS/254

Seed: S. wheat (1980): Highbury, sown at 350 seeds per m^2 (about 170 kg).
W. barley (1981): Igri, with no seed dressing, sown at 160 kg.

Cultivations, etc.:-
S. wheat: Basal N, K and Mg applied, treatment P applied: 8 Apr, 1980. Dolomitic limestone applied: 9 Apr. Methyl bromide applied: 21 Apr. Inoculum applied: 29 Apr. Seed sown: 8 May. Harvested by hand: 14 Aug. Previous crops: Fallow 1978 and 1979.
W. barley: Paraquat applied: 11 Sept, 1980 and 26 Sept. Seedbed N, K applied: 18 Sept. Disc harrowed: 26 Sept. Seed sown: 2 Oct. Isoproturon applied: 27 Nov. Spring N applied: 1 Apr, 1981. Harvested by hand: 22 June.

NOTES: (1) Plots were sampled five times during the season to assess mycorrhizal infection, and twice to measure P content of the leaves and soil.
(2) Grain yields were not taken, crop was harvested green on 22 June.

TOTAL DRY MATTER TONNES/HECTARE

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

P(80) / STERILNT(80)	0	15	30	60	MEAN
NONE	4.87	6.07	6.94	6.96	6.21
METH BR	4.81	5.97	5.93	7.13	5.96
MEAN	4.84	6.02	6.44	7.05	6.08

INOCULUM(80) / STERILNT(80)	NONE	G MOSSE	MEAN
NONE	5.98	6.44	6.21
METH BR	5.10	6.82	5.96
MEAN	5.54	6.63	6.08

INOCULUM(80) / P(80)	NONE	G MOSSE	MEAN
0	4.14	5.53	4.84
15	5.08	6.96	6.02
30	6.29	6.58	6.44
60	6.65	7.44	7.05
MEAN	5.54	6.63	6.08

STERILNT(80) / INOCULUM(80) P(80)	NONE	G MOSSE
NONE 0	4.51	5.23
15	5.63	6.51
30	6.69	7.19
60	7.10	6.83
METH BR 0	3.77	5.84
15	4.52	7.42
30	5.89	5.98
60	6.21	8.04

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81/R/CS/254

TOTAL DRY MATTER TONNES/HECTARE

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

TABLE	STERILNT(80)	P(80)	INOCULUM(80)	STERILNT(80) P(80)
SED	0.311	0.440	0.238	0.623

TABLE	STERILNT(80) INOCULUM(80)	P(80) INOCULUM(80)	STERILNT(80) P(80) INOCULUM(80)
SED	0.392	0.555	0.784
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
STERILNT(80)	0.337		
P(80)		0.477	
STERILNT(80).P			0.675

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.763	12.5
BLOCK.WP.SP	16	0.826	13.6

GRAIN MEAN DM% 34.2

SUB PLOT AREA HARVESTED 0.00010

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81/R/CS/256

WINTER WHEAT

FUNGICIDES AND SOIL-BORNE DISEASES

Object: To study the residual effects of a range of soil-applied fungicides on soil-borne diseases and yield of w. wheat - Claycroft.

Sponsor: G.L. Bateman.

The second year, w. wheat.

For previous year see 80/R/WW/7.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 2.13 x 12.2.

Treatments:

FUNGCIDE(80)	Residues of fungicides and times and methods of application for w. wheat harvested 1980:
NONE	None (duplicated)
BEN A	Benomyl at 20 kg, worked in to seedbed in autumn
BEN S	Benomyl at 20 kg, as a drench in 5400 l in spring
CHL A	Chloroneb at 14 kg, worked in to seedbed in autumn
KWG A+S	'KWG 0599' at 23 kg a.i. worked in to seedbed in autumn, repeated as a drench in 5400 l in spring
NUA A+S	Nuarimol at 4.4 kg worked in to seedbed in autumn, repeated as a drench in 5400 l in spring

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l. Isoproturon at 2.1 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Flanders, with no seed dressing, sown at 200 kg.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 12 Sept, 1980, 16 Sept. Paraquat applied: 3 Oct. Rotary harrowed: 6 Oct. Seed sown: 9 Oct. Isoproturon applied: 9 Apr, 1981. N applied: 15 Apr. 'Brittox' applied: 23 Apr. Combine harvested: 26 Aug.

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

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81/R/CS/256

GRAIN TONNES/HECTARE

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

FUNGCIDE(80)	NONE	BEN A	BEN S	CHL A	KWG A+S	NUA A+S	MEAN
	6.68	6.76	7.28	6.64	7.00	7.26	6.90

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

TABLE	FUNGCIDE(80)	
SED	0.171	MIN REP
	0.148	MAX-MIN

	FUNGCIDE(80)
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	19	0.242	3.5

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00176

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81/R/CS/258

LIQUID FERTILISER AND NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to liquid fertilisers on the yield and nitrogen uptake of grass cut for silage - White Horse II.

Sponsors: F.V. Widdowson, A. Penny, G.A. Rodgers.

The second year, ryegrass.

For previous year see 80/R/G/1.

Design: 3 randomised blocks of 20 plots.

Whole plot dimensions: 2.44 x 12.2.

Treatments: All combinations of:-

1. N TIME — Times of injecting aqueous urea and nitrification inhibitors (cumulative to previous year dates):

6 NOV	6 November, 1980
20 JAN	20 January, 1981
2 APR	2 April

2. N INHIB — Nitrification inhibitors, added to aqueous urea supplying 375 kg N:

U3 0	None in 1980 and 1981
U3 N	Nitrapyrin at 1.5 kg in 1980 and 1981
U3(S2)E	Sodium trithiocarbonate (rate equivalent to 10 kg carbon disulphide) in 1980. Etridiazole at 1.5 kg in 1981
U3(S1P)D	Sodium trithiocarbonate (rate equivalent to 5 kg carbon disulphide) plus potassium ethyl xanthate at 5 kg in 1980. Dicyandiamide at 10 kg in 1981
U3 S2P	Sodium trithiocarbonate (rate equivalent to 10 kg carbon disulphide) plus potassium ethyl xanthate at 5 kg in 1980 and 1981

plus five extra treatments

EXTRA — 'Nitro-Chalk' dressings (kg N) (cumulative to 1980 dressings):

0	None
NC2 D	250 divided equally between 3 application dates - 27 Mar, 1981, 4 June, 12 Aug
NC3 D	375 divided equally between 3 application dates - 27 Mar, 1981, 4 June, 12 Aug
NC4 D	500 divided equally between 3 application dates - 27 Mar, 1981, 4 June, 12 Aug
NC3 S	375 as a single application on 27 Mar

Basal applications: Manures (0:14:28) at 500 kg.

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81/R/CS/258

Cultivations, etc.:- PK applied: 21 Nov, 1980. Cut: 3 June, 1981, 6 Aug, 4 Nov.

NOTE: Plants were sampled for ammonium nitrate contents and soils for urea and inhibitor contents, and for nitrifying bacteria.

1ST CUT (3/6/81) DRY MATTER TONNES/HECTARE

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

N INHIB / N TIME	U3 0	U3 N	U3(S2)E	U3(S1P)D	U3 S2P	MEAN
6 NOV	5.75	5.43	6.51	5.61	6.28	5.92
20 JAN	5.47	5.24	5.35	5.30	5.50	5.37
2 APR	4.26	4.28	4.51	4.39	4.49	4.39
MEAN	5.16	4.98	5.46	5.10	5.42	5.23

EXTRA	0	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	0.76	4.27	4.46	4.40	4.76	3.73

GRAND MEAN 4.85

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.332	0.149	0.192	0.332

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.407	8.4

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81/R/CS/258
2ND CUT (6/8/81) DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	U3 0	U3 N	U3(S2)E	U3(S1P)D	U3 S2P	MEAN
6 NOV	1.06	1.74	1.39	1.24	1.29	1.34
20 JAN	1.60	2.21	2.12	1.70	1.98	1.92
2 APR	2.69	2.50	2.47	2.46	2.38	2.50
MEAN	1.78	2.15	2.00	1.80	1.88	1.92

EXTRA	0	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	0.19	2.28	2.72	2.62	2.71	2.10

GRAND MEAN 1.97

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.254	0.114	0.147	0.254

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.311	15.8

3RD CUT (4/11/81) DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	U3 0	U3 N	U3(S2)E	U3(S1P)D	U3 S2P	MEAN
6 NOV	0.54	0.51	0.49	0.58	0.66	0.56
20 JAN	1.03	1.04	1.04	1.03	1.11	1.05
2 APR	0.61	0.82	0.77	0.54	0.54	0.66
MEAN	0.73	0.79	0.77	0.72	0.77	0.75

EXTRA	0	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	0.19	2.07	2.35	2.46	1.27	1.67

GRAND MEAN 0.98

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.168	0.075	0.097	0.168

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.205	20.9

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TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	U3 0	U3 N	U3(S2)E	U3(S1P)D	U3 S2P	MEAN
6 NOV	7.35	7.68	8.39	7.43	8.22	7.82
20 JAN	8.10	8.49	8.52	8.03	8.58	8.35
2 APR	7.56	7.60	7.75	7.39	7.41	7.54
MEAN	7.67	7.93	8.22	7.62	8.07	7.90

EXTRA	0	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	1.14	8.62	9.53	9.48	8.74	7.50

GRAND MEAN 7.80

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.410	0.183	0.237	0.410

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	0.502	6.4

1ST CUT MEAN DM% 16.7
2ND CUT MEAN DM% 18.3
3RD CUT MEAN DM% 26.9
TOTAL OF 3 CUTS MEAN DM% 20.6

PLOT AREA HARVESTED 0.00093

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81/R/CS/261

BENOMYL AND TAKE-ALL

Object: To study the effects of benomyl, applied to the soil with and without a surfactant, and of nuarimol on take-all (Gaeumannomyces graminis) and on the yield of w. wheat - New Zealand.

Sponsor: G.L. Bateman.

The first year, w. wheat.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 2.13 x 12.2.

Treatments:

FUNGCIDE	Fungicides, surfactant and times and methods of application:
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

NOTE: Treatments were applied on 2 Oct, 1980 and 24 Apr, 1981.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 390 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l. Chlortoluron at 5.6 l in 250 l. Growth regulator: Chlormequat at 1.7 l in 250 l.

Seed: Flanders, with no seed dressing, sown at 200 kg.

Cultivations, etc.:- Paraquat applied: 19 Sept, 1980. Ploughed: 27 Sept. Spring-tine cultivated twice: 1 Oct. Spike rotary cultivated, harrowed: 2 Oct. Seed sown: 3 Oct. Chlortoluron applied: 10 Oct. N applied: 16 Apr, 1981. Growth regulator applied: 24 Apr. Combine harvested: 25 Aug. Previous crops: Grass and fallow 1979, w. wheat, 1980.

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

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81/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
	7.64	5.02	7.48	8.59	6.05	7.70	7.72	7.17

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

TABLE	FUNGCIDE
SED	0.367

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

STRATUM	DF	SE	CV%
BLOCK.WP	18	0.520	7.2

GRAIN MEAN DM% 79.2

PLOT AREA HARVESTED 0.00176

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81/R/CS/263

FUNGICIDE TIMES

Object: To study the effects of times of applying four fungicides on pathogens and yield of 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 first year, w. oilseed rape.

Design: 3 randomised blocks of 15 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments: All combinations of:-

1. FUNGCIDE — Fungicides:

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:

SOIL	To soil surface on 28 Aug, 1980 before seedbed cultivation
FOL	To foliage on 24 Oct
SOIL + FOL	On both above dates

plus one extra treatment:

EXTRA	
NONE	No fungicides (triplicated)

NOTES: (1) Sprays were applied in 340 l.
(2) 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.

Standard applications: Long Hoos IV and Summerdells I: Manures: 'Nitro-Chalk' at 670 kg. Weedkillers: Propyzamide at 0.56 kg with dalapon at 1.9 kg in 340 l. Manures: (13:13:20) at 380 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3 l) in 250 l.

Seed: Long Hoos IV and Summerdells I: Primor, sown at 9 kg. Summerdells I: Georgie, sown at 160 kg.

Cultivations, etc.:-
Long Hoos IV: NPK applied: 1 Sept, 1980. Rotary harrowed, seed sown: 5 Sept. Weedkillers applied: 30 Oct. N applied: 18 Feb, 1981. Cut and windrowed: 21 July. Grain threshed: 31 July. Previous crops: S. barley 1979, fallow 1980.

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Summerdells I: NPK applied: 1 Sept, 1980. Heavy spring-tine cultivated twice: 2 Sept. Rotary harrowed: 4 Sept. Primor seed sown: 5 Sept. Propyzamide and dalapon applied: 30 Oct. N applied: 18 Feb, 1981. Chisel ploughed: 1 May. Rotary harrowed: 13 May. Georgie seed sown: 14 May. 'Brittox' applied: 19 June. Combine harvested: 8 Sept. Previous crops: W. barley 1979, w. oilseed rape 1980.

NOTES: (1) On Summerdells I: Foliar diseases on w. oilseed rape were assessed twice; s. barley was assessed fortnightly for mildew, yellow and brown rust. Soil cores were analysed for triadimefon residues.
(2) On Long Hoos IV: Foliar disease was assessed five times during the season.

LONG HOOS IV

OIL SEED RAPE

GRAIN TONNES/HECTARE

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

FUNGTIME FUNGCIDE	SOIL	FOL	SOIL+FOL	MEAN
BENOMYL	0.91	1.20	0.92	1.01
IMAZALIL	0.99	1.46	1.11	1.18
PROCHLOR	1.11	1.15	1.47	1.24
TRIADIME	1.19	1.26	1.29	1.25
MEAN	1.05	1.27	1.20	1.17

EXTRA NONE 1.13

GRAND MEAN 1.16

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

TABLE	FUNGCIDE	FUNGTIME	FUNGCIDE FUNGTIME
SED	0.110	0.095	0.190

SED FOR EXTRA NONE V ANY ITEM IN FUNGCIDE.FUNGTIME TABLE IS 0.155

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.233	20.0

GRAIN MEAN DM% 80.6

PLOT AREA HARVESTED 0.00065

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81/R/CS/263 SUMMERDELLS I

SPRING BARLEY

GRAIN TONNES/HECTARE

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

FUNGTIME FUNGCIDE	SOIL	FOL	SOIL+FOL	MEAN
BENOMYL	1.39	1.66	1.68	1.58
IMAZALIL	1.46	1.60	1.57	1.54
PROCHLOR	1.59	1.49	1.60	1.56
TRIADIME	1.91	1.86	2.14	1.97
MEAN	1.59	1.65	1.75	1.66

EXTRA NONE 1.56

GRAND MEAN 1.64

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

TABLE	FUNGCIDE	FUNGTIME	FUNGCIDE FUNGTIME
SED	0.157	0.136	0.273

SED FOR EXTRA NONE V ANY ITEM IN FUNGCIDE.FUNGTIME TABLE IS 0.223

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	0.334	20.3

GRAIN MEAN DM% 78.1

PLOT AREA HARVESTED 0.00053

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81/R/CS/264

FUNGICIDE RATES

Object: To study the effects of a range of rates of triadimefon on pathogens and yield of 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 first year, w. oilseed rape, s. barley.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 2.13 x 3.05.

Treatments:

FUNGRATE	Rates of triadimefon (kg) applied to soil surface on 28 Aug, 1980 before seedbed cultivation:
0.06	
0.12	
0.25	
0.50	
1.00	
2.00	

NOTES: (1) Sprays were applied in 340 l.
(2) 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.

Standard applications: Long Hoos IV and Summerdells I: Manures: 'Nitro-Chalk' at 670 kg. Weedkillers: Propyzamide at 0.56 kg with dalapon at 1.9 kg in 340 l. Manures: (13:13:20) at 380 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3 l.) in 250 l.

Seed: Long Hoos IV and Summerdells I: Primor, sown at 9 kg. Summerdells I: Georgie, sown at 160 kg.

Cultivations, etc.:-
Long Hoos IV: NPK applied: 1 Sept, 1980. Rotary harrowed, seed sown: 5 Sept. Weedkillers applied: 30 Oct. N applied: 18 Feb, 1981. Cut and windrowed: 21 July. Grain threshed: 31 July. Previous crops: S. barley 1979, fallow 1980.
Summerdells I: NPK applied: 1 Sept, 1980. Heavy spring-tine cultivated twice: 2 Sept. Rotary harrowed: 4 Sept. Primor seed sown: 5 Sept. Propyzamide and dalapon applied: 30 Oct. N applied: 18 Feb, 1981. Chisel ploughed: 1 May. Rotary harrowed: 13 May. Georgie seed sown: 14 May. 'Brittox' applied: 19 June. Combine harvested: 8 Sept. Previous crops: W. barley 1979, w. oilseed rape 1980.

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NOTES: (1) On Summerdells I: Foliar diseases on w. oilseed rape were assessed twice; s. barley was assessed fortnightly for mildew, yellow and brown rust. Soil cores were analysed for triadimefon residues.
(2) On Long Hoos IV: Foliar diseases were assessed five times during the season.
(3) 2 plots, with FUNGRATE 0.06 and 2.00 were lost, estimated values were used in the analysis.

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81/R/CS/264 LONG HOOS IV

OILSEED RAPE

GRAIN TONNES/HECTARE

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

FUNGRATE	0.06	0.12	0.25	0.50	1.00	2.00	MEAN
	1.41	1.24	1.24	1.44	1.29	1.28	1.32

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

TABLE	FUNGRATE
SED	0.079

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.079	7.4

GRAIN MEAN DM% 78.4

PLOT AREA HARVESTED 0.00065

81/R/CS/264 SUMMERDELLS I

SPRING BARLEY

GRAIN TONNES/HECTARE

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

FUNGRATE	0.06	0.12	0.25	0.50	1.00	2.00	MEAN
	2.35	1.92	2.22	2.48	2.49	2.82	2.38

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

TABLE	FUNGRATE
SED	0.257

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.314	13.2

GRAIN MEAN DM% 79.4

PLOT AREA HARVESTED 0.00053

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81/R/CS/265

SOIL FUMIGATION, MYCORRHIZA AND P

Object: To study the effects on s. wheat of applications of mycorrhizal inoculum, methyl bromide and rates of phosphate fertiliser - Delharding.

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

The first year, s. wheat.

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

Whole plot dimensions: 4.4 x 3.0.

Treatments: All combinations of:-

Whole plots

1. STERILNT Soil sterilant:

   NONE None
   METH BR Methyl bromide at 980 kg

2. P Rates of phosphate fertiliser (kg P), as superphosphate:

   0
   15
   30
   60

Sub plots

3. 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: Dolomitic limestone at 12.5 t. Chalk at 3.0 t N at 125 kg as 'Nitro-Chalk', K at 50 kg as muriate of potash, Mg at 100 kg as Epsom salts. Weedkillers: Ioxynil at 0.42 l and mecoprop at 1.26 l in 250 l, applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: Highbury, sown at 350 seeds per m^2 (about 170 kg).

Cultivations, etc.:- Dolomitic limestone applied: 15 Sept, 1980. Epsom salts applied: 13 Jan, 1981. Basal chalk, N, and K and test P applied: 18 Mar. Methyl bromide applied: 13 Apr. Inoculum applied, seed sown: 23 Apr. Weedkillers applied: 7 June. Harvested by hand: 9 Sept.

NOTE: Plots were sampled five times during the season to assess mycorrhizal infection, and twice to measure P content of the leaves and soil.

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81/R/CS/265
GRAIN TONNES/HECTARE
***** TABLES OF MEANS *****

P	0	15	30	60	MEAN
STERILNT					
NONE	2.70	3.86	4.31	5.07	3.98
METH BR	2.70	3.62	4.23	4.90	3.86
MEAN	2.70	3.74	4.27	4.98	3.92

INOCULUM	NONE	G MOSSE	MEAN
STERILNT			
NONE	3.86	4.11	3.98
METH BR	3.39	4.33	3.86
MEAN	3.62	4.22	3.92

INOCULUM	NONE	G MOSSE	MEAN
P			
0	2.31	3.09	2.70
15	3.45	4.03	3.74
30	4.00	4.54	4.27
60	4.73	5.23	4.98
MEAN	3.62	4.22	3.92

	INOCULUM	NONE	G MOSSE
STERILNT	P		
NONE	0	2.42	2.99
	15	3.84	3.89
	30	4.16	4.45
	60	5.01	5.12
METH BR	0	2.21	3.19
	15	3.07	4.16
	30	3.83	4.64
	60	4.45	5.34

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

TABLE	STERILNT	P	INOCULUM	STERILNT P
SED	0.201	0.285	0.075	0.403

TABLE	STERILNT INOCULUM	P INOCULUM	STERILNT P INOCULUM
SED	0.215	0.304	0.429

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

STERILNT	0.106
P	0.149
STERILNT.P	0.211

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

STRATUM	DF	SE	CV%
BLOCK.STERILNT.P	14	0.493	12.6
BLOCK.STERILNT.P.INOCULUM	16	0.258	6.6

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81/R/CS/265

STRAW TONNES/HECTARE

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

P	0	15	30	60	MEAN
STERILNT					
NONE	3.38	4.40	5.01	5.67	4.61
METH BR	4.47	5.31	5.83	5.80	5.35
MEAN	3.93	4.85	5.42	5.73	4.98

INOCULUM	NONE	G MOSSE	MEAN
STERILNT			
NONE	4.41	4.82	4.61
METH BR	4.95	5.76	5.35
MEAN	4.68	5.29	4.98

INOCULUM	NONE	G MOSSE	MEAN
P			
0	3.44	4.41	3.93
15	4.49	5.22	4.85
30	5.11	5.73	5.42
60	5.67	5.80	5.73
MEAN	4.68	5.29	4.98

INOCULUM	NONE	G MOSSE
STERILNT	P	
NONE	0	3.02	3.74
	15	4.30	4.50
	30	4.84	5.18
	60	5.48	5.86
METH BR	0	3.87	5.08
	15	4.68	5.94
	30	5.39	6.28
	60	5.86	5.73

NO DRY MATTER PERCENTAGES - CROP WEIGHED DRY

SUB PLOT AREA HARVESTED 0.00020

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81/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 16th year, w. wheat.

For previous years see 66/C/30(t), 67/C/23(t), 68/C/39, 69-70/S/CS/1, 71/S/CS/1(t), 72/S/CS/1(t), and 73-80/S/CS/1.

Design: Half replicate of 2x2x2x4x2 arranged as 8 whole plots split into 4 sub plots. One extra sub plot was included in each whole plot. Previous treatments have been ignored.

Whole plot dimensions: 8.53 x 18.3.

Treatments: All combinations of:-

Whole plots

1. VARIETY — Varieties:

   AVALON
   VIRTUE

2. AUT N — Nitrogen fertiliser to seedbed in autumn on 29 Sept, 1980:

   0
   50

3. PATHCONT — Pest & pathogen control:

   NONE — None
   FULL — Carbendazim (as 'Bavistin' at 0.5 kg) with tridemorph at 0.53 kg on 14 April, 1981. Carbendazim with maneb and tridemorph (as 'Cosmic' at 3.9 kg) with captafol at 1.05 kg on 20 May. Carbendazim at 0.25 kg with maneb at 1.61 kg and captafol at 1.05 kg, applied with pirimicarb at 0.14 kg on 2 July

Sub plots

4. N RATE — Total nitrogen fertiliser applied in spring (kg N):

   80
   120
   160
   200

5. N TIME — Times of applying nitrogen fertiliser:

   SINGLE — All on 14 April
   DIVIDED — 40 kg N on 19 Feb, 1981, remainder on 14 April

plus whole plot treatments as above but given no spring nitrogen

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NOTES: (1) Treatment sprays were applied in 280 l.
(2) Plots given autumn N (treatment 2) received it as the compound (15:15:15). Plots not given autumn N received balancing P and K as (0:20:20). Applied 29 Sept, 1980.

Basal applications: Manures: K_2O at 190 kg as muriate of potash.

Weedkillers: Chlortoluron at 5.6 l in 220 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) with 'Wheatclene' (1.26 kg of solid (metoxuron and simazine) plus 1.26 l of liquid (barban)) in 220 l.

Seed: Varieties sown at 375 seed per m^2.

Cultivations, etc.:- Muriate of potash applied: 27 Aug, 1980. Ploughed: 29 Aug. Seed sown: 29 Sept. Chlortoluron applied: 30 Sept. 'Brittox' and 'Wheatclene' applied: 7 Apr, 1981. Combine harvested: 18 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 straw was determined at harvest.

