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# Yields of the Field Experiments 1987

[Full Table of Content](#)

ARC, Institute of Arable Crops Research  
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Printed: Northampton, 1988  
Rothamsted 088

## Default Title

### Rothamsted Research

Rothamsted Research (1988) *Default Title* ; Yields Of The Field Experiments 1987, pp 1 - 282 - **DOI:** <https://doi.org/10.23637/ERADOC-1-37>

AFRC, Institute of Arable Crops Research  
Rothamsted Experimental Station  
Harpenden  
YIELDS  
of the  
FIELD  
EXPERIMENTS  
1987

This report is produced by members of the Statistics Department and of the Field Experiments Section. It includes only experiments conducted at Rothamsted and Woburn. 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.

Price: Twelve pounds.

Published 1988



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## CONVENTIONS 1987

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

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

For the classical and some long-term experiments reference is made to 'Details' - separate publications, giving full descriptions of treatments until 1967 & 1973, with full titles 'Details of the Classical and Long Term Experiments up to 1967' and 'Details of the Classical and Long Term Experiments up to 1973'.

The following conventions are observed unless otherwise stated.

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

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

All yields and plant numbers are per hectare.

The following abbreviations are used in variate headings:

Wheat, barley, oats, beans etc.

Grain: Grain (at 85% dry matter)

Straw: Straw (at 85% dry matter)

Sugar beet

Roots: Roots (washed)

Sugar %: Sugar percentage of washed roots

All crops

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

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

'Nitro-Chalk' refers to the grade containing 27.5% N unless otherwise stated. 'Nitram' contains 34.5% N.

Compound fertilizers indicated thus - (20:10:10) = compound fertilizer (20% N, 10% P<sub>2</sub>O<sub>5</sub>, 10% K<sub>2</sub>O), granular unless otherwise stated.

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



### Harvest areas for cereals

On most of those cereal experiments at Rothamsted and Woburn which are harvested by combine the 'blank-row' technique is used to distinguish the areas taken for yield from the discard areas. For example when seed is drilled in rows 7 in. (18 cm) apart 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.

87/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. Since 1985 part of the second rotation has been added to the first to extend the rotation to fallow, potatoes, w. wheat, w. wheat, w. wheat.

The 144th year, w. wheat, fallow, potatoes.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, 74-86/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00298
	1	0.00548
	4,5,6,and 7	0.00453
	8 and 9	0.00477
Potatoes:	3	0.00695

Treatments:

Whole plots

PLOT	Fertilizers and organic manures:-			
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K (Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17NO+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	NO+3 1/2(PK Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
19C	19	C	C	C
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Potatoes receive N3 1/2 (PK Mg) on both Plots 17 and 18.

87/R/BK/1

N1,N2,N3,N4,N5,N6: 48, 96, 144, 192, 240, 288 kg N (as sulphate of ammonia until 1967, except N\* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1968 to 1985, as 'Nitram' since 1986.)

N0+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring

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

K: 90 kg K as sulphate of potash

Na: 55 kg Na as sulphate of soda

(Na): 16 kg Na as sulphate of soda until 1973

Mg: 30 kg Mg annually to Plot 14, 35 kg Mg every third year to other plots since 1974. All as kieserite since 1974, previously as sulphate of magnesia annually

D: Farmyard manure at 35 tonnes

C: Castor meal to supply 96 kg N

F: P K (Na) Mg H: Half rate

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

SECTION	Section	68	69	70, 71, 72, 73, 74, 75, and and and	76	77	78	79	80	81	82	83	84	85	86	87
SC0/W36B	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W21B	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W	W	F
POTATOES	3	W	W	F	W	W	F	W	W	W	W	W	W	W	W	P
SC4/W2B	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W
SCS/W1	5	W	F	W	W	F	W	W	W	W	W	W	W	F	P	W
SC6/W10B	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
SC6/W10S	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
SC7/W3B	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W	W	W
SC8/W6B	8+	W	W	W	W	W	W	W	W	F	W	W	W	W	W	W
SC9/W29B	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

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

\* Straw incorporated since 1987. \*\* No sprays except weedkillers since 1985. + No weedkillers.

B = Brimstone, S = Squareheads Master

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

87/R/BK/1

Standard applications:

W. wheat: Manures: Chalk at 2.9 t (sections 0, 4 and 5 only).  
Weedkillers (not applied to section 8): Methabenzthiazuron at 3.2 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides (not applied to section 6): Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l with the growth regulator. Fenpropimorph at 0.75 kg with chlorothalonil at 1.0 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l. Growth regulator (not applied to section 6): Chlormequat chloride at 1.3 kg.

Potatoes: Weedkiller: Linuron at 1.6 kg in 500 l. Fungicides: Mancozeb at 1.4 kg on four occasions in 200 l, applied with the insecticide on the second. Fentin hydroxide at 0.28 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.80 kg in 500 l.

Fallow: Weedkiller: Glyphosate at 1.4 kg in 200 l on two occasions.

Seed: W. wheat: Brimstone, dressed fonofos, and Squareheads Master, untreated, both sown at 190 kg.

Potatoes: Pentland Crown.

Cultivations, etc.:-

All Sections:

Kieserite, sulphate of soda and castor meal applied: 19 Sept, 1986. Sulphate of potash applied: 22 Sept. Superphosphate applied: 6 Oct. FYM applied, ploughed, disced, rotary harrowed: 8 Oct.

Cropped Sections:

W. wheat: Straw chopped (section 0): 5 Sept, 1986. Chalk applied (sections 0, 4 and 5): 26 Sept. Rotary harrowed, seed sown: 10 Oct. Methabenzthiazuron applied (except section 8): 17 Oct. N treatments applied: 14 Apr, 1987. Remaining weedkillers applied (except section 8): 15 Apr. Prochloraz, carbendazim and the growth regulator applied (except section 6): 6 May. Fenpropimorph and chlorothalonil applied (except section 6): 16 June. Propiconazole with carbendazim and maneb applied (except section 6): 10 July. Combine harvested: 8 Sept.

Potatoes: Heavy spring-tine cultivated: 17 Feb, 1987. N treatments applied: 14 Apr. Rotary harrowed, potatoes planted: 16 Apr. Rotary ridged: 27 Apr. Weedkiller applied: 30 Apr. Mancozeb applied: 24 June, 8 July, 28 July and 10 Aug. Pirimicarb applied: 8 July. Fentin hydroxide applied: 28 Aug. Haulm desiccant applied: 4 Sept. Lifted: 23 Sept.

Fallow: Heavy spring-tine cultivated: 17 Feb, 1987. Rotary harrowed: 27 Apr. Deep-tine cultivated: 28 Apr. Spring-tine cultivated: 29 Apr. Glyphosate applied: 22 June. Heavy spring-tine cultivated: 30 June. Glyphosate applied: 17 Aug.

87/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SECTION PLOT	5/W1B	4/W2B	7/W3B	8/W5B	6/W10B	6/W10S	1/W21B	9W29B	0/W36B	Mean
01DN4PK	7.90	8.16	8.74	*	5.69	*	*	*	*	7.62
21DN2	8.92	9.32	8.44	1.88	7.32	*	8.54	8.97	7.42	7.60
22D	9.45	6.44	6.21	2.10	7.05	*	6.67	7.70	6.57	6.53
030	1.86	1.15	1.10	2.29	1.33	1.04	1.47	1.24	1.52	1.44
05F	2.04	1.28	0.93	2.61	1.47	1.02	1.41	1.31	1.28	1.48
06N1F	4.77	4.01	2.01	3.23	3.39	2.22	3.21	3.55	3.28	3.30
07N2F	6.95	5.51	3.99	2.02	4.37	3.04	5.32	4.89	4.62	4.52
08N3F	8.25	6.52	5.50	1.93	6.35	3.05	5.95	6.47	5.70	5.52
09N4F	8.77	7.09	6.53	2.34	5.79	2.87	6.18	6.71	6.01	5.81
10N2	6.46	6.49	3.77	1.55	3.45	2.19	3.18	2.90	2.90	3.66
11N2P	6.11	5.64	5.12	1.97	4.18	3.16	4.69	3.89	4.95	4.41
12N2PNA	6.88	5.58	4.82	2.23	4.89	3.21	4.39	4.88	4.98	4.65
13N2PK	6.86	5.39	4.12	1.65	4.40	2.65	5.24	5.54	4.54	4.49
14N2PKMG	6.82	5.73	3.83	1.95	4.67	2.89	5.22	5.40	5.04	4.62
15N5F	9.06	7.53	4.93	1.29	4.74	2.25	6.84	6.81	6.52	5.55
16N6F	9.32	7.78	6.02	2.13	4.37	2.09	7.54	6.96	4.92	5.68
17N0+3FN	8.16	6.74	4.96	2.03	6.15	3.43	6.91	6.39	6.39	5.68
18N1+3FN	9.03	8.06	5.60	2.37	6.26	2.37	7.10	6.37	7.20	6.04
19C	6.08	4.33	2.30	2.32	2.06	1.62	3.68	2.49	2.61	3.05
20NKMG	*	*	*	*	*	*	1.64	*	2.08	1.86

GRAIN MEAN DM% 78.0

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SECTION PLOT	5/W1B	1/W21B	Mean
01DN4PK	6.52	*	6.52
21DN2	7.30	6.21	6.76
22D	5.57	4.96	5.26
030	0.92	*	0.92
05F	0.91	0.97	0.94
06N1F	2.07	2.50	2.29
07N2F	3.02	2.80	2.91
08N3F	3.68	*	3.68
09N4F	4.44	4.00	4.22
10N2	2.75	3.33	3.04
11N2P	2.67	1.93	2.30
12N2PNA	3.15	1.94	2.55
13N2PK	3.21	2.81	3.01
14N2PKMG	3.67	2.71	3.19
15N5F	4.47	3.76	4.12
16N6F	5.09	4.59	4.84
17N0+3FN	4.47	3.57	4.02
18N1+3FN	5.06	4.42	4.74
19C	2.63	3.32	2.97
20NKMG	*	1.33	1.33

STRAW MEAN DM% 85.6

87/R/BK/1 POTATOES

\*\*\*\*\* Tables of means \*\*\*\*\*

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	38.3	94.7
21DN2	36.9	91.3
22D	35.9	96.1
030	9.5	94.4
05F	17.4	94.9
06N1F	25.3	89.8
07N2F	32.0	92.9
08N3F	42.5	94.6
09N4F	43.0	98.0
10N2	5.5	84.2
11N2P	6.6	66.7
12N2PNA	6.9	69.2
13N2PK	22.3	85.4
14N2PKMG	35.3	92.9
15N5F	40.9	94.6
16N6F	40.1	97.1
17N3FH	27.4	97.0
18N3FH	26.8	96.9
19C	17.4	94.3

87/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 136th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-86/R/HB/2.

Treatments: All combinations of:-

1. MANURE Fertilizers and organic manures:

	Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980
---	None	-	-
-P-	None	P	-
--K	None	K(Na)Mg	-
-PK	None	PK(Na)Mg	-
A--	A	-	-
AP-	A	P	-
A-K	A	K(Na)Mg	-
APK	A	PK(Na)Mg	-
N----	N	-	-
NP---	N	P	-
N-K--	N	K(Na)Mg	-
NPK--	N	PK(Na)Mg	-
N--S-	N	Si	Si omitted
NP-S-	N	P Si	"
N-KS-	N	K(Na)MgSi	"
NPKS-	N	PK(Na)MgSi	"
N---S	N	-	Si added
NP--S	N	P	"
N-K-S	N	K(Na)Mg	"
NPK-S	N	PK(Na)Mg	"
N--SS	N	Si	-
NP-SS	N	P Si	-
N-KSS	N	K(Na)MgSi	-
NPKSS	N	PK(Na)MgSi	-
C(--)	C	-	PKMg omitted
C(P-)	C	P	"
C(-K)	C	K(Na)Mg	"
C(PK)	C	PK(Na)Mg	"
D	None	D	-
(D)	(D)	-	-
(A)	(Ashes)	-	-
-	None	-	-

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

87/R/HB/2

Mg: 35 kg Mg, as kieserite every third year since 1974 (sulphate of magnesia annually until 1973)

Si: Silicate of soda at 450 kg

D: Farmyard manure at 35 tonnes. (D): until 1871 only

(Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

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

0  
48  
96  
144

Plus extra plots testing all combinations of:-

1. MANURE Fertilizers other than magnesium:

551AN2PK	Plot 551 AN2PK
561--PK	Plot 561 --PK
571NN2--	Plot 571 NN2
581NN2--	Plot 581 NN2

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

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

0  
35

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

Basal applications: Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.

Seed: Triumph, dressed triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.: - Glyphosate applied: 6 Nov, 1986. Silicate of soda, K and P applied: 28 Nov. FYM applied, ploughed: 2 Dec. Spring-tine cultivated, seed sown: 16 Mar, 1987. N applied: 24 Apr. Remaining weedkillers applied: 5 May. Fungicide applied: 29 May. Combine harvested: 21 Aug.



87/R/HB/2

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N	0	48	96	144	Mean
MANURE					
---	0.95	1.56	2.27	1.98	1.69
-P-	2.38	3.92	3.39	3.35	3.26
--K	1.82	2.66	3.47	2.94	2.72
-PK	2.30	3.64	5.26	5.54	4.19
A--	1.46	1.56	1.48	2.36	1.72
AP-	2.79	3.79	2.43	1.81	2.71
A-K	1.48	1.97	2.38	2.85	2.17
APK	2.51	4.14	5.47	5.77	4.47
N----	1.82	2.59	2.12	2.95	2.37
NP---	2.65	4.28	3.32	2.34	3.15
N-K--	1.60	1.70	2.21	2.32	1.96
NPK--	2.91	4.39	5.10	5.74	4.54
N--S-	1.80	3.45	3.23	2.99	2.87
NP-S-	2.88	3.91	4.43	4.47	3.92
N-KS-	1.90	3.04	4.42	5.23	3.65
NPKS-	2.47	4.56	5.48	5.68	4.55
N---S	1.83	2.13	2.46	3.46	2.47
NP--S	3.43	4.21	5.34	4.29	4.32
N-K-S	1.74	2.73	3.11	2.49	2.52
NPK-S	2.67	3.83	5.01	6.23	4.44
N--SS	1.73	2.49	3.06	3.37	2.66
NP-SS	3.39	4.75	4.61	4.70	4.36
N-KSS	1.57	2.76	3.27	3.39	2.75
NPKSS	2.11	4.52	6.30	5.44	4.59
C(--)	1.83	3.39	3.70	4.18	3.28
C(P-)	2.64	3.98	4.08	4.46	3.79
C(-K)	1.54	4.02	3.92	5.00	3.62
C(PK)	1.97	3.90	5.01	5.31	4.05
D	5.89	6.14	5.87	6.18	6.02
(D)	1.98	4.34	3.96	3.98	3.57
(A)	2.90	3.59	3.83	4.01	3.58
-	2.21	2.52	2.81	1.96	2.37
Mean	2.29	3.45	3.84	3.96	3.38

GRAIN MEAN DM% 84.8

87/R/HB/2

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N	0	48	96	144	Mean
MANURE					
---	0.35	0.72	0.91	0.91	0.72
-P-	0.91	1.85	1.85	2.59	1.80
--K	0.71	1.23	2.15	2.02	1.53
-PK	1.09	2.16	3.10	3.68	2.51
A--	0.54	0.73	0.72	1.10	0.77
AP-	1.10	2.01	1.66	1.29	1.52
A-K	0.72	1.42	1.24	1.41	1.20
APK	1.09	1.97	3.26	3.97	2.57
D	3.54	4.35	4.68	4.69	4.32
(D)	0.96	2.40	2.20	2.64	2.05
(A)	1.19	1.92	1.94	2.17	1.81
-	0.72	1.43	1.69	2.27	1.53
Mean	1.08	1.85	2.12	2.39	1.86

STRAW MEAN DM% 89.2

PLOT AREA HARVESTED 0.00161

EXTRA PLOTS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	4.34	1.04	3.76	2.30	2.86
35	4.97	1.39	3.69	2.35	3.10
Mean	4.65	1.22	3.72	2.33	2.98

GRAIN MEAN DM% 85.3

PLOT AREA HARVESTED 0.00344

87/R/WF/3

WHEAT AND FALLOW

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

The 132nd year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-86/R/WF/3.