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81/S/CS/1

GRAIN TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	50	MEAN
VARIETY			
AVALON	9.10	9.58	9.34
VIRTUE	9.48	9.38	9.43
MEAN	9.29	9.48	9.38

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	8.89	9.78	9.34
VIRTUE	8.04	10.82	9.43
MEAN	8.47	10.30	9.38

PATHCONT	NONE	FULL	MEAN
AUT N			
0	8.38	10.19	9.29
50	8.55	10.41	9.48
MEAN	8.47	10.30	9.38

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	9.36	9.31	9.34
VIRTUE	9.38	9.48	9.43
MEAN	9.37	9.40	9.38

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	9.29	9.29	9.29
50	9.46	9.50	9.48
MEAN	9.37	9.40	9.38

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	8.42	8.51	8.47
FULL	10.33	10.28	10.30
MEAN	9.37	9.40	9.38

N RATE	80	120	160	200	MEAN
VARIETY					
AVALON	8.59	9.27	9.64	9.84	9.34
VIRTUE	8.99	9.48	9.67	9.57	9.43
MEAN	8.79	9.38	9.66	9.71	9.38

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81/S/CS/1

GRAIN TONNES/HECTARE

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

N RATE	80	120	160	200	MEAN
AUT N					
0	8.49	9.26	9.58	9.82	9.29
50	9.09	9.50	9.73	9.60	9.48
MEAN	8.79	9.38	9.66	9.71	9.38

N RATE	80	120	160	200	MEAN
PATHCONT					
NONE	8.15	8.51	8.69	8.51	8.47
FULL	9.43	10.24	10.63	10.91	10.30
MEAN	8.79	9.38	9.66	9.71	9.38

N RATE	80	120	160	200	MEAN
N TIME					
SINGLE	8.78	9.36	9.65	9.69	9.37
DIVIDED	8.80	9.39	9.66	9.72	9.40
MEAN	8.79	9.38	9.66	9.71	9.38

NO SPRING NITROGEN

AUT N	0	50	MEAN
VARIETY			
AVALON	5.47	6.44	5.96
VIRTUE	7.11	7.56	7.33
MEAN	6.29	7.00	6.65

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	6.44	5.48	5.96
VIRTUE	6.95	7.71	7.33
MEAN	6.70	6.59	6.65

PATHCONT	NONE	FULL	MEAN
AUT N			
0	6.30	6.28	6.29
50	7.09	6.91	7.00
MEAN	6.70	6.59	6.65

GRAND MEAN 8.84

GRAIN MEAN DM% 86.9

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81/S/CS/1

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

AUT N	0	50	MEAN
VARIETY			
AVALON	4.19	4.76	4.48
VIRTUE	4.72	5.25	4.98
MEAN	4.45	5.01	4.73

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	4.12	4.83	4.48
VIRTUE	4.73	5.23	4.98
MEAN	4.42	5.03	4.73

PATHCONT	NONE	FULL	MEAN
AUT N			
0	4.07	4.84	4.45
50	4.78	5.23	5.01
MEAN	4.42	5.03	4.73

N TIME	SINGLE	DIVIDED	MEAN
VARIETY			
AVALON	4.35	4.60	4.48
VIRTUE	4.94	5.03	4.98
MEAN	4.65	4.81	4.73

N TIME	SINGLE	DIVIDED	MEAN
AUT N			
0	4.30	4.61	4.45
50	4.99	5.02	5.01
MEAN	4.65	4.81	4.73

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	4.26	4.59	4.42
FULL	5.03	5.04	5.03
MEAN	4.65	4.81	4.73

N RATE	80	120	160	200	MEAN
VARIETY					
AVALON	4.29	4.34	4.56	4.70	4.48
VIRTUE	4.57	4.79	5.13	5.45	4.98
MEAN	4.43	4.56	4.85	5.07	4.73

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81/S/CS/1

STRAW TONNES/HECTARE

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

SPRING NITROGEN APPLIED

N RATE	80	120	160	200	MEAN
AUT N					
0	4.08	4.37	4.49	4.88	4.45
50	4.79	4.76	5.20	5.27	5.01
MEAN	4.43	4.56	4.85	5.07	4.73

N RATE	80	120	160	200	MEAN
PATHCONT					
NONE	4.17	4.35	4.45	4.73	4.42
FULL	4.69	4.78	5.24	5.42	5.03
MEAN	4.43	4.56	4.85	5.07	4.73

N RATE	80	120	160	200	MEAN
N TIME					
SINGLE	4.32	4.40	4.84	5.02	4.65
DIVIDED	4.54	4.73	4.85	5.13	4.81
MEAN	4.43	4.56	4.85	5.07	4.73

NO SPRING NITROGEN

AUT N	0	50	MEAN
VARIETY			
AVALON	2.89	3.31	3.10
VIRTUE	3.20	3.80	3.50
MEAN	3.05	3.56	3.30

PATHCONT	NONE	FULL	MEAN
VARIETY			
AVALON	3.15	3.06	3.10
VIRTUE	3.40	3.60	3.50
MEAN	3.27	3.33	3.30

PATHCONT	NONE	FULL	MEAN
AUT N			
0	3.17	2.92	3.05
50	3.38	3.74	3.56
MEAN	3.27	3.33	3.30

GRAND MEAN 4.44

STRAW MEAN DM% 76.2

SUBPLOT AREA HARVESTED 0.00126

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81/R/WW/1 and 81/W/WW/1

WINTER WHEAT

VARIETIES

Object: To study a selection of the newer varieties of w. wheat and the effects of nitrogen and enhanced farm practice on them on land in rotation (pathogen free) and after wheat and barley (pathogen infected) - Rothamsted Sawyers II (pathogen free RH) and Claycroft (pathogen infected RD), Woburn Lansome II/III (pathogen free WH).

Sponsors: R. Moffitt, R.J. Gutteridge.

Design: 4 randomised blocks (3 for WH) of 9 x 4 criss cross.

Whole plot dimensions 4.27 x 27.1.

Treatments: All combinations of:-

Column plots

1. VARIETY	Varieties:
AVALON	Avalon
BARON	Baron
BOUNTY	Bounty
BO+BR+HO	Equal parts of Bounty, Brigand & Hobbit
BRIGAND	Brigand
FENMAN	Fenman
FLANDERS	Flanders
NORMAN	Norman
RAPIER	Rapier

Row plots

2. N	Nitrogen fertiliser (kg N) and enhanced farm practice:
63	63
126	126
189	189
189+E	189, given growth regulator & fungicides

NOTE: The growth regulator was chlormequat at 1.7 l in 250 l on 5 May, 1981 (RH, RD), at 1.4 l in 280 l on 20 Apr (WH). The fungicides were prochloraz at 0.4 l in 250 l (RH, RD) in 280 l (WH) on 5 May and prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 250 l (RH, RD) on 22 June, in 280 l (WH) on 18 June.

Basal applications: Manures: Sawyers II (RH), Claycroft (RD) and Lansome II/III (WH): (0:20:20) at 310 kg, combine drilled (R), broadcast (W). Weedkillers: Claycroft (RD) two blocks in autumn, remainder in spring, Lansome II/III (WH): Isoproturon at 2.5 l in 250 l (R) and at 1.8 l in 280 l (W). All sites: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l (R), 2.4 l (W)) in 250 l (R) and 280 l (W).

Seed: Sawyers II (RH), Claycroft (RD): Varieties sown at 200 kg
Lansome II/III (WH): Varieties sown at 190 kg

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81/R/WW/1 and 81/W/WW/1

Cultivations, etc.:-

Sawyers II (RH): Heavy spring-tine cultivated: 13 Oct, 1980. Spring-tine cultivated: 14 Oct. Seed sown: 15 Oct. N applied: 16 Apr, 1981. 'Brittox' applied: 17 Apr. Combine harvested: 27 Aug. Previous crops: W. wheat 1979, potatoes 1980.

Claycroft (RD): Heavy spring-tine cultivated: 12 Sept, 1980, 16 Sept. Spring-tine cultivated, seed sown: 14 Oct. Isoproturon applied: 15 Oct, 9 Apr, 1981. N applied: 16 Apr. 'Brittox' applied: 23 Apr. Combine harvested: 27 Aug. Previous crops: S. barley 1979, w. wheat 1980.

Lansome II/III: Heavy spring-tine cultivated, PK applied, spring-tine cultivated: 29 Oct, 1980. Seed sown: 30 Oct. N applied: 9 Apr, 1981. Isoproturon and 'Brittox' applied: 22 Apr. Combine harvested: 25 Aug. Previous crops: Grass ley 1979, potatoes 1980.

NOTE: Samples were taken in July on Claycroft (RD) for estimates of eyespot (Pseudocercosporella herpotrichoides) and take-all (Gaeumannomyces graminis).

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81/R/WW/1 SAWYERS II (R)

HEALTHY SITE

GRAIN TONNES/HECTARE

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

N	63	126	189	189+E	MEAN
VARIETY					
AVALON	8.69	8.85	8.85	9.91	9.07
BARON	8.39	8.57	7.96	9.55	8.62
BOUNTY	8.09	8.36	8.30	9.11	8.47
BO+BR+HO	8.76	8.22	8.11	9.36	8.61
BRIGAND	9.01	8.47	7.70	8.51	8.42
FENMAN	9.13	8.66	8.56	10.17	9.13
FLANDERS	8.19	8.01	7.79	8.81	8.20
NORMAN	9.34	9.03	8.56	10.58	9.38
RAPIER	8.99	8.84	8.07	9.03	8.73
MEAN	8.73	8.56	8.21	9.45	8.74

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

TABLE	VARIETY	N	VARIETY N
SED	0.148	0.040	0.244
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.227
N			0.253

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

STRATUM	DF	SE	CV%
BLOCK.WP1	24	0.209	2.4
BLOCK.WP2	9	0.057	0.7
BLOCK.WP1.WP2	72	0.336	3.8

GRAIN MEAN DM% 88.1

PLOT AREA HARVESTED 0.00173

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81/R/WW/1 CLAYCROFT (R)

DISEASED SITE

GRAIN TONNES/HECTARE

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

N	63	126	189	189+E	MEAN
VARIETY					
AVALON	4.74	6.17	7.04	6.95	6.23
BARON	5.56	6.44	6.50	7.16	6.41
BOUNTY	5.56	6.26	7.09	7.02	6.48
BO+BR+HO	5.39	6.46	6.90	7.23	6.50
BRIGAND	5.68	6.40	6.87	6.94	6.47
FENMAN	6.14	6.46	7.06	6.89	6.64
FLANDERS	4.95	6.11	6.20	7.37	6.16
NORMAN	5.88	6.72	7.10	7.82	6.88
RAPIER	5.68	6.60	6.41	7.00	6.42
MEAN	5.51	6.40	6.80	7.15	6.47

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

TABLE	VARIETY	N	VARIETY N
SED	0.250	0.178	0.371
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.303
N			0.337

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

STRATUM	DF	SE	CV%
BLOCK.WP1	24	0.354	5.5
BLOCK.WP2	9	0.251	3.9
BLOCK.WP1.WP2	72	0.369	5.7

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00172

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81/W/WW/1 LANSOME II/III (W)

GRAIN TONNES/HECTARE

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

N	63	126	189	189+E	MEAN
VARIETY					
AVALON	5.85	6.61	6.34	8.72	6.88
BARON	6.72	6.29	6.70	8.04	6.94
BOUNTY	6.47	7.72	6.98	8.20	7.34
BO+BR+HO	6.45	6.81	6.68	7.21	6.79
BRIGAND	6.41	7.27	6.57	7.48	6.93
FENMAN	5.74	7.76	7.55	7.24	7.07
FLANDERS	5.44	6.06	5.03	5.35	5.47
NORMAN	5.91	6.71	6.65	6.67	6.49
RAPIER	5.86	6.28	6.46	7.21	6.45
MEAN	6.10	6.83	6.55	7.35	6.71

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

TABLE	VARIETY	N	VARIETY N
SED	0.506	0.367	0.755
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.620
N			0.683

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

STRATUM	DF	SE	CV%
BLOCK.WP1	16	0.620	9.2
BLOCK.WP2	6	0.450	6.7
BLOCK.WP1.WP2	48	0.649	9.7

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00173

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81/R/WW/2

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 half or standard seed rate - Gt. Harpenden 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):

100
200

2. EARLY N Nitrogen fertiliser applied 16 Feb, 1981 (kg N):

0
25
50
75

3. APRIL N Nitrogen fertiliser applied 3 Apr, 1981 (kg N):

75
100
125

plus extra treatments, all combinations of:-

1. SD RATEX Seed rates (kg):

100
200

2. APRIL NX Nitrogen fertiliser applied 3 Apr, 1981 (kg N):

150
175
200

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Fungicides: Prochloraz at 0.4 l in 250 l applied twice, with the growth regulator on the first occasion and with maneb and zineb on the second. Maneb at 1.2 kg with zineb at 0.13 kg. Growth regulator: Chlormequat at 1.7 kg.

Seed: Flanders.

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81/R/WW/2

Cultivations, etc.:- Disc harrowed twice: 12 Sept, 1980. Heavy spring-tine cultivated three times: 6 Oct. Spring-tine cultivated: 8 Oct. Seed sown: 9 Oct. Chlortoluron applied: 14 Oct. 'Brittox' applied: 21 Apr, 1981. Growth regulator and prochloraz applied: 5 May. Prochloraz, maneb and zineb applied: 19 June. Combine harvested: 25 Aug. Previous crops: S. barley, 1979, w. oats, 1980.

NOTES: (1) Plant counts were made in November, shoot counts in February and April and ear counts in July.
(2) 1000 grain weights and N content of grain were measured.

GRAIN TONNES/HECTARE

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

EARLY N / SD RATE	0	25	50	75	MEAN
100	7.94	8.02	8.18	8.38	8.13
200	7.82	8.24	8.18	8.41	8.16
MEAN	7.88	8.13	8.18	8.39	8.15

APRIL N / SD RATE	75	100	125	MEAN
100	7.93	8.27	8.18	8.13
200	7.97	8.28	8.25	8.16
MEAN	7.95	8.27	8.22	8.15

APRIL N / EARLY N	75	100	125	MEAN
0	7.57	8.08	8.00	7.88
25	7.86	8.20	8.32	8.13
50	7.94	8.27	8.33	8.18
75	8.42	8.54	8.22	8.39
MEAN	7.95	8.27	8.22	8.15

SD RATE	APRIL N / EARLY N	75	100	125
100	0	7.71	8.00	8.13
	25	7.76	8.13	8.16
	50	7.83	8.43	8.28
	75	8.43	8.53	8.17
200	0	7.44	8.17	7.87
	25	7.96	8.27	8.48
	50	8.06	8.11	8.38
	75	8.41	8.56	8.27

APRIL NX / SD RATEX	150	175	200	MEAN
100	8.19	7.94	8.22	8.11
200	8.08	8.09	8.23	8.13
MEAN	8.13	8.01	8.22	8.12

GRAND MEAN 8.14

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81/R/WW/2

GRAIN TONNES/HECTARE

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

TABLE	SD RATE	EARLY N	APRIL N	SD RATEX
SED	0.075	0.106	0.092	0.150

TABLE	APRIL NX	SD RATE EARLY N	SD RATE APRIL N	EARLY N APRIL N
SED	0.184	0.150	0.130	0.184

TABLE	SD RATE EARLY N APRIL N	SD RATEX APRIL NX
	0.260	0.260

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

STRATUM	DF	SE	CV%
BLOCK.WP	29	0.260	3.2

GRAIN MEAN DM% 84.2

PLOT AREA HARVESTED 0.00246

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81/R/WW/3

WINTER WHEAT

FACTORS LIMITING YIELD

Object: To study the effects of a range of factors on the incidence of pests and diseases and on the growth and yield of w. wheat - Little Hoos.

Sponsors: R.D. Prew, B.M. Church, A. Dewar, J. Lacey, A. Penny, R.T. Plumb, G.N. Thorne, A.D. Todd, T.D. Williams.

Associate sponsors: P. Barraclough, D.S. Jenkinson, R. Leigh, A. Weir, P.J. Welbank, F.V. Widdowson.

Design: Half replicate of 2^8 + 38 extra plots, arranged in 4 blocks.

Whole plot dimensions: 3.0 x 15.2.

Treatments: Combinations of:-

1. SOWDATE	Dates of sowing:	
	15 SEP	15 September, 1980
	30 OCT	30 October
2. TOTAL N	Total amount of nitrogen fertiliser (kg N) applied:	
	80	
	150	
3. N DIVIS	Division of total nitrogen fertiliser:	
	SINGLE	Single dressing
	DIVIDED	40 kg of the total before single dressing, 20 kg after the single dressing, remainder on single dressing date
4. N TIME	Time of applying single dressing of nitrogen fertiliser:	
	EARLY	At ear initiation of SOWDATE 15 SEP
	LATE	At ear initiation of SOWDATE 30 OCT
5. AUT PEST	Autumn pesticide:	
	NONE	None
	ALDICARB	Aldicarb at 5 kg worked in to seedbed
6. APHICIDE	Aphicide:	
	NONE	None
	PIRIMICA	Pirimicarb at 0.14 kg on 23 June, 1981
7. FUNGCIDE	Fungicides:	
	NONE	None
	CA+MA+TR	Carbendazim + maneb + tridemorph (as 'Cosmic' at 4.0 kg) with captafol at 0.96 l applied on 13 May, 1981, 10 June and 30 June

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81/R/WW/3

8. IRRIGATN Irrigation:

NONE	None
FULL	Full (125 mm) to lessen a deficit of 37.5 mm to 12.5 mm

plus all combinations of the following (all given single N dressing, aldicarb, pirimicarb, carbendazim + maneb + tridemorph, no irrigation):

1. SOWDATEX Dates of sowing:

15 SEP	15 September, 1980
30 OCT	30 October

2. TOTAL NX Total amount of nitrogen fertiliser (kg N):

40
80
115
150
185
220

3. N TIMEX Time of applying nitrogen fertiliser:

EARLY	At ear initiation of SOWDATE 15 SEP
LATE	At ear initiation of SOWDATE 30 OCT

plus two extra plots (both given aldicarb, pirimicarb, carbendazim + maneb + tridemorph, no irrigation):

NO 15 SEP	Sown 20 September, given no nitrogen
NO 30 OCT	Sown 30 October, given no nitrogen

plus all combinations of the following (all sown 15 September, given aldicarb, pirimicarb, carbendazim + maneb + tridemorph + captafol, no irrigation, all given 150 kg N as 'Nitro-Chalk', divided dressing except plots given 40 kg N as urea on 2 February which received 110 kg N as 'Nitro-Chalk'):

1. INHIB Nitrification inhibitor:

NONE	None
DICYANDI	Dicyandiamide at 3 kg

2. UREA UREA (kg N):

0
40

3. I U DATE Times of applying nitrification inhibitor and urea:

8 DEC	8 December, 1980
2 FEB	2 February, 1981

plus four extra plots used for root sampling, all sown 30 October, given aldicarb, pirimicarb, carbendazim + maneb + tridemorph + captafol, no irrigation, given 150 kg N as 'Nitro-Chalk' as a single dressing at ear initiation. Yields not presented.

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NOTES: (1) The irrigation treatment was as follows (mm water):-

25 June	25
1 July	25
7 July	25
16 July	25
21 July	25
Total	125

(2) Nitrogen applications were as follows:-

	N DIVIS	
	SINGLE	DIVIDED
SOWDATE 15 SEP	19 Mar	2 Feb, 19 Mar, 6 May
SOWDATE 30 OCT	23 Apr	19 Mar, 23 Apr, 20 May

(3) All treatment sprays were applied in 340 l.

Basal applications: Manures: (0:14:28) at 360 kg. Weedkillers: Methabenzthiazuron at 3.2 kg in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 340 l. Growth regulator: Chlormequat at 1.4 kg, applied at Zadoks growth stage 30, with the 'Brittox'.

Seed: Hustler, sown at 380 seeds per square metre.

Cultivations, etc.:- PK applied: 10 Sept, 1980. Heavy spring-tine cultivated twice: 11 Sept. Aldicarb applied for the first sowing, and all early sown plots sown with the rotary harrow, seed drill combination: 15 Sept. Aldicarb applied for the second sowing, and all late sown plots sown with the rotary harrow, seed drill combination: 30 Oct. Methabenzthiazuron applied: 31 Oct. 'Brittox' and growth regulator applied to first sowing: 3 Apr, 1981. 'Brittox' and growth regulator applied to second sowing: 1 May. Combine harvested: 27 Aug. Previous crops: S. beans, 1979, potatoes 1980.

NOTE: Soil was sampled for nematodes, wheat bulb fly larvae, water levels, and mineral N. Plants were assessed for foot and root rots in April and July, and lodging in July and August. 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. Weeds were scored in June.

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GRAIN TONNES/HECTARE

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

TOTAL N	80	150	MEAN
SOWDATE			
15 SEPT	8.58	8.18	8.38
30 OCT	8.32	8.07	8.19
MEAN	8.45	8.12	8.29

N DIVIS	SINGLE	DIVIDED	MEAN
SOWDATE			
15 SEPT	8.43	8.33	8.38
30 OCT	8.14	8.25	8.19
MEAN	8.28	8.29	8.29

N DIVIS	SINGLE	DIVIDED	MEAN
TOTAL N			
80	8.41	8.48	8.45
150	8.15	8.10	8.12
MEAN	8.28	8.29	8.29

N TIME	EARLY	LATE	MEAN
SOWDATE			
15 SEPT	8.27	8.49	8.38
30 OCT	8.15	8.23	8.19
MEAN	8.21	8.36	8.29

N TIME	EARLY	LATE	MEAN
TOTAL N			
80	8.41	8.49	8.45
150	8.01	8.24	8.12
MEAN	8.21	8.36	8.29

N TIME	EARLY	LATE	MEAN
N DIVIS			
SINGLE	8.25	8.32	8.28
DIVIDED	8.17	8.41	8.29
MEAN	8.21	8.36	8.29

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
15 SEPT	8.25	8.51	8.38
30 OCT	8.13	8.26	8.19
MEAN	8.19	8.39	8.29

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GRAIN TONNES/HECTARE

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

AUT PEST TOTAL N	NONE	ALDICARB	MEAN
80	8.29	8.61	8.45
150	8.09	8.16	8.12
MEAN	8.19	8.39	8.29

AUT PEST N DIVIS	NONE	ALDICARB	MEAN
SINGLE	8.22	8.34	8.28
DIVIDED	8.15	8.43	8.29
MEAN	8.19	8.39	8.29

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	8.11	8.31	8.21
LATE	8.27	8.46	8.36
MEAN	8.19	8.39	8.29

APHICIDE SOWDATE	NONE	PIRIMICA	MEAN
15 SEPT	8.41	8.35	8.38
30 OCT	8.21	8.18	8.19
MEAN	8.31	8.26	8.29

APHICIDE TOTAL N	NONE	PIRIMICA	MEAN
80	8.54	8.36	8.45
150	8.08	8.17	8.12
MEAN	8.31	8.26	8.29

APHICIDE N DIVIS	NONE	PIRIMICA	MEAN
SINGLE	8.26	8.30	8.28
DIVIDED	8.36	8.23	8.29
MEAN	8.31	8.26	8.29

APHICIDE N TIME	NONE	PIRIMICA	MEAN
EARLY	8.27	8.15	8.21
LATE	8.34	8.38	8.36
MEAN	8.31	8.26	8.29

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GRAIN TONNES/HECTARE

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

APHICIDE	NONE	PIRIMICA	MEAN
AUT PEST			
NONE	8.22	8.16	8.19
ALDICARB	8.40	8.37	8.39
MEAN	8.31	8.26	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
SOWDATE			
15 SEPT	7.31	9.45	8.38
30 OCT	7.59	8.79	8.19
MEAN	7.45	9.12	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
TOTAL N			
80	7.75	9.15	8.45
150	7.16	9.09	8.12
MEAN	7.45	9.12	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
N DIVIS			
SINGLE	7.39	9.18	8.28
DIVIDED	7.52	9.07	8.29
MEAN	7.45	9.12	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
N TIME			
EARLY	7.39	9.03	8.21
LATE	7.52	9.21	8.36
MEAN	7.45	9.12	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
AUT PEST			
NONE	7.42	8.96	8.19
ALDICARB	7.49	9.28	8.39
MEAN	7.45	9.12	8.29

FUNGCIDE	NONE	CA+MA+TR	MEAN
APHICIDE			
NONE	7.50	9.12	8.31
PIRIMICA	7.41	9.12	8.26
MEAN	7.45	9.12	8.29

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GRAIN TONNES/HECTARE

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

IRRIGATN SOWDATE	NONE	FULL	MEAN
15 SEPT	8.58	8.19	8.38
30 OCT	8.40	7.99	8.19
MEAN	8.49	8.09	8.29

IRRIGATN TOTAL N	NONE	FULL	MEAN
80	8.66	8.24	8.45
150	8.31	7.94	8.12
MEAN	8.49	8.09	8.29

IRRIGATN N DIVIS	NONE	FULL	MEAN
SINGLE	8.51	8.05	8.28
DIVIDED	8.46	8.12	8.29
MEAN	8.49	8.09	8.29

IRRIGATN N TIME	NONE	FULL	MEAN
EARLY	8.39	8.03	8.21
LATE	8.58	8.15	8.36
MEAN	8.49	8.09	8.29

IRRIGATN AUT PEST	NONE	FULL	MEAN
NONE	8.39	7.99	8.19
ALDICARB	8.58	8.19	8.39
MEAN	8.49	8.09	8.29

IRRIGATN APHICIDE	NONE	FULL	MEAN
NONE	8.48	8.14	8.31
PIRIMICA	8.49	8.03	8.26
MEAN	8.49	8.09	8.29

IRRIGATN FUNGCIDE	NONE	FULL	MEAN
NONE	7.69	7.22	7.45
CA+MA+TR	9.28	8.96	9.12
MEAN	8.49	8.09	8.29

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GRAIN TONNES/HECTARE

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

TOTAL N	80		150	
N DIVIS	SINGLE	DIVIDED	SINGLE	DIVIDED
SOWDATE				
15 SEPT	8.65	8.51	8.21	8.16
30 OCT	8.18	8.46	8.09	8.04

TOTAL N	80		150	
N TIME	EARLY	LATE	EARLY	LATE
SOWDATE				
15 SEPT	8.57	8.59	7.96	8.40
30 OCT	8.25	8.39	8.06	8.08

N DIVIS	SINGLE		DIVIDED	
N TIME	EARLY	LATE	EARLY	LATE
SOWDATE				
15 SEPT	8.26	8.59	8.28	8.39
30 OCT	8.23	8.04	8.07	8.43

N DIVIS	SINGLE		DIVIDED	
N TIME	EARLY	LATE	EARLY	LATE
TOTAL N				
80	8.42	8.41	8.40	8.57
150	8.07	8.23	7.95	8.25

TOTAL N	80		150	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
SOWDATE				
15 SEPT	8.35	8.81	8.15	8.22
30 OCT	8.23	8.41	8.03	8.11

N DIVIS	SINGLE		DIVIDED	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
SOWDATE				
15 SEPT	8.29	8.57	8.21	8.46
30 OCT	8.16	8.11	8.10	8.41

N DIVIS	SINGLE		DIVIDED	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
TOTAL N				
80	8.29	8.54	8.30	8.67
150	8.16	8.13	8.01	8.19

N TIME	EARLY		LATE	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
SOWDATE				
15 SEPT	8.15	8.38	8.34	8.64
30 OCT	8.06	8.25	8.20	8.27

N TIME	EARLY		LATE	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
TOTAL N				
80	8.29	8.53	8.29	8.68
150	7.93	8.10	8.25	8.23

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GRAIN TONNES/HECTARE

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

N TIME	EARLY		LATE	
AUT PEST	NONE	ALDICARB	NONE	ALDICARB
N DIVIS				
SINGLE	8.21	8.28	8.24	8.39
DIVIDED	8.00	8.35	8.30	8.52

TOTAL N	80		150	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
SOWDATE				
15 SEPT	8.69	8.46	8.12	8.24
30 OCT	8.39	8.25	8.04	8.10

N DIVIS	SINGLE		DIVIDED	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
SOWDATE				
15 SEPT	8.45	8.40	8.37	8.30
30 OCT	8.07	8.20	8.35	8.15

N DIVIS	SINGLE		DIVIDED	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
TOTAL N				
80	8.39	8.44	8.69	8.28
150	8.13	8.17	8.03	8.17

N TIME	EARLY		LATE	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
SOWDATE				
15 SEPT	8.35	8.19	8.47	8.52
30 OCT	8.20	8.10	8.22	8.25

N TIME	EARLY		LATE	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
TOTAL N				
80	8.58	8.24	8.50	8.48
150	7.97	8.05	8.19	8.29

N TIME	EARLY		LATE	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
N DIVIS				
SINGLE	8.26	8.23	8.26	8.37
DIVIDED	8.29	8.06	8.43	8.39

AUT PEST	NONE		ALDICARB	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
SOWDATE				
15 SEPT	8.30	8.19	8.51	8.51
30 OCT	8.14	8.12	8.28	8.23

AUT PEST	NONE		ALDICARB	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
TOTAL N				
80	8.45	8.14	8.63	8.58
150	7.99	8.18	8.16	8.16

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GRAIN TONNES/HECTARE

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

AUT PEST	NONE		ALDICARB	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
N DIVIS				
SINGLE	8.19	8.25	8.32	8.35
DIVIDED	8.25	8.06	8.48	8.39

AUT PEST	NONE		ALDICARB	
APHICIDE	NONE	PIRIMICA	NONE	PIRIMICA
N TIME				
EARLY	8.18	8.04	8.37	8.26
LATE	8.26	8.28	8.43	8.49

TOTAL N	80		150	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
SOWDATE				
15 SEPT	7.62	9.53	7.00	9.37
30 OCT	7.87	8.77	7.32	8.82

N DIVIS	SINGLE		DIVIDED	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
SOWDATE				
15 SEPT	7.28	9.57	7.34	9.33
30 OCT	7.49	8.78	7.70	8.80

N DIVIS	SINGLE		DIVIDED	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
TOTAL N				
80	7.68	9.15	7.82	9.15
150	7.09	9.20	7.22	8.98

N TIME	EARLY		LATE	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
SOWDATE				
15 SEPT	7.19	9.35	7.43	9.56
30 OCT	7.58	8.72	7.61	8.86

N TIME	EARLY		LATE	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
TOTAL N				
80	7.65	9.17	7.85	9.13
150	7.13	8.90	7.19	9.29

N TIME	EARLY		LATE	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
N DIVIS				
SINGLE	7.35	9.14	7.42	9.22
DIVIDED	7.42	8.93	7.62	9.20

AUT PEST	NONE		ALDICARB	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
SOWDATE				
15 SEPT	7.34	9.16	7.28	9.74
30 OCT	7.50	8.76	7.69	8.82

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GRAIN TONNES/HECTARE

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

AUT PEST	NONE		ALDICARB	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
TOTAL N				
80	7.63	8.95	7.87	9.35
150	7.20	8.97	7.11	9.22

AUT PEST	NONE		ALDICARB	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
N DIVIS				
SINGLE	7.35	9.10	7.43	9.25
DIVIDED	7.49	8.82	7.55	9.31

AUT PEST	NONE		ALDICARB	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
N TIME				
EARLY	7.33	8.89	7.45	9.18
LATE	7.50	9.04	7.53	9.38

APHICIDE	NONE		PIRIMICA	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
SOWDATE				
15 SEPT	7.26	9.56	7.36	9.35
30 OCT	7.74	8.68	7.45	8.90

APHICIDE	NONE		PIRIMICA	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
TOTAL N				
80	7.87	9.21	7.63	9.09
150	7.13	9.03	7.19	9.16

APHICIDE	NONE		PIRIMICA	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
N DIVIS				
SINGLE	7.39	9.13	7.38	9.23
DIVIDED	7.61	9.11	7.43	9.02

APHICIDE	NONE		PIRIMICA	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
N TIME				
EARLY	7.48	9.06	7.29	9.00
LATE	7.51	9.18	7.52	9.24

APHICIDE	NONE		PIRIMICA	
FUNGCIDE	NONE	CA+MA+TR	NONE	CA+MA+TR
AUT PEST				
NONE	7.45	8.99	7.38	8.94
ALDICARB	7.54	9.25	7.44	9.31

TOTAL N	80		150	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	8.72	8.43	8.43	7.94
30 OCT	8.59	8.05	8.20	7.93

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GRAIN TONNES/HECTARE

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

N DIVIS	SINGLE		DIVIDED	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	8.67	8.19	8.49	8.18
30 OCT	8.35	7.92	8.44	8.06

N DIVIS	SINGLE		DIVIDED	
IRRIGATN	NONE	FULL	NONE	FULL
TOTAL N				
80	8.61	8.22	8.70	8.27
150	8.41	7.89	8.22	7.98

N TIME	EARLY		LATE	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	8.48	8.06	8.67	8.31
30 OCT	8.31	8.00	8.49	7.98

N TIME	EARLY		LATE	
IRRIGATN	NONE	FULL	NONE	FULL
TOTAL N				
80	8.63	8.19	8.68	8.29
150	8.15	7.87	8.48	8.00

N TIME	EARLY		LATE	
IRRIGATN	NONE	FULL	NONE	FULL
N DIVIS				
SINGLE	8.42	8.07	8.60	8.04
DIVIDED	8.36	7.99	8.56	8.26

AUT PEST	NONE		ALDICARB	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	8.47	8.02	8.68	8.35
30 OCT	8.31	7.95	8.48	8.03

AUT PEST	NONE		ALDICARB	
IRRIGATN	NONE	FULL	NONE	FULL
TOTAL N				
80	8.51	8.07	8.81	8.41
150	8.27	7.90	8.36	7.97

AUT PEST	NONE		ALDICARB	
IRRIGATN	NONE	FULL	NONE	FULL
N DIVIS				
SINGLE	8.51	7.93	8.50	8.17
DIVIDED	8.27	8.04	8.66	8.21

AUT PEST	NONE		ALDICARB	
IRRIGATN	NONE	FULL	NONE	FULL
N TIME				
EARLY	8.28	7.93	8.51	8.12
LATE	8.50	8.04	8.66	8.26

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GRAIN TONNES/HECTARE

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

APHICIDE	NONE		PIRIMICA	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	8.56	8.26	8.59	8.11
30 OCT	8.40	8.03	8.40	7.96

APHICIDE	NONE		PIRIMICA	
IRRIGATN	NONE	FULL	NONE	FULL
TOTAL N				
80	8.73	8.35	8.58	8.13
150	8.22	7.93	8.41	7.94

APHICIDE	NONE		PIRIMICA	
IRRIGATN	NONE	FULL	NONE	FULL
N DIVIS				
SINGLE	8.44	8.07	8.57	8.04
DIVIDED	8.51	8.21	8.42	8.03

APHICIDE	NONE		PIRIMICA	
IRRIGATN	NONE	FULL	NONE	FULL
N TIME				
EARLY	8.42	8.12	8.36	7.93
LATE	8.53	8.16	8.63	8.14

APHICIDE	NONE		PIRIMICA	
IRRIGATN	NONE	FULL	NONE	FULL
AUT PEST				
NONE	8.39	8.05	8.39	7.92
ALDICARB	8.57	8.23	8.60	8.15

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
SOWDATE				
15 SEPT	7.55	7.07	9.60	9.30
30 OCT	7.82	7.37	8.97	8.62

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
TOTAL N				
80	7.99	7.50	9.32	8.98
150	7.39	6.93	9.24	8.94

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
N DIVIS				
SINGLE	7.70	7.07	9.31	9.04
DIVIDED	7.68	7.36	9.25	8.88

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
N TIME				
EARLY	7.63	7.14	9.15	8.92
LATE	7.75	7.29	9.41	9.00

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GRAIN TONNES/HECTARE

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

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
AUT PEST				
NONE	7.69	7.14	9.10	8.83
ALDICARB	7.69	7.29	9.47	9.09

FUNGCIDE	NONE		CA+MA+TR	
IRRIGATN	NONE	FULL	NONE	FULL
APHICIDE				
NONE	7.67	7.32	9.28	8.96
PIRIMICA	7.71	7.11	9.28	8.96

TOTAL NX	40	80	115	150	185	220	MEAN
SOWDATEX							
15 SEPT	9.47	10.20	9.49	9.62	9.52	9.03	9.56
30 OCT	9.48	9.59	9.54	9.19	8.37	8.86	9.17
MEAN	9.48	9.90	9.52	9.40	8.94	8.95	9.36

N TIMEX	EARLY	LATE	MEAN
SOWDATEX			
15 SEPT	9.21	9.91	9.56
30 OCT	9.09	9.26	9.17
MEAN	9.15	9.58	9.36

N TIMEX	EARLY	LATE	MEAN
TOTAL NX			
40	9.65	9.30	9.48
80	9.53	10.27	9.90
115	9.13	9.91	9.52
150	9.44	9.36	9.40
185	8.62	9.26	8.94
220	8.51	9.39	8.95
MEAN	9.15	9.58	9.36

N TIMEX	EARLY	LATE
SOWDATEX TOTAL NX		
15 SEPT 40	9.46	9.48
80	9.67	10.74
115	9.01	9.98
150	9.59	9.64
185	9.19	9.85
220	8.32	9.75
30 OCT 40	9.84	9.13
80	9.39	9.79
115	9.26	9.83
150	9.29	9.09
185	8.06	8.68
220	8.69	9.04

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81/R/WW/3

GRAIN TONNES/HECTARE

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

EXTRA	NO 15 SEP	NO 30 OCT
	7.66	6.63

INHIB	UREA	I U DATE	
NONE	0	-	10.22
NONE	40	8 DEC	9.73
NONE	40	2 FEB	9.98
DICYANDI	0	8 DEC	10.33
DICYANDI	0	2 FEB	10.79
DICYANDI	40	8 DEC	10.12
DICYANDI	40	2 FEB	10.15

GRAND MEAN 8.54

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

SED APPLY TO MAIN FACTORIAL PLOTS ONLY

MARGINS OF TWO FACTOR TABLES	0.067
TWO FACTOR TABLES	0.095
THREE FACTOR TABLES	0.135

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

STRATUM	DF	SE	CV%
BLOCK.WP	32	0.381	4.6

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.00223

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81/W/WW/3

WINTER WHEAT

GROWTH AND YIELD ON A CONTRASTED SITE

Object: To study on a contrasted site the effects of some of the factors tested in 81/R/WW/3 Factors Limiting Yield and to determine the extent to which differences between the sites can be eliminated by appropriate combinations of the factors - Woburn Butt Close III.

Sponsors: F.V. Widdowson, P.J. Welbank.

Design: Half replicate of 2^6, arranged as 16 whole plots split into 2 sub plots, plus 24 extra sub plots.

Whole plot dimensions: 2.74 x 14.8.

Treatments: Combinations of:-

Whole plots

1.	SOWDATE	Dates of sowing:
	16 SEP	16 September, 1980
	31 OCT	31 October

Sub plots

2.	TOTAL N	Total amount of nitrogen fertiliser (kg N) applied:
	150	
	220	
3.	N DIVIS	Division of total nitrogen fertiliser:
	SINGLE	Single dressing
	DIVIDED	40 kg of the total before single dressing, 40 kg of the total after single dressing, remainder on single date
4.	N TIME	Time of applying single dressing of nitrogen fertiliser:
	EARLY	At ear initiation of SOWDATE 16 SEP on 17 March
	LATE	At ear initiation of SOWDATE 31 OCT on 21 April
5.	AUT PEST	Autumn pesticide:
	NONE	None
	ALDICARB	Aldicarb at 5 kg worked in to seedbed
6.	IRRIGATN	Irrigation:
	NONE	None
	FULL	Full (196 mm) to lessen a deficit of 25 mm to 12.5 mm

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plus all combinations of the following (all given N as a single dressing at ear initiation, aldicarb to seedbed, irrigated):

1. SOWDATEX Dates of sowing:

   16 SEP
   31 OCT

2. TOTAL NX Total amount of nitrogen fertiliser (kg N):

   0
   80
   115
   185
   220
   255

plus all combinations of the following (all sown on 16 September, given 220 kg N as 'Nitro-Chalk', divided dressing, except plots given 40 kg N as urea on 3 February which received 180 kg N as 'Nitro-Chalk', aldicarb to seedbed, irrigated):

1. N INHIB Nitrification inhibitor:

NONE	None
DICYANDI	Dicyandiamide at 3.0 kg

2. UREA N Nitrogen (kg N) as urea:

   0
   40

3. I U DATE Times of applying nitrification inhibitor and urea:

10 DEC	10 December, 1980
3 FEB	3 February, 1981

plus four extra sub plots used for root sampling, all sown 31 October, given 220 kg N as 'Nitro-Chalk' as a single dressing at ear initiation, aldicarb to seedbed, not irrigated. Yields not presented.

Irrigation was applied as follows (mm water):

11 June	20	16 July	5
18 June	20	17 July	5
22 June	10	20 July	9
26 June	10	22 July	5
29 June	10	23 July	5
2 July	10	27 July	10
6 July	9	30 July	10
8 July	9	31 July	5
10 July	9	5 Aug	10
13 July	10		
14 July	10	Total	196
15 July	5		

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81/W/WW/3

	N DIVIS	
	SINGLE	DIVIDED
SOWDATE 16 SEP	17 Mar	3 Feb, 17 Mar, 5 May
SOWDATE 31 OCT	21 Apr	3 Feb, 21 Apr, 5 May

Standard applications: Manures: (0:14:28) at 360 kg. Weedkillers: Methabenzthiazuron at 1.6 kg in 280 l to SOWDATE 31 OCT only; Methabenzthiazuron at 1.6 kg with mecoprop (as 'Herrifex DS' at 2.5 l) in 280 l to SOWDATE 16 SEP only; mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l to both sowing dates. Insecticides: Chlorfenvinphos at 0.67 kg in 280 l, pirimicarb at 0.14 kg in 280 l. Fungicide: Triadimefon with carbendazim (as 'Bayleton BM' at 0.32 kg) in 280 l, triadimefon with captafol (as 'Bayleton CF' at 2.1 kg) in 280 l. Growth regulator: Chlormequat at 1.4 l in 280 l.

Seed: Hustler, sown at 200 kg.

Cultivations, etc.:- Deep-tine cultivated: 7 Aug, 1980. PK applied: 15 Sept. Heavy spring-tine cultivated, aldicarb applied for SOWDATE 16 SEP and rotary cultivated: 16 Sept. Aldicarb applied for SOWDATE 31 OCT and rotary cultivated: 31 Oct. Methabenzthiazuron applied to SOWDATE 31 OCT and methabenzthiazuron with 'Herrifex DS' applied to SOWDATE 16 SEP: 10 Nov. Chlorfenvinphos applied: 30 Jan, 1981. Growth regulator and 'Brittox' applied to SOWDATE 16 SEP: 3 Apr. 'Bayleton BM' applied: 15 Apr. Growth regulator and 'Brittox' applied to SOWDATE 31 OCT: 21 Apr. 'Bayleton CF' applied: 5 June. Pirimicarb applied: 13 July. Combine harvested: 28 Aug. Previous crops: W. wheat 1979, early potatoes 1980.

NOTE: Measurements were made of plant and shoot numbers, dry weight of tops and ears, leaf areas 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 in July. Disease assessments were made during the growing season. Soil samples were taken in autumn and spring to determine N contents.

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81/W/WW/3

GRAIN TONNES/HECTARE

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

TOTAL N	150	220	MEAN
SOWDATE			
16 SEP	9.41	9.39	9.40
31 OCT	7.45	8.23	7.84
MEAN	8.43	8.81	8.62

N DIVIS	SINGLE	DIVIDED	MEAN
SOWDATE			
16 SEP	9.11	9.69	9.40
31 OCT	7.65	8.03	7.84
MEAN	8.38	8.86	8.62

N DIVIS	SINGLE	DIVIDED	MEAN
TOTAL N			
150	8.19	8.68	8.43
220	8.57	9.04	8.81
MEAN	8.38	8.86	8.62

N TIME	EARLY	LATE	MEAN
SOWDATE			
16 SEP	9.13	9.66	9.40
31 OCT	8.27	7.41	7.84
MEAN	8.70	8.54	8.62

N TIME	EARLY	LATE	MEAN
TOTAL N			
150	8.50	8.36	8.43
220	8.90	8.71	8.81
MEAN	8.70	8.54	8.62

N TIME	EARLY	LATE	MEAN
N DIVIS			
SINGLE	8.88	7.88	8.38
DIVIDED	8.52	9.20	8.86
MEAN	8.70	8.54	8.62

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
16 SEP	8.77	10.02	9.40
31 OCT	7.68	8.00	7.84
MEAN	8.23	9.01	8.62

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81/W/WW/3

GRAIN TONNES/HECTARE

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

AUT PEST TOTAL N	NONE	ALDICARB	MEAN
150	8.09	8.77	8.43
220	8.36	9.25	8.81
MEAN	8.23	9.01	8.62

AUT PEST N DIVIS	NONE	ALDICARB	MEAN
SINGLE	7.95	8.81	8.38
DIVIDED	8.50	9.21	8.86
MEAN	8.23	9.01	8.62

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	8.62	8.78	8.70
LATE	7.84	9.24	8.54
MEAN	8.23	9.01	8.62

IRRIGATN SOWDATE	NONE	FULL	MEAN
16 SEP	9.03	9.76	9.40
31 OCT	7.47	8.21	7.84
MEAN	8.25	8.99	8.62

IRRIGATN TOTAL N	NONE	FULL	MEAN
150	8.07	8.79	8.43
220	8.44	9.18	8.81
MEAN	8.25	8.99	8.62

IRRIGATN N DIVIS	NONE	FULL	MEAN
SINGLE	7.96	8.80	8.38
DIVIDED	8.54	9.17	8.86
MEAN	8.25	8.99	8.62

IRRIGATN N TIME	NONE	FULL	MEAN
EARLY	8.43	8.97	8.70
LATE	8.07	9.00	8.54
MEAN	8.25	8.99	8.62

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81/W/WW/3

GRAIN TONNES/HECTARE

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

IRRIGATN	NONE	FULL	MEAN
AUT PEST			
NONE	7.74	8.72	8.23
ALDICARB	8.77	9.25	9.01
MEAN	8.25	8.99	8.62

TOTAL NX	0	80	115	185	220	255	MEAN
SOWDATE							
16 SEP	7.02	8.20	8.95	10.75	10.13	10.71	9.29
31 OCT	6.37	5.72	7.45	8.11	7.50	6.97	7.02
MEAN	6.69	6.96	8.20	9.43	8.81	8.84	8.16

N INHIB	UREA N	I D DATE	
NONE	0	-	10.17
NONE	40	10 DEC	11.76
NONE	40	3 FEB	11.19
DICYANDI	0	10 DEC	10.06
DICYANDI	0	3 FEB	11.54
DICYANDI	40	10 DEC	11.16
DICYANDI	40	3 FEB	11.34

GRAND MEAN 8.75

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

SED FOR TABLES EXCEPT THOSE INVOLVING FACTORS.TOTAL NX, SOWDATE, N INHIB, UREA N OR I D DATE ARE

MARGINS OF 2 WAY TABLES	0.194
TWO WAY TABLES	0.275

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

STRATUM	DF	SE	CV%
WP	10	0.549	6.4

GRAIN MEAN DM% 84.2

PLOT AREA HARVESTED 0.00223

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81/R/WW/4

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 - Webbs.

Sponsor: N. Magan.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 4.27 x 16.2.

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 1 June, 1981

2. L FUNG A — Late-applied fungicides:

BENOMYL	Benomyl at 0.56 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:

12 JUNE	12 June, 1981
22 JUNE	22 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 1 June, 1981 (duplicated)

NOTE: Treatment sprays were applied in 340 l.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 390 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Maris Huntsman, sown at 200 kg.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 2 Oct, 1980. Spring-tine cultivated, seed sown: 3 Oct. N applied: 8 Apr, 1981. Weedkillers applied: 10 Apr. Combine harvested: 29 Aug. Previous crops: W. wheat 1979, potatoes, 1980.

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NOTE: Grain and flag leaf microflora, especially Alternaria and Cladosporium, were assessed at fortnightly intervals after heading. Thousand grain weights were measured, and grain was assessed for germination and seedling growth.