Whole plot dimensions: 9.60 x 211.

Treatments:

Each year there are two plots, one is sown to w. wheat, one is fallow; they alternate in successive years.

Seed: Brimstone, dressed fonofos, sown at 190 kg.

Cultivations, etc.:-

Wheat plot: Rotary harrowed, seed sown: 11 Oct, 1986. Combine harvested: 1 Sept, 1987.

Fallow plot: Ploughed: 10 Oct, 1986. Rotary harrowed: 27 Apr, 1987.

Deep-tine cultivated: 28 Apr. Heavy spring-tine cultivated: 22 June, 30 June. Cultivated by rotary grubber: 19 Aug.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.06	0.76
MEAN DM%	82.8	87.5
PLOT AREA HARVESTED	0.06009	

87/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856-1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley - Hoosfield.

The 132nd year, s. barley.

For previous years see 'Details' 1967, 1973 and 74-86/R/EX/4.

Treatments: All combinations of:-

Whole plots

1. OLD RES                      Residues of manures applied annually 1876-1901:
  - 0                                  None
  - D                                  Farmyard manure at 35 tonnes
  - N                                  96 kg N as ammonium salts
  - P                                  34 kg P as superphosphate
  - NPKNAMG                      N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia
  
2. P                                  Phosphate applied annually from 1986:
  - 0                                  None
  - P1                                  44 kg P as superphosphate
  - P2                                  87 kg P as superphosphate
  - P3                                  131 kg P as superphosphate

plus all combinations of:-

1. OLD RES                      Residues of manures applied annually 1876-1901:
  - 0                                  None
  - D                                  Farmyard manure at 35 tonnes
  - N\*                                  96 kg N as nitrate of soda
  - PK                                  34 kg P as superphosphate, 137 kg K as sulphate of potash
  - N\*PK                              N, P and K as above
  
2. N87                              Nitrogen fertilizer (kg N) as 'Nitro-Chalk' until 1985, as 'Nitram' since 1986 (basal until 1975, on a cyclic system since 1976):
  - 0
  - 48
  - 96
  - 144

NOTE: All plots in the combination OLD RES, P were given N at 144 kg as 'Nitram' and K at 83 kg as muriate of potash.

Basal applications: Weedkillers: Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.

87/R/EX/4

Seed: Triumph, seed dressed triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.:- P and K applied: 10 Oct, 1986. Ploughed: 6 Nov. Spring-tine cultivated, seed sown: 19 Mar, 1987. N applied: 23 Apr. Weedkillers applied: 28 May. Fungicide applied: 24 June. Combine harvested: 21 Aug.

PHOSPHATE PLOTS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	P	0	P1	P2	P3	Mean
OLD RES						
O		2.80	4.31	4.52	4.57	4.05
D		3.79	4.72	4.82	5.05	4.60
N		2.57	4.17	4.70	4.33	3.94
P		4.07	4.43	4.69	4.37	4.39
NPKNAMG		3.75	4.47	4.77	4.98	4.49
Mean		3.39	4.42	4.70	4.66	4.29

GRAIN MEAN DM% 87.4

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	P	0	P1	P2	P3	Mean
OLD RES						
O		1.17	2.63	2.88	2.48	2.29
D		2.35	3.15	3.24	3.39	3.03
N		1.13	2.32	3.05	2.74	2.31
P		2.26	3.14	2.90	2.88	2.79
NPKNAMG		2.19	2.87	2.94	3.00	2.75
Mean		1.82	2.82	3.00	2.90	2.63

STRAW MEAN DM% 76.5

PLOT AREA HARVESTED 0.00728

87/R/EX/4

NITROGEN PLOTS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N87	0	48	96	144	Mean
OLD RES						
0	0.66	1.71	1.32	1.58	1.32	
D	2.17	4.54	3.28	3.45	3.36	
N*	1.11	1.77	1.25	1.51	1.41	
PK	1.36	2.60	2.03	2.45	2.11	
N*PK	1.47	3.82	2.38	2.35	2.51	
Mean	1.35	2.89	2.05	2.27	2.14	

GRAIN MEAN DM% 86.6

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N87	0	48	96	144	Mean
OLD RES						
0	0.41	0.75	0.77	0.88	0.70	
D	1.06	1.96	1.64	2.06	1.68	
N*	0.63	0.89	0.64	0.94	0.77	
PK	0.95	1.67	1.67	1.99	1.57	
N*PK	1.09	1.59	1.22	1.45	1.34	
Mean	0.83	1.37	1.19	1.46	1.21	

STRAW MEAN DM% 72.9

PLOT AREA HARVESTED 0.00728

87/R/PG/5

PARK GRASS

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

The 132nd year, hay.

For previous years see 'Details' 1967 and 1973 and 74-86/R/PG/5.

Treatments: Combinations of:-

Whole plots

1. MANURE

Fertilizers and organic manures:

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

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

87/R/PG/5

Sub plots

2. LIME                      Liming:

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

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

Additional sub plots (Plots 18, 19 and 20 only) (tonnes CaCO<sub>3</sub> applied every fourth year 1920-1964):

N2K NAMGO	18-1	None
N2K NAMG2	18-2	13.5
N2K NAMG1	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: 27 Nov, 1986.  
Remaining mineral fertilizers applied: 10 Dec. Fish meal applied:  
11 Dec. Chain harrowed: 17 Apr, 1987. N applied: 22 Apr. Cut:  
29 June, 3 Dec.



87/R/PG/5

1ST CUT (29/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

LIME MANURE	A	B	C	D	MEAN
N1	2.99	2.80	1.66	0.48	1.98
O(D)	2.45	3.07	1.86	1.36	2.18
O/PLOT3	2.26	3.41	1.50	1.39	2.14
P	2.91	3.18	2.45	2.38	2.73
N2P	3.79	3.52	3.68	2.72	3.43
N1MIN	5.48	4.98			5.23
MIN	5.13	4.94	4.34	3.59	4.50
PNAMG	3.10	3.29	3.07	2.99	3.11
N2MIN	5.24	6.00	5.45	4.78	5.37
N2PNAMG	3.94	3.69	3.47	2.27	3.34
N3MIN	6.19	5.82	5.74	5.20	5.73
N3MINSI	6.67	6.20	5.63	5.17	5.92
O/PLOT12	2.51	1.96	1.53	1.71	1.93
D/F	4.52	4.87	4.61	4.29	4.57
N2*MIN	6.12	6.08	5.76	5.10	5.76
MIN(N2*)	4.52	5.02	2.69	3.01	3.81
N1*MIN	4.81	5.79	4.88	4.03	4.88
N1*	2.91	2.96	2.81	2.71	2.85
N2KNAMGO			0.86	0.60	0.73
N2KNAMG2	3.21				3.21
N2KNAMG1	2.98	2.60			2.79
D0	4.43				4.43
D2	4.96				4.96
D1	4.39				4.39
D/N*PK0	5.40				5.40
D/N*PK2	5.68				5.68
D/N*PK1	5.00				5.00

1ST CUT MEAN DM% 22.7

87/R/PG/5

2ND CUT (3/12/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

LIME MANURE	A	B	C	D	MEAN
N1	3.04	2.49	2.36	1.02	2.23
O(D)	2.93	2.58	2.51	2.53	2.64
O/PLOT3	2.67	2.78	3.45	4.24	3.28
P	2.66	2.81	3.29	5.13	3.47
N2P	2.15	1.61	2.16	1.28	1.80
N1MIN	2.60	2.69			2.65
MIN	3.38	3.04	3.20	3.45	3.27
PNAMG	2.77	3.36	4.98	4.34	3.86
N2MIN	2.54	3.08	2.40	1.24	2.32
N2PNAMG	2.07	2.13	2.91	0.88	2.00
N3MIN	3.54	3.29	3.35	2.80	3.24
N3MINSI	4.47	3.89	3.05	3.25	3.67
O/PLOT12	3.08	2.76	2.03	2.84	2.68
D/F	6.09	6.77	4.43	3.51	5.20
N2*MIN	1.82	3.44	2.40	3.68	2.84
MIN(N2*)	3.31	3.36	2.88	3.00	3.14
N1*MIN	3.42	2.84	2.81	2.42	2.87
N1*	2.71	3.21	4.21	2.86	3.25
N2KNAMG0			1.89	1.21	1.55
N2KNAMG2	3.27				3.27
N2KNAMG1	2.99	2.71			2.85
D0	4.41				4.41
D2	4.02				4.02
D1	3.70				3.70
D/N*PK0	4.24				4.24
D/N*PK2	3.95				3.95
D/N*PK1	3.89				3.89

2ND CUT MEAN DM% 33.4

87/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

LIME MANURE	A	B	C	D	MEAN
N1	6.03	5.28	4.03	1.50	4.21
O(D)	5.38	5.64	4.37	3.89	4.82
O/PLOT3	4.93	6.19	4.95	5.62	5.42
P	5.56	5.99	5.74	7.51	6.20
N2P	5.95	5.14	5.84	4.00	5.23
N1MIN	8.08	7.67			7.88
MIN	8.51	7.98	7.54	7.05	7.77
PNAMG	5.87	6.65	8.05	7.34	6.98
N2MIN	7.77	9.08	7.86	6.02	7.68
N2PNAMG	6.02	5.82	6.38	3.15	5.34
N3MIN	9.73	9.10	9.08	7.99	8.98
N3MINSI	11.14	10.09	8.68	8.42	9.59
O/PLOT12	5.59	4.72	3.56	4.54	4.60
D/F	10.62	11.64	9.04	7.80	9.77
N2*MIN	7.94	9.52	8.16	8.78	8.60
MIN(N2*)	7.83	8.39	5.57	6.01	6.95
N1*MIN	8.23	8.63	7.69	6.45	7.75
N1*	5.62	6.17	7.01	5.57	6.09
N2KNAMG0			2.75	1.81	2.28
N2KNAMG2	6.48				6.48
N2KNAMG1	5.97	5.31			5.64
D0	8.83				8.83
D2	8.98				8.98
D1	8.09				8.09
D/N*PK0	9.63				9.63
D/N*PK2	9.63				9.63
D/N*PK1	8.89				8.89

TOTAL OF 2 CUTS MEAN DM% 28.1

PLOT AREA HARVESTED 0.00002

87/R/AG/6

AGDELL

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

The 18th year of revised scheme, ley.

For previous years see 'Details' 1967 and 1973, and 74-86/R/AG/6.

NOTE: Yields were not taken and no new treatments were applied.

Basal applications: Manures: 'Nitram' at 130 kg and later at 200 kg.

Cultivations, etc.: - First N applied: 6 Apr, 1987. Cut: 4 June. Second N applied: 12 June.

87/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 the fourth year of grass/clover. The 13th year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-86/R/BN/7.

Plot dimensions: 10.7 x 55.9.

Treatments to grass: All combinations of:-

Whole plots

1. MANURE                      Fertilizers and organic manures:

D	D
DPK	D P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
O	O

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

K: 225 kg K as sulphate of potash

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

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

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

Quarter plots

2. N PERCUT                      Nitrogen fertilizer in 1987 (kg N per cut) as 'Nitram' and residues of forms of N previously each supplying 96 kg N per annum:

75	75, previously nitrate of soda, section 3
100	100, previously sulphate of ammonia, section 4
125	125, previously sulphate of ammonia + castor meal, section 5
150	150, previously castor meal, section 6

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

plus one plot MANURE KMG 100

Treatments to grass/clover, sections 1 and 2 (not given nitrogen fertilizer):

MANURE	Fertilizers and organic manures as for grass above, excluding KMG.
--------	--

87/R/BN/7

NOTES: (1) P K and D treatments were applied to Sections 1 and 2 until 1980. None were applied subsequently until the resumption of P and K treatments, only, from 1985.  
 (2) Yields were not taken from section 2.

Cultivations, etc.:-

All sections: P applied: 27 Nov, 1986. K applied: 28 Nov. Cut: 2 June, 1987, 26 Aug, 2 Dec.

Grass (Sections 3, 4, 5 and 6) only: N applied: 11 June, 28 Aug.

GRASS

1ST CUT (2/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N PERCUT MANURE	75	100	125	150	Mean
D	4.40	5.49	5.89	5.83	5.40
DPK	5.47	6.18	6.46	6.27	6.09
PKMG	3.59	4.40	5.84	6.37	5.05
P	2.33	2.34	2.25	1.79	2.18
PK	4.11	5.52	5.53	5.34	5.13
PMG	3.06	2.33	2.21	1.95	2.39
0	2.49	2.12	1.88	1.88	2.09
Mean	3.64	4.06	4.29	4.21	4.05

MANURE KMG 100 4.98

Grand mean 4.08

1ST CUT MEAN DM% 20.2

2ND CUT (26/8/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N PERCUT MANURE	75	100	125	150	Mean
D	4.44	5.46	5.57	5.73	5.30
DPK	5.14	5.50	6.17	5.44	5.56
PKMG	4.15	4.89	4.87	5.03	4.73
P	2.96	1.55	0.94	0.95	1.60
PK	4.26	4.69	5.13	4.98	4.76
PMG	2.98	1.94	1.47	1.12	1.88
0	2.22	1.69	1.07	1.20	1.55
Mean	3.74	3.67	3.60	3.49	3.63

MANURE KMG 100 4.96

Grand mean 3.67

2ND CUT MEAN DM% 26.9

87/R/BN/7

GRASS

3RD CUT (2/12/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N PERCUT MANURE	75	100	125	150	Mean
D	1.60	2.08	2.40	2.16	2.06
DPK	1.80	2.50	2.59	2.44	2.33
PKMG	1.38	1.50	1.85	1.78	1.63
P	0.94	0.73	0.33	0.64	0.66
PK	1.49	1.90	2.24	2.01	1.91
PMG	0.70	0.48	0.34	0.48	0.50
0	0.28	0.27	0.30	0.31	0.29
Mean	1.17	1.35	1.43	1.40	1.34

MANURE KMG 100 1.88

Grand mean 1.36

3RD CUT MEAN DM% 22.9

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N PERCUT MANURE	75	100	125	150	Mean
D	10.45	13.03	13.86	13.72	12.76
DPK	12.42	14.18	15.22	14.14	13.99
PKMG	9.13	10.79	12.56	13.18	11.41
P	6.23	4.62	3.51	3.38	4.44
PK	9.86	12.11	12.90	12.33	11.80
PMG	6.74	4.76	4.02	3.56	4.77
0	4.99	4.09	3.25	3.40	3.93
Mean	8.54	9.08	9.33	9.10	9.01

MANURE KMG 100 11.82

Grand mean 9.11

TOTAL OF 3 CUTS MEAN DM% 23.3

PLOT AREA HARVESTED 0.00568

87/R/BN/7

GRASS/CLOVER

1ST CUT (2/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	3.16	3.12	2.48	1.54	1.90	2.05	1.56	2.26

1ST CUT MEAN DM% 19.8

2ND CUT (26/8/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	2.51	2.80	2.27	2.18	2.48	2.91	1.85	2.43

2ND CUT MEAN DM% 18.2

3RD CUT (2/12/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	0.64	0.54	0.39	0.19	0.23	0.17	0.20	0.34

3RD CUT MEAN DM% 24.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	6.31	6.46	5.13	3.92	4.61	5.13	3.61	5.02

TOTAL OF 3 CUTS MEAN DM% 20.8

PLOT AREA HARVESTED 0.00568



87/R/GC/8

GARDEN CLOVER

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

Sponsor: J. McEwen.

The 134th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-86/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.02 x 1.42.

Treatments:

FUNG RES      Residual effects of fungicide to control *Sclerotinia trifoliorum*:

NONE            None

BENOMYL       Benomyl sprays during winter, last applied December 1985

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

NOTE: Additional K was applied to replace that removed by the crop in 1986. FUNG RES NONE required 360 and 263 kg K20 to the first and second blocks respectively, FUNG RES BENOMYL 267 and 258 kg K20. This was applied as muriate of potash, one third in spring 1987 and one third after the first and second cuts.

Seed: Hungaropoly, sown at 34 kg.

Cultivations, etc.: - Hand dug, root stumps carted: 25 Sept, 1986.  
Chalk, PK and Mg applied: 3 Oct. Sown, K and aldicarb applied: 15 Apr, 1987. Cut and K applied: 30 July, 1 Sept. Cut: 25 Sept.

87/R/GC/8

1ST CUT (30/7/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNG RES	NONE	BENOMYL	Mean
	2.87	3.28	3.08

1ST CUT MEAN DM% 12.6

2ND CUT (1/9/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNG RES	NONE	BENOMYL	Mean
	2.40	2.21	2.30

2ND CUT MEAN DM% 13.0

3RD CUT (25/9/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNG RES	NONE	BENOMYL	Mean
	0.91	0.73	0.82

3RD CUT MEAN DM% 12.0

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNG RES	NONE	BENOMYL	Mean
	6.18	6.22	6.20

TOTAL OF 3 CUTS MEAN DM% 12.5

PLOT AREA HARVESTED 0.00010

87/R/RN/1 and 87/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 - Highfield and Fosters.

Sponsor: A.E. Johnston.

The 39th year, old grass, leys, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-86/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (87/R/RN/1)

FOSTERS A site with little organic matter initially (87/R/RN/2)

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

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

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

From 1983 the test crops have been W, W, W.

RESEEDED On both fields in the first three years other plots were sown with long-term reseeded grass

OLDGRASS On Highfield plots of the old turf were left initially unploughed, for comparison with the three-year leys

In 1962 and 1963 some of the old and reseeded grass plots were divided for management identical to:-

C Clover-grass ley  
N All-grass ley

From 1968 only two phases on each field continued in the six-course rotation (the museum blocks). The four other phases (the new sequence blocks) were used for studies on take-all (*Gaeumannomyces graminis*) in wheat. These studies ended in 1985 and these phases are no longer included in the experiment.

87/R/RN/1 and 87/R/RN/2

Additional treatments to 3rd test crop w. wheat:-

Sub plots

FYMRES68 Farmyard manure residues, last applied 1968:

NONE None  
FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1987 (kg N) as 'Nitram':

0  
50  
100  
150

Standard applications:

3rd Treatment crops:

All crops: Manures: Chalk at 5.8 t (Highfield only).  
Lucerne: Manures: (0:18:36) at 630 kg.  
All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg  
in spring and after the first cut.  
Clover-grass ley: Manures: (0:18:36) at 420 kg.  
S. oats: Manures: (20:10:10) at 350 kg. Weedkillers: Clopyralid at  
0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 500 l.

3rd Test crop:

W. wheat: Manures: (0:24:24), combine drilled at 210 kg.  
Weedkillers: Isoproturon at 2.5 kg, clopyralid at 0.07 kg,  
bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l.  
Reseeded grass and old grass: Manures: Chalk at 5.8 t (to plots  
in 3rd treatment crop blocks on Highfield and to plots in 3rd  
test crop blocks on Fosters). (0:18:36) at 420 kg. All-grass  
half plots: (25:0:16) at 300 kg in spring and after each cut  
except the last.

Seed: S. oats: Rollo, sown at 190 kg.  
W. wheat: Avalon, sown at 180 kg.

Cultivations, etc.:-

3rd Treatment crops:

All Crops: Chalk applied (Highfield only): 28 Nov, 1986.  
Lucerne: PK applied: 24 Feb, 1987. Cut: 1 June, 11 Aug.  
All-grass ley and clover-grass ley: PK applied: 24 Feb, 1987. NK  
applied to all-grass ley: 31 Mar, 3 June. Cut: 1 June, 11 Aug.  
S. oats: Ploughed: 28 Nov, 1986. Spring-tine cultivated: 19 Mar,  
1987. NPK applied, spring-tine cultivated, seed sown: 21 Mar.  
Weedkillers applied: 8 May. Combine harvested: 9 Sept.

3rd Test crop wheat: Ploughed: 30 Sept, 1986 (Fosters), 1 Oct  
(Highfield). PK applied: 1 Oct. Rotary harrowed: 3 Oct.  
Seed sown: 4 Oct. N applied: 14 Apr, 1987. Weedkillers  
applied: 15 Apr. Combine harvested: 1 Sept.

Reseeded grass and old grass: Chalk applied: 28 Nov, 1986. PK  
applied: 24 Feb, 1987. NK applied to all-grass half plots:  
31 Mar, 3 June, 29 Aug. Cut: 1 June, 27 Aug, 2 Dec.

87/R/RN/1 AND 87/R/RN/2

DRY MATTER: TONNES/HECTARE

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

	HIGHFIELD		FOSTERS			
CLOVER-GRASS LEY						
TOTAL OF 2 CUTS	7.10		7.37			
MEAN DM%	19.0		17.8			
ALL-GRASS LEY						
TOTAL OF 2 CUTS	7.69		7.74			
MEAN DM%	25.5		23.4			
LUCERNE						
TOTAL OF 2 CUTS	8.58		9.00			
MEAN DM%	19.3		18.4			
OLD GRASS						
	HIGHFIELD					
TOTAL OF 3 CUTS	C		N			
39TH EXPTL YEAR						
BLOCKS 1 & 4	6.46		10.07			
BLOCK 2	6.73		10.67			
MEAN DM%	20.5		21.4			
RESEEDED GRASS						
TOTAL OF 3 CUTS						
	HIGHFIELD		FOSTERS			
	BLOCKS	C	N	BLOCKS	C	N
39TH EXPTL YEAR	1 & 4	7.12	10.09	1 & 3	7.42	10.85
39TH EXPTL YEAR	2 & 3	6.46	11.76	2 & 4	7.93	10.45
(SEEDED 1949 RESEDED 1973)						
MEAN DM%		19.5	20.9		19.0	23.0
OATS:						
	HIGHFIELD			FOSTERS		
GRAIN TONNES/HECTARE		7.51			7.35	
MEAN DM%		84.6			83.5	

87/R/RN/1 HIGHFIELD W.WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYMRES68	NONE	FYM	Mean		
ROTATION					
LUCERNE	5.34	5.48	5.41		
CLOGRA	5.96	5.97	5.97		
GRASS	5.79	5.50	5.64		
ARABLE	5.10	5.17	5.14		
Mean	5.55	5.53	5.54		
N	0	50	100	150	Mean
ROTATION					
LUCERNE	3.70	5.26	6.42	6.28	5.41
CLOGRA	4.02	6.07	6.44	7.34	5.97
GRASS	3.50	5.55	6.35	7.17	5.64
ARABLE	3.26	4.83	5.74	6.71	5.14
Mean	3.62	5.43	6.24	6.88	5.54
N	0	50	100	150	Mean
FYMRES68					
NONE	3.78	5.53	6.21	6.68	5.55
FYM	3.46	5.33	6.27	7.07	5.53
Mean	3.62	5.43	6.24	6.88	5.54
N	0	50	100	150	
ROTATION	FYMRES68				
LUCERNE	NONE	3.78	5.76	5.77	6.07
	FYM	3.62	4.76	7.07	6.48
CLOGRA	NONE	4.21	5.69	6.75	7.20
	FYM	3.83	6.44	6.13	7.48
GRASS	NONE	3.98	5.63	6.94	6.60
	FYM	3.03	5.47	5.75	7.75
ARABLE	NONE	3.17	5.03	5.37	6.84
	FYM	3.36	4.64	6.12	6.57

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00663

87/R/RN/2 FOSTERS W.WHEAT 3RD TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYMRES68	NONE	FYM	Mean		
ROTATION					
LUCERNE	5.35	5.61	5.48		
CLOGRA	5.29	5.24	5.27		
GRASS	5.34	5.53	5.43		
ARABLE	4.95	4.73	4.84		
Mean	5.23	5.28	5.25		
N	0	50	100	150	Mean
ROTATION					
LUCERNE	3.42	5.31	5.96	7.23	5.48
CLOGRA	3.56	5.24	5.87	6.41	5.27
GRASS	3.69	5.19	6.13	6.72	5.43
ARABLE	2.86	4.73	5.63	6.14	4.84
Mean	3.38	5.12	5.90	6.62	5.25
N	0	50	100	150	Mean
FYMRES68					
NONE	3.42	5.10	5.85	6.56	5.23
FYM	3.34	5.13	5.94	6.69	5.28
Mean	3.38	5.12	5.90	6.62	5.25
	N	0	50	100	150
ROTATION	FYMRES68				
LUCERNE	NONE	3.11	5.32	5.87	7.12
	FYM	3.73	5.29	6.06	7.35
CLOGRA	NONE	3.74	5.10	5.97	6.36
	FYM	3.37	5.38	5.77	6.45
GRASS	NONE	3.74	5.26	5.77	6.58
	FYM	3.64	5.12	6.49	6.85
ARABLE	NONE	3.09	4.73	5.80	6.19
	FYM	2.64	4.72	5.46	6.09

GRAIN MEAN DM% 81.4

PLOT AREA HARVESTED 0.00663

87/W/RN/3

LEY/ARABLE

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

Sponsor: A.E. Johnston.

The 50th year, leys, w. beans, w. wheat, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-86/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

LN1 to LN3 = three year grass ley with N, 1st year to 3rd year,  
LC = clover/grass ley no N, BE = beans (s. oats until 1980), F = fallow



87/W/RN/3

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

LLN	LN, LN, LN, LN, LN, LN, LN, LN, W, B
LLC	LC, LC, LC, LC, LC, LC, LC, LC, W, B

LLN1 to LLN8 = eight year grass ley with N, first year to eighth year, similarly for LLC

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

Yields are taken only from the leys and the test crops.

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

Whole plots

1. ROTATION                      Rotations:

LN 8  
LN 3  
LC 8  
LC 3  
AF  
AB

1/2 plots

2. FYMRES66                      Farmyard manure residues, last applied 1966:

NONE	None
FYM	38 tonnes on each occasion

1/8 plots

3. N                                  Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

0  
70  
140  
210

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

Whole plots

1. ROTATION                      Rotations:

LN 8  
LN 3  
LC 8  
LC 3  
AF  
AB

87/W/RN/3

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 fertilizer (kg N) as 'Nitro-Chalk':

0  
 60  
 120  
 180

Treatments to leys:

FYM RES Farmyard manure residues:  
 NONE None  
 FYM 38 tonnes on each occasion, last applied 1964 to 1st and 6th year leys, 1963 to 2nd and 7th year leys, 1962 to 3rd and 8th year leys, 1966 to 4th year leys, 1965 to 5th year leys

Corrective K dressings (kg K<sub>2</sub>O) 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	339	276
LC	126	75
AF	540	552
AB	452	527

Ex-alternating rotations

LN 8 ploughed for w. wheat	163	213
LN 8 not ploughed	301	351
LC 8 ploughed for w. wheat	100	213
LC 8 not ploughed	0	100

Standard applications:-

Grass ley and clover/grass ley, 1st year: Manures: (0:18:36) at 410 kg. N at 77 kg to grass ley and 50 kg to clover/grass as 'Nitram'. (25:0:16) at 300 kg to grass ley, K<sub>2</sub>O at 48 kg as muriate of potash to clover/grass ley. Weedkillers: Glyphosate at 1.4 kg in 200 l. Paraquat at 0.40 kg ion in 200 l.

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

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

87/W/RN/3

- S. barley, 1st and 2nd treatment crops: Manures: (20:10:10) at 400 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 2.5 kg in 200 l applied with the tridemorph. Fungicides: Tridemorph at 0.52 kg. Triadimenol at 0.062 kg with tridemorph at 0.37 kg in 200 l.
- W. beans, 3rd treatment crop: Manures: (0:20:20) at 200 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Trietazine at 0.72 kg with simazine at 0.10 kg in 240 l.
- Fallow, 1st treatment year only: Weedkiller: Glyphosate at 1.4 kg in 200 l.
- W. wheat, 1st test crop: Manures: (0:24:24) at 260 kg. Weedkillers: Glyphosate at 1.5 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 240 l. Fungicides: Fenpropimorph at 0.75 kg with chlorothalonil at 0.75 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l. Insecticide: Carbofuran at 7.5 kg.
- S. barley, 2nd test crop: Manures: Magnesian limestone at 5.0 t, (0:20:20) at 310 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 2.5 kg in 200 l applied with the tridemorph. Fungicides: Tridemorph at 0.52 kg. Triadimenol at 0.062 kg with tridemorph at 0.38 kg in 200 l. Insecticide: Carbofuran at 7.5 kg.
- Seed: Grass ley: Climax timothy at 17 kg and meadow fescue at 17 kg, mixture sown at 34 kg.  
Clover/grass ley: Climax timothy at 16 kg, meadow fescue at 14 kg and Huia white clover at 4.0 kg, mixture sown at 34 kg.  
S. barley: Klaxon, sown at 160 kg.  
W. beans: Bourdon, sown at 250 kg.  
W. wheat: Mercia, sown at 190 kg.
- Cultivations, etc.: - Treatment crops:  
Grass ley and clover/grass ley, 1st year: Glyphosate applied: 19 Sept, 1986. Ploughed: 4 Dec. Spring-tine cultivated: 6 May, 1987 and 12 May. N and PK applied: 29 May. Paraquat applied, spike harrowed with crumbler attached, seed sown and rolled: 1 June. NK applied to grass ley, K applied to clover/grass ley: 17 Aug. Cut: 12 Aug and 15 Dec.  
Grass ley and clover/grass ley, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th years: Magnesian limestone applied to 5th year only: 28 Nov, 1986. Corrective K applied to 4th year only: 26 Jan, 1987. PK applied: 10 Mar. NK applied to grass ley and K applied to clover/grass ley: 2 Apr, 26 June and 17 Aug. Cut: 16 June, 12 Aug and 15 Dec.  
S. barley, 1st and 2nd treatment crops: Glyphosate applied: 19 Sept, 1986. Ploughed: 1st treatment crop: 4 Dec, 2nd treatment crop: 1 Dec. Spike harrowed with crumbler attached, NPK applied, seed sown: 17 Mar, 1987. Clopyralid, bromoxynil, mecoprop and tridemorph applied: 29 May. Triadimenol and tridemorph applied: 4 July. Combine harvested: 21 Aug.  
W. beans, 3rd treatment crop: Glyphosate applied: 19 Sept, 1986. PK applied, seed sown, ploughed, harrowed: 12 Nov. Trietazine and simazine applied: 13 Nov. Combine harvested: 26 Sept, 1987.  
Fallow, 1st and 2nd treatment years: Glyphosate applied to 1st year only: 19 Sept, 1986. Ploughed; 1st year: 4 Dec, 2nd year: 1 Dec. Spring-tine cultivated: 6 and 12 May, 1987. Cultivated with thistlebar: 29 June.