GRAIN TONNES/HECTARE

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

LFNGDATE E FUNG	12 JUNE	22 JUNE	MEAN
NONE	8.21	8.31	8.26
CARB+MAN	8.45	8.41	8.43
MEAN	8.33	8.36	8.34

L FUNG A E FUNG	BENOMYL	CAPTAFOL	CARB+MAN	IMAZALIL	PROCHLOR	MEAN
NONE	8.39	8.27	8.25	7.99	8.38	8.26
CARB+MAN	8.40	8.32	8.59	8.24	8.59	8.43
MEAN	8.40	8.29	8.42	8.11	8.49	8.34

L FUNG A LFNGDATE	BENOMYL	CAPTAFOL	CARB+MAN	IMAZALIL	PROCHLOR	MEAN
12 JUNE	8.47	8.22	8.28	8.11	8.56	8.33
22 JUNE	8.32	8.36	8.56	8.12	8.41	8.36
MEAN	8.40	8.29	8.42	8.11	8.49	8.34

E FUNG	L FUNG A LFNGDATE	BENOMYL	CAPTAFOL	CARB+MAN	IMAZALIL	PROCHLOR
NONE	12 JUNE	8.49	8.21	8.13	7.89	8.31
	22 JUNE	8.30	8.33	8.37	8.08	8.46
CARB+MAN	12 JUNE	8.46	8.23	8.43	8.32	8.81
	22 JUNE	8.34	8.40	8.75	8.17	8.37

L FUNG O	NONE	CARB+MAN
	7.93	8.00

GRAND MEAN 8.28

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81/R/WW/4

GRAIN TONNES/HECTARE

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

TABLE	L FUNG 0	E FUNG	LFNGDATE	L FUNG A
SED	0.172	0.077	0.077	0.121

TABLE	E FUNG LFNGDATE	E FUNG L FUNG A	LFNGDATE L FUNG A	E FUNG LFNGDATE L FUNG A
SED	0.109	0.172	0.172	0.243

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

STRATUM	DF	SE	CV%
BLOCK.WP	25	0.243	2.9

GRAIN MEAN DM% 83.7

SUB PLOT AREA HARVESTED 0.00260

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81/R/WW/5

WINTER WHEAT

DIRECT DRILLING AND SLUG CONTROL

Object: To study the effects of a range of materials and methods of application on the control of slugs and on the yield of direct-drilled w. wheat - Pastures.

Sponsors: G.C. Scott, D.C. Griffiths.

Design: 4 randomised blocks of 9 plots.

Whole plot dimensions: 5.63 x 7.62.

Treatments:

TREATMNT	Materials, methods and rates of application:
NONE	None
109 SD	'M&B 10903' seed dressing (0.2 % weight of seed)
329 SD	'SAN 329' seed dressing (0.2 % weight of seed)
CART SD	Cartap seed dressing (0.2 % weight of seed)
METH SD	Methiocarb seed dressing (0.2 % weight of seed)
METH MIX	Methiocarb at 5.5 kg mixed with seed
METH BCE	Methiocarb at 5.5 kg broadcast 15 Oct before drilling
METH BCL	Methiocarb at 5.5 kg broadcast 5 Nov after drilling
META BCE	Metaldehyde at 7.8 kg broadcast 15 Oct before drilling

Basal applications: Manures: 'Nitro-Chalk' at 560 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l. Isoproturon at 2.1 l and mecoprop at 3.2 l in 250 l. Fungicides: Prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- 'Banlene Plus' applied: 13 Oct, 1980. Disc harrowed: 24 Oct. Seed sown: 1 Nov. N applied: 14 Apr, 1981. Isoproturon and mecoprop applied: 22 Apr. Fungicides applied: 19 June. Combine harvested: 26 Aug. Previous crops: Clover 1979 and 1980.

NOTE: Slugs were counted three times, and plants were assessed for slug damage twice between late October and early January.

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81/R/WW/5

GRAIN TONNES/HECTARE

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

TREATMNT	
NONE	8.02
109 SD	7.79
329 SD	7.88
CART SD	7.68
METH SD	8.20
METH MIX	8.05
METH BCE	7.80
METH BCL	7.89
META BCE	8.07
MEAN	7.93

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

TABLE	TREATMNT
SED	0.225

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

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.318	4.0

GRAIN MEAN DM% 82.9

PLOT AREA HARVESTED 0.00213

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81/R/WW/6

WINTER WHEAT

PREDATORS AND POLYTHENE BARRIERS

Object: To study the effects of polythene barriers on the incidence of mobile insect predators and on the yield of w. wheat - Sawyers II.

Sponsors: R. Bardner, W. Powell, K.E. Fletcher, J.R. Lofty.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 19.2 x 19.2.

Treatments: All combinations of:-

1. BARRIER — Polythene barriers, 45 cm above and 15 cm below soil surface from 7 May, 1981 until 17 Aug:

   NONE — None
   POLYTHEN — Polythene barriers on all sides of plots

2. INSCTCDE — Insecticide applied to soil surface:

   NONE — None
   FONOFOS — Fonofos at 4.5 kg on 11 May

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 390 kg. Weedkillers: Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- Heavy spring-tine cultivated: 13 Oct, 1980. Spring-tine cultivated: 14 Oct. Seed sown: 15 Oct. N applied: 15 Apr, 1981. Weedkillers applied: 17 Apr. Combine harvested: 25 Aug. Previous crops: W. wheat 1979, potatoes 1980.

NOTE: Soil surface predators were counted throughout the season, and wheat blossom midges and thrips were counted in July.

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81/R/WW/6

GRAIN TONNES/HECTARE

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

INSCTCDE / BARRIER	NONE	FONOFOS	MEAN
NONE	7.05	7.42	7.23
POLYTHEN	6.96	7.23	7.09
MEAN	7.00	7.32	7.16

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

TABLE	BARRIER	INSCTCDE	BARRIER INSCTCDE
SED	0.156	0.156	0.220

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.270	3.8

GRAIN MEAN DM% 84.4

PLOT AREA HARVESTED 0.00546

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81/R/WW/7

WINTER WHEAT

INTEGRATED PEST CONTROL

Object: To study the effects of chemical and biological treatments on the incidence of pests and beneficial insects and on the yield of w. wheat - Gt. Harpenden I.

Sponsors: W. Powell, R. Bardner, C.A. Edwards, G.J.W. Dean, A.M. Dewar, N. Wilding, J.R. Lofty, K.E. Fletcher, R.T. Plumb.

Design: 3 randomised blocks of 5 plots.

Whole plot dimensions: 13.7 x 19.2.

Treatments:

TREATMNT	Chemical & biological treatments:
NONE	None (duplicated)
BENOMYL	Benomyl at 0.56 kg in 360 l on 7 April, 1981
DIMETHOA	Dimethoate at 0.34 l in 600 l on 22 June
PIRIMICA	Pirimicarb at 0.14 kg in 600 l on 22 June

NOTES: (1) Polythene barriers, 45 cm above ground level and 15 cm below ground level, were erected around each plot on 5 May, 1981, and remained until harvest.
(2) A planned biological control treatment, using the aphid pathogenic fungus Erynia, was omitted because aphids were few.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkillers: Paraquat at 0.84 kg ion in 250 l applied twice. Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Flanders, sown at 200 kg.

Cultivations, etc.:- Disc harrowed: 21 Aug, 1980. Paraquat applied: 19 Sept, 3 Oct. Heavy spring-tine cultivated three times: 4-6 Oct. Spring-tine cultivated and seed sown: 8 Oct. Chlortoluron applied: 14 Oct. N applied: 16 Apr, 1981. 'Brittox' applied: 21 Apr. Combine harvested: 26 Aug. Previous crops: S. barley 1979, w. oats, 1980.

NOTES: Ground surface insects were counted weekly between April and August and aerial insects weekly between May and July. Soil insects were counted in June. Aphid numbers, infection with Erynia and aphid parasite numbers were assessed in June and July.

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81/R/WW/7

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	BENOMYL	DIMETHOA	PIRIMICA	MEAN
	7.03	7.17	7.27	6.79	7.06

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

TABLE	TREATMNT	
SED	0.336	MIN REP
	0.291	MAX-MIN

TREATMNT
MAX-MIN NONE V ANY OF REMAINDER
MIN REP ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.412	5.8

GRAIN MEAN DM% 87.2

PLOT AREA HARVESTED 0.00293

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81/R/WW/8

WINTER WHEAT

VARIETIES, WEEDKILLERS AND PESTS

Object: To study the effects of weeds on pests and their predators and on the yield of two varieties of w. wheat - Stackyard.

Sponsors: W. Powell, R. Bardner, C.A. Edwards, G.J.W. Dean, A.M. Dewar, N. Wilding, J.R. Lofty, K.E. Fletcher, R.T. Plumb.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 19.2 x 19.2.

Treatments: All combinations of:-

1. VARIETY — Varieties:

KADOR	Kador
HUNTSMAN	Maris Huntsman

2. WEEDKLLR — Weedkillers:

NONE	None
ISOP+MEC	Isoproturon at 2.1 kg plus mecoprop at 3.0 l

NOTE: The weedkiller treatment was applied in 250 l on 22 Apr, 1981.

Basal applications: Manures: (10:23:23) at 250 kg, combine drilled. 'Nitro-Chalk' at 560 kg. Weedkiller: Glyphosate at 1.5 l in 250 l.

Seed: Varieties sown at 200 kg.

Cultivations, etc.:- Glyphosate applied: 27 Sept, 1980. Ploughed: 14 Oct. Spring-tine cultivated: 30 Oct. Seed sown: 31 Oct. N applied: 14 Apr, 1981. Combine harvested: 29 Aug. Previous crops: W. oats 1979, w. wheat 1980.

NOTE: Ground surface insects were counted weekly between April and August and aerial insects weekly between May and July. Soil insects were counted in June. Aphid numbers, infection with Entomophthorales and aphid parasite numbers were assessed in June and July. Weed cover was assessed in April and June.

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81/R/WW/8

GRAIN TONNES/HECTARE

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

WEEDKLLR VARIETY	NONE	ISOP+MEC	MEAN
KADOR	5.99	7.10	6.54
HUNTSMAN	7.22	7.20	7.21
MEAN	6.60	7.15	6.88

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

TABLE	VARIETY	WEEDKLLR	VARIETY WEEDKLLR
SED	0.183	0.183	0.258

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.316	4.6

GRAIN MEAN DM% 82.0

PLOT AREA HARVESTED 0.00410

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81/R/WW/9

WINTER WHEAT

NITRIFICATION INHIBITORS AND SOIL N

Object: To study the effects of nitrification inhibitors, applied before sowing on the leaching of nitrogen in the soil and on the yield of w. wheat - Gt. Harpenden I.

Sponsor: G.A. Rodgers.

Design: 2 randomised blocks of 21 plots.

Whole plot dimensions: 2.74 x 11.6.

Treatments: All combinations of:-

1. N INHIB — Nitrification inhibitors before sowing:

NONE	None
DICYAN 1	Dicyandiamide at 5 kg
DICYAN 2	Dicyandiamide at 20 kg
ETRIDI 1	Etridiazole at 0.5 kg
ETRIDI 2	Etridiazole at 2.0 kg
NITRAP 1	Nitrapyrin at 0.5 kg
NITRAP 2	Nitrapyrin at 2.0 kg

2. SPRING N — Nitrogen fertiliser (kg N) in spring on 16 April, 1981:

0
35
70

NOTE: Nitrification inhibitors were applied on 24 Sept, 1980.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Isoproturon at 2.5 kg in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Fungicides: Prochloraz at 0.4 l applied with maneb at 1.2 kg and zineb at 0.13 kg in 250 l.

Seed: Flanders, sown at 190 kg.

Cultivations, etc.:- Subsoiled four times: 13 June, 1980. Chisel ploughed twice: 16 June. Rotary cultivated: 18 June, 8 July, 7 Aug, 18 Sept. Rotary harrowed: 24 Sept. Seed sown: 29 Sept. Isoproturon applied: 4 Oct. 'Brittox' applied: 21 Apr, 1981. Fungicides applied: 22 June. Combine harvested: 26 Aug. Previous crops: Grass 1979 and 1980.

NOTES: (1) Soil cores were taken to 20 cms, at 21 day intervals between September and April, and to 1 m in January, and analysed for ammonium and nitrate concentrations.

(2) Dicyandiamide concentrations were measured on several occasions after applications. Total N was measured in plants in April, and ears were counted in June. Harvested grain and straw was analysed for total N.

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81/R/WW/9

GRAIN TONNES/HECTARE

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

SPRING N / N INHIB	0	35	70	MEAN
NONE	4.55	5.87	7.10	5.84
DICYAN 1	4.69	6.62	7.21	6.17
DICYAN 2	5.30	6.40	7.18	6.29
ETRIDI 1	4.36	6.13	7.46	5.98
ETRIDI 2	5.08	5.84	7.14	6.02
NITRAP 1	5.10	6.40	6.48	6.00
NITRAP 2	4.88	6.17	6.75	5.93
MEAN	4.85	6.20	7.05	6.03

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

TABLE	N INHIB	SPRING N	N INHIB SPRING N
SED	0.282	0.185	0.488

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

STRATUM	DF	SE	CV%
BLOCK.WP	20	0.488	8.1

GRAIN MEAN DM% 86.0

STRAW TONNES/HECTARE

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

SPRING N / N INHIB	0	35	70	MEAN
NONE	2.32	3.19	3.49	3.00
DICYAN 1	2.34	2.81	3.49	2.88
DICYAN 2	2.49	3.20	3.67	3.12
ETRIDI 1	2.36	3.07	3.99	3.14
ETRIDI 2	2.80	2.67	3.83	3.10
NITRAP 1	2.36	3.31	3.51	3.06
NITRAP 2	2.28	3.34	3.29	2.97
MEAN	2.42	3.09	3.61	3.04

STRAW MEAN DM% 88.2

PLOT AREA HARVESTED 0.00156

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81/R/WS/1

SPRING WHEAT

ALTERNARIA INOCULATION

Object: To study the effects of times of inoculating Alternaria on grain quality and yield of s. wheat - Long Hoos V 5.

Sponsor: N. Magan

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 2.16 x 2.13

Treatments:

INOCTIME	Times of applying Alternaria inoculum:
0	Not inoculated
ZGS 50	Zadoks growth stage 50
ZGS 60	" " " 60
ZGS 70	" " " 70

Basal applications: 'Nitro-Chalk' at 450 kg, combine drilled.

Seed: Timmo, sown at 180 kg.

Cultivations, etc.:- Ploughed: 13 Nov, 1980. Power harrowed, seed sown: 13 Apr, 1981. Combine harvested: 4 Sept. Previous crops: S. wheat 1979, potatoes 1980.

NOTES: Plots were sampled weekly after treatment for Alternaria and other microflora. Ear samples were taken just before harvest to measure Alternaria microtoxins.

GRAIN TONNES/HECTARE

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

INOCTIME	0	ZGS 50	ZGS 60	ZGS 70	MEAN
	3.93	3.94	4.07	3.87	3.95

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

TABLE	INOCTIME
SED	0.327

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

STRATUM	DF	SE	CV%
BLOCK.WP	6	0.401	10.1

GRAIN MEAN DM% 78.5

PLOT AREA HARVESTED 0.00046

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81/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 - Fosters West.

Sponsors: F.V. Widdowson, J.F. Jenkyn, R.T. Plumb, D.W. Lawlor, G.J.S. Ross.

Associate sponsors: B.R. Kerry, G.C. Scott.

Design: Half replicate of 2^7 + 2 extra plots, arranged in 2 blocks.

Whole plot dimensions: 3.0 x 15.2.

Treatments: Combinations of:-

1. SOWDATE		Dates of sowing:
	17 SEP	17 September, 1980
	30 OCT	30 October
2. N RATE		Rates of nitrogen fertiliser (kg N):
	90	
	140	
3. N TIME		Times of applying nitrogen fertiliser:
	EARLY	At end of tillering of SOWDATE 17 SEP - 18 Mar, 81
	LATE	At end of tillering of SOWDATE 30 OCT - 13 Apr
4. AUT PEST		Autumn pesticide:
	NONE	None
	ALDICARB	Aldicarb at 5 kg worked in to seedbed
5. E FUNG		Early fungicides:
	NONE	None
	TFSD	Triadimenol and fuberidazole seed dressing
6. L FUNG		Late fungicides:
	NONE	None
	PRS	Prochloraz spray at 0.4 l on 16 Feb, 14 May, and (to SOWDATE 30 Oct only) June
7. GRTH REG		Growth regulator:
	NONE	None
	MEP+ETH	Mepiquat chloride + ethephon as 'Terpal' at 2.46 l in 280 l

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plus two extra treatments given no nitrogen fertiliser, pesticides, fungicides or growth regulator:

EXTRA	
17 SEP 0	Sown 17 September
30 OCT 0	Sown 30 October

NOTE: (1) Aldicarb was applied just before sowing on each occasion, and worked in by the rotary harrow, seed drill combination.
(2) The growth regulator was applied at the recommended growth stage (Zadoks 31/32) which occurred on 15 April for the first sowing, and 7 May for the second.
(3) The first and third prochloraz sprays were applied in 450 l and the second in 340 l.

Basal applications: Manures: (0:14:28) at 360 kg. Weedkiller: Chlortoluron at 5.6 l in 250 l.

Seed: Igri, sown at 160 kg.

Cultivations: PK applied, heavy spring-tine cultivated twice: 17 Sept, 1980. Weedkiller applied: 1 Nov. Combine harvested: 3 Aug, 1981. Previous crops: S. beans 1979, potatoes 1980.

NOTES: (1) Nitrate in the crop was measured three times during the season, and nitrate in the soil twice. Crop height and ear numbers were measured in June. Leaf diseases were assessed periodically.
(2) The first sowing suffered severe sparrow damage at grain filling and reported grain yields are not reliable estimates of treatment effects.

GRAIN TONNES/HECTARE

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

N RATE	90	140	MEAN
SOWDATE			
17 SEP	7.05	7.22	7.14
30 OCT	7.56	7.38	7.47
MEAN	7.30	7.30	7.30

N TIME	EARLY	LATE	MEAN
SOWDATE			
17 SEP	6.90	7.37	7.14
30 OCT	7.34	7.60	7.47
MEAN	7.12	7.49	7.30

N TIME	EARLY	LATE	MEAN
N RATE			
90	7.19	7.42	7.30
140	7.05	7.55	7.30
MEAN	7.12	7.49	7.30

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GRAIN TONNES/HECTARE

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

AUT PEST SOWDATE	NONE	ALDICARB	MEAN
17 SEP	6.87	7.40	7.14
30 OCT	7.39	7.55	7.47
MEAN	7.13	7.47	7.30

AUT PEST N RATE	NONE	ALDICARB	MEAN
90	7.07	7.54	7.30
140	7.20	7.41	7.30
MEAN	7.13	7.47	7.30

AUT PEST N TIME	NONE	ALDICARB	MEAN
EARLY	6.92	7.32	7.12
LATE	7.35	7.63	7.49
MEAN	7.13	7.47	7.30

E FUNG SOWDATE	NONE	TFSD	MEAN
17 SEP	7.57	6.70	7.14
30 OCT	7.54	7.40	7.47
MEAN	7.55	7.05	7.30

E FUNG N RATE	NONE	TFSD	MEAN
90	7.61	7.00	7.30
140	7.49	7.11	7.30
MEAN	7.55	7.05	7.30

E FUNG N TIME	NONE	TFSD	MEAN
EARLY	7.34	6.90	7.12
LATE	7.77	7.20	7.49
MEAN	7.55	7.05	7.30

E FUNG AUT PEST	NONE	TFSD	MEAN
NONE	7.39	6.88	7.13
ALDICARB	7.72	7.23	7.47
MEAN	7.55	7.05	7.30

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GRAIN TONNES/HECTARE

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

L FUNG	NONE	PRS	MEAN
SOWDATE			
17 SEP	6.82	7.45	7.14
30 OCT	7.36	7.58	7.47
MEAN	7.09	7.51	7.30

L FUNG	NONE	PRS	MEAN
N RATE			
90	7.07	7.54	7.30
140	7.11	7.49	7.30
MEAN	7.09	7.51	7.30

L FUNG	NONE	PRS	MEAN
N TIME			
EARLY	6.86	7.37	7.12
LATE	7.32	7.66	7.49
MEAN	7.09	7.51	7.30

L FUNG	NONE	PRS	MEAN
AUT PEST			
NONE	6.95	7.31	7.13
ALDICARB	7.23	7.72	7.47
MEAN	7.09	7.51	7.30

L FUNG	NONE	PRS	MEAN
E FUNG			
NONE	7.27	7.84	7.55
TFSD	6.92	7.19	7.05
MEAN	7.09	7.51	7.30

GRTH REG	NONE	MEP+ETH	MEAN
SOWDATE			
17 SEP	6.93	7.34	7.14
30 OCT	7.30	7.64	7.47
MEAN	7.12	7.49	7.30

GRTH REG	NONE	MEP+ETH	MEAN
N RATE			
90	7.17	7.44	7.30
140	7.07	7.53	7.30
MEAN	7.12	7.49	7.30

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GRAIN TONNES/HECTARE

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

GRTH REG N TIME	NONE	MEP+ETH	MEAN
EARLY	6.97	7.27	7.12
LATE	7.27	7.71	7.49
MEAN	7.12	7.49	7.30

GRTH REG AUT PEST	NONE	MEP+ETH	MEAN
NONE	7.00	7.26	7.13
ALDICARB	7.24	7.71	7.47
MEAN	7.12	7.49	7.30

GRTH REG E FUNG	NONE	MEP+ETH	MEAN
NONE	7.38	7.73	7.55
TFSD	6.86	7.24	7.05
MEAN	7.12	7.49	7.30

GRTH REG L FUNG	NONE	MEP+ETH	MEAN
NONE	6.86	7.32	7.09
PRS	7.37	7.66	7.51
MEAN	7.12	7.49	7.30

EXTRA	17 SEPT 0	30 OCT 0	MEAN
	5.36	5.66	5.51

GRAND MEAN 7.25

***** STANDARD ERROR OF DIFFERENCES OF MEANS *****

SED FOR ONE WAY TABLES (EXCEPT EXTRA) IS 0.087
SED FOR TWO WAY TABLES IS 0.124

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.350	4.8

GRAIN MEAN DM% 82.5

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STRAW TONNES/HECTARE

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

N RATE	90	140	MEAN
SOWDATE			
17 SEP	7.78	7.49	7.64
30 OCT	6.45	6.40	6.43
MEAN	7.12	6.94	7.03

N TIME	EARLY	LATE	MEAN
SOWDATE			
17 SEP	7.78	7.49	7.64
30 OCT	6.55	6.30	6.43
MEAN	7.17	6.90	7.03

N TIME	EARLY	LATE	MEAN
N RATE			
90	7.32	6.92	7.12
140	7.02	6.87	6.94
MEAN	7.17	6.90	7.03

AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
17 SEP	7.65	7.62	7.64
30 OCT	6.24	6.61	6.43
MEAN	6.95	7.11	7.03

AUT PEST	NONE	ALDICARB	MEAN
N RATE			
90	7.16	7.08	7.12
140	6.74	7.15	6.94
MEAN	6.95	7.11	7.03

AUT PEST	NONE	ALDICARB	MEAN
N TIME			
EARLY	7.00	7.34	7.17
LATE	6.90	6.89	6.90
MEAN	6.95	7.11	7.03

E FUNG	NONE	TFSD	MEAN
SOWDATE			
17 SEP	6.97	8.30	7.64
30 OCT	6.17	6.68	6.43
MEAN	6.57	7.49	7.03

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STRAW TONNES/HECTARE

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

E FUNG	NONE	TFSD	MEAN
N RATE			
90	6.66	7.58	7.12
140	6.48	7.41	6.94
MEAN	6.57	7.49	7.03

E FUNG	NONE	TFSD	MEAN
N TIME			
EARLY	6.68	7.65	7.17
LATE	6.46	7.33	6.90
MEAN	6.57	7.49	7.03

E FUNG	NONE	TFSD	MEAN
AUT PEST			
NONE	6.55	7.34	6.95
ALDICARB	6.59	7.64	7.11
MEAN	6.57	7.49	7.03

L FUNG	NONE	PRS	MEAN
SOWDATE			
17 SEP	7.40	7.88	7.64
30 OCT	6.22	6.63	6.43
MEAN	6.81	7.25	7.03

L FUNG	NONE	PRS	MEAN
N RATE			
90	7.04	7.20	7.12
140	6.58	7.31	6.94
MEAN	6.81	7.25	7.03

L FUNG	NONE	PRS	MEAN
N TIME			
EARLY	6.85	7.48	7.17
LATE	6.77	7.02	6.90
MEAN	6.81	7.25	7.03

L FUNG	NONE	PRS	MEAN
AUT PEST			
NONE	6.77	7.13	6.95
ALDICARB	6.85	7.38	7.11
MEAN	6.81	7.25	7.03

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STRAW TONNES/HECTARE

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

L FUNG / E FUNG	NONE	PRS	MEAN
NONE	6.46	6.68	6.57
TFSD	7.16	7.83	7.49
MEAN	6.81	7.25	7.03

GRTH REG / SOWDATE	NONE	MEP+ETH	MEAN
17 SEP	7.53	7.75	7.64
30 OCT	6.30	6.56	6.43
MEAN	6.91	7.15	7.03

GRTH REG / N RATE	NONE	MEP+ETH	MEAN
90	6.97	7.26	7.12
140	6.85	7.04	6.94
MEAN	6.91	7.15	7.03

GRTH REG / N TIME	NONE	MEP+ETH	MEAN
EARLY	7.03	7.31	7.17
LATE	6.80	6.99	6.90
MEAN	6.91	7.15	7.03

GRTH REG / AUT PEST	NONE	MEP ETH	MEAN
NONE	6.98	6.91	6.95
ALDICARB	6.84	7.39	7.11
MEAN	6.91	7.15	7.03

GRTH REG / E FUNG	NONE	MEP+ETH	MEAN
NONE	6.50	6.64	6.57
TFSD	7.32	7.67	7.49
MEAN	6.91	7.15	7.03

GRTH REG / L FUNG	NONE	MEP+ETH	MEAN
NONE	6.68	6.94	6.81
PRS	7.15	7.36	7.25
MEAN	6.91	7.15	7.03

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81/R/B/1

STRAW TONNES/HECTARE

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

EXTRA	17 SEPT 0	30 OCT 0	MEAN
	5.77	3.64	4.70

GRAND MEAN 6.97

STRAW MEAN DM% 84.8

PLOT AREA HARVESTED 0.00450

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81/W/B/1

WINTER & SPRING BARLEY

MILDEW STUDY

Object: To study the effects of fungicides applied to w. & s. barley on the incidence of mildew and on yield and whether these effects are influenced by neighbouring treatments - Woburn Far Field II.