87/W/RN/3

Test crops:

- W. wheat, 1st test crop: Glyphosate applied: 19 Sept, 1986. Ploughed: 30 Sept. Rolled, PK applied: 1 Oct. Carbofuran applied, rotary cultivated with crumbler attached, seed sown, harrowed: 2 Oct. Corrective K applied: 26 Jan, 1987. N applied, clopyralid, bromoxynil and mecoprop applied: 14 Apr. Fenpropimorph and chlorothalonil applied: 15 June. Propiconazole, carbendazim and maneb applied: 29 June. Combine harvested: 7 Sept.
- S. barley, 2nd test crop: Glyphosate applied: 19 Sept, 1986. Magnesian limestone applied: 28 Nov. Ploughed: 1 Dec. Spike harrowed with crumbler attached, PK applied, carbofuran applied, harrowed, seed sown: 17 Mar, 1987. N applied: 8 Apr. Clopyralid, bromoxynil, mecoprop and tridemorph applied: 29 May. Triadimenol and tridemorph applied: 4 July. Combine harvested: 21 Aug.

LEYS

1ST CUTTING OCCASION (16/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYM RES	NONE	FYM	Mean
LEY			
LC1	*	*	*
LC2	5.80	6.34	6.07
LC3	5.06	5.22	5.14
LN1	*	*	*
LN2	6.69	6.56	6.63
LN3	5.37	5.54	5.45
LLC1	*	*	*
LLC2	6.07	4.99	5.53
LLC3	4.67	4.65	4.66
LLC4	5.86	6.05	5.95
LLC5	5.71	6.50	6.10
LLC6	5.43	5.01	5.22
LLC7	4.21	5.33	4.77
LLC8	5.13	5.25	5.19
LLN1	*	*	*
LLN2	7.93	7.72	7.82
LLN3	7.30	6.87	7.08
LLN4	7.27	6.53	6.90
LLN5	6.02	6.89	6.46
LLN6	6.90	7.60	7.25
LLN7	6.81	6.78	6.80
LLN8	7.30	6.32	6.81
Mean	6.08	6.12	6.10

1ST CUT MEAN DM% 22.0

87/W/RN/3

LEYS

2ND CUTTING OCCASION (12/8/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYM RES	NONE	FYM	Mean
LEY			
LC1	2.96	3.24	3.10
LC2	1.23	1.34	1.28
LC3	2.62	2.70	2.66
LN1	2.98	2.59	2.78
LN2	2.82	3.06	2.94
LN3	2.36	3.41	2.88
LLC1	1.75	1.86	1.80
LLC2	2.03	2.43	2.23
LLC3	2.65	2.62	2.63
LLC4	2.95	2.91	2.93
LLC5	1.97	2.02	1.99
LLC6	1.01	0.94	0.98
LLC7	1.08	1.01	1.04
LLC8	2.11	2.07	2.09
LLN1	2.20	2.18	2.19
LLN2	2.61	2.53	2.57
LLN3	2.83	2.84	2.83
LLN4	2.46	2.31	2.38
LLN5	2.84	2.85	2.84
LLN6	4.00	3.88	3.94
LLN7	3.30	3.47	3.38
LLN8	2.87	3.62	3.25
Mean	2.44	2.54	2.49

2ND CUT MEAN DM% 18.7

87/W/RN/3

LEYS

3RD CUTTING OCCASION (15/12/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYM RES	NONE	FYM	Mean
LEY			
LC1	1.12	1.56	1.34
LC2	1.45	1.03	1.24
LC3	*	*	*
LN1	1.62	2.33	1.97
LN2	2.39	2.31	2.35
LN3	*	*	*
LLC1	2.22	1.16	1.69
LLC2	2.27	1.77	2.02
LLC3	1.48	1.18	1.33
LLC4	1.02	0.77	0.89
LLC5	1.07	1.73	1.40
LLC6	0.54	0.77	0.65
LLC7	1.97	0.77	1.37
LLC8	*	*	*
LLN1	2.60	2.63	2.62
LLN2	2.67	2.34	2.51
LLN3	0.84	1.15	1.00
LLN4	1.45	1.86	1.66
LLN5	1.79	1.83	1.81
LLN6	3.51	4.01	3.76
LLN7	3.49	4.48	3.99
LLN8	*	*	*
Mean	1.86	1.87	1.87

3RD CUT MEAN DM% 29.9

87/W/RN/3

LEYS

TOTAL OF 3 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYM RES	NONE	FYM	Mean
LEY			
LC1	4.08	4.80	4.44
LC2	8.48	8.71	8.59
LC3	7.68	7.92	7.80
LN1	4.59	4.92	4.76
LN2	11.90	11.93	11.91
LN3	7.73	8.94	8.34
LLC1	3.97	3.03	3.50
LLC2	10.36	9.19	9.78
LLC3	8.80	8.45	8.63
LLC4	9.83	9.73	9.78
LLC5	8.74	10.25	9.49
LLC6	6.97	6.72	6.84
LLC7	7.26	7.11	7.18
LLC8	7.24	7.32	7.28
LLN1	4.81	4.81	4.81
LLN2	13.21	12.59	12.90
LLN3	10.96	10.86	10.91
LLN4	11.18	10.70	10.94
LLN5	10.65	11.58	11.11
LLN6	14.41	15.48	14.94
LLN7	13.60	14.73	14.17
LLN8	10.16	9.94	10.05
Mean	8.94	9.08	9.01

TOTAL OF 3 CUTTING OCCASIONS MEAN DM% 22.9

PLOT AREA HARVESTED 0.00204

87/W/RN/3

WINTER WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYMRES66	NONE	FYM	Mean		
ROTATION					
LN 8	6.79	6.41	6.60		
LN 3	6.40	6.43	6.42		
LC 8	7.16	7.43	7.30		
LC 3	7.13	6.92	7.02		
AF	5.18	5.62	5.40		
AB	5.84	6.74	6.29		
Mean	6.42	6.59	6.50		
N	0	70	140	210	Mean
ROTATION					
LN 8	4.80	6.74	7.86	7.00	6.60
LN 3	4.41	6.55	7.59	7.13	6.42
LC 8	5.26	7.48	8.31	8.13	7.30
LC 3	5.51	7.24	7.74	7.61	7.02
AF	3.02	5.56	6.60	6.43	5.40
AB	4.39	6.18	6.75	7.84	6.29
Mean	4.56	6.62	7.47	7.36	6.50
N	0	70	140	210	Mean
FYMRES66					
NONE	4.56	6.30	7.29	7.52	6.42
FYM	4.57	6.95	7.66	7.19	6.59
Mean	4.56	6.62	7.47	7.36	6.50
N	0	70	140	210	Mean
ROTATION					
LN 8	NONE	4.93	6.76	7.75	7.72
	FYM	4.66	6.71	7.97	6.28
LN 3	NONE	4.52	6.32	7.43	7.33
	FYM	4.29	6.79	7.74	6.92
LC 8	NONE	4.94	6.84	8.59	8.27
	FYM	5.58	8.12	8.04	7.98
LC 3	NONE	5.55	7.06	8.01	7.91
	FYM	5.47	7.41	7.47	7.32
AF	NONE	2.82	5.15	6.20	6.57
	FYM	3.22	5.98	7.01	6.28
AB	NONE	4.58	5.67	5.77	7.32
	FYM	4.19	6.68	7.73	8.35

GRAIN MEAN DM% 73.7

PLOT AREA HARVESTED 0.00251



87/W/RN/3

SPRING BARLEY 2ND TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FYMRES65	NONE	FYM	Mean		
ROTATION					
LN 8	6.24	6.10	6.17		
LN 3	5.75	5.42	5.58		
LC 8	6.23	6.13	6.18		
LC 3	5.78	5.86	5.82		
AF	4.73	4.94	4.84		
AB	5.01	4.94	4.98		
Mean	5.63	5.57	5.60		
N	0	60	120	180	Mean
ROTATION					
LN 8	4.81	6.77	7.03	6.07	6.17
LN 3	4.06	5.91	6.56	5.80	5.58
LC 8	5.22	6.61	6.41	6.48	6.18
LC 3	4.83	6.59	6.31	5.57	5.82
AF	2.10	4.77	6.12	6.34	4.84
AB	2.49	5.31	6.06	6.05	4.98
Mean	3.92	6.00	6.42	6.05	5.60
N	0	60	120	180	Mean
FYMRES65					
NONE	3.89	5.96	6.48	6.18	5.63
FYM	3.95	6.03	6.35	5.92	5.57
Mean	3.92	6.00	6.42	6.05	5.60
ROTATION	N	0	60	120	180
	FYMRES65				
LN 8	NONE	4.63	6.42	7.56	6.36
	FYM	4.99	7.12	6.49	5.78
LN 3	NONE	4.28	6.10	6.64	5.98
	FYM	3.84	5.73	6.47	5.62
LC 8	NONE	5.11	6.69	6.68	6.46
	FYM	5.34	6.54	6.15	6.50
LC 3	NONE	4.93	6.78	6.17	5.26
	FYM	4.73	6.40	6.45	5.87
AF	NONE	2.26	4.33	5.71	6.62
	FYM	1.95	5.22	6.53	6.06
AB	NONE	2.13	5.42	6.09	6.42
	FYM	2.84	5.20	6.04	5.69

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00251

87/W/RN/4

MARKET GARDEN

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

Sponsor: S.P. McGrath.

The 46th year, clover.

For previous years see 'Details' 1967 & 1973, 74-80/W/RN/4 and 83-86/W/RN/4.

Design: 2 series each of 4 blocks of 10 plots split, systematically, into 2.

Whole plot dimensions: 8.15 x 5.18.

Treatments:

To Series A, second year white clover, all combinations of:-

Whole plots

- |             |   |
|-------------|---|
| 1. OM RESID | Residues of organic manures:                                  |
| FYM         | Farmyard manure until 1967                                    |
| SEWAGE      | Sewage sludge until 1961                                      |
| SEW COM     | Sewage sludge, composted with straw, until 1961               |
| VEG COM     | Vegetable compost until 1962, then farmyard manure until 1967 |
| 2. OM RATE  | Rates of organic manures (t per crop):                        |
| 25          |   |
| 50          |   |
| EXTRA       | plus one extra treatment (duplicated):                        |
| NONE        | No organic manures  |

Sub plots

- |            |                                       |
|------------|---------------------------------------|
| 3. NPERCUT | Nitrogen (kg N) per cut, as 'Nitram': |
| 0          |                                       |
| 100        |                                       |

87/W/RN/4

To Series B, fourth year white clover, all combinations of:-

Whole plots

1. OM RESID                      Residues of organic manures:
  - FYM                              Farmyard manure to whole plots until 1964, to half plots until 1967. Untreated half plots received a balancing dressing in 1974
  - SEWAGE                         Sewage sludge until 1961
  - SEW COM                        Sewage sludge, composted with straw, until 1961
  - VEG COM                        Vegetable compost until 1962, then farmyard manure until 1965
2. OM RATE                      Rates of organic manures (t per crop):
  - 25
  - 50
  - EXTRA                            plus one extra treatment (duplicated):
  - PEAT                             Peat at 31 t per crop to half plots 1965 to 1967. Untreated half plots received a balancing dressing in 1974.

Sub plots

3. NPERCUT                      Nitrogen (kg N) per cut, as 'Nitram':
  - 0
  - 100

NOTE: Series B became very weedy and yields were not taken.

Basal applications:

Series A and B: Manures: K20 at 150 kg as muriate of potash.  
Weedkillers: Benazolin, 2,4-DB and MCPA (as 'Legumex Extra' at 7 l) in 200 l.

Cultivations, etc.: - Basal K and treatment N applied: 3 Apr, 1987.  
Weedkillers applied: 27 May. Cut: 18 June (Series A): 23 June (Series B). Treatment N applied: 26 June. Cut: 19 Aug (Series A only).

87/W/RN/4 WHITE CLOVER SERIES A

1ST CUT (18/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

OM RESID	FYM	SEWAGE	SEW COM	VEG COM	Mean
OM RATE					
25	3.48	3.80	3.71	3.63	3.65
50	3.72	3.46	3.52	3.58	3.57
Mean	3.60	3.63	3.62	3.60	3.61
NPERCUT	0	100	Mean		
OM RATE					
25	3.67	3.63	3.65		
50	3.63	3.51	3.57		
Mean	3.65	3.57	3.61		
NPERCUT	0	100	Mean		
OM RESID					
FYM	3.65	3.54	3.60		
SEWAGE	3.66	3.60	3.63		
SEW COM	3.62	3.62	3.62		
VEG COM	3.67	3.53	3.60		
Mean	3.65	3.57	3.61		
OM RATE	NPERCUT	0	100		
25	OM RESID				
	FYM	3.47	3.48		
	SEWAGE	3.73	3.87		
	SEW COM	3.72	3.70		
	VEG COM	3.76	3.50		
50	FYM	3.83	3.60		
	SEWAGE	3.58	3.34		
	SEW COM	3.51	3.54		
	VEG COM	3.59	3.57		
NONE	NPERCUT	0	100	Mean	
		3.70	3.48	3.59	

Grand mean 3.61

\*\*\* Standard errors of differences of means \*\*\*

Table	OM RESID	OM RATE	NPERCUT	OM RESID
s.e.d.	0.171	0.121	0.096	OM RATE
				0.241
Table	OM RESID	OM RATE	OM RESID	NONENPER
s.e.d.	NPERCUT	NPERCUT	OM RATE	
			NPERCUT	
	0.218	0.154	0.308	0.192
Except when comparing means with the same level(s) of				
	OM RESID			
	0.192			
	OM RATE	0.135		
	OM RESID.OM RATE		0.271	

87/W/RN/4 WHITE CLOVER SERIES A

1ST CUT (18/6/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.341	9.5
BLOCK.WP.SP	31	0.383	10.6

1ST CUT MEAN DM% 11.1

PLOT AREA HARVESTED 0.00053

87/W/RN/4 WHITE CLOVER SERIES A

2ND CUT (19/8/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

OM RESID	FYM	SEWAGE	SEW COM	VEG COM	Mean
OM RATE					
25	3.24	2.95	3.23	3.15	3.14
50	3.35	3.23	3.17	3.15	3.23
Mean	3.30	3.09	3.20	3.15	3.18
NPERCUT	0	100	Mean		
OM RATE					
25	3.07	3.21	3.14		
50	3.21	3.24	3.23		
Mean	3.14	3.23	3.18		
NPERCUT	0	100	Mean		
OM RESID					
FYM	3.20	3.40	3.30		
SEWAGE	3.04	3.14	3.09		
SEW COM	3.17	3.23	3.20		
VEG COM	3.17	3.14	3.15		
Mean	3.14	3.23	3.18		
OM RATE	NPERCUT	0	100		
25	OM RESID				
	FYM	3.14	3.34		
	SEWAGE	2.81	3.08		
	SEW COM	3.14	3.32		
	VEG COM	3.20	3.11		
50	FYM	3.25	3.45		
	SEWAGE	3.26	3.21		
	SEW COM	3.20	3.13		
	VEG COM	3.13	3.17		
NONE	NPERCUT	0	100	Mean	
		3.09	3.33	3.21	

Grand mean 3.19

\*\*\* Standard errors of differences of means \*\*\*

Table	OM RESID	OM RATE	NPERCUT	OM RESID
s.e.d.	0.140	0.099	0.079	OM RATE
				0.198
Table	OM RESID	OM RATE	OM RESID	NONENPER
	NPERCUT	NPERCUT	OM RATE	
			NPERCUT	
s.e.d.	0.179	0.127	0.253	0.158
Except when comparing means with the same level(s) of				
	OM RESID			
	0.158			
	OM RATE	0.112		
	OM RESID.OM RATE		0.224	

87/W/RN/4 WHITE CLOVER SERIES A

2ND CUT (19/8/87) DRY MATTER TONNES/HECTARE

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.280	8.8
BLOCK.WP.SP	31	0.316	9.9

2ND CUT MEAN DM% 12.3

PLOT AREA HARVESTED 0.00052

87/W/RN/4 WHITE CLOVER SERIES A

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

OM RESID	FYM	SEWAGE	SEW COM	VEG COM	Mean
OM RATE					
25	6.72	6.75	6.94	6.78	6.80
50	7.07	6.69	6.69	6.73	6.80
Mean	6.89	6.72	6.82	6.76	6.80
NPERCUT	0	100	Mean		
OM RATE					
25	6.75	6.85	6.80		
50	6.84	6.75	6.80		
Mean	6.79	6.80	6.80		
NPERCUT	0	100	Mean		
OM RESID					
FYM	6.85	6.94	6.89		
SEWAGE	6.69	6.75	6.72		
SEW COM	6.79	6.84	6.82		
VEG COM	6.84	6.67	6.76		
Mean	6.79	6.80	6.80		
OM RATE	NPERCUT	0	100		
25	OM RESID				
	FYM	6.61	6.82		
	SEWAGE	6.55	6.94		
	SEW COM	6.86	7.02		
	VEG COM	6.96	6.60		
50	FYM	7.09	7.05		
	SEWAGE	6.84	6.55		
	SEW COM	6.71	6.67		
	VEG COM	6.72	6.75		
NONE	NPERCUT	0	100	Mean	
		6.78	6.81	6.79	

Grand mean 6.80

\*\*\* Standard errors of differences of means \*\*\*

Table	OM RESID	OM RATE	NPERCUT	OM RESID
s.e.d.	0.260	0.184	0.127	OM RATE
				0.367
Table	OM RESID	OM RATE	OM RESID	NONENPER
s.e.d.	NPERCUT	NPERCUT	OM RATE	
	0.315	0.223	NPERCUT	0.253
Except when comparing means with the same level(s) of				
	OM RESID			
	0.253			
	OM RATE	0.179		
	OM RESID.OM RATE		0.358	



87/W/RN/4 WHITE CLOVER SERIES A

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.519	7.6
BLOCK.WP.SP	31	0.507	7.5

TOTAL OF 2 CUTS MEAN DM% 11.7

87/R/RN/5

ARABLE REFERENCE PLOTS

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

Sponsor: A. Penny.

The 32nd year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980; w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 28th 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 31st 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 69-86/R/RN/5.

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

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilizers and farmyard manure:

MANURE

Original plots

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

N1, 2 (kg N): 20, 40 (ley): 100, 200 (w. wheat, w. barley and w. oats): 125, 250 (potatoes, and permanent grass) as 'Nitro-Chalk' (26% N)

P: 63 kg P205 as superphosphate

K: 250 kg K20 as muriate of potash

D: 38 tonnes FYM (permanent grass): 100 tonnes (to potatoes only - 50 tonnes to potatoes and kale until 1980): none to other crops

- NOTES: (1) All w. wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts.  
(2) Cereals receive 20 kg of N1 and 40 kg of N2 in February or March, remainder in April.  
(3) In 1987 w. oats on the original plots given MANURE 0, N1, P and NP failed during the winter and were sown to s. oats.

87/R/RN/5

Additional plots

MANURE Fertilizers from 1980 to 1987 and in previous years:

1980-87	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 1987: N1: 20 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 200 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). Until 1979 N2 = larger rate on original plots in these years. As urea in all years. Cereals receive 40 kg N in March, remainder in April.
- P: 126 kg P2O5 as potassium dihydrogen phosphate.
- K: 251 kg K2O total. As potassium dihydrogen phosphate (83 kg K2O) on all PK plots. In addition plots without S receive 168 kg K2O as potassium chloride, plots with S receive 92 kg K2O as potassium sulphate plus 76 kg K2O as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg K2O for potatoes, applied in autumn as potassium chloride.
- Mg: 126 kg MgO as magnesium chloride.
- CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given Ca received calcium carbonate at 7.5 t, except 0 which was given 5.0 t.
- S: 30 kg S supplied by the potassium sulphate.
- TE: Trace element mixture which included Mn, Cu, Zn, B, Mo, Ca and Fe.

Standard applications:

Original and additional plots:

- All cereals: Weedkillers: Mecoprop at 0.72 kg, bromoxynil at 0.16 kg and ioxynil at 0.16 kg in 220 l on two occasions, with isoproturon (except to oats) at 2.1 kg on the first occasion. Fungicides: Prochloraz at 0.37 kg and carbendazim at 0.14 kg with tridemorph at 0.52 kg in 220 l. Propiconazole at 0.13 kg with captafol at 1.0 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg with chlorothalonil at 1.1 kg and the insecticide in 220 l. Insecticide: Pirimicarb at 0.14 kg.
- W. wheat: Manures: MgO at 82 kg as Epsom salts. Growth regulator: Chlormequat at 1.9 kg in 220 l.
- W. barley: Growth regulator: Mepiquat chloride at 0.85 kg and 2-chloroethylphosphonic acid at 0.43 kg in 220 l.
- W. oats: Growth regulator: Chlormequat at 1.9 kg in 220 l (none to s. oats).
- Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg ion in 220 l. Fungicides: Mancozeb at 1.3 kg in 220 l on three occasions, applied with the insecticide on the second. Applied on a fourth occasion to later-harvested plots only. Insecticide: Pirimicarb at 0.14 kg.

87/R/RN/5

Seed: W. wheat: Galahad, sown at 210 kg.  
W. barley: Panda, sown at 190 kg.  
W. oats: Bulwark, sown at 210 kg.  
S. oats: Dula, sown at 180 kg.  
Potatoes: Cara.  
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.

Cultivations, etc.:-

Original and additional plots:

All cereals: Mecoprop, bromoxynil, ioxynil and (except to oats) isoproturon applied: 20 Nov, 1986. First N treatments applied: 24 Mar, 1987. Mecoprop, bromoxynil, ioxynil applied: 10 Apr. Second N treatments applied, prochloraz, carbendazim with tridemorph applied: 24 Apr. Growth regulators applied: 1 May (to barley) and 6 May to wheat and oats (except re-sown plots). Propiconazole and captafol applied: 13 May (to barley), 20 May (to wheat additional plots) and 28 May (to wheat original plots and oats). Carbendazim, maneb, tridemorph, chlorothalonil and pirimicarb applied: 23 June.

W. wheat: Rotary cultivated, P, K, Mg and S applied (S to additional plots only), seed sown and raked in: 25 Sept, 1986. Hand harvested: 17 Aug, 1987.

W. barley: Rotary cultivated, P and K and (to additional plots only) Mg and S applied: 1 Sept, 1986. Seed sown and raked in: 17 Sept. Hand harvested: 31 July, 1987.

W. & s. oats: Rotary cultivated, P and K and (to additional plots only) Mg and S applied: 16 Sept, 1986. Seed sown and raked in: 2 Oct. S. oats sown: 26 Mar, 1987. Hand harvested: 11 Aug. Spring oats harvested: 1 Sept.

Potatoes: Extra K applied (to additional plots except nil only): 2 Oct, 1986. FYM applied to original plots and all original plots dug by hand: 1 Dec. All additional plots dug by hand, P, K and (to additional plots only), Mg and S applied: 2 Dec. N applied, rotary cultivated, potatoes planted: 22 Apr, 1987. Weedkillers applied: 13 May. Mancozeb applied: 24 June, 7 July and 28 July. Insecticide applied: 7 July. Plots given neither FYM nor K on original plots and plot given no fertilizer on additional plots harvested by hand, mancozeb applied to remaining plots: 14 Aug. Remaining plots harvested by hand: 29 Sept (original plots) and 30 Sept (additional plots).

Grass-clover ley: Rotary cultivated: 11 Aug, 1986. Seed sown and raked in: 12 Aug. P, K and (to additional plots only), Mg and S applied: 2 Dec. N applied: 24 Mar, 1987. Cut: 19 May, 20 July and 28 Sept.

Permanent grass: P and K applied: 2 Dec, 1986. FYM applied: 12 Mar, 1987. First N applied: 24 Mar. Cut, second N applied: 19 May. Cut, third N applied: 20 July. Cut: 28 Sept.

87/R/RN/5

ORIGINAL PLOTS

TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	W. WHEAT:		W. BARLEY:		LEY : DRY MATTER			
	GRAIN	STRAW	GRAIN	STRAW	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
O	2.41	2.60	2.62	1.94	1.20	1.75	1.16	4.11
N1	3.21	3.81	3.73	3.40	2.30	1.85	1.25	5.40
P	4.37	4.24	3.02	2.52	1.95	1.50	0.90	4.34
N1P	1.01	1.83	3.60	3.78	3.75	1.54	0.68	5.98
K	4.07	4.23	2.43	2.27	2.19	2.88	1.98	7.05
N1K	5.77	6.67	4.91	4.24	2.58	2.47	1.39	6.44
PK	4.72	4.75	3.49	3.08	3.65	4.78	3.65	12.09
N1PK	8.03	7.83	7.85	5.73	4.57	4.81	3.56	12.93
N2PK	8.57	9.26	8.46	6.33	5.58	4.43	3.59	13.60
D	6.12	6.75	3.64	3.69	3.56	4.25	3.37	11.19
N1PKD	9.50	10.35	8.24	5.76	5.16	5.16	3.95	14.27
N2PKD	9.65	11.87	9.23	7.95	5.02	5.27	3.91	14.20
MEAN DM%	80.6	53.7	81.2	61.9	23.4	19.2	22.4	21.7

MANURE	W. OATS:		POTATOES:	PERMANENT GRASS : DRY MATTER			
	GRAIN	STRAW	TOTAL TUBERS	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
O	3.00*	2.37*	12.5	0.57	0.90	0.84	2.31
N1	4.38*	3.16*	14.2	1.40	2.07	2.11	5.59
P	2.78*	2.54*	8.1	0.57	1.17	0.92	2.67
N1P	2.73*	2.82*	7.3	1.99	2.56	2.22	6.77
K	2.76	2.88	34.4	0.74	1.01	1.03	2.78
N1K	4.94	5.16	36.7	1.56	2.60	2.05	6.22
PK	3.94	4.25	50.2	0.82	1.26	1.27	3.36
N1PK	7.64	8.12	62.7	2.40	3.02	2.90	8.32
N2PK	8.02	11.45	58.2	3.67	4.52	3.55	11.73
D	4.56	5.26	71.9	3.92	2.42	2.73	9.08
N1PKD	8.41	11.43	83.0	4.51	3.96	3.66	12.13
N2PKD	7.71	13.46	74.6	4.70	4.99	4.41	14.09
MEAN DM%	79.1	40.9	21.0	28.3	24.3	29.4	27.3

\* S. OATS

87/R/RN/5

ADDITIONAL PLOTS

\*\*\*\*\* Tables of means \*\*\*\*\*

	W. WHEAT:		W. BARLEY:		W. OATS:		POTATOES:
	GRAIN	STRAW	GRAIN	STRAW	GRAIN	STRAW	TOTAL TUBERS
MANURES							
0	2.85	2.70	2.70	2.07	2.73	2.74	9.1
N2PK	9.00	8.90	9.03	7.39	7.67	11.21	69.8
N2PKMG	8.02	8.70	8.56	6.42	8.23	13.20	69.2
N2PKS	7.52	7.85	9.04	6.97	8.01	10.31	66.5
N2PKMGS	8.47	8.72	8.67	7.28	7.92	12.38	78.8
N1PKMGS	8.28	8.64	8.34	6.56	8.17	11.21	74.4
N3PKMGS	8.69	9.35	8.99	7.21	7.40	10.69	69.4
MEAN DM%	79.3	44.5	80.6	62.4	78.4	44.8	21.5

	LEY : DRY MATTER			
	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURES				
0	1.79	1.57	1.31	4.66
N2PK	4.99	5.36	3.52	13.87
N2PKMG	5.04	4.79	3.90	13.73
N2PKS	5.05	4.98	4.13	14.16
N2PKMGS	4.24	5.07	3.92	13.24
N1PKMGS	4.32	4.53	3.81	12.66
N3PKMGS	4.67	4.40	3.51	12.58
MEAN DM%	22.1	17.2	22.1	20.5

87/R/RN/8

CULTIVATION/WEEDKILLER

Object: To study the long-term effects of different methods of primary cultivation on a sequence of crops; weedkillers were also tested until 1981 - Great Harpenden I.

Sponsor: R. Moffitt.

The 27th year, w. barley.

For previous years see 'Details' 1967 and 1973 and 74-86/R/RN/8.

Design: 2 randomised blocks of 12 plots.

Whole plot dimensions: 12.8 x 12.2.

Treatments: All combinations of:-

Whole plots

1. CLT CHOP            Primary cultivations annually; straw chopped since 1985:

PLOUGH	Ploughed: 27 Aug, 1986
ROTA DIG	Cultivated by rotary digger: 8 Sept
DEEPTINE	Deep-tine cultivated, 3 times: 27 Aug

2. SUBSOIL[82]        Subsoiling in September 1982:

NONE	None
CNVNTIAL	Conventional vertical tine
PARAPLOW	'Paraplow'

XTR BURN	plus three extra treatments with straw burnt since 1985 direct drilled until 1984, heavy spring-tine cultivated twice on 27 August, 1986 in addition to basal cultivating, differing in subsoiling in September 1982:
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NONE	None
CNVNTIAL	Conventional vertical tine
PARAPLOW	'Paraplow'

- NOTES: (1) Straw was chopped on 6 Aug, 1986 and was burnt on XTR BURN on 13 Aug and these plots were spring-tine cultivated on 14 Aug. All plots were sprayed with paraquat at 0.60 kg ion in 200 l on 29 Sept, rotary harrowed on 30 Sept and drilled on 1 Oct.
- (2) The conventional vertical tine subsoiler had tines 76 cm apart and worked at a depth of about 50 cm.
- (3) The 'Paraplow' had rigid tines set at a 45 degree angle. The tip of each tine was in line with the attachment of an adjacent tine. The tines were 51 cm apart and worked at a depth of about 38 cm.