Sponsor: D.W. Hollomon.

Design: W. barley: 3 blocks of 7 plots split into 2
S. barley: 3 blocks of 7 plots

Whole plot dimensions: 8.53 x 8.53.

Treatments:

To W. BARLEY: All combinations of:-

Whole plots

1. SEEDRESS — Seed dressing to w. barley and one adjacent plot of s. barley, other adjacent 'plot' of s. barley sprayed tridemorph at 0.53 kg in 280 l on 30 May:

WBO SBO	None to w. and s. barley
WBO SBE	None to w. barley, ethirimol to s. barley
WBO SBT	None to w. barley, triadimenol + fuberidazole to s. barley
WBE SBO	Ethirimol to w. barley, none to s. barley
WBE SBE	Ethirimol to w. and s. barley
WBT SBO	Triadimenol + fuberidazole to w. barley, none to s. barley
WBT SBT	Triadimenol + fuberidazole to w. and s. barley

Sub plots

2. POSITION — Position of w. barley plots in relation to s. barley plots testing seed dressing:

N EAST	North east
S WEST	South west

To S. BARLEY:

SEEDRESS — Seed dressings to s. barley and to both adjacent plots of w. barley:

SBO WBO	None to s. and w. barley
SBO WBE	None to s. barley, ethirimol to w. barley
SBO WBT	None to s. barley, triadimenol + fuberidazole to w. barley
SBE WBO	Ethirimol to s. barley, none to w. barley
SBE WBE	Ethirimol to s. and w. barley
SBT WBO	Triadimenol + fuberidazole to s. barley, none to w. barley
SBT WBT	Triadimenol + fuberidazole to s. and w. barley

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Standard applications: Manures: (10:23:23) at 250 kg for w. barley, (0:20:20) at 310 kg for s. barley, N at 130 kg as 'Nitro-Chalk' to all plots. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l to w. barley, isoproturon at 2.5 kg in 280 l to w. barley, dicamba with mecoprop and MCPA (as 'Banlene Plus' at 4.9 l) in 280 l to s. barley.

Seed: W. barley: Hoppel, sown at 160 kg.
S. barley: Wing, sown at 160 kg.

Cultivations, etc.:- Deep-tine cultivated: 24 Sept, 1980. NPK applied and spring-tine cultivated with crumbler attached for w. barley: 1 Oct. W. barley seed sown: 2 Oct. Deep-tine cultivated for s. barley: 31 Oct. PK applied for s. barley: 26 Feb, 1981. Spring-tine cultivated with crumbler attached three times for s. barley: 27 Feb, 6 Apr, 7 Apr. N applied to all plots: 20 Mar. 'Brittox' applied to w. barley: 27 Mar. S. barley, seed sown: 8 Apr. Isoproturon applied to w. barley: 22 Apr. 'Banlene Plus' applied to s. barley: 29 May. W. barley combine harvested: 28 July. S. barley combine harvested: 18 Aug. Previous crops: Grain legumes 1979, w. wheat 1980.

NOTE: The incidence of mildew (Erysiphe graminis) was measured during December and April for w. barley and on four occasions between May and July for s. barley.

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81/W/B/1

WINTER BARLEY

GRAIN TONNES/HECTARE

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

POSITION SEEDRESS	N EAST	S WEST	MEAN
WBO SBO	6.41	6.56	6.49
WBO SBE	7.18	6.72	6.95
WBO SBT	7.22	7.24	7.23
WBE SBO	6.72	7.50	7.11
WBE SBE	6.88	7.11	6.99
WBT SBO	6.94	7.05	6.99
WBT SBT	6.53	6.76	6.64
MEAN	6.84	6.99	6.91

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

TABLE	SEEDRESS	POSITION	SEEDRESS POSITION
SED	0.303	0.100	0.356
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEEDRESS			0.265

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.371	5.4
BLOCK.WP.SP	14	0.324	4.7

GRAIN MEAN DM% 79.6

SUB PLOT AREA HARVESTED 0.00243

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81/W/B/1

SPRING BARLEY

GRAIN TONNES/HECTARE

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

SEEDRESS	
SBO WBO	5.78
SBO WBE	6.07
SBO WBT	5.78
SBE WBO	6.10
SBE WBE	6.00
SBT WBO	6.13
SBT WBT	6.16
MEAN	6.00

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

TABLE	SEEDRESS
SED	0.178

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.217	3.6

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00243

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81/R/B/2

WINTER BARLEY

RHYNCHOSPORIUM STUDIES

Object: To study the effects of interference between plots of w. barley with different amounts of Rhynchosporium secalis - Gt. Knott II.

Sponsors: J.F. Jenkyn, A. Bainbridge, O.J. Stedman, G.V. Dyke.

Design: Two Series each a line of 36 plots with single external flanking plots. Because the line of Series II was broken by a dell an extra flanking plot was sown on each side of the dell. Each line was a serially balanced sequence such that each of 4 treatments had as neighbours all ordered pairs of the other 3 treatments, once each.

Whole plot dimensions: 8.84 x 4.27.

Treatments:

TREATMNT	Treatment with infected straw, sowing dates and times of applying fungicide:

Series I

ST SEP	No fungicide against R. secalis. Infected straw worked in to seedbed, sown 27 Sept, 1980
PA SEP	Prochloraz in autumn, sown 27 Sept
PS SEP	Prochloraz in spring, sown 27 Sept
PAS SEP	Prochloraz in autumn and spring, sown 27 Sept

Series II

ST SEP	As for Series I
0 FEB	No fungicide against R. secalis, sown 19 Feb, 1981
PS FEB	Prochloraz in spring, sown 19 Feb
PSS FEB	Prochloraz in spring and early summer, sown 19 Feb

NOTES: (1) The effects of treatments to neighbouring plots (left - LHN, right - RHN) were estimated. In this experiment 'left' was West, 'right' was East. The analysis presented assumes a Fourier curve with 4 terms, 2 sine and 2 cosine to represent positional variation.

(2) The two Series were separated by 30.8 m and surrounded by the relatively Rhynchosporium resistant variety Athene, seed dressed ethirimol, sown at 160 kg on 27 Sept, 1980, sprayed prochloraz at 0.4 kg in 340 l on 7 Apr, 1981.

(3) Straw was applied at 610 kg to ST SEP plots on 26 Sept.

(4) Prochloraz was applied at 0.4 kg in 340 l on 22 Dec to PA SEP and PAS SEP plots, on 3 Mar, 1981 to PS SEP and PAS SEP, PS FEB and PSS FEB plots and additionally on 21 May to PSS FEB plots.

Basal applications: Manures: (10:23:23) at 250 kg. 'Nitro-Chalk' at 135 kg followed by 420 kg. Weedkillers: Diquat at 0.59 kg ion in 220 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Maris Otter, sown at 160 kg.

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81/R/B/2

Cultivations, etc.:- Diquat applied: 19 Sept, 1980. NPK applied: 23 Sept. Heavy spring-tine cultivated twice: 24 Sept. Heavy spring-tine cultivated: 25 Sept. Rotary harrowed: 26 Sept. Spring-tine cultivated: 18 Feb, 1981 (Series II only). First N applied: 19 Feb. Second N applied: 9 Apr. 'Brittox' applied: 23 Apr. Combine harvested: 30 July (Series I), 17 Aug (Series II). Previous crops: S. barley 1979, s. beans 1980.

NOTE: Leaf diseases were assessed at frequent intervals between November and July.

SERIES I

GRAIN TONNES/HECTARE

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

TREATMNT	ST SEP	PA SEP	PS SEP	PAS SEP
	5.92	5.44	6.06	5.44

LHN / TREATMNT	ST SEP	PA SEP	PS SEP	PAS SEP
ST SEP		5.97	5.94	5.86
PA SEP	6.29		5.12	4.91
PS SEP	6.26	5.86		6.06
PAS SEP	4.83	5.58	5.91	

RHN / TREATMNT	ST SEP	PA SEP	PS SEP	PAS SEP
ST SEP		6.40	5.98	5.39
PA SEP	5.47		5.50	5.34
PS SEP	6.16	5.68		6.35
PAS SEP	5.80	4.75	5.77	

GRAND MEAN 5.72

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

TABLE	TREATMNT	TREATMNT LHN	TREATMNT RHN
SED	0.173	0.338	0.339

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

STRATUM	DF	SE	CV%
WP	12	0.356	6.2

GRAIN MEAN DM% 85.1

PLOT AREA HARVESTED 0.00189

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81/R/B/2 SERIES II

GRAIN TONNES/HECTARE

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

TREATMNT	ST SEP	0 FEB	PS FEB	PSS FEB
	5.99	4.67	4.49	4.75

LHN TREATMNT	ST SEP	0 FEB	PS FEB	PSS FEB
ST SEP		6.46	6.04	5.48
0 FEB	4.82		4.57	4.63
PS FEB	4.56	4.29		4.61
PSS FEB	4.41	4.91	4.94	

RHN TREATMNT	ST SEP	0 FEB	PS FEB	PSS FEB
ST SEP		6.08	6.13	5.77
0 FEB	4.84		4.39	4.80
PS FEB	4.44	4.68		4.34
PSS FEB	4.39	4.90	4.98	

GRAND MEAN 4.98

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

TABLE	TREATMNT	TREATMNT LHN	TREATMNT RHN
SED	0.189	0.383	0.381

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

STRATUM	DF	SE	CV%
WP	12	0.395	7.9

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00189

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81/R/B/3

WINTER BARLEY

SEED TREATMENT AND RHYNCHOSPORIUM

Object: To study the effects of fungicidal seed treatment on the incidence of Rhynchosporium and on the yield of w. barley - Sawyers II.

Sponsor: G.L. Bateman.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 2.13 x 9.14.

Treatments: All combinations of:-

1. SEED INF — Seed infection with Rhynchosporium:

   NONE
   INFECTED

2. SEEDRESS — Fungicidal seed dressing:

NONE	None
PMA+EMC	Phenyl mercury acetate at 25 mg of mercury plus ethyl mercury chloride at 2.5 mg of mercury per kg of seed

NOTE: Plot sides were separated by 2.13 m and plot ends by 9.14 m sown to w. oats.

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 390 kg. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l.

Seed: Maris Otter, sown at 160 kg.

Cultivations, etc.:- Heavy spring-tine cultivated: 13 Oct, 1980. Heavy spring-tine cultivated, spring-tine cultivated, seed sown: 14 Oct. N applied: 15 Apr, 1981. Weedkillers applied: 17 Apr. Combine harvested: 17 Aug. Previous crops: W. wheat 1979, potatoes 1980.

NOTE: Leaf diseases were assessed at monthly intervals between April and July.

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81/R/B/3

GRAIN TONNES/HECTARE

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

SEEDRESS	NONE	PMA+EMC	MEAN
SEED INF			
NONE	5.17	5.16	5.16
INFECTED	5.28	5.20	5.24
MEAN	5.23	5.18	5.20

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

TABLE	SEED INF	SEEDRESS	SEED INF SEEDRESS
SED	0.093	0.093	0.131

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.186	3.6

GRAIN MEAN DM% 87.3

SUB PLOT AREA HARVESTED 0.00195

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81/R/B/6 and 81/W/B/6

SPRING BARLEY

VARIETIES, N AND FUNGICIDE

Object: To study the yields of some of the newer varieties of s. barley; fungicides and nitrogen rates are also tested - Rothamsted (R), Gt. Knott III and Woburn (W), Horsepool Lane Close E.

Sponsor: R. Moffitt.

Design: 3 randomised blocks of 10 x 4 criss cross.

Column plot dimensions: Gt. Knott III (R): 3.0 x 27.1.
Horsepool Lane Close E (W): 4.0 x 27.1.

Treatments: All combinations of:-

Column plots

1. VARIETY — Varieties and systemic fungicidal seed dressings:

ATEM	Atem, no systemic seed dressing
GEORG 0	Georgie, no systemic seed dressing
GEORG E	Georgie, dressed ethirimol
GEORG T	Georgie, dressed triadimenol plus fuberidazole
GOLDMARK	Goldmarker, no systemic seed dressing
GO+KO+TR	Goldmarker, Koru and Triumph seed mixed in equal parts, no systemic seed dressing
KORU	Koru, no systemic seed dressing
KYM	Kym, no systemic seed dressing
TRIUMPH	Triumph, no systemic seed dressing
TYRA	Tyra, no systemic seed dressing

Row plots

2. N FUNG — Nitrogen fertiliser (kg N) and foliar fungicide:

40	40
80	80
120	120
120+TRID	120 + tridemorph at 0.53 kg

NOTE: Tridemorph was applied in 250 l on 30 May to Gt. Knott III (R); in 280 l on 1 June to Horsepool Lane Close (W).

Basal applications:
Gt. Knott III (R): Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Glyphosate at 1.4 l in 250 l, dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5 l) in 250 l.
Horsepool Lane Close (W): Manures: (0:20:20) at 310 kg, broadcast. Weedkillers: Dicamba with mecoprop and MCPA (as 'Herrisol' at 4.9 l) in 280 l.

Seed: Gt. Knott III (R): Sown at 160 kg.
Horsepool Lane Close (W): Sown at 160 kg.

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81/R/B/6 and 81/W/B/6

Cultivations, etc.:-
Gt. Knott III (R): Glyphosate applied: 25 Sept, 1980. Ploughed: 25 Nov. Spring-tine cultivated twice: 9 Apr, 1981. Seed sown: 10 Apr. N applied: 16 Apr. 'Banlene Plus' applied: 30 May. Combine harvested: 3 Sept. Previous crops: W. oats 1979, w. barley 1980.
Horsepool Lane Close (W): Deep-tine cultivated twice: 5 Jan, 1980. Spring-tine cultivated: 9 Apr. PK applied, N applied, rotary cultivated: 13 Apr. Seed sown: 14 Apr. 'Herrisol' applied: 1 June. Combine harvested: 28 Aug. Previous crops: W. wheat 1979, potatoes 1980.

81/R/B/6 GT. KNOTT III (R)

GRAIN TONNES/HECTARE

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

N FUNG / VARIETY	40	80	120	120+TRID	MEAN
ATEM	5.07	5.30	6.01	6.31	5.67
GEORG O	4.73	4.89	4.96	5.73	5.08
GEORG E	4.65	5.24	5.15	5.77	5.20
GEORG T	5.28	5.69	5.72	5.95	5.66
GOLDMARK	5.14	5.66	5.09	5.97	5.47
GO+KO+TR	4.93	6.20	6.06	6.45	5.91
KORU	4.97	5.61	5.65	6.15	5.59
KYM	5.37	5.53	5.98	5.86	5.68
TRIUMPH	5.08	6.09	6.38	6.78	6.08
TYRA	4.88	4.96	4.76	5.20	4.95
MEAN	5.01	5.52	5.58	6.02	5.53

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

TABLE	VARIETY	N FUNG	VARIETY N FUNG
SED	0.218	0.177	0.353
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.308
N FUNG			0.316

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

STRATUM	DF	SE	CV%
BLOCK.WP1	18	0.267	4.8
BLOCK.WP2	6	0.217	3.9
BLOCK.WP1.WP2	54	0.324	5.9

GRAIN MEAN DM% 85.6

SUB PLOT AREA HARVESTED 0.00124

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81/W/B/6 HORSEPOOL LANE CLOSE E (W)

GRAIN TONNES/HECTARE

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

N FUNG VARIETY	40	80	120	120+TRID	MEAN
ATEM	5.18	5.15	6.11	5.97	5.60
GEORG O	4.19	4.05	4.88	4.73	4.46
GEORG E	3.20	3.48	4.17	4.21	3.77
GEORG T	4.27	4.43	5.40	4.90	4.75
GOLDMARK	4.33	5.13	5.92	5.46	5.21
GO+KO+TR	4.24	4.69	5.70	5.34	4.99
KORU	4.42	4.36	5.46	5.57	4.95
KYM	4.81	5.07	5.89	5.92	5.42
TRIUMPH	3.88	4.36	4.62	5.16	4.50
TYRA	4.78	4.34	5.70	5.30	5.03
MEAN	4.33	4.51	5.39	5.26	4.87

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

TABLE	VARIETY	N FUNG	VARIETY N FUNG
SED	0.496	0.402	0.734
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.585
N FUNG			0.630

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

STRATUM	DF	SE	CV%
BLOCK.WP1	18	0.608	12.5
BLOCK.WP2	6	0.492	10.1
BLOCK.WP1.WP2	54	0.549	11.3

GRAIN MEAN DM% 82.5

SUB PLOT AREA HARVESTED 0.00168

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81/R/B/7

SPRING BARLEY

SOWING DATES AND INSECTICIDES

Object: To study the effects of three insecticides on insect pests and yields of s. barley sown on two dates - W. Barnfield I.

Sponsor: G.C. Scott.

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: 8.53 x 12.2.

Treatments: All combinations of:-

1. SOWDATE — Date of sowing:

21 FEB	21 February, 1981
14 APR	14 April

2. INSCTCDE — Insecticides & frequencies of application:

NONE	None
DEMET 1	Demeton-s-methyl at 0.24 kg applied once on 9 July
DEMET R	Demeton-s-methyl at 0.24 kg applied on 1 June, 12 June and 9 July
FENITROT	Fenitrothion at 0.70 kg applied 17 June, 9 July
OMETH 1	Omethoate at 0.64 kg applied once on 9 July
OMETH R	Omethoate at 0.64 kg applied on 1 June, 12 June and 9 July

Basal applications: Manures: (20:10:10) at 450 kg, combine drilled. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 2.5 l) in 250 l applied with the fungicide. Fungicide: Tridemorph at 0.53 kg.

Seed: Triumph, sown at 160 kg.

Cultivations, etc.:- Ploughed: 6 Jan, 1981. Spring-tine cultivated twice: 19 & 20 Feb. Weedkillers and fungicide applied to early-sown plots: 12 May. Weedkillers and fungicide applied to late-sown plots: 30 May. Early-sown plots combine harvested: 18 Aug. Late-sown plots combine harvested: 3 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Aphids, thrips, and stem borers were counted ten times between May and July. Components of yield were measured.

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81/R/B/7

GRAIN TONNES/HECTARE

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

INSCTCDE SOWDATE	NONE	DEMET 1	DEMET R	FENITROT	OMETH 1	OMETH R	MEAN
21 FEB	6.39	6.59	6.30	6.97	6.58	6.14	6.50
14 APR	5.29	5.54	6.17	5.90	5.72	6.20	5.80
MEAN	5.84	6.07	6.24	6.43	6.15	6.17	6.15

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

TABLE	SOWDATE	INSCTCDE	SOWDATE INSCTCDE
SED	0.167	0.289	0.408

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

STRATUM	DF	SE	CV%
BLOCK.WP	33	0.578	9.4

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00260

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81/R/B/9

SPRING BARLEY

ELECTROSTATIC SPRAY STUDY (BIOLOGICAL)

Object: To study the effects of applying fungicides by an electrostatic sprayer on the control of mildew and on the yield of s. barley - Gt. Knott III.

Sponsors: D.C. Griffiths, A.J. Arnold, G.R. Cayley, P. Etheridge, F.T. Phillips, B. Pye, G.C. Scott.

Design: 3 randomised blocks of 11 plots.

Whole plot dimensions: 4.27 x 24.4.

Treatments: All combinations of:-

1. SPR FORM — Sprayer and formulation of spray material:

EL OIL	Electrostatic sprayer, oil formulation
EL WATER	Electrostatic sprayer, water formulation

2. FUNGCIDE — Fungicides:

DITALIMF	Ditalimfos
TRIDEMOR	Tridemorph

3. FUNGRATE — Fungicide rate (kg):

0.26
0.52

plus three extra treatments:

EXTRA	
NONE	No fungicides
ST W D2	Standard sprayer, water formulation, ditalimfos at 0.52 kg.
ST W T2	Standard sprayer, water formulation, tridemorph at 0.52 kg.

NOTE: Treatments were applied on 18 June, in 3.73 l of oil or water by electrostatic sprayer, in 340 l of water by standard sprayer.

Basal applications: Manures: (20:10:10) at 450 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA, (as 'Banlene Plus' at 5.0 l) in 250 l.

Seed: Wing, sown at 160 kg.

Cultivations, etc.:- Ploughed: 25 Nov, 1980. Spring-tine cultivated twice: 9 Apr, 1981. Seed sown: 10 Apr. Weedkillers applied: 30 May. Combine harvested: 2 Sept. Previous crops: W. oats 1979, w. wheat 1980.

NOTES: Mildew was assessed in July.

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81/R/B/9

GRAIN TONNES/HECTARE

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

FUNGCIDE	DITALIMF	TRIDEMOR	MEAN
SPR FORM			
EL OIL	3.97	4.46	4.21
EL WATER	4.04	4.48	4.26
MEAN	4.01	4.47	4.24

FUNGRATE	0.26	0.52	MEAN
SPR FORM			
EL OIL	4.18	4.24	4.21
EL WATER	4.19	4.34	4.26
MEAN	4.19	4.29	4.24

FUNGRATE	0.26	0.52	MEAN
FUNGCIDE			
DITALIMF	3.97	4.04	4.01
TRIDEMOR	4.40	4.54	4.47
MEAN	4.19	4.29	4.24

	FUNGRATE	0.26	0.52
SPR FORM	FUNGCIDE		
EL OIL	DITALIMF	4.02	3.91
	TRIDEMOR	4.34	4.58
EL WATER	DITALIMF	3.91	4.18
	TRIDEMOR	4.47	4.50

EXTRA	NONE	ST W D2	ST W T2	MEAN
	4.13	4.03	4.53	4.23

GRAND MEAN 4.24

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

TABLE	EXTRA	SPR FORM	FUNGCIDE	FUNGRATE
SED	0.132	0.066	0.066	0.066

TABLE	SPR FORM FUNGCIDE	SPR FORM FUNGRATE	FUNGCIDE FUNGRATE	SPR FORM FUNGCIDE FUNGRATE & EXTRA
SED	0.093	0.093	0.093	0.132

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

STRATUM	DF	SE	CV%
BLOCK.WP	20	0.161	3.8

GRAIN MEAN DM% 85.5 PLOT AREA HARVESTED 0.00520

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81/R/B/13

SPRING BARLEY

MILDEW SOURCES

Object: To study the effects of inter-plot interactions and mildew sources on the response of s. barley to fungicide sprays applied at different times - Summerdells II.

Sponsors: J.F. Jenkyn, A. Bainbridge, G.V. Dyke.

Design: Series I: 3 randomised blocks of 3 plots split into 8.
Series II: 3 randomised blocks of 8 plots.

Plot dimensions: Series I sub plots: 2.13 x 9.14.
Series II whole plots: 2.13 x 9.14.

Treatments:
To Series I, all combinations of:-

Whole plots

1. SEPRTION		Separations between sides of sub plots:
	NONE	No crop, 0.61 m fallow path
	SINGLE	2.13 m wide strip of mildew resistant barley, Simon, seed dressed triadimenol plus fuberidazole, 0.61 m fallow paths on each side of the Simon
	DOUBLE	As for SINGLE except strip of Simon 4.26 m wide

Sub plots

2. FNG TIME(1)		Times of applying tridemorph to mildew susceptible barley, Porthos, sown on strips 2.13 m wide, 9.14 m long:
	0	None
	1	14 May, 1981
	2	21 May
	3	28 May
	4	4 June
	5	12 June
	6	18 June
	R	Repeated on 14 May, 4 June, 18 June, 8 July

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To Series II:-

FNG TIME(2) Times of applying tridemorph to mildew susceptible barley, Porthos, sown on strips 2.13 m wide, 9.14 m long, strips separated from each other by further strips of Porthos, not given fungicide, 2.13 m wide with 0.61 m fallow paths on each side:

0	None
1	14 May
2	21 May
3	28 May
4	4 June
5	12 June
6	18 June
R	Repeated on 14 May, 4 June, 18 June, 8 July

NOTES: (1) On Series I whole plots were surrounded by 9 m of variety Simon, seed dressed triadimenol plus fuberidazole.
(2) Series II was surrounded by 4 m of variety Porthos, not given fungicide
(3) Tridemorph was applied at 0.53 kg in 340 l on all occasions except occasion 3 when poor ground conditions forced the use of another sprayer which applied the tridemorph in 450 l.