87/R/RN/8

Basal applications: Manures: Chalk at 5.0 t. 'Nitram' at 460 kg.  
 Weedkillers: Isoproturon at 2.5 kg with clopyralid at 0.07 kg and  
 bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l.

Seed: Igri, sown at 150 kg.

Cultivations, etc.:- Chalk applied: 24 Sept, 1986. N applied: 20 Mar,  
 1987. Weedkillers applied: 16 Apr. Combine harvested: 7 Aug.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SUBSOIL[82]	NONE	CNVNTIAL	PARAPLOW	Mean
CLT CHOP				
PLOUGH	5.58	5.58	5.78	5.65
ROTA DIG	5.78	5.61	6.19	5.86
DEEPTINE	5.79	5.54	5.86	5.73
Mean	5.72	5.57	5.95	5.75
XTR BURN	NONE	CNVNTIAL	PARAPLOW	Mean
	5.89	4.34	4.29	4.84

Grand mean 5.52

\*\*\* Standard errors of differences of means \*\*\*

Table	XTR BURN	CLT CHOP	SUBSOIL[82]	CLT CHOP SUBSOIL[82]
s.e.d.	0.463	0.267	0.267	0.463

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.463	8.4

GRAIN MEAN DM% 85.0

PLOT AREA HARVESTED 0.00280



87/W/RN/12

ORGANIC MANURING

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

Sponsor: A.E. Johnston.

The 23rd year, w. wheat, w. oats, ley.

For previous years see 'Details' 1973 and 74-86/W/RN/12.

Design for w. wheat: 2 blocks of 8 plots split into 6  
W. oats: 2 blocks of 4 plots  
6th and 8th year leys: 2 blocks of 4 plots.

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. On the first pair leys were ploughed for 1st test crop w. wheat in 1987. In addition to leys the second pair included w. oats.

W. wheat tested all combinations of:

Whole plots

1. TREATMNT	Previous treatments:
LC 8 GM	Eight-year clover/grass ley until 1986, green manure in the preliminary period
LC 8 PT	As above, peat in the preliminary period
LC 6 LC	Six-year clover/grass ley until 1986, clover/grass ley in the preliminary period
LC 6 LN	As above, grass ley with N in the preliminary period
FYM	Farmyard manure annually 1981 to 1985 and in the preliminary period
STRAW	Straw in both periods
FERT-FYM	Fertilizers only in both periods, rates of P, K and Mg equivalent to amounts in FYM
FERT-STR	Fertilizer only in both periods rates of P, K and Mg equivalent to amounts in straw (+P)

Sub plots

2. N	Nitrogen fertilizer in 1987 (kg N) as 'Nitro-Chalk':
0	
50	
100	
150	
200	
250	

87/W/RN/12

W. oats tested:

MANURE      Organic manures and fertilizers in 1986 (not applied in 1987), cumulative to 1985, 1983 and 1982 and to those applied in the preliminary period:

FYM          Farmyard manure at 50 tonnes

STRAW        Straw at 7.5 tonnes plus P205 at 140 kg, K20 at 140 kg, MgO at 50 kg

FERT-FYM     P205 at 280 kg, K20 at 560 kg, MgO at 100 kg

FERT-STR     P205 at 140 kg, K20 at 280 kg, MgO at 50 kg

All leys were clover/grass (LC) without N. 6th year leys tested:

PREV LEY     Previous ley:

LC(LC)        Clover/grass ley in preliminary period

LC(LN)        Grass ley with N in preliminary period

8th year leys tested:

PREV MAN     Previous manure:

LC(GM)        Green manures in preliminary period

LC(PT)        Peat in preliminary period

Standard applications:

W. wheat: Manures: (0:18:36) at 560 kg. Mn at 0.16 kg as manganese sulphate in 240 l applied with the prochloraz, carbendazim and growth regulator. Weedkillers: Glyphosate at 1.4 kg in 200 l. Chlortoluron at 5.6 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 240 l. Fungicides: Prochloraz at 0.34 kg with carbendazim at 0.13 kg. Fenpropimorph at 0.75 kg with chlorothalonil at 0.75 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l. Growth regulator: Chlormequat chloride at 1.1 kg. Insecticide: Carbofuran at 7.5 kg. Molluscicide: Methiocarb at 0.22 kg.

W. oats: Manure: N at 90 kg as 'Nitram'. Weedkiller: Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 240 l.

Leys, 6th and 8th years: Manures: MgO at 50 kg as kieserite. (0:18:36) at 780 kg.

Seed: W. wheat: Mercia, sown at 190 kg.  
W. oats: Bulwark, sown at 140 kg.

Cultivations, etc.:-

W. wheat: After leys only: Plough and roll: 25 July, 1986. Subsoiled, with 25 cm wings on tines 30 cm deep and 70 cm apart, in two directions at right angles: 28 Aug. All wheat plots: Glyphosate applied: 16 Sept. Methiocarb applied: 18 Sept. Ploughed plots after oats: 24 Sept. PK applied, insecticide applied, rotary harrowed with crumbler attached: 24-Sept. Seed sown: 25 Sept. Chlortoluron applied: 9 Oct. Clopyralid, bromoxynil and mecoprop applied: 14 Apr, 1987. N treatments applied: 16 Apr. Manganese, prochloraz, carbendazim and chlormequat applied: 21 Apr. Fenpropimorph and chlorothalonil

87/W/RN/12

Cultivations, etc.:-

applied: 5 June. Propiconazole, carbendazim and maneb applied: 29 June. Combine harvested: 1 Sept.  
 W. oats: Ploughed: 25 Sept, 1986. Rotary cultivated with crumbler attached, seed sown: 2 Oct. Clopyralid, bromoxynil and mecoprop applied: 27 Apr, 1987. N applied: 5 May. Combine harvested: 20 Aug.  
 Leys, 6th and 8th years: PK and Mg applied: 10 Mar, 1987. Cut: 18 June and 12 Aug.

WINTER WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	N	0	50	100	150	200	250	Mean
LC 8 GM		5.23	7.74	8.46	8.72	8.40	7.78	7.72
LC 8 PT		5.32	7.37	7.51	8.43	8.37	8.39	7.57
LC 6 LC		5.98	7.04	8.59	8.49	7.62	8.40	7.69
LC 6 LN		6.15	7.73	8.05	7.97	8.60	8.21	7.78
FYM		4.03	5.82	7.22	6.48	7.51	8.00	6.51
STRAW		2.95	3.89	5.82	7.16	6.50	7.75	5.68
FERT-FYM		1.36	3.05	4.48	5.06	5.25	5.77	4.16
FERT-STR		2.07	4.18	4.92	4.84	5.15	6.19	4.56
Mean		4.14	5.85	6.88	7.14	7.18	7.56	6.46

\*\*\* Standard errors of differences of means \*\*\*

Table	TREATMNT	N	TREATMNT N
s.e.d.	0.832	0.192	0.968
Except when comparing means with the same level(s) of TREATMNT			0.543

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.832	12.9
BLOCK.WP.SP	40	0.543	8.4

GRAIN MEAN DM% 81.6

SUB PLOT AREA HARVESTED 0.00254

87/W/RN/12

WINTER OATS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	Mean
	5.15	4.94	4.29	5.03	4.85

GRAIN MEAN DM% 83.5

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

MANURE	FYM	STRAW	FERT-FYM	FERT-STR	Mean
	5.59	4.81	4.14	4.80	4.84

STRAW MEAN DM% 76.6

PLOT AREA HARVESTED 0.00796

6TH YEAR LEY

DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	1ST CUT (18/6/87)	2ND CUT (12/8/87)	TOTAL OF 2 CUTS
PREV LEY			
LC(LC)	6.05	2.48	8.53
LC(LN)	6.11	1.93	8.04
MEAN	6.08	2.20	8.28
MEAN DM%	21.6	16.9	19.2

8TH YEAR LEY

DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	1ST CUT (18/6/87)	2ND CUT (12/8/87)	TOTAL OF 2 CUTS
PREV MAN			
LC(GM)	4.39	2.39	6.77
LC(PT)	4.63	2.31	6.94
MEAN	4.51	2.35	6.86
MEAN DM%	20.2	17.5	18.9

87/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 22nd year, w. wheat.

For previous years see 'Details' 1973 and 74-86/W/RN/13.

Design: 4 randomised blocks of 6 plots split into 6.

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 was used to establish grass/clover leys of different durations for tests on w. wheat in 1987. Plots not in ley were sown to w. wheat on both halves of the experiment. All leys were ploughed for 1987 and the site sown to w. wheat with all combinations of the following treatments:

Whole plots

1. LEY AGE            Length of ley:

- 1 YEAR
- 2 YEARS
- 3 YEARS
- 4 YEARS
- 5 YEARS
- 6 YEARS

Sub plots

2. N                    Nitrogen fertilizer in 1987 (kg N) as 'Nitro-Chalk':

- 0
- 50
- 100
- 150
- 200
- 250

87/W/RN/13

Standard applications: Manures: (0:18:36) at 560 kg. Mn at 0.16 kg as manganese sulphate in 240 l applied with the prochloraz, carbendazim and growth regulator. Weedkillers: Glyphosate at 1.4 kg in 200 l. Chlortoluron at 5.6 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 240 l. Fungicides: Prochloraz at 0.34 kg with carbendazim at 0.13 kg. Fenpropimorph at 0.75 kg with chlorothalonil at 0.75 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l. Growth regulator: Chlormequat at 1.1 kg. Insecticide: Carbofuran at 7.5 kg. Molluscicide: Methiocarb at 0.22 kg.

Seed: Mercia, sown at 190 kg.

Cultivations, etc.: - Ploughed and rolled: 17 July, 1986. Subsoiled with 25 cm wings on tines 30 cm deep and 70 cm apart, in two directions at right angles: 28 Aug. Glyphosate applied: 16 Sept. Methiocarb applied: 18 Sept. PK applied, carbofuran applied, rotary harrowed with crumbler attached, seed sown: 25 Sept. Chlortoluron applied: 9 Oct. Mn, prochloraz, carbendazim, chlormequat applied: 14 Apr, 1987. Clopyralid, bromoxynil and mecoprop applied subsequently: 14 Apr. N applied: 23 Apr. Fenpropimorph and chlorothalonil applied: 5 June. Propiconazole, carbendazim and maneb applied: 29 June. Combine harvested: 1 Sept.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N	0	50	100	150	200	250	Mean
LEY AGE								
1 YEAR		4.86	6.33	7.94	7.96	7.99	8.51	7.27
2 YEARS		5.82	8.22	8.73	8.87	9.01	9.08	8.29
3 YEARS		7.72	8.60	8.85	9.36	9.18	9.36	8.84
4 YEARS		8.37	8.94	8.85	9.28	9.43	8.96	8.97
5 YEARS		8.37	8.94	8.85	9.28	9.06	9.22	8.95
6 YEARS		8.24	8.63	8.62	8.77	8.16	8.99	8.57
Mean		7.23	8.28	8.64	8.92	8.81	9.02	8.48

\*\*\* Standard errors of differences of means \*\*\*

Table	LEY AGE	N	LEY AGE
s.e.d.	0.271	0.158	0.445
Except when comparing means with the same level(s) of LEY AGE			0.387

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.383	4.5
BLOCK.WP.SP	90	0.547	6.5

GRAIN MEAN DM% 82.6

SUB PLOT AREA HARVESTED 0.00165

87/R/RN/17

RATES OF P AND K TO THE SUBSOIL

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

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

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

For previous years see 81-86/R/RN/17.

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

Whole plot dimensions: 3.0 x 14.0.

Treatments to each series:

TREATMNT Extra P and K and primary cultivation tool in autumn 1980 only, except on A plots, treatments repeated annually, and F plots treatments repeated four yearly:

	P205(kg)	K20(kg)	Tool	
- - -	0	0	Plough	(duplicated)
P6 K6 T	1000	500 to topsoil	"	( " )
- - S	0	0	Wye double-digger	(triplicated)
- - SA	0	0	" "	(duplicated)
- - SF	0	0	" "	"
P2 - SA	63	0 to subsoil	" "	"
P3 - SF	125	0 " "	" "	"
P4 - S	250	0 " "	" "	"
P5 - S	500	0 " "	" "	"
P5 - SF	500	0 " "	" "	"
P6 - S	1000	0 " "	" "	"
- K2 SA	0	31 " "	" "	"
- K3 SF	0	63 " "	" "	"
- K4 S	0	125 " "	" "	"
- K5 S	0	250 " "	" "	"
- K5 SF	0	250 " "	" "	"
- K6 S	0	350 " "	" "	"
P1 K1 SA	31	16 " "	" "	"
P1 K3 SA	31	63 " "	" "	"
P2 K2 SA	63	31 " "	" "	"
P3 K1 SA	125	16 " "	" "	"
P3 K3 SA	125	63 " "	" "	"
P3 K4 SF	125	125 " "	" "	"
P4 K3 SF	250	63 " "	" "	"
P4 K4 S	250	125 " "	" "	"
P4 K5 S	250	250 " "	" "	"
P4 K5 SF	250	250 " "	" "	"
P4 K6 S	250	350 " "	" "	"
P5 K4 S	500	125 " "	" "	"
P5 K4 SF	500	125 " "	" "	"
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 " "	" "	"

87/R/RN/17

- NOTES: (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
- (2) The topsoil PK dressing was equally divided before and after ploughing.
- (3) All plots were conventionally ploughed each autumn unless the Wye double-digging treatment was due.
- (4) The rate of 350 kg K20 applied was in error for 500 kg K20.

Standard applications:

- Potatoes: Manures: (10:10:15+4.5 Mg) at 1960 kg. Weedkiller: Linuron at 1.6 kg in 500 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions, applied with the pirimicarb on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg in 300 l.
- S. barley: Manures: (20:10:10) at 630 kg. Weedkillers: Clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.
- S. beans: Weedkillers: Trietazine at 1.2 kg and simazine at 0.17 kg in 500 l. Insecticide: Phorate at 4.5 kg.
- W. wheat: Manures: (0:18:36) at 350 kg. 'Nitram' at 590 kg. Weedkillers: Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.

Seed: Potatoes: Pentland Crown.

- S. barley: Klaxon, dressed triadimenol and fuberidazole, sown at 160 kg.
- S. beans: Minden, sown at 260 kg.
- W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-

All crops: Treatments applied by double-digger: 29 Oct, 1986 and 30 Oct. Ploughed: 31 Oct.