Basal applications: Manures: (20:10:10) at 500 kg. 'Nitro-Chalk' at 190 kg. Weedkillers: Dicamba with mecoprop and MCPA (as 'Banlene Plus' at 5.0 l) in 250 l.

Seed: All varieties sown at 160 kg.

Cultivations, etc.:- Ploughed: 18 Dec, 1980. Spring-tine cultivated: 7 Apr, 1981. NPK applied, spring-tine cultivated: 8 Apr. Seed sown: 9 Apr. Weedkillers applied: 28 May. N applied: 6 June. Combine harvested: 2 Sept. Previous crops: S. beans, 1979, w. wheat 1980.

NOTE: Mildew was assessed frequently during the season.

SERIES I

GRAIN TONNES/HECTARE

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

SEPRTION / FNG TIME(1)	NONE	SINGLE	DOUBLE	MEAN
0	5.55	5.36	5.25	5.39
1	5.73	5.76	5.32	5.60
2	5.63	5.82	5.66	5.70
3	5.63	5.56	6.04	5.74
4	5.80	5.89	5.85	5.85
5	5.96	5.92	5.72	5.87
6	5.53	5.82	5.63	5.66
R	6.52	6.34	6.38	6.41
MEAN	5.79	5.81	5.73	5.78

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81/R/B/13 SERIES I

GRAIN TONNES/HECTARE

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

TABLE	SEPRTION FNG TIME(1)		SEPRTION FNG TIME(1)
SED	0.194	0.108	0.262
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
SEPRTION			0.188

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

STRATUM	DF	SE	CV%
BLOCK.WP	4	0.237	4.1
BLOCK.WP.SP	42	0.230	4.0

GRAIN MEAN DM% 85.8

SUB PLOT AREA HARVESTED 0.00195

SERIES II

GRAIN TONNES/HECTARE

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

FNG TIME(2)	0	1	2	3	4	5	6	R	MEAN
	4.89	4.87	5.23	5.27	5.21	5.32	5.15	5.42	5.17

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

TABLE	FNG TIME(2)
SED	0.301

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.368	7.1

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00195

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81/S/B/1

WINTER BARLEY

AMOUNTS AND TIMES OF N, GROWTH REGULATOR AND PATHOGEN CONTROL

Object: To study the effects of two rates of nitrogen, applied as single or divided dressings, with or without growth regulator and control of pests and pathogens - Saxmundham, Grove Plot.

Sponsors: F.V. Widdowson, A. Penny.

Design: 2 randomised blocks of 18 plots.

Whole plot dimensions: 3.05 x 6.40.

Treatments: All combinations of:-

1. N RATE — Total nitrogen fertiliser applied (kg N):

   120
   160

2. N TIME — Times of applying nitrogen fertiliser:

   SINGLE — All on 14 April, 1981
   DIVIDED — 40 kg N on 19 February, remainder on 14 April

3. GRTH REG — Growth regulator:

   NONE — None
   MEP+ETH — Mepiquat chloride + ethephon (as 'Terpal' at 2.8 l) on 30 April

4. PATHCONT — Pest and pathogen control:

   NONE — None
   FULL — Fungicides and insecticide

plus two extra plots not given nitrogen fertiliser or growth regulator:

   EXTRA
   0 0 0 0 — No pest & pathogen control
   0 0 0 PC — Pest & pathogen control as for PATHCONT FULL above

NOTE: (1) PATHCONT FULL consisted of carbendazim (as 'Bavistin' at 0.50 kg) with tridemorph at 0.53 kg in 280 l applied on 14 April, and benodanil at 1.12 kg with tridemorph at 0.53 kg and pirimicarb at 0.14 kg in 280 l applied on 20 May.
(2) Growth regulator was applied in 220 l.

Basal applications: Manures: (0:14:28) at 315 kg. (15:15:15) at 260 kg, combine drilled. Weedkillers: Isoproturon at 2.5 l in 220 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 220 l.

Seed: Igri, sown at 170 kg.

Cultivations, etc.:- PK applied: 27 Aug, 1980. Ploughed: 8 Sept. Seed sown, isoproturon applied: 24 Sept. 'Brittox' applied: 7 Apr, 1981. Combine harvested: 27 July. Previous crop: W. wheat 1980.

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81/S/B/1

NOTE: N content of grain was determined. Height of straw from ground to base of ear was measured in early July.

GRAIN TONNES/HECTARE

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

N RATE	120	160	MEAN
PATHCONT			
NONE	5.79	6.51	6.15
FULL	6.53	6.86	6.69
MEAN	6.16	6.68	6.42

GRTH REG	NONE	MEP+ETH	MEAN
PATHCONT			
NONE	6.29	6.01	6.15
FULL	6.68	6.70	6.69
MEAN	6.49	6.36	6.42

GRTH REG	NONE	MEP+ETH	MEAN
N RATE			
120	6.13	6.19	6.16
160	6.84	6.52	6.68
MEAN	6.49	6.36	6.42

N TIME	SINGLE	DIVIDED	MEAN
PATHCONT			
NONE	5.95	6.36	6.15
FULL	6.57	6.82	6.69
MEAN	6.26	6.59	6.42

N TIME	SINGLE	DIVIDED	MEAN
N RATE			
120	6.11	6.21	6.16
160	6.40	6.96	6.68
MEAN	6.26	6.59	6.42

N TIME	SINGLE	DIVIDED	MEAN
GRTH REG			
NONE	6.39	6.58	6.49
MEP+ETH	6.13	6.59	6.36
MEAN	6.26	6.59	6.42

	GRTH REG	NONE	MEP+ETH
PATHCONT	N RATE		
NONE	120	5.93	5.66
	160	6.66	6.36
FULL	120	6.34	6.72
	160	7.03	6.69

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81/S/B/1

GRAIN TONNES/HECTARE

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

PATHCONT	N TIME N RATE	SINGLE	DIVIDED
NONE	120	5.72	5.87
	160	6.18	6.84
FULL	120	6.51	6.54
	160	6.63	7.09

PATHCONT	N TIME GRTH REG	SINGLE	DIVIDED
NONE	NONE	6.06	6.52
	MEP+ETH	5.83	6.19
FULL	NONE	6.72	6.65
	MEP+ETH	6.42	6.98

N RATE	N TIME GRTH REG	SINGLE	DIVIDED
120	NONE	6.10	6.16
	MEP+ETH	6.13	6.25
160	NONE	6.68	7.01
	MEP+ETH	6.13	6.92

	GRTH REG	NONE		MEP+ETH	
	N TIME	SINGLE	DIVIDED	SINGLE	DIVIDED
PATHCONT	N RATE				
NONE	120	5.84	6.01	5.59	5.74
	160	6.29	7.03	6.08	6.64
FULL	120	6.37	6.31	6.66	6.77
	160	7.07	6.98	6.18	7.20

EXTRA	0 0 0 0	0 0 0 PC	MEAN
	3.18	3.54	3.36

GRAND MEAN 6.08

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81/S/B/1

GRAIN TONNES/HECTARE

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

TABLE	PATHCONT	N RATE	GRTH REG	N TIME
SED	0.163	0.163	0.163	0.163

TABLE	PATHCONT N RATE	PATHCONT GRTH REG	N RATE GRTH REG	PATHCONT N TIME
SED	0.231	0.231	0.231	0.231

TABLE	N RATE N TIME	GRTH REG N TIME	PATHCONT N RATE GRTH REG	PATHCONT N RATE N TIME
SED	0.231	0.231	0.327	0.327

TABLE	PATHCONT GRTH REG N TIME	N RATE GRTH REG N TIME	PATHCONT N RATE GRTH REG N TIME
SED	0.327	0.327	0.462

SED FOR EXTRA AND COMPARING EXTRA WITH ANY ITEM IN
PATHCONT.N RATE.GRTH REG.N TIME
TABLE IS 0.462

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.462	7.6

GRAIN MEAN DM% 80.4

PLOT AREA HARVESTED 0.00088

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81/W/O/1

SPRING OATS

CONTROL OF CEREAL CYST-NEMATODE

Object: To study the effects of small amounts of soil fumigants on the control of cereal cyst-nematode (Heterodera avenae), on fungal parasites of the nematode and on the yield of spring-sown oats - Woburn White Horse.

Sponsors: A.G. Whitehead, B.R. Kerry.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 2.13 x 9.75.

Treatments:

CHEMICAL	Chemicals, all applied at sowing:
NONE	None (duplicated)
	Applied to the seed furrow:
DI 4	Dichloromethane at 4.0 l
ED+DI 1	Ethylene dibromide at 5.0 kg plus dichloromethane at 1.0 kg
ED+DI 2	Ethylene dibromide at 10 kg plus dichloromethane at 2.0 kg
ED+DI 4	Ethylene dibromide at 20 kg plus dichloromethane at 4.0 kg
TE 1	'Telone II' at 5.0 kg
TE 2	'Telone II' at 10 kg
TE 4	'Telone II' at 20 kg
	Combine drilled with the seed:
OX 1	Oxamyl at 0.75 kg
OX 2	Oxamyl at 1.50 kg
OX 4	Oxamyl at 3.00 kg

NOTES: (1) Dichloromethane was used as a diluent to lessen the freezing point of ethylene dibromide.
(2) The field was sown to w. oats before the requirement for this experiment was known. W. oats were destroyed in February.

Standard applications: (10:23:23) at 280 kg, combine drilled, (20:10:10) at 360 kg, N at 90 kg as 'Nitro-Chalk'. Weedkillers: Paraquat on two occasions, at 0.56 kg ion and 0.84 kg ion in 280 l, the second to kill w. oats; methabenzthiazuron at 1.6 kg in 280 l; mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Fungicide: Triadimefon 0.12 kg in 280 l.

Seed: W. oats: Panema, sown at 200 kg.
S. oats: Maris Tabard, sown at 200 kg.

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81/W/0/1

Cultivations, etc.:- Paraquat applied: 24 Sept, 1980. Ploughed: 29 Sept. Spring-tine cultivated, w. oats sown: 30 Sept. Methabenzthiazuron applied: 3 Oct. Paraquat applied: 13 Feb, 1981. Ploughed: 18 Feb. NPK applied, spring-tine cultivated, s. oats with combine drilled treatments sown: 18 Mar. All other treatments applied and spring-tine cultivated and s. oats sown: 19 Mar. 'Brittox' applied, N applied: 14 May. Fungicide applied: 3 June. Combine harvested: 13 Aug. Previous crops: W. wheat 1979, barley 1980.

NOTE: Soil samples were taken before sowing, during the season and after harvest for counts of cereal cyst-nematode. Assessments of fungal parasitism of cereal cyst nematode were made during the growing season.

GRAIN TONNES/HECTARE

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

CHEMICAL	
NONE	3.65
DI 4	3.78
ED+DI 1	3.59
ED+DI 2	3.98
ED+DI 4	3.51
TE 1	4.36
TE 2	3.99
TE 4	3.52
OX 1	3.96
OX 2	5.35
OX 4	5.52
MEAN	4.07

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

TABLE	CHEMICAL	
SED	0.565	MIN REP
	0.489	MAX-MIN

	CHEMICAL
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	23	0.692	17.0

GRAIN MEAN DM% 84.6

PLOT AREA HARVESTED 0.00097

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81/R/BE/2

WINTER BEANS

FUNGICIDES

Object: To study the effects of two times of applying three fungicides on the incidence of Chocolate Spot (Botrytis spp.) and on the yield of w. beans - Road Piece.

Sponsors: A. Bainbridge, G.R. Cayley.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 4.27 x 7.62.

Treatments: All combinations of:-

1. FUNGCIDE Fungicides (applied at 0.50 kg on each occasion):

BENOMYL	Benomyl
IPRODION	Iprodione
PROCHLOR	Prochloraz

2. APP TIME Times of applying fungicides:

NONE	None
E	22 May, 1981
L	9 July
E+L	22 May and 9 July

NOTE: Sprays were applied in 340 l.

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Simazine at 1.2 kg in 250 l. Fungicides: Benomyl at 0.55 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l.

Seed: Throws MS, sown at 250 kg.

Cultivations, etc.:- Rotary harrowed, heavy spring-tine cultivated: 19 Sept, 1980. Chalk applied: 20 Sept. Heavy spring-tine cultivated: 23 Sept. Seed sown: 24 Sept. Weedkiller applied: 25 Sept. Basal benomyl applied: 27 Mar, 1981. Insecticide applied: 12 June. Combine harvested: 1 Sept. Previous crops: Long ley until 1979, fallow 1980.

NOTE: Seedling emergence and percentage leaf area affected by Botrytis spp. were estimated. Stem counts, numbers of pods per stem, and 1000 grain weights were measured. Spore trapping took place throughout the season.

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81/R/BE/2

GRAIN TONNES/HECTARE

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

APP TIME FUNGCIDE	E	L	E+L	MEAN
BENOMYL	3.25	3.04	3.49	3.26
IPRODION	3.24	3.16	3.33	3.25
PROCHLOR	3.20	2.91	3.08	3.07
MEAN	3.23	3.04	3.30	3.19

NONE 3.11

GRAND MEAN 3.17

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

TABLE	FUNGCIDE	APP TIME	FUNGCIDE APP TIME
SED	0.146	0.146	0.252

SED FOR COMPARING NONE WITH ANY ITEM IN
APP TIME.FUNGCIDE TABLE IS 0.206

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

STRATUM	DF	SE	CV%
BLOCK.WP	23	0.309	9.7

GRAIN MEAN DM% 80.5

PLOT AREA HARVESTED 0.00203

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81/R/BE/5

WINTER BEANS

EFFECTS OF PESTS & PATHOGENS

Object: To assess the benefits from three amounts of pest and disease control on winter beans - Highfield VI.

Sponsors: A. Bainbridge, R. Bardner, A.J. Cockbain, J.M. Day, K.E. Fletcher, D.C. Griffiths, J. McEwen, G.A. Salt, R.M. Webb, D.P. Yeoman.

Design: 6 randomised blocks of 3 plots.

Whole plot dimensions: 4.27 x 13.7.

Treatments:

PATHCONT	Pest & pathogen control (in addition to basals):
STANDARD	None
ENHANCED	Seed dressed with benomyl and thiram (2.0 g of each per kg of seed)
	Fosetyl-Al at 3.26 kg on 16 Dec, 1980
	Carbofuran at 2.24 kg on 6 Apr, 1981
FULL	Seed dressed with benomyl and thiram (2.0 g of each per kg of seed)
	Aldicarb at 10 kg on 29 Sept, 1980
	Fosetyl-Al at 3.26 kg on 16 Dec
	Benomyl at 0.56 kg on 16 Dec
	Benomyl at 0.56 kg on 3 Feb, 1981
	Fosetyl-Al at 3.26 kg on 17 Feb
	Benomyl at 0.56 kg on 27 Mar
	Carbofuran at 2.24 kg on 6 Apr
	Benomyl at 0.56 kg on 29 June

NOTES: (1) Treatment sprays were applied in 520 l on 16 Dec, 1980, 3 Feb, 1981 and 27 Mar, and in 340 l on all other occasions.
(2) Sides of plots were separated by strips of w. beans 4.27 m wide plus 0.9 m fallow paths, ends of plots were separated by strips of w. beans 8.8 m wide plus 0.9 m fallow paths. The separating crop received basal applications as for the plots, and in addition received benomyl at 0.56 kg on 5 Jan, 1981, 12 Feb, 27 Mar and 29 June.

Basal applications: Manures: Chalk at 7.5 t. Muriate of potash at 830 kg. Weedkillers: Simazine at 0.17 kg with trietazine at 1.2 kg in 250 l. Fungicide: Benomyl at 0.56 kg in 340 l applied twice. Insecticides: Pirimicarb at 0.14 kg in 340 l. Desiccant: Diquat at 0.59 kg ion in 250 l.

Seed: Throws MS, sown at 250 kg (at 230 kg in error on ENHANCED and FULL).

Cultivations, etc.:- Chalk applied: 19 Sept, 1980. K applied: 22 Sept. Ploughed: 24 Sept. Disc harrowed and heavy spring-tine cultivated: 27 Sept. Rotary harrowed: 29 Sept. Seed sown, weedkiller applied: 30 Sept. Basal fungicide applied: 5 May, 1981, 3 June. Basal insecticide applied: 29 June. Desiccant applied: 29 Aug. Combine harvested: 1 Sept. Previous crops: W. wheat 1979, s. wheat 1980.

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81/R/BE/5

NOTE: Plant counts were made after establishment and components of yield measured before harvest. Total above-ground dry matter and N content were measured in July. Migratory nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. N content of grain was measured.

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	2.89	4.48	4.85	4.07

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

TABLE	PATHCONT
SED	0.204

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.353	8.7

GRAIN MEAN DM% 80.5

PLOT AREA HARVESTED 0.00293

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81/R/BE/6

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 - Fosters Corner.

Sponsors: J. McEwen, R. Bardner, A.J. Cockbain, J.M. Day, W. Day, K.E. Fletcher, G.A. Salt, R.M. Webb, 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 49 mm)

Sub plots

2. PATHCONT Pest and pathogen control (in addition to basal):

STANDARD	None
ENHANCED	Phorate at 2.24 kg, combine drilled Benomyl at 0.56 kg on 11 Aug
FULL	Aldicarb at 10 kg on 19 Feb, 1981 Fosetyl-Al at 2.24 kg on 23 Apr Benomyl at 0.56 kg on 28 July Benomyl at 0.56 kg on 11 Aug

NOTES: (1) Treatment sprays were applied in 340 l.
(2) Irrigation was applied to reduce a deficit of 50 mm to 25 mm before pod set, and from 80 mm to 55 mm after pod set. (mm water):

3 July	12
4 July	12
10 July	25
Total	49

Basal applications: Manures: Chalk at 7.5 t. Weedkiller: Simazine at 1.2 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 250 l applied twice.

Seed: Minden, sown at 240 kg (500,000 seeds per hectare).

Cultivations, etc.:- Chalk applied: 3 Dec, 1980. Ploughed: 10 Dec. Spring-tine cultivated three times: 18 Feb, 1981, 19 Feb. Rotary harrowed, seed sown: 20 Feb. Weedkiller applied: 8 Apr. Basal insecticide applied: 3 June, 28 July. Combine harvested: 8 Sept. Previous crops: W. wheat 1979, s. barley 1980.

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81/R/BE/6

NOTE: Plant counts were made after establishment and components of yield measured before harvest. Total above-ground dry matter and N content were measured in August. Migratory nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. N content of grain was measured.

GRAIN TONNES/HECTARE

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

PATHCONT IRRIGATN	STANDARD	ENHANCED	FULL	MEAN
NONE	3.93	4.50	4.65	4.36
FULL	4.66	5.00	5.02	4.89
MEAN	4.29	4.75	4.84	4.63

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

TABLE	PATHCONT	IRRIGATN* PATHCONT
SED	0.074	0.104

* WITHIN THE SAME LEVEL OF IRRIGATN ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	12	0.147	3.2

GRAIN MEAN DM% 86.8

SUB PLOT AREA HARVESTED 0.00293

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81/R/BE/8

SPRING BEANS

ELECTROSTATIC SPRAY STUDY (BIOLOGICAL)

Object: To study the performance of an electrostatic sprayer on deposition of insecticide, control of pests and on yield of s. beans - Whittlocks.

Sponsors: D.C. Griffiths, A.J. Arnold, G.R. Cayley, P. Etheridge, F.T. Phillips, B.Pye, G.C. Scott.

Design: 3 randomised blocks of 13 plots.

Whole plot dimensions: 3.20 x 24.4.

Treatments: All combinations of:-

1. SPR FORM		Sprayer and formulation:
	EST OIL	Electrostatic sprayer, oil formulation
	EST WATR	Electrostatic sprayer, water formulation
2. INSCTCDE		Insecticide:
	DIMETH	Dimethoate
	PERMETH	Permethrin
3. INS RATE		Rates of insecticide:
	STANDARD	Standard rate (500 g dimethoate; 100 g permethrin)
	HALF	Half rate (250 g dimethoate; 50 g permethrin)

plus five extra treatments:

EXTRA	
NONE	Unsprayed
S W DI S	Standard sprayer, water formulation of dimethoate at standard rate
S W PE S	Standard sprayer, water formulation of permethrin at standard rate
M PE O S	Microencapsulated formulation of permethrin at standard rate, particles uncharged
M PE C S	Microencapsulated formulation of permethrin at standard rate, particles charged

NOTE: Treatments were applied on 14 May, in 3.73 l of oil or water by electrostatic sprayer in 450 l of water by standard sprayer.

Basal applications: Manure: Chalk at 7.5 t. Weedkiller: Simazine at 1.2 l in 250 l. Fungicide: Benomyl at 0.55 kg applied with the insecticide in 250 l. Insecticide: Pirimicarb at 0.14 kg.

Seed: Minden, sown at 260 kg.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated twice: 19 Feb, 1981, 20 Feb. Seed sown: 20 Feb. Weedkiller applied: 8 Apr. Insecticide and fungicide applied: 18 June. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

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81/R/BE/8

NOTE: Leaf notching by Sitona was counted, four times in May and early June and suction samples were examined for adult Sitona. The upper leaves of ten plants per plot were removed for laboratory examinations.
GRAIN TONNES/HECTARE

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

INSCTCDE	DIMETH	PERMETH	MEAN
SPR FORM			
EST OIL	2.98	2.92	2.95
EST WATR	3.21	3.31	3.26
MEAN	3.10	3.11	3.10

INS RATE	STANDARD	HALF	MEAN
SPR FORM			
EST OIL	3.01	2.89	2.95
EST WATR	3.23	3.28	3.26
MEAN	3.12	3.09	3.10

INS RATE	STANDARD	HALF	MEAN
INSCTCDE			
DIMETH	3.13	3.06	3.10
PERMETH	3.11	3.12	3.11
MEAN	3.12	3.09	3.10

	INS RATE	STANDARD	HALF
SPR FORM	INSCTCDE		
EST OIL	DIMETH	3.12	2.84
	PERMETH	2.89	2.94
EST WATR	DIMETH	3.14	3.27
	PERMETH	3.33	3.29

EXTRA	NONE	S W DI S	S W PE S	M PE O S	M PE C S	MEAN
	2.83	3.02	3.11	2.97	3.14	3.01

GRAND MEAN 3.07

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

TABLE	EXTRA	SPR FORM	INSCTCDE	INS RATE
SED	0.218	0.109	0.109	0.109

TABLE	SPR FORM INSCTCDE	SPR FORM INS RATE	INSCTCDE INS RATE	SPR FORM INSCTCDE INS RATE & EXTRA
SED	0.514	0.514	0.514	0.218

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

STRATUM	DF	SE	CV%
BLOCK.WP	24	0.267	8.7

GRAIN MEAN DM% 87.5 PLOT AREA HARVESTED 0.00520

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81/R/BE/9

SPRING BEANS

CONTROL OF SITONA

Object: To study the effects of four insecticides on the incidence of Sitona and on the yield of s. beans - Whittlocks.

Sponsors: R. Bardner, K.E. Fletcher, D.C. Griffiths.

Design: 4 randomised blocks of 8 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

INSCTCDE	Forms, rates & methods of application of insecticides:
NONE	None (duplicated)
ALD 1 CD	Aldicarb at 2.24 kg, combine drilled
ALD 2 BC	Aldicarb at 10.0 kg, broadcast & worked in to seedbed
CAR CD	Carbofuran at 2.24 kg, combine drilled
PHO 1 CD	Phorate at 1.70 kg, combine drilled
PHO 2 CD	Phorate at 2.24 kg, combine drilled
PER FS	Permethrin at 0.15 kg, foliar spray in 340 l on 21 May

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l. Fungicide: Benomyl at 0.56 kg in 250 l with the pirimicarb. Insecticide: Pirimicarb at 0.14 kg.

Seed: Minden, sown at 260 kg.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated: 19 Feb, 1981. Rotary harrowed, seed sown: 6 Apr. Weedkillers applied: 9 Apr. Basal insecticide and fungicide applied: 18 June. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Leaf notching by adult Sitona lineatus was assessed in early June and soil cores were examined for larval populations in early July.