- Potatoes: Heavy spring-tine cultivated: 20 Feb, 1987. NPK+Mg applied: 14 Apr. Heavy spring-tine cultivated: 15 Apr. Rotary harrowed, potatoes planted: 16 Apr. Rotary ridged: 27 Apr. Linuron applied: 8 May. Mancozeb applied: 24 June, 8 July, 28 July, 10 Aug. Insecticide applied: 8 July. Fentin hydroxide applied: 28 Aug, 9 Sept. Desiccant applied: 21 Sept. Haulm mechanically destroyed: 3 Oct. Lifted: 19 Oct.
- S. barley: Heavy spring-tine cultivated: 20 Feb, 1987. NPK applied, spring-tine cultivated: 16 Mar. Rotary harrowed, seed sown: 17 Mar. Weedkillers applied: 6 May. Fungicide applied: 24 June. Combine harvested: 20 Aug.
- S. beans: Heavy spring-tine cultivated: 20 Feb, 1987. Phorate applied, spring-tine cultivated: 16 Mar. Rotary harrowed, seed sown: 18 Mar. Weedkillers applied: 30 Mar. Combine harvested: 18 Sept.
- W. wheat: PK applied, rotary harrowed, seed sown: 7 Nov, 1986. N applied: 17 Apr, 1987. Weedkillers applied: 8 May. Fungicide applied: 24 June. Combine harvested: 31 Aug.



87/R/RN/17

SERIES III POTATOES

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	
- - -	64.6
P6 K6 T	60.0
- - S	61.7
- - SA	62.2
- - SF	63.6
P2 - SA	62.4
P3 - SF	71.5
P4 - S	50.7
P5 - S	65.4
P5 - SF	66.9
P6 - S	68.1
- K2 SA	62.6
- K3 SF	65.0
- K4 S	68.1
- K5 S	70.1
- K5 SF	66.6
- K6 S	70.8
P1 K1 SA	61.8
P1 K3 SA	67.6
P2 K2 SA	69.5
P3 K1 SA	67.9
P3 K3 SA	65.7
P3 K4 SF	71.8
P4 K3 SF	63.0
P4 K4 S	62.3
P4 K5 S	65.0
P4 K5 SF	68.8
P4 K6 S	68.1
P5 K4 S	68.7
P5 K4 SF	67.8
P5 K5 S	70.5
P5 K6 S	64.6
P6 K4 S	67.0
P6 K5 S	67.7
P6 K6 S	69.2
Mean	65.4

\*\*\* Standard errors of differences of means \*\*\*

Table	TREATMNT
s.e.d.	7.14 min.rep
	5.83 max-min

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	5	5.05	7.7

87/R/RN/17

SERIES III POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	
- - -	97.6
P6 K6 T	98.5
- - S	98.2
- - SA	98.5
- - SF	97.6
P2 - SA	97.8
P3 - SF	98.8
P4 - S	97.7
P5 - S	98.5
P5 - SF	98.0
P6 - S	98.3
- K2 SA	98.5
- K3 SF	98.1
- K4 S	97.7
- K5 S	97.7
- K5 SF	98.3
- K6 S	98.1
P1 K1 SA	96.7
P1 K3 SA	98.4
P2 K2 SA	98.2
P3 K1 SA	99.1
P3 K3 SA	97.3
P3 K4 SF	98.8
P4 K3 SF	98.2
P4 K4 S	97.9
P4 K5 S	98.3
P4 K5 SF	97.9
P4 K6 S	98.5
P5 K4 S	97.5
P5 K4 SF	98.1
P5 K5 S	99.3
P5 K6 S	96.9
P6 K4 S	98.4
P6 K5 S	98.1
P6 K6 S	99.3
Mean	98.1

PLOT AREA HARVESTED 0.00210

\* SEDs apply only to - - -, P6 K6 T, - - S and - - SA

	TREATMNT
max-min	- - S v any of remainder
min.rep	any of remainder

87/R/RN/17

SERIES IV WINTER BARLEY

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	
- - -	7.02
P6 K6 T	6.92
- - S	6.95
- - SA	7.22
- - SF	6.73
P2 - SA	7.42
P3 - SF	7.12
P4 - S	6.99
P5 - S	6.98
P5 - SF	7.23
P6 - S	6.50
- K2 SA	7.28
- K3 SF	7.10
- K4 S	7.21
- K5 S	7.37
- K5 SF	7.05
- K6 S	6.92
P1 K1 SA	7.10
P1 K3 SA	6.82
P2 K2 SA	6.90
P3 K1 SA	6.82
P3 K3 SA	7.40
P3 K4 SF	7.18
P4 K3 SF	7.10
P4 K4 S	7.01
P4 K5 S	7.30
P4 K5 SF	7.33
P4 K6 S	7.12
P5 K4 S	7.09
P5 K4 SF	6.86
P5 K5 S	7.08
P5 K6 S	7.05
P6 K4 S	6.58
P6 K5 S	6.36
P6 K6 S	7.00
Mean	7.03

\*\*\* Standard errors of differences of means \*\*\*

Table	TREATMNT
s.e.d.	0.206 min.rep 0.168 max-min

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	5	0.146	2.1
GRAIN MEAN DM%	86.0	PLOT AREA HARVESTED	0.00286

87/R/RN/17

SERIES I SPRING BEANS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	
- - -	4.50
P6 K6 T	4.31
- - S	4.51
- - SA	4.83
- - SF	4.14
P2 - SA	4.34
P3 - SF	4.43
P4 - S	4.07
P5 - S	4.14
P5 - SF	4.97
P6 - S	4.68
- K2 SA	4.74
- K3 SF	4.77
- K4 S	4.80
- K5 S	4.41
- K5 SF	4.81
- K6 S	4.72
P1 K1 SA	4.63
P1 K3 SA	4.53
P2 K2 SA	4.88
P3 K1 SA	4.70
P3 K3 SA	4.01
P3 K4 SF	4.75
P4 K3 SF	4.32
P4 K4 S	3.82
P4 K5 S	4.50
P4 K5 SF	4.27
P4 K6 S	4.63
P5 K4 S	5.04
P5 K4 SF	4.93
P5 K5 S	4.43
P5 K6 S	4.80
P6 K4 S	4.55
P6 K5 S	4.44
P6 K6 S	4.44
Mean	4.54

\*\*\* Standard errors of differences of means \*\*\*

Table	TREATMNT
s.e.d.	0.430 min.rep
	0.351 max-min

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	5	0.304	6.7
GRAIN MEAN DM%	81.9	PLOT AREA HARVESTED	0.00386

87/R/RN/17

SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT	
- - -	6.69
P6 K6 T	7.41
- - S	6.62
- - SA	6.90
- - SF	5.93
P2 - SA	7.10
P3 - SF	7.79
P4 - S	7.15
P5 - S	7.28
P5 - SF	6.99
P6 - S	6.85
- K2 SA	6.81
- K3 SF	5.53
- K4 S	7.35
- K5 S	6.74
- K5 SF	7.08
- K6 S	5.17
P1 K1 SA	7.58
P1 K3 SA	7.24
P2 K2 SA	7.49
P3 K1 SA	7.56
P3 K3 SA	7.27
P3 K4 SF	8.14
P4 K3 SF	7.24
P4 K4 S	7.29
P4 K5 S	6.65
P4 K5 SF	7.01
P4 K6 S	7.88
P5 K4 S	6.33
P5 K4 SF	7.31
P5 K5 S	6.29
P5 K6 S	6.82
P6 K4 S	6.90
P6 K5 S	6.63
P6 K6 S	7.10
Mean	6.96

\*\*\* Standard errors of differences of means \*\*\*

Table	TREATMNT
s.e.d.	0.624 min.rep
	0.510 max-min

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	5	0.441	6.3
GRAIN MEAN DM%	83.0	PLOT AREA HARVESTED	0.00274

87/R/CS/10 and 87/W/CS/10

LONG TERM LIMING

Object: To study the effects of different amounts of lime and phosphate on the yields and compositions of a sequence of crops. Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsors: S.P. McGrath, J. McEwen, D.P. Yeoman.

The 26th year, *Lupinus albus*.

For previous years see 'Details' 1967, 1973 and 74-86/R&W/CS/10.

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

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

Whole plots

1. CHALK Residual effects of ground chalk (tonnes CaCO<sub>3</sub>) (total applied 1962-87):

		Rothamsted total		Woburn total	
R	W	1962-78	1982-87	1962-78	1982-87
0	0	0	0	0	0
15	9	7	8	6	3
24.5	25.5	15	9.5	14	11.5
52.5	45.5	30	22.5	23	22.5

2. P Residual effects of P fertilizer applied:

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

Rates 1981-83 P1, P2, P3, P4 = 25, 50, 75, 100 kg P as superphosphate

Sub plots

3. MANGNESE Manganese applied in 1987:

0	None
MN	Manganese sprays

- NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with crop, K was also applied cumulatively, to P1 and P3 plots. Since 1981 K has been applied basally (none in 1986 and 1987).  
 (2) On Sawyers I (R) manganese was applied as manganese lignin polycarboxylate ('Stoller Manganese' at 3.0 l in 200 l on 5 June, 1987 and at 9.0 l in 200 l on 11 Aug).  
 (3) On Stackyard C (W) manganese was applied at 0.19 kg Mn on 4 June, 1987 and 0.57 kg Mn on 4 Aug as manganese sulphate in 200 l.

87/R/CS/10 and 87/W/CS/10

Basal applications:-

Sawyers I (R): Weedkillers: Terbutryne at 0.98 kg with terbuthylazine at 0.42 kg in 200 l. Fungicide: Benomyl at 0.50 kg applied with the insecticide and a wetting agent ('Agral' at 0.06 l) in 200 l. Insecticide: Pirimicarb at 0.14 kg.

Stackyard C (W): Weedkillers: Glyphosate at 1.4 kg in 200 l. Terbutryne at 0.56 kg with terbuthylazine at 0.24 kg in 240 l. Fungicide: Benomyl at 1.0 kg applied with the pirimicarb and a wetting agent ('Enhance' at 0.06 l) in 200 l. Insecticides: Deltamethrin at 0.038 kg in 200 l. Pirimicarb at 0.15 kg.

Seed: Sawyers I (R): Vladimir, sown at 260 kg.  
Stackyard C (W): Vladimir, sown at 250 kg.

Cultivations, etc.:-

Sawyers I (R): Chalk treatments applied: 13 Nov, 1986. Ploughed: 14 Nov. Spring-tine cultivated, rotary harrowed, seed sown, harrowed: 31 Mar, 1987. Weedkillers applied: 13 Apr. Fungicide and insecticide applied: 9 July. Combine harvested: 17 Nov.

Stackyard C (W): Glyphosate applied: 16 Sept, 1986. Chalk treatments applied: 13 Nov. Ploughed: 28 Nov. Spike harrowed with crumbler attached, seed sown: 6 Apr, 1987. Harrowed, terbutryne and terbuthylazine applied: 13 Apr. Deltamethrin applied: 8 May. Benomyl and pirimicarb applied: 13 July. Combine harvested: 18 Nov.

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

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

P	0	P1	P2	P3	Mean
CHALK					
0	0.71	1.33	2.28	2.97	1.82
15	2.86	2.25	3.47	2.65	2.81
24.5	2.98	2.24	3.69	2.56	2.87
52.5	2.87	2.31	4.04	3.17	3.10
Mean	2.36	2.03	3.37	2.84	2.65
MANGNESE	0	MN	Mean		
CHALK					
0	1.89	1.76	1.82		
15	2.69	2.92	2.81		
24.5	2.98	2.75	2.87		
52.5	3.04	3.15	3.10		
Mean	2.65	2.64	2.65		
MANGNESE	0	MN	Mean		
P					
0	2.38	2.33	2.36		
P1	2.12	1.94	2.03		
P2	3.32	3.42	3.37		
P3	2.78	2.89	2.84		
Mean	2.65	2.64	2.65		

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

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CHALK	MANGNESE	0	MN
0	P		
	0	0.66	0.77
	P1	1.41	1.25
15	P2	2.25	2.32
	P3	3.24	2.71
	0	2.73	2.98
	P1	2.27	2.22
24.5	P2	3.52	3.43
	P3	2.26	3.03
	0	3.02	2.94
	P1	2.48	1.99
52.5	P2	3.86	3.52
	P3	2.56	2.56
	0	3.10	2.64
	P1	2.31	2.32
	P2	3.68	4.40
	P3	3.08	3.25

\*\*\* Standard errors of differences of means \*\*\*

Table	CHALK	P	MANGNESE	CHALK P
s.e.d.	0.233	0.233	0.114	0.466

Table	CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE
s.e.d.	0.283	0.283	0.567
Except when comparing means with the same level(s) of			
CHALK	0.228		
P		0.228	
CHALK.P			0.456

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.466	17.6
BLOCK.WP.SP	16	0.456	17.2

GRAIN MEAN DM% 65.2

SUB PLOT AREA HARVESTED 0.00177



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

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

P	0	P1	P2	P3	Mean
CHALK					
0	2.17	1.99	1.87	1.81	1.96
9	1.91	1.72	1.66	1.55	1.71
25.5	2.04	1.44	1.38	1.57	1.61
45.5	1.98	1.49	1.68	1.31	1.62
Mean	2.03	1.66	1.65	1.56	1.72
MANGNESE					
0	MN	Mean			
CHALK					
0	2.09	1.83	1.96		
9	1.72	1.70	1.71		
25.5	1.57	1.64	1.61		
45.5	1.68	1.56	1.62		
Mean	1.77	1.68	1.72		
MANGNESE					
0	MN	Mean			
P					
0	2.12	1.94	2.03		
P1	1.73	1.60	1.66		
P2	1.57	1.73	1.65		
P3	1.66	1.46	1.56		
Mean	1.77	1.68	1.72		
MANGNESE					
0	MN				
CHALK					
0	P	0	2.63	1.72	
	P1		1.82	2.17	
	P2		1.84	1.90	
	P3		2.08	1.54	
9	0		1.95	1.88	
	P1		1.89	1.56	
	P2		1.35	1.97	
	P3		1.71	1.39	
25.5	0		1.78	2.29	
	P1		1.47	1.41	
	P2		1.37	1.40	
	P3		1.67	1.46	
45.5	0		2.09	1.87	
	P1		1.74	1.25	
	P2		1.71	1.66	
	P3		1.17	1.44	

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

\*\*\* Standard errors of differences of means \*\*\*

Table	CHALK	P	MANGNESE	CHALK P
s.e.d.	0.107	0.107	0.098	0.214

Table	CHALK MANGNESE	P MANGNESE	CHALK P MANGNESE
s.e.d.	0.175	0.175	0.351
Except when comparing means with the same level(s) of			
CHALK	0.197		
P		0.197	
CHALK.P			0.393

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.214	12.4
BLOCK.WP.SP	16	0.393	22.8

GRAIN MEAN DM% 60.3

SUB PLOT AREA HARVESTED 0.00172

87/W/CS/34

NEMATOCIDES IN CROP SEQUENCE

Object: To study the effects of a range of nematicides on the incidence of *Globodera rostochiensis* and the 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 19th year, potatoes, w. wheat, s. barley.

For previous years see 71/W/CS/34(t), 72/W/CS/34(t) and 73-86/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:-

	1970	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
Series I	P	P*	SB	B	P	P*	W	B	P	P*	B	B	P	P*	W	B	P	P
Series II	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B	P	P*	B	B	P
Series III	B	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B	P	P*	W	B
Series IV	B	P	P	P	P*	SB	B	P	P*	W	B	P	P*	W	B	P	P*	W

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

\* Treatments applied to potatoes, subsequent crops test residual effects. In 1987 planned new treatments were not applied to Series I and yields were not taken.