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81/R/BE/9

GRAIN TONNES/HECTARE

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

INSCTCDE	
NONE	3.71
ALD 1 CD	4.03
ALD 2 BC	4.04
CAR CD	3.94
PHO 1 CD	4.02
PHO 2 CD	3.97
PER FS	3.83
MEAN	3.91

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

TABLE	INSCTCDE	
SED	0.128	MIN REP
	0.111	MAX-MIN

	INSCTCDE
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	22	0.181	4.6

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00439

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81/R/BE/10

SPRING BEANS

TIMES OF APPLYING ERYNIA

Object: To study the effects of rates and times of applying the aphid-pathogenic fungus Erynia neoaphidis (formerly Entomophthora aphidis) on the numbers of black aphids (Aphis fabae) and on the yield of s. beans - Fosters Corner.

Sponsor: N. Wilding.

Design: 3 randomised blocks of 7 plots.

Whole plot dimensions: 2.13 x 2.67.

Treatments:

APH CONT	Chemical & biological aphid control:
NONE	None
	Pirimicarb at 0.14 kg in 340 l:
PIRIM E	Applied early, on 5 June, 1981
PIRIM L	Applied later, on 19 June
	Erynia neoaphidis applied as a powder of mummified aphids:
E NE01 E	Applied at 0.5 mg per plant early, on 5 June
E NE01 L	Applied at 0.5 mg per plant later, on 18 June
E NE02 E	Applied at 5.0 mg per plant early, on 5 June
E NE02 L	Applied at 5.0 mg per plant later, on 18 June

NOTE: Basal irrigation was applied as follows (mm water):

22 June	12
2 July	12
7 July	6
8 July	6
10 July	12
15 July	12
28 July	12
Total	72

Basal applications: Manures: Chalk at 7.5 t. Weedkiller: Simazine at 1.2 kg in 250 l.

Seed: Minden, sown at 240 kg.

Cultivations, etc.:- Chalk applied: 3 Dec, 1980. Ploughed: 10 Dec. Spring-tine cultivated twice: 18 Feb, 1981. Seed sown: 20 Feb. Weedkiller applied: 8 Apr. Combine harvested: 8 Sept. Previous crops: W. wheat 1979, s. barley 1980.

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81/R/BE/10

NOTES: (1) Visual estimates of aphid numbers were made weekly in June and July and samples of 50 live aphids per plot were examined for infection with Erynia, other fungi and parasites.
(2) Because of an error in weighing, one plot with treatment PIRIM L was lost.
An estimated value was used in the analysis.

GRAIN TONNES/HECTARE

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

APH CONT	NONE	PIRIM E	PIRIM L E	NE01 E E	NE01 L E	NE02 E E	NE02 L	MEAN
	3.60	5.15	4.77	3.70	2.99	3.90	3.13	3.89

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

TABLE	APH CONT
SED	0.537

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.657	16.9

GRAIN MEAN DM% 89.0

PLOT AREA HARVESTED 0.00024

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81/R/BE/11

SPRING BEANS

CONIDIOBOLUS AND APHIDS

Object: To study the effects of two rates of applying the aphid-pathogenic fungus Conidiobolus obscurus (formerly Entomophthora obscura) on the incidence of black aphids (Aphis fabae) and on the yield of s. beans - Fosters Corner.

Sponsor: N. Wilding.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 2.13 x 2.67.

Treatments:

APH CONT	Chemical and biological aphid control:
NONE	None
PIRIMICA	Pirimicarb at 0.14 kg in 340 l on 19 June
C OBS M1	C. obscurus applied as a powder of mummified aphids at 0.5 mg per plant on 18 June
C OBS M2	C. obscurus applied as a powder of mummified aphids at 5.0 kg per plant on 18 June

NOTE: Basal irrigation was applied as follows (mm water):

22 June	12
2 July	12
7 July	6
8 July	6
10 July	12
15 July	12
28 July	12
Total	72

Basal applications: Manures: Chalk at 7.5 t. Weedkiller: Simazine at 1.2 kg in 250 l.

Seed: Minden, sown at 240 kg.

Cultivations, etc.:- Chalk applied: 3 Dec, 1980. Ploughed: 10 Dec. Spring-tine cultivated twice: 18 Feb, 1981. Seed sown: 20 Feb. Weedkiller applied: 8 Apr. Combine harvested: 8 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Visual estimates of aphid numbers were made weekly in June and July and samples of 50 live aphids per plot were examined for infection with Conidiobolus and parasites.

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81/R/BE/11

GRAIN TONNES/HECTARE

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

APH CONT	NONE	PIRIMICA	C OBS M1	C OBS M2	MEAN
	2.20	4.77	3.51	3.06	3.39

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

TABLE	APH CONT
SED	0.365

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.517	15.3

GRAIN MEAN DM% 88.4

PLOT AREA HARVESTED 0.00024

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81/R/BE/12

SPRING BEANS

CONTROL OF PRATYLENCHUS

Object: To study the effects of two nematicides on the control of nematodes of the genus Pratylenchus and on the yield of s. beans - Whittlocks.

Sponsor: R.M. Webb.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments:

NEMACIDE	Nematicides and rates and methods of application:
NONE	None
ALD BC	Aldicarb at 10 kg, broadcast and worked in to seedbed
CAR 1 CD	Carbofuran at 1.7 kg, combine drilled
CAR 2 CD	Carbofuran at 2.2 kg, combine drilled
CAR 3 CD	Carbofuran at 3.2 kg, combine drilled

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Simazine at 0.14 kg with trietazine at 1.0 kg in 250 l. Fungicide: Benomyl at 0.56 kg in 250 l, applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: Minden, sown at 260 kg.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated: 19 Feb, 1981. Rotary harrowed, seed sown: 6 Apr. Weedkillers applied: 9 Apr. Fungicide and insecticide applied: 18 June. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Soil samples were taken in February, and root and soil samples taken in June for assessment of Pratylenchus.

GRAIN TONNES/HECTARE

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

NEMACIDE	NONE	ALD BC	CAR 1 CD	CAR 2 CD	CAR 3 CD	MEAN
	3.80	3.94	4.11	4.05	4.01	3.98

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

TABLE	NEMACIDE
SED	0.092

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.130	3.3

GRAIN MEAN DM% 85.8 PLOT AREA HARVESTED 0.00293

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81/R/BE/13

SPRING BEANS

VARIETIES AND BLRV

Object: To study the effects of full pest and pathogen control on three varieties differing in susceptibility to bean leaf roll virus (BLRV) - Whittlocks.

Sponsor: A.J. Cockbain.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments: All combinations of:-

1. VARIETY — Varieties:

BEAD	Maris Bead (resistant to BLRV)
MINDEN	Minden (susceptible to BLRV)
WEIRBOON	Weirboon (tolerant to BLRV)

2. PATHCONT — Pest & pathogen control in addition to basal:

STANDARD	None
FULL	Phorate at 2.2 kg combine drilled for BEAD and MINDEN, but applied at 4.5 kg after drilling for WEIRBOON

NOTES: (1) The large seed size of cv. Weirboon made it impossible to use the combine drill used for the other varieties. An alternative drill, not fitted for combine drilling, was used and the planned rate of phorate was doubled and applied to the soil surface the day after drilling.
(2) Additional pesticides planned for inclusion in PATHCONT FULL were omitted as the target organisms were absent.

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Trietazine at 1.0 kg and simazine at 0.14 kg in 250 l. Insecticide: Pirimicarb at 0.14 kg in 340 l.

Seed: Maris Bead, and Minden, sown at 260 kg.
Weirboon, sown at 500 kg.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated twice: 19 Feb, 1981, 7 Apr. Heavy spring-tine cultivated: 6 Apr. Seed sown: 7 Apr. Weedkillers applied: 9 Apr. Basal insecticide applied: 14 July. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Plant counts were made at emergence. Pest and disease incidence and growth parameters were assessed throughout the season.

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81/R/BE/13

GRAIN TONNES/HECTARE

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

VARIETY PATHCONT	BEAD	MINDEN	WEIRBOON	MEAN
STANDARD	3.48	3.61	3.57	3.55
FULL	3.78	4.15	4.21	4.05
MEAN	3.63	3.88	3.89	3.80

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

TABLE	VARIETY	PATHCONT	VARIETY PATHCONT
SED	0.096	0.078	0.136

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.166	4.4

GRAIN MEAN DM% 83.9

PLOT AREA HARVESTED 0.00293

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81/R/BE/14

SPRING BEANS

PRECISION SOWING

Object: To study the effects of precision sowing and four seed rates on the yield of s. beans - Whittlocks.

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	273	256
4	400	344	355
5	500	422	454
6	600	540	530

NOTE: Seed was sown in rows spaced 36 cm (14 inches) apart.

Basal applications: Manures: Chalk at 7.5 t. Weedkillers: Trietazine at 1.0 kg with simazine at 0.14 kg in 250 l. Fungicide: Benomyl at 0.56 kg in 250 l applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg.

Seed: Minden.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated twice: 19 Feb, 1981, 7 Apr. Heavy spring-tine cultivated: 6 Apr. Seed sown: 7 Apr. Weedkillers applied: 9 Apr. Fungicide and insecticide applied: 18 June. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTES: Sowing depths were measured. Establishment counts were made. Components of yield were measured at maturity. Incidence of Sitona larvae was assessed.

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81/R/BE/14

GRAIN TONNES/HECTARE

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

POPULATN / DRILL	3	4	5	6	MEAN
STANDARD	3.37	3.36	3.31	3.55	3.40
PRECISN	3.30	3.49	3.10	3.57	3.37
MEAN	3.33	3.43	3.21	3.56	3.38

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

TABLE	DRILL	POPULATN	DRILL POPULATN
SED	0.153	0.217	0.306

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.375	11.1

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00176

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81/R/BE/15

SPRING BEANS

ALARM PHEROMONE STUDY

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: 2.03 x 4.57.

Treatments:

TREATMNT	Aphicide & pheromone treatments applied on 22 June, 1981:
NONE	None
PHEROMON	Aphid alarm pheromone
PERMETH	Permethrin at 0.10 kg
PHER+PER	Aphid alarm pheromone and permethrin at 0.10 kg
DEMETON	Demeton-s-methyl at 0.25 kg
PIRIMICA	Pirimicarb at 0.19 kg

NOTE: Pheromone was applied at 300 mg per ha in a stream of nitrogen gas. All insecticides were applied in 340 l.

Basal applications: Manures: Chalk at 2.9 t. Weedkillers: Glyphosate at 1.5 l in 340 l. Simazine at 0.83 l in 340 l.

Seed: Minden, sown at 280 kg.

Cultivations, etc.:- Glyphosate applied: 2 Oct, 1980. Chalk applied: 4 Dec. Ploughed: 12 Dec. Power harrowed, seed sown: 19 Feb, 1981. Simazine applied: 7 Apr. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Plants were sampled for aphids in June, and aphid counts were made in July.

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81/R/BE/15

GRAIN TONNES/HECTARE

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

TREATMNT	NONE	PHEROMON	PERMETH	PHER+PER	DEMETON	PIRIMICA	MEAN
	2.16	2.11	2.08	2.09	2.15	1.97	2.09

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

TABLE	TREATMNT
SED	0.154

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.218	10.4

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00046

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81/R/BE/16

SPRING BEANS

VARIETIES

Object: To compare agronomic characters and yields of one selection of a red-seeded field bean with four white-seeded varieties - Long Hoos III 6.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 2 randomised blocks of 10 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments: All combinations of:-

1. VARIETY — Varieties:

   BLAZE
   HERRA
   MINDEN
   RED TICK
   WEIRBOON

2. PATHCONT — Pathogen-control before flowering:

   NONE — None
   FULL — Permethrin at 0.15 kg in 340 l on 29 May, 12 June, 29 June, 1981

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. Weedkillers: Glyphosate at 1.5 l in 340 l. Trietazine and simazine (as 'Remtal SC' at 3.0 l) in 340 l. Insecticide: Pirimicarb at 0.14 kg in 340 l on two occasions.

Cultivations, etc.:- Glyphosate applied: 2 Oct, 1980. Chalk applied: 21 Nov. Ploughed: 12 Dec. Spring-tine cultivated, power harrowed, seed sown: 9 Apr, 1981. Trietazine and simazine applied: 22 Apr. Pirimicarb applied: 15 June, 15 July. Harvested by hand: 8 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Plant counts were made after establishment. Components of yield were measured at maturity. N content of grain was measured.

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81/R/BE/16

GRAIN TONNES/HECTARE

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

PATHCONT VARIETY	NONE	FULL	MEAN
BLAZE	4.90	5.03	4.96
HERRA	4.27	4.99	4.63
MINDEN	4.78	5.00	4.89
RED TICK	4.37	4.94	4.65
WEIRBOON	4.86	5.51	5.19
MEAN	4.63	5.09	4.86

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

TABLE	VARIETY	PATHCONT	VARIETY PATHCONT
SED	0.310	0.196	0.439

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.439	9.0

GRAIN MEAN DM% 83.6

PLOT AREA HARVESTED 0.00015

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81/R/BE/19

SPRING BEANS

ELECTROSTATIC SPRAYING AND APHIDS

Object: To study the effects of applying aphicides with an electrostatic sprayer on the control of black fly (Aphis fabae) and on the yield of s.beans - Whittlocks.

Sponsors: D.C. Griffiths, A.J. Arnold, G.R.Cayley, P. Etheridge, F.T. Phillips, B. Pye, G.C. Scott.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 3.20 x 9.14.

Treatments:

TREATMNT	Sprayers and aphicides:
NONE	None
EL V2 D1	Electrostatic sprayer, droplets charged 25 kV, demeton-s-methyl at 0.06 kg.
EL V2 D2	Electrostatic sprayer, droplets charged 25 kV, demeton-s-methyl at 0.12 kg.
EL V2 D4	Electrostatic sprayer, droplets charged 25 kV, demeton-s-methyl at 0.24 kg.
EL V2 P4	Electrostatic sprayer, droplets charged 25 kV, permethrin at 0.10 kg.
EL - U	Electrostatic sprayer, droplets uncharged, 'Uvitex' dye
EL V1 U	Electrostatic sprayer, droplets charged 15 kV, 'Uvitex' dye
EL V2 U	Electrostatic sprayer, droplets charged 25 kV, 'Uvitex' dye
ST - D4	Standard sprayer, droplets uncharged, demeton-s-methyl at 0.24 kg.
ST - P4	Standard sprayer, droplets uncharged, permethrin at 0.10 kg.

NOTE: Treatments were applied on 12 June, 1981 in 3.73 l of oil or water by electrostatic sprayer, in 450 l of water by standard sprayer.

Basal applications: Manure: Chalk at 7.5 t. Weedkillers: Simazine at 1.2 kg in 250 l. Benomyl at 0.55 kg in 250 l.

Seed: Minden, sown at 260 kg.

Cultivations, etc.:- Chalk applied: 2 Sept, 1980. Ploughed: 29 Dec. Spring-tine cultivated twice: 19 Feb, 1981, 20 Feb. Seed sown: 20 Feb. Weedkiller applied: 8 Apr. Fungicide applied: 18 June. Combine harvested: 9 Sept. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Leaf notching by Sitona was counted in June, and aphids were counted seven times during June and July.

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81/R/BE/19

GRAIN TONNES/HECTARE

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

TREATMNT	
NONE	3.45
EL V2 D1	3.79
EL V2 D2	3.61
EL V2 D4	3.89
EL V2 P4	3.41
EL - U	3.00
EL V1 U	3.40
EL V2 U	3.20
ST - D4	3.89
ST - P4	3.67
MEAN	3.53

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

TABLE	TREATMNT
SED	0.287

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

STRATUM	DF	SE	CV%
BLOCK.WP	27	0.406	11.5

GRAIN MEAN DM% 87.2

SUB PLOT AREA HARVESTED 0.00195

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81/R/PE/1 and 81/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 IV 4 and Woburn (W) Butt Close.

Sponsors: J. McEwen, A.J. Cockbain, K.E. Fletcher, G.A. Salt, A.G. Whitehead, D.P. Yeoman.

Design: 6 randomised blocks of 3 plots.

Whole plot dimensions: 4.27 x 7.62.

Treatments:

PATHCONT	Pest & pathogen control:
STANDARD	Thiram seed dressing
ENHANCED	Thiram seed dressing Phorate at 2.2 kg, combine drilled on 8 Apr (R), 15 Apr (W)
FULL	Thiram seed dressing Aldicarb at 10 kg to seedbed on 8 Apr (R), 13 Apr (W)

Basal applications:
Long Hoos IV 4 (R): Manures: Chalk at 2.9 t. Weedkillers: Glyphosate at 1.5 l in 340 l, trietazine and simazine (as 'Remtal SC' at 3.0 l) in 340 l. Desiccant: Diquat at 0.59 kg ion in 340 l.
Butt Close (W): Manures: (0:14:28) at 340 kg. Weedkillers: Trietazine and simazine (as 'Remtal SC' at 1.9 l) in 280 l. Desiccant: Diquat 0.49 kg ion in 340 l.

Seed: Filby, dressed thiram, sown at 250 kg (R), 210 kg (W).

Cultivations, etc.:-
Long Hoos IV 4 (R): Glyphosate applied: 8 Sept, 1980. Chalk applied: 20 Nov. Ploughed: 4 Dec. Rotary harrowed, seed sown: 8 Apr, 1981. 'Remtal SC' applied: 22 Apr. Desiccant applied: 14 Aug. Combine harvested: 25 Aug. Previous crops: Potatoes 1979, s. barley 1980.
Butt Close (W): Ploughed: 20 Nov, 1980. Spring-tine cultivated: 8 Apr, 1981. PK applied, rotary cultivated: 13 Apr. Seed sown: 15 Apr. Weedkillers applied: 21 Apr. Desiccant applied: 11 Aug. Combine harvested: 17 Aug. Previous crops: W. wheat 1979, s. barley 1980.

NOTE: Observations on pests and diseases were made during the season. Nitrogen percentages of grain were measured.

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81/R/PE/1 LONG HOOS IV (R)

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	2.68	3.02	3.22	2.97

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

TABLE	PATHCONT
SED	0.144

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.249	8.4

GRAIN MEAN DM% 84.7

PLOT AREA HARVESTED 0.00122

81/W/PE/1 BUTT CLOSE (W)

GRAIN TONNES/HECTARE

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

PATHCONT	STANDARD	ENHANCED	FULL	MEAN
	1.93	2.14	2.29	2.12

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

TABLE	PATHCONT
SED	0.187

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

STRATUM	DF	SE	CV%
BLOCK.WP	10	0.323	15.3

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00122

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81/R/PE/2

PEAS

CONTROL OF SITONA

Object: To study the effects of forms and methods of application of insecticides on the incidence of Sitona and on the yield of leafy peas - Pennells Piece.

Sponsors: R. Bardner, D.C. Griffiths, K.E. Fletcher.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 4.27 x 8.23.

Treatments:

INSCTCDE	Insecticides:
NONE	None (duplicated)
ALD BC E	Aldicarb at 10 kg, broadcast & worked in to seedbed
PHO BC E	Phorate at 2.2 kg, broadcast & worked in to seedbed
PHO BC L	Phorate at 2.2 kg, broadcast at two-leaf stage on 21 May, 1981
PHO CD	Phorate at 2.2 kg, combine drilled
PER FS	Permethrin at 0.15 kg, foliar spray in 340 l on 22 May

Basal applications: Manures: (0:14:28) at 380 kg. Weedkillers: Chlorthal-dimethyl (as 'Delozin S' at 6 kg) in 250 l.

Seed: Vedette, dressed with drazoxolon, sown at 190 kg.

Cultivations, etc.:- Ploughed: 2 Jan, 1981. Heavy spring-tine cultivated: 20 Feb. PK applied: 21 Feb. Aldicarb broadcast: 6 Apr. Phorate broadcast, rotary harrowed: 7 Apr. Seed sown: 8 Apr. Weedkiller applied: 9 Apr. Combine harvested: 15 Aug. Previous crops: S. barley 1979, s. wheat 1980.

NOTE: Leaf notching by adult Sitona lineatus was assessed in early June, and roots were examined for larvae in early July.

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81/R/PE/2

GRAINS TONNES/HECTARE

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

INSCTCDE	NONE	ALD BC E	PHO BC E	PHO BC L	PHO CD	PER FS	MEAN
	4.08	4.04	3.85	4.03	4.09	4.03	4.03

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

TABLE	INSCTCDE	
SED	0.275	MIN REP
	0.238	MAX-MIN

	INSCTCDE
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	19	0.388	9.6

GRAIN MEAN DM% 79.5

PLOT AREA HARVESTED 0.00251

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81/R/MA/1

FORAGE MAIZE

RATES AND TIMES OF N

Object: To study the effects of a range of nitrogen fertiliser rates, applied before sowing or to the seedbed, on the yields and nitrogen uptakes of forage maize - Long Hoos V I.

Sponsor: A.J. Barnard.

Design: 3 randomised blocks of 22 plots.

Whole plot dimensions: 2.13 x 3.66.

Treatments: All combinations of:-

1. EARLY N — Rates of nitrogen fertiliser (kg N) applied on 8 Apr, 1981:

   0
   30
   60
   90

2. SDBED N — Rates of nitrogen fertiliser (kg N) applied on 4 June:

   0
   30
   60
   90

plus all combinations of:-

1. N TIME — Times of applying nitrogen fertiliser:

   EARLY — 8 Apr
   SDBED — 4 June

2. N RATE — Rates of nitrogen fertiliser (kg N):

   120
   150
   180

Basal applications: Manures: Chalk at 2.9 t. Weedkillers: Glyphosate at 1.5 l in 340 l. Atrazine at 1.7 kg with paraquat at 0.42 kg ion in 340 l.

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

Cultivations, etc.:- Glyphosate applied: 8 Sept, 1980. Chalk applied: 20 Nov. Ploughed: 24 Nov. Spring-tine cultivated: 8 Apr, 1981. Power harrowed, seed sown: 1 June. Atrazine and paraquat applied: 5 June. Harvested by hand: 26 Oct. Previous crops: Potatoes 1979, s. barley 1980.

NOTE: Plant population counts were made in July and the N content of the harvested produce was measured.

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81/R/MA/1

FORAGE DRY MATTER TONNES/HECTARE

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

SDBED N / EARLY N	0	30	60	90	MEAN
0	7.76	9.56	10.01	9.09	9.10
30	10.26	10.15	11.33	11.39	10.78
60	9.80	11.77	9.77	11.76	10.78
90	10.44	11.68	11.19	11.58	11.22
MEAN	9.56	10.79	10.57	10.95	10.47

N RATE / N TIME	120	150	180	MEAN
EARLY	11.84	9.89	12.57	11.43
SDBED	11.13	10.73	10.44	10.77
MEAN	11.48	10.31	11.51	11.10

GRAND MEAN 10.64

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

TABLE	EARLY N	SDBED N	N TIME
SED	0.410	0.410	0.473

TABLE	SUBDIVN N RATE	SUBDIVN EARLY N SDBED N	SUBDIVN N TIME N RATE
SED	0.580	0.820	0.820

SED FOR COMPARING ANY ITEM IN EARLY N.SDBED N
TABLE WITH ANY ITEM IN N TIME.N RATE TABLE IS 0.820

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

STRATUM	DF	SE	CV%
BLOCK.WP	42	1.004	9.4

MEAN DM% 23.2

PLOT AREA HARVESTED 0.00039

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81/W/P/1

POTATOES

VARIETIES AND POTATO CYST-NEMATODE

Object: To study the effects of oxamyl on control of potato cyst-nematode and on growth and yield of ten potato varieties having a range of resistance to the nematode - 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: Magnesian limestone at 7.5 t, FYM at 25 t, (10:10:15 + 4.5 Mg) at 2510 kg. Weedkillers: Linuron at 1.1 l with paraquat at 0.28 kg ion in 280 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times with the insecticide on the first five occasions. Insecticide: Pirimicarb at 0.14 kg.

Cultivations, etc.:- Magnesian limestone applied: 3 Nov, 1980. FYM applied: 5 Dec. Ploughed: 11 Dec. NPK applied: 22 Apr, 1981. Oxamyl applied, rotary cultivated: 30 Apr. Potatoes planted: 1 May. Weedkillers applied: 22 May. Grubbed: 15 June. Rotary ridged: 16 June. Fungicide applied, with insecticide on the first five occasions: 22 June, 2 July, 14 July, 28 July, 11 Aug, 27 Aug. Haulm mechanically destroyed: 22 Sept. Lifted: 12 Oct. Previous crops: Potatoes 1979 and 1980.

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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81/W/P/1

TOTAL TUBERS TONNES/HECTARE

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

OXAMYL	0.0	5.6	MEAN
VARIETY			
ANCHOR	5.1	30.4	17.7
BANNER	9.9	47.7	28.8
CARA	42.3	60.2	51.2
CROFT	8.7	46.4	27.6
CROWN	20.4	60.5	40.5
DELL	7.0	46.8	26.9
DESIREE	12.2	56.8	34.5
PEER	7.3	36.0	21.7
PIPER	41.7	56.1	48.9
RECORD	9.5	49.3	29.4
MEAN	16.4	49.0	32.7

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

TABLE	VARIETY	OXAMYL	VARIETY OXAMYL
SED	3.38	1.51	4.78

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

STRATUM	DF	SE	CV%
BLOCK.WP	38	5.86	17.9

PERCENTAGE WARE 3.81 CM (1.5 INCH) MIDDLE

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

OXAMYL	0.0	5.6	MEAN
VARIETY			
ANCHOR	91.4	93.9	92.7
BANNER	75.4	94.7	85.0
CARA	97.7	97.1	97.4
CROFT	80.9	94.4	87.6
CROWN	94.0	97.8	95.9
DELL	55.6	94.4	75.0
DESIREE	85.1	97.6	91.3
PEER	68.5	94.2	81.4
PIPER	96.9	94.1	95.5
RECORD	68.3	95.2	81.8
MEAN	81.4	95.3	88.4

PLOT AREA HARVESTED 0.00087

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81/R/P/2

POTATOES

ELECTROSTATIC APPLICATION OF FUNGICIDE

Object: To study the effects of applying thiabendazole to seed tubers by electrostatic sprayer on subsequent incidence of stem canker (Rhizoctonia solani) and on yield of potatoes - Highfield VI.

Sponsors: G.R. Cayley, G.A. Hide, A.J. Arnold.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 1.5 x 9.53.

Treatments: All combinations of:-

1. CHITMETH — Methods of chitting in boxes:

   RANDOM — Position of tubers random
   ROSE UP — Arranged with rose ends up

2. FUNGMETH — Methods of applying thiabendazole fungicide to tubers:

   NONE — Not applied
   ES CH — By electrostatic sprayer (APE 80) using charged particles
   ES UCH — By electrostatic sprayer (APE 80) using uncharged particles

NOTE: (1) Rhizoctonia was cultured on vermiculite and spread over the tubers in furrows before splitting back.
(2) Thiabendazole fungicide was applied to tubers after chitting at 50 g per tonne of tubers.
(3) Winter beans were sown on the site in Sept, 1980 but had failed by April 1981 and were replaced by potatoes.

Basal applications: Manures: Chalk at 7.5 t. Muriate of potash at 830 kg, 'Nitro-Chalk' at 750 kg, (0:20:20) at 1460 kg, magnesium sulphate at 900 kg. Weedkillers: Trietazine at 1.2 kg with simazine at 0.17 kg in 250 l. Linuron at 1.13 kg with paraquat at 0.4 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times, with the insecticide on the first five occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.

Seed: King Edward.

Cultivations, etc.:- Chalk applied: 19 Sept, 1980. K applied: 22 Sept. Ploughed: 24 Sept. Disc harrowed, heavy spring-tine cultivated: 27 Sept. Rotary harrowed, beans sown: 29 Sept. Trietazine & simazine applied: 30 Sept. Heavy spring-tine cultivated twice: 15 Apr, 1981. N, PK, and Mg applied: 23 Apr. Chisel ploughed, rotary harrowed, ridged, potatoes planted, split back: 24 Apr. Linuron and paraquat applied: 21 May. Fungicide applied, with insecticide on the first five occasions: 22 June, 1 July, 13 July, 27 July, 11 Aug, 24 Aug. BOV applied: 25 Sept. Remaining haulm mechanically destroyed: 7 Oct. Lifted: 12 Oct. Previous crops: W. wheat 1979, s. wheat 1980.

NOTE: Stem bases were examined for Rhizoctonia (Stem canker) and progeny tubers were assessed for black scurf.

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81/R/P/2

TOTAL TUBERS TONNES/HECTARE

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

FUNGMETH CHITMETH	NONE	ES CH	ES UCH	MEAN
RANDOM	51.3	53.2	51.0	51.9
ROSE UP	51.3	54.3	53.7	53.1
MEAN	51.3	53.8	52.4	52.5

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

TABLE	CHITMETH	FUNGMETH	CHITMETH FUNGMETH
SED	1.13	1.38	1.95

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	2.76	5.3

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

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

FUNGMETH CHITMETH	NONE	ES CH	ES UCH	MEAN
RANDOM	77.9	76.8	75.1	76.6
ROSE UP	75.5	77.0	79.2	77.2
MEAN	76.7	76.9	77.1	76.9

PLOT AREA HARVESTED 0.00143

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81/R/P/3

POTATOES

SEED TREATMENT AND TUBER SIZE

Object: To study the effects of seed treatment with thiabendazole and times of boxing on stem numbers, tuber numbers and size and on the yield of potatoes - Highfield VI.

Sponsors: G.A. Hide, G.R. Cayley.

Design: 4 randomised blocks of 11 plots.

Whole plot dimensions: 3 x 9.53.

Treatments: All combinations of:-

1. FUNGCIDE — Fungicide:

NONE	None
THIABEND	Thiabendazole at lifting on 16 October, 1980

2. BOX TIME — Times of boxing seed:

NONE	Not boxed
OCTOBER	At lifting on 16 October
DECEMBER	11 December
FEBRUARY	10 February, 1981

plus three extra treatments:

EXTRA

TD BD	Seed treated thiabendazole at boxing in December
TF BF	Seed treated thiabendazole at boxing in February
TA 0	Seed treated thiabendazole on 21 April. Not boxed

NOTES: (1) Fungicide was applied by immersing tubers for five minutes in a solution containing 0.1% thiabendazole.
(2) Winter beans were sown on the site in Sept, 1980 but had failed by April 1981 and were replaced by potatoes.

Basal applications: Manures: Chalk at 7.5 t. Muriate of potash at 830 kg, 'Nitro-Chalk' at 750 kg, (0:20:20) at 1460 kg, magnesium sulphate at 900 kg. Weedkillers: Trietazine at 1.2 kg with simazine at 0.17 kg in 250 l. Linuron at 1.1 kg with paraquat at 0.4 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times, with the insecticide on the first five occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.

Seed: King Edward.

Cultivations, etc.:- Chalk applied: 19 Sept, 1980. K applied: 22 Sept. Ploughed: 24 Sept. Disc harrowed, heavy spring-tine cultivated: 27 Sept. Rotary harrowed, beans sown: 29 Sept. Trietazine and simazine applied: 30 Sept. Heavy spring-tine cultivated twice: 15 Apr, 1981. N, PK, and Mg applied: 23 Apr. Chisel ploughed: 24 Apr. Rotary harrowed, ridged, hand planted, split back: 7 May. Linuron and paraquat applied:

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81/R/P/3

21 May. Fungicide applied, with insecticide on the first five occasions: 22 June, 1 July, 13 July, 27 July, 11 Aug, 24 Aug. Desiccant applied: 25 Sept. Remaining haulm mechanically destroyed: 7 Oct. Lifted: 12 Oct. Previous crops: W. wheat 1979, s. wheat 1980.

NOTE: Stem and plant counts were made before harvest.

TOTAL TUBERS TONNES/HECTARE

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

BOX TIME FUNGCIDE	NONE	OCTOBER	DECEMBER	FEBRUARY	MEAN
NONE	43.5	58.5	60.5	60.0	55.6
THIABEND	48.7	59.3	59.0	60.5	56.9
MEAN	46.1	58.9	59.8	60.3	56.3

EXTRA	TD BD	TF BF	TA O	MEAN
	58.6	59.7	50.7	56.3

GRAND MEAN 56.3

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

TABLE	EXTRA	FUNGCIDE	BOX TIME	FUNGCIDE BOX TIME & EXTRA
SED	3.12	1.56	2.21	3.12

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

STRATUM	DF	SE	CV%
BLOCK.WP	30	4.41	7.8

PERCENTAGE WARE 4.44 CM (1.75 INCH) RIDDLE

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

BOX TIME FUNGCIDE	NONE	OCTOBER	DECEMBER	FEBRUARY	MEAN
NONE	75.5	76.2	74.7	78.5	76.2
THIABEND	73.2	74.0	74.8	73.2	73.8
MEAN	74.4	75.1	74.7	75.8	75.0

EXTRA	TD BD	TF BF	TA O	MEAN
	67.8	70.9	73.4	70.7

GRAND MEAN 73.8

PLOT AREA HARVESTED 0.00143

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81/R/P/5

POTATOES

ALARM PHEROMONE STUDY

Object: To study the effects of an aphid alarm pheromone on the effectiveness of a contact aphicide - Geescroft.

Sponsors: D.C. Griffiths, J.A. Pickett.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.25 x 6.10.

Treatments:

TREATMNT	Aphicide and pheromone treatments:
NONE	None
PHEROMON	Aphid alarm pheromone (beta farnesene at 0.3 g)
PERMETH	Permethrin at 0.10 kg
PHER + PER	Aphid alarm pheromone plus permethrin
DEMETON	Demeton-s-methyl at 0.25 kg
PIRIMICA	Pirimicarb at 0.15 kg

NOTE: Treatments were applied on 23 June, insecticide sprays in 340 l of water, beta farnesene in nitrogen gas at 5000 l.

Basal applications: Manures: (10:10:15 + 4.5 Mg) at 1960 kg. Weedkillers: Zinuron at 1.1 l with paraquat at 0.6 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied six times. Desiccant: BOV at 170 l.

Seed: King Edward.

Cultivations, etc.:- Ploughed: 20 Nov, 1980. NPK applied: 16 Apr, 1981. Spike rotary cultivated, seed sown: 7 May. Weedkillers applied: 27 May. Fungicide applied: 22 June, 1 July, 13 July, 27 July, 11 Aug and 24 Aug. Haulm mechanically destroyed: 11 Sept. Desiccant applied: 25 Sept. Lifted: 7 Oct. Previous crops: S. barley 1979, w. beans 1980.

NOTE: Aphids were counted three times between late June and late July.

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81/R/P/5

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	NONE	PHEROMON	PERMETH	PHER+PER	DEMETON	PIRIMICA	MEAN
	37.1	37.8	36.3	41.2	40.4	38.6	38.6

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

TABLE	TREATMNT
SED	2.57

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	3.63	9.4

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	NONE	PHEROMON	PERMETH	PHER+PER	DEMETON	PIRIMICA	MEAN
	87.4	89.2	86.9	88.6	89.9	88.9	88.5

PLOT AREA HARVESTED 0.00091

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81/R/G/1

GRASS

NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to granular urea on the yield and nitrogen uptake of grass cut for silage - White Horse II.

Sponsor: G.A. Rodgers.

Design: 3 randomised blocks of 15 plots.

Whole plot dimensions: 2.43 x 12.2.

Treatments: All combinations of:-

1. N TIME — Times of applying urea and nitrification inhibitors:

20 JAN	20 January, 1981
2 APR	2 April

2. N INHIB — Forms of urea (supplying 375 kg N) and nitrification inhibitors added to urea:

AU3 O	Aqueous urea, injected into soil, no inhibitor
GU3 O	Granular urea, broadcast, no inhibitor
GU3 DIC	Granular urea plus dicyandiamide at 16 kg, broadcast
GU3 CAL	Granular urea plus calcium chloride at 50 kg, broadcast
GU3 HYD	Granular urea plus hydroquinone at 5 kg, broadcast

plus five extra treatments:

EXTRA — Nitrogen dressings (kg N) divided equally between three application dates - 2 Apr, 1981, 4 June, 12 Aug:

0	None
NC2 D	250 as 'Nitro-Chalk'
NC3 D	375 as 'Nitro-Chalk'
NC4 D	500 as 'Nitro-Chalk'
GU3 D	375 as granular urea

Basal applications: Manures: (0:14:28) at 500 kg.

Cultivations, etc.:- PK applied: 21 Nov, 1980. Cut: 3 June, 1981, 7 Aug, 5 Nov. Previous crops: Grass 1979 & 1980.

NOTE: Ammonia volatilisation was measured. Urea, ammonium, and nitrate were determined in soils from treatments other than EXTRA.

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81/R/G/1

1ST CUT (3/6/81) DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	AU3 0	GU3 0	GU3 DIC	GU3 CAL	GU3 HYD	MEAN
20 JAN	5.33	4.50	5.08	4.79	4.76	4.89
2 APR	4.38	4.61	4.96	4.69	4.74	4.68
MEAN	4.86	4.55	5.02	4.74	4.75	4.78

EXTRA	0	NC2 D	NC3 D	NC4 D	GU3 D	MEAN
	1.57	5.34	4.86	4.99	4.80	4.31

GRAND MEAN 4.63

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.308	0.138	0.217	0.308

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.377	8.1

1ST CUT MEAN DM% 18.3

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81/R/G/1

2ND CUT (6&7/8/81) DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	AU3 0	GU3 0	GU3 DIC	GU3 CAL	GU3 HYD	MEAN
20 JAN	1.60	0.60	1.14	0.91	0.74	1.00
2 APR	2.50	1.39	1.83	1.65	1.41	1.76
MEAN	2.05	1.00	1.49	1.28	1.08	1.38

EXTRA	0	NC2 D	NC3 D	NC4 D	GU3 D	MEAN
	0.43	2.48	3.11	3.42	2.77	2.44

GRAND MEAN 1.73

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.178	0.080	0.126	0.178

2ND CUT (6&7/8/81) DRY MATTER TONNES/HECTARE

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.219	12.6

2ND CUT MEAN DM% 17.9

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81/R/G/1

3RD CUT (4&5/11/81) DRY MATTER TONNES/HECTARE

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

N INHIB N TIME	AU3 0	GU3 0	GU3 DIC	GU3 CAL	GU3 HYD	MEAN
20 JAN	0.47	0.56	0.52	0.33	0.62	0.50
2 APR	0.73	0.35	0.46	0.44	0.55	0.51
MEAN	0.60	0.45	0.49	0.39	0.59	0.50

EXTRA	0	NC2 D	NC3 D	NC4 D	GU3 D	MEAN
	0.34	2.29	2.56	2.61	2.32	2.03

GRAND MEAN 1.01

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.203	0.091	0.143	0.203

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.248	24.6

3RD CUT MEAN DM% 27.7

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81/R/G/1

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N INHIB / N TIME	AU3 0	GU3 0	GU3 DIC	GU3 CAL	GU3 HYD	MEAN
20 JAN	7.40	5.65	6.73	6.03	6.12	6.39
2 APR	7.61	6.35	7.25	6.78	6.71	6.94
MEAN	7.50	6.00	6.99	6.41	6.41	6.66

EXTRA	0	NC2 D	NC3 D	NC4 D	GU3 D	MEAN
	2.35	10.11	10.53	11.01	9.90	8.78

GRAND MEAN 7.37

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

TABLE	EXTRA	N TIME	N INHIB	N TIME N INHIB & EXTRA
SED	0.420	0.188	0.297	0.420

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.515	7.0

TOTAL OF 3 CUTS MEAN DM% 21.3

PLOT AREA HARVESTED 0.00093

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81/E/1

METEOROLOGICAL RECORDS 1981 - 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	61 (+9)	4.0 (+1.1)	1.5	5.1	6.7
FEB	74 (+7)	2.4 (-0.9)	0.3	4.2	6.1
MAR	53 (-61)	7.7 (+2.5)	5.9	6.8	6.3
APR	126 (-24)	7.2 (-0.4)	3.9	8.4	8.0
MAY	117 (-77)	10.9 (-0.1)	7.9	10.7	9.2
JUN	148 (-54)	12.8 (-1.2)	9.1	13.7	11.7
JUL	137 (-54)	15.3 (-0.5)	12.0	14.9	13.0
AUG	206 (+27)	16.3 (+0.6)	12.7	16.1	14.3
SEP	149 (+5)	14.3 (+0.9)	11.4	14.9	14.5
OCT	109 (+6)	8.1 (-1.4)	5.7	11.2	12.7
NOV	56 (-6)	6.8 (+1.0)	5.0	8.7	10.2
DEC	49 (+3)	-0.3 (-4.0)	-1.5	4.4	7.7
YEAR*	1286 (-218)	8.8 (-0.2)	6.1	9.9	10.0

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	20	44 (-20)	18	31	10.7
FEB	22	19 (-30)	9	4	10.3
MAR	8	123 (+74)	28	91	12.7
APR	12	49 (+0)	9	25	10.9
MAY	5	86 (+32)	20	42	7.6
JUN	1	36 (-21)	11	10	8.7
JUL	0	65 (+3)	12	12	6.5
AUG	1	44 (-20)	8	21	5.3
SEP	0	99 (+38)	16	40	6.9
OCT	15	78 (+5)	22	46	9.2
NOV	18	48 (-23)	16	31	9.4
DEC	29	59 (-8)	17	78	8.9
YEAR*	131	752 (+30)	186	432	8.9

(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 1981 - WOBURN

(Departure from long-period means in brackets)

Mean temperature: C

MONTH	Total sunshine: hours	Air(1)	Dew point	In ground under grass 30 cm	In ground under grass 100 cm	Ground frosts (2)	Total rainfall: mm 12.7 cm (5in) gauge	Rain days (3)	Wind km per hour (4)
JAN	49 (-1)	4.3 (+1.1)	2.1	5.2	7.0	20	31 (-23)	14	10.1
FEB	67 (+3)	2.6 (-0.8)	0.3	4.2	6.4	23	16 (-25)	7	8.9
MAR	56 (-58)	8.0 (+2.6)	6.0	6.9	6.6	8	103 (+58)	26	12.4
APR	111 (-29)	7.3 (-0.6)	3.8	8.2	8.0	11	71 (+26)	8	8.6
MAY	123 (-61)	11.2 (+0.2)	8.0	11.7	9.4	3	63 (+9)	20	8.2
JUN	148 (-49)	13.3 (-0.9)	9.0	14.9	12.4	2	34 (-17)	10	9.1
JUL	145 (-34)	15.9 (-0.1)	11.8	16.6	14.0	0	44 (-10)	13	7.5
AUG	184 (+14)	16.2 (+0.4)	12.6	17.2	15.2	0	53 (-10)	9	4.9
SEP	144 (+9)	14.6 (+1.0)	11.6	15.4	15.0	0	71 (+20)	16	8.3
OCT	99 (-2)	8.4 (-1.6)	5.9	10.9	12.8	7	79 (+25)	22	10.0
NOV	41 (-20)	7.1 (+0.8)	4.8	8.3	10.3	14	34 (-29)	12	10.7
DEC	37 (-7)	-0.2 (-4.2)	-1.8	4.0	7.5	25	47 (-7)	16	6.6
YEAR*	1204 (-235)	9.0 (-0.1)	6.2	10.3	10.4	113	646 (+17)	173	8.8

METEOROLOGICAL RECORDS 1981 - SAXMUNDHAM

Mean temperature: C

MONTH	Air(1)	Dew point	In ground under bare soil 30 cm	Ground frosts (2)	Total rainfall :mm 12.7 cm (5 in) gauge	Rain days (3)	Wind km per hour (4)
JAN	4.7 (+0.8)	3.9	4.6	13	54 (-5)	12	11.4
FEB	5.6 (+1.4)	1.7	3.4	21	26 (-16)	9	11.4
MAR	8.0 (+2.4)	6.7	6.4	10	103 (+60)	19	13.9
APR	7.5 (+0.2)	5.0	8.7	9	87 (+52)	9	10.8
MAY	11.5 (+0.7)	9.4	11.5	4	61 (+28)	15	8.8
JUN	13.9 (+0.1)	10.5	15.3	0	48 (+1)	7	7.9
JUL	16.0 (+0.0)	12.2	17.0	0	69 (+20)	8	6.4
AUG	16.5 (+0.1)	13.9	17.1	0	12 (-30)	4	5.7
SEP	15.5 (+1.4)	12.8	15.3	0	86 (+22)	12	10.1
OCT	8.9 (-1.7)	6.7	10.2	9	80 (+33)	18	10.8
NOV	7.7 (+1.1)	6.1	8.0	11	51 (-14)	11	11.2
DEC	0.6 (-4.7)	0.0	3.9	21	79 (+24)	13	9.9
YEAR*	9.7 (+0.2)	7.4	10.1	98	756 (+176)	137	9.9

(1)Mean of maximum and minimum
(2)Number of nights grass min. was below 0.0 C
(3)Number of days rainfall was 0.2 mm or more
(4)At 2 metres above ground level
*Mean or total

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CONVERSION FACTORS

Factors for the Conversion of Imperial to Metric Units

1 inch (in.)	= 2·540 centimetres (cm)
1 foot (ft) (=12 in.)	= 30·48 cm
1 yard (yd) (=3 ft)	= 0·9144 metre (m)
1 square yard (yd²)	= 0·8361 m²
1 acre (ac) (=4840 yd²)	= 0·4047 hectare (ha)
1 ounce (oz)	= 28·35 grams (g)
1 pound (lb)	= 0·4536 kilogram (kg)
1 hundredweight (cwt) (=112 lb)	= 50·80 kg
1 ton (=2240 lb)	= 1016 kg = 1·016 metric tons (tonnes) (t)
1 pint	= 0·5682 litre (l)
1 gallon (gal) (=8 pints)	= 4·546 litres
1 fluid ounce = 1/20 pint	= 0·02841 litre = 28·41 ml
1 cubic foot	= 28·32 litres

To convert	*Multiply by*
oz ac^{-1} to g ha^{-1}	70·06
lb ac^{-1} to kg ha^{-1}	1·121
cwt ac^{-1} to kg ha^{-1}	125·5
cwt ac^{-1} to t ha^{-1}	0·1255
ton ac^{-1} to kg ha^{-1}	2511
ton ac^{-1} to t ha^{-1}	2·511
gal ac^{-1} to l ha^{-1}	11·233

The following factors are accurate to about 2 parts in 100:

1 lb ac^{-1} = 1·1 kg ha^{-1}
1 gal ac^{-1} = 11 litres ha^{-1}
1 ton ac^{-1} = 2·5 t ha^{-1}

In general reading of the text there will be no great inaccuracy in regarding:

1 lb = 0·5 kg
1 lb ac^{-1} = 1 kg ha^{-1}

Temperatures

To convert °F into °C subtract 32 and multiply by $\frac{5}{9}$ (0.556)
To convert °C into °F multiply by $\frac{9}{5}$ (1·8) and add 32

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CONVERSION FACTORS

Factors for the Conversion of Metric to Imperial Units

1 centimetre (cm)	=	0·3937 inch (in.) = 0·03281 ft
1 metre (m)	=	1·094 yards (yd)
1 square metre (m^2)	=	1·196 square yards (yd^2)
1 hectare (ha)	=	2·471 acres (ac)
1 gram (g)	=	0·03527 ounce (oz)
1 kilogram (kg)	=	2·205 pounds (lb)
1 kg	=	0·01968 hundredweight (cwt) = 0·0009842 ton
1 metric ton (tonne) (t)	=	0·9842 ton
1 litre	=	1·760 pints = 0·2200 gallon (gal)

1 litre = 1000 millilitres (ml) = 35·20 fluid ounces = 0·03531 cubic foot (ft^3)

To convert	*Multiply by*
g ha^{-1} to oz ac^{-1}	0·01427
kg ha^{-1} to lb ac^{-1}	0·8921
kg ha^{-1} to cwt ac^{-1}	0·007966
t ha^{-1} to cwt ac^{-1}	7·966
kg ha^{-1} to tons ac^{-1}	0·0003983
t ha^{-1} to tons ac^{-1}	0·3983
l ha^{-1} to gal ac^{-1}	0·08902

Plant nutrients

Plant nutrients are best stated in terms of amounts of the elements (P, K, Na, Ca, Mg, S); the old 'oxide' terminology (P_2O_5, K_2O, Na_2O, CaO, MgO, SO_3) is still used in work involving fertilisers and liming since Regulations require statements of P_2O_5, K_2O, etc.

For quick conversions

(accurate to within 2%) the following factors may be used:

$2\frac{1}{3} \times P = P_2O_5$	$\frac{3}{7} \times P_2O_5 = P$
$1\frac{1}{5} \times K = K_2O$	$\frac{5}{6} \times K_2O = K$
$1\frac{2}{5} \times Ca = CaO$	$\frac{7}{10} \times CaO = Ca$
$1\frac{2}{3} \times Mg = MgO$	$\frac{3}{5} \times MgO = Mg$

For accurate conversions:

To convert	*Multiply by*	*To convert*	*Multiply by*
P_2O_5 to P	0·4364	P to P_2O_5	2·2915
K_2O to K	0·8301	K to K_2O	1·2047
CaO to Ca	0·7146	Ca to CaO	1·3994
MgO to Mg	0·6031	Mg to MgO	1·6581

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