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

1. NEMACIDE[84] Residues of nematicides applied 1984:

ALDICARB  
SDS38697  
SDS46995

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

SINGLE Single (2.8 kg of aldicarb, 1.4 kg of SDS materials)  
DOUBLE Double (5.6 kg of aldicarb, 2.8 kg of SDS materials)  
QUAD Quadruple (11.2 kg of aldicarb, 5.6 kg of SDS materials)

plus one untreated plot per block

RATE

NONE

87/W/CS/34

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

1. NEMACIDE[85] Residues of nematicides applied 1985:

OXAMYL	Oxamyl
SDS46995	'SDS 46995'
THIODICA	Thiodicarb
  
2. RATE Rates of nematicide (a.i.):

SINGLE	Single (1.4 kg of 'SDS 46995', 2.8 kg of other materials)
DOUBLE	Double (2.8 kg of 'SDS 46995', 5.6 kg of other materials)
QUAD	Quadruple (5.6 kg of 'SDS 46995', 11.2 kg of other materials)

plus one untreated plot per block

RATE

NONE

Treatments to w. wheat (Series IV):

1. NEMACIDE[86] Residues of nematicides and rates (a.i.) applied 1986:

AL 3.3	Aldicarb at 3.3 kg
AL 6.6	Aldicarb at 6.6 kg
AL S 3.3	Aldicarb, slow release formulation at 3.3 kg
AL S 6.6	Aldicarb, slow release formulation at 6.6 kg
ETH 7.5	Ethoprophos at 7.5 kg
MB 5.0	'MB 41380' at 5.0 kg
MB 7.5	'MB 41380' at 7.5 kg
MB 10.0	'MB 41380' at 10.0 kg
OX 5.0	Oxamyl at 5.0 kg
NONE	None

Standard applications:

- Potatoes (Series I and II): Manures: (10:10:15+4.5 Mg) at 2300 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l to Series II only. Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg on four occasions in 200 l, applied with the pirimicarb on the second. Fentin hydroxide at 0.28 kg on two occasions in 200 l. Nematicide: Oxamyl at 5.6 kg to Series I only. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.
- W. wheat (Series IV): Manures: N at 210 kg as 'Nitram'. Weedkillers: Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 2.5 kg applied with the tridemorph in 200 l. Fungicides: Tridemorph at 0.52 kg. Triadimenol at 0.062 kg with tridemorph at 0.38 kg in 200 l.
- S. barley (Series III): Manures: (20:10:10) at 630 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 2.5 kg applied with the tridemorph in 200 l. Fungicides: Tridemorph at 0.52 kg. Triadimenol at 0.062 kg with tridemorph at 0.38 kg in 200 l.

87/W/CS/34

Seed: Potatoes: Pentland Crown.  
W. wheat: Avalon, sown at 210 kg.  
S. barley: Klaxon, sown at 160 kg.

Cultivations, etc.:-

- Potatoes (Series I and II): Glyphosate applied (Series II only): 19 Sept, 1986. Ploughed (Series II only): 21 Nov. Spring-tine cultivated: 18 Feb, 1987. NPK Mg applied: 21 Apr. Oxamyl applied (Series I only), rotary cultivated, potatoes planted: 27 Apr. Rotary ridged: 15 May. Linuron applied: 25 May. Mancozeb applied: 24 June, 8 July, 26 July, 5 Aug. Pirimicarb applied: 8 July. Fentin hydroxide applied: 18 Aug, 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted; (Series I): 12 Oct, (Series II): 13 Oct.
- W. wheat (Series IV): Spring-tine cultivated, rotary harrowed with crumbler attached, seed sown, harrowed: 4 Dec, 1986. N applied: 5 May, 1987. Weedkillers and tridemorph applied: 29 May. Triadimenol and tridemorph applied: 4 July. Combine harvested: 15 Sept.
- S. barley (Series III): Glyphosate applied: 19 Sept, 1986. Ploughed: 21 Nov. Spring-tine cultivated: 18 Feb, 1987. NPK applied, spike harrowed with crumbler attached, seed sown: 19 Mar. Clopyralid, bromoxynil, mecoprop and tridemorph applied: 29 May. Triadimenol and tridemorph applied: 4 July. Combine harvested: 21 Aug.

87/W/CS/34

POTATOES SERIES II

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	RATE	SINGLE	DOUBLE	QUAD	Mean
NEMACIDE[84]					
ALDICARB		38.4	37.7	40.7	38.9
SDS38697		29.1	38.2	38.8	35.3
SDS46995		36.1	35.2	34.8	35.4
Mean		34.5	37.0	38.1	36.5
RATE NONE		30.6			
Grand mean		35.9			

\*\*\* Standard errors of differences of means \*\*\*

Table	NEMACIDE[84]	RATE NEMACIDE[84] RATE & RATE NONE
s.e.d.	1.22	1.22 2.11

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	2.58	7.2

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

	RATE	SINGLE	DOUBLE	QUAD	Mean
NEMACIDE[84]					
ALDICARB		86.3	83.8	86.0	85.4
SDS38697		85.9	85.1	84.7	85.2
SDS46995		86.6	86.0	83.8	85.5
Mean		86.2	84.9	84.8	85.3
RATE NONE		83.7			
Grand mean		85.2			

PLOT AREA HARVESTED 0.00130

87/W/CS/34

W. WHEAT SERIES IV

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

NEMACIDE[86]	
AL 3.3	4.39
AL 6.6	4.67
AL S 3.3	4.19
AL S 6.6	5.36
ETH 7.5	4.45
MB 5.0	4.39
MB 7.5	4.94
MB 10.0	5.39
OX 5.0	4.60
NONE	4.21
Mean	4.66

\*\*\* Standard errors of differences of means \*\*\*

Table	NEMACIDE[86]
s.e.d.	0.498

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.610	13.1
GRAIN MEAN DM%	81.3		
PLOT AREA HARVESTED	0.00251		

87/W/CS/34

S. BARLEY SERIES III

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	RATE	SINGLE	DOUBLE	QUAD	Mean
NEMACIDE[85]					
OXAMYL		5.10	4.79	4.86	4.92
SDS46995		5.16	4.96	4.88	5.00
THIODICA		4.98	4.92	5.23	5.04
Mean		5.08	4.89	4.99	4.99

RATE NONE 4.22

Grand mean 4.91

\*\*\* Standard errors of differences of means \*\*\*

Table	NEMACIDE[85]	RATE NEMACIDE[85]	RATE & RATE NONE
s.e.d.	0.237	0.237	0.411

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.504	10.3

GRAIN MEAN DM% 88.1

PLOT AREA HARVESTED 0.00251



87/R/CS/133

CONTROL OF PATHOGENS

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

Sponsors: A.J. Barnard, D.J. Hooper, D. Hornby, R.T. Plumb.

The 14th year, forage maize.

For previous years see 74-86/R/CS/133.

Design: 3 randomised blocks of 9 plots.

Whole plot dimensions: 2.13 x 18.3.

Treatments:-

CHEM RES	Residual effect of chemicals applied annually in previous years (except as stated), none in 1987:
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 and 1986)
PERMETH	Permethrin, as foliar spray (in 1979, 1984 and 1985 only)
PHORATE	Phorate, 1.68 kg as granules to seedbed
PIRIMICA	Pirimicarb, as foliar spray (in 1979, 1984 and 1985 only)
BE+DA+PH	Benomyl + dazomet (not applied 1975, 1979, 1981, and 1986) + phorate, at above rates and times

Basal applications: Manure: 'Nitro-Chalk' at 550 kg. Weedkiller: Atrazine at 1.7 kg in 220 l.

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

Cultivations, etc.: - Ploughed: 24 Dec, 1986. N applied, spring-tine cultivated twice, seed sown: 6 May, 1987. Rolled, weedkiller applied: 7 May. Harvested by hand: 3 Nov.

87/R/CS/133

FORAGE DRY MATTER TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CHEM RES	
NONE	9.04
ALDICARB	9.30
BENOMYL	8.98
DAZOMET	10.06
PERMETH	9.05
PHORATE	9.00
PIRIMICA	8.85
BE+DA+PH	8.61
Mean	9.10

\*\*\* Standard errors of differences of means \*\*\*

Table	CHEM RES
s.e.d.	0.763 min.rep
	0.661 max-min

	CHEM RES
max-min	NONE v any of remainder
min.rep	any of remainder

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	17	0.935	10.3
FORAGE MEAN DM%	20.8		
PLOT AREA HARVESTED	0.00065		

87/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: R.H. Bromilow, R. Macdonald.

The 14th year, s. barley.

For previous years see 74-86/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments, applied cumulatively except as stated:

All combinations of:-

1. WEEDKLLR            Weedkiller in autumn:  
    NONE                None  
    GLYPHOS            Glyphosate at 1.4 kg to barley stubble each autumn  
                              from 1979 to 1984 at 0.72 kg in 1985 and at  
                              0.54 kg in 1986
2. FUNGCIDE[1]        Fungicide in autumn:  
    NONE                None  
    TRIADIM            Triadimefon at 0.25 kg in autumn 1981, 1982, 1984,  
                              1985 and 1986, 0.28 kg in autumn 1983
3. FUNGCIDE[2]        Fungicide in spring:  
    NONE                None  
    BENOMYL            Benomyl at 4 kg to seedbed
4. INSECTCDE          Insecticide:  
    NONE                None  
    CHLORFEN           Chlorfenvinphos at 2 kg to the seedbed
5. NEMACIDE           Nematicide:  
    NONE                None  
    ALDICARB           Aldicarb at 6 kg to the seedbed

NOTE: Glyphosate and triadimefon were applied in 220 l on 22 Sept, 1986 and 13 Oct respectively. Other treatments were applied on 19 Mar, 1987.

87/R/CS/140

Basal applications: Manures: (0:18:36) at 1060 kg, 'Nitro-Chalk' at 550 kg. Weedkillers: Bentazone at 0.80 kg, dichlorprop at 1.08 kg, and MCPA at 0.64 kg in 220 l applied with the fungicide. Fungicide: Tridemorph at 0.52 kg.

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

Cultivations, etc.: - PK applied: 16 Sept, 1986. Rotary cultivated: 13 Oct. Ploughed: 26 Nov. Spring-tine cultivated, seedbed treatments applied, rotary harrowed, seed sown and N applied: 19 Mar, 1987. Weedkillers and fungicide applied: 6 May. Combine harvested: 21 Aug.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNGICIDE[1]	NONE	TRIADIM	Mean
WEEDKLLR			
NONE	5.26	5.40	5.33
GLYPHOS	5.13	5.24	5.18
Mean	5.19	5.32	5.26
FUNGICIDE[2]	NONE	BENOMYL	Mean
WEEDKLLR			
NONE	5.42	5.24	5.33
GLYPHOS	5.26	5.10	5.18
Mean	5.34	5.17	5.26
FUNGICIDE[2]	NONE	BENOMYL	Mean
FUNGICIDE[1]			
NONE	5.35	5.04	5.19
TRIADIM	5.34	5.30	5.32
Mean	5.34	5.17	5.26
INSTCDE	NONE	CHLORFEN	Mean
WEEDKLLR			
NONE	5.31	5.35	5.33
GLYPHOS	5.26	5.10	5.18
Mean	5.29	5.23	5.26
INSTCDE	NONE	CHLORFEN	Mean
FUNGICIDE[1]			
NONE	5.31	5.08	5.19
TRIADIM	5.26	5.37	5.32
Mean	5.29	5.23	5.26

87/R/CS/140

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSC TCDE	NONE	CHLORFEN	Mean
FUNGCIDE[2]			
NONE	5.33	5.36	5.34
BENOMYL	5.24	5.09	5.17
Mean	5.29	5.23	5.26
NEMACIDE	NONE	ALDICARB	Mean
WEEDKLLR			
NONE	5.45	5.21	5.33
GLYPHOS	5.21	5.15	5.18
Mean	5.33	5.18	5.26
NEMACIDE	NONE	ALDICARB	Mean
FUNGCIDE[1]			
NONE	5.23	5.16	5.19
TRIADIM	5.42	5.21	5.32
Mean	5.33	5.18	5.26
NEMACIDE	NONE	ALDICARB	Mean
FUNGCIDE[2]			
NONE	5.46	5.23	5.34
BENOMYL	5.20	5.14	5.17
Mean	5.33	5.18	5.26
NEMACIDE	NONE	ALDICARB	Mean
INSC TCDE			
NONE	5.38	5.19	5.29
CHLORFEN	5.27	5.18	5.23
Mean	5.33	5.18	5.26
WEEDKLLR	FUNGCIDE[2]	NONE	BENOMYL
NONE	FUNGCIDE[1]		
	NONE	5.41	5.11
	TRIADIM	5.44	5.36
GLYPHOS	NONE	5.29	4.96
	TRIADIM	5.23	5.24
WEEDKLLR	INSC TCDE	NONE	CHLORFEN
NONE	FUNGCIDE[1]		
	NONE	5.22	5.30
	TRIADIM	5.40	5.40
GLYPHOS	NONE	5.39	4.86
	TRIADIM	5.13	5.34

87/R/CS/140

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	INSCTCDE	NONE	CHLORFEN
WEEDKLLR	FUNGCIDE[2]		
NONE	NONE	5.40	5.45
	BENOMYL	5.22	5.26
GLYPHOS	NONE	5.26	5.27
	BENOMYL	5.27	4.93
	INSCTCDE	NONE	CHLORFEN
FUNGCIDE[1]	FUNGCIDE[2]		
NONE	NONE	5.39	5.31
	BENOMYL	5.23	4.85
TRIADIM	NONE	5.26	5.41
	BENOMYL	5.26	5.34
	NEMACIDE	NONE	ALDICARB
WEEDKLLR	FUNGCIDE[1]		
NONE	NONE	5.34	5.19
	TRIADIM	5.56	5.24
GLYPHOS	NONE	5.13	5.13
	TRIADIM	5.29	5.18
	NEMACIDE	NONE	ALDICARB
WEEDKLLR	FUNGCIDE[2]		
NONE	NONE	5.55	5.29
	BENOMYL	5.34	5.14
GLYPHOS	NONE	5.36	5.17
	BENOMYL	5.06	5.14
	NEMACIDE	NONE	ALDICARB
FUNGCIDE[1]	FUNGCIDE[2]		
NONE	NONE	5.50	5.20
	BENOMYL	4.96	5.11
TRIADIM	NONE	5.41	5.26
	BENOMYL	5.43	5.17
	NEMACIDE	NONE	ALDICARB
WEEDKLLR	INSCTCDE		
NONE	NONE	5.42	5.20
	CHLORFEN	5.47	5.23
GLYPHOS	NONE	5.35	5.18
	CHLORFEN	5.07	5.13
	NEMACIDE	NONE	ALDICARB
FUNGCIDE[1]	INSCTCDE		
NONE	NONE	5.35	5.26
	CHLORFEN	5.11	5.05
TRIADIM	NONE	5.42	5.11
	CHLORFEN	5.43	5.32

87/R/CS/140

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNGCIDE[2]	NEMACIDE	NONE	ALDICARB
NONE	INSCTCDE		
	NONE	5.43	5.23
	CHLORFEN	5.49	5.23
BENOMYL	NONE	5.34	5.15
	CHLORFEN	5.06	5.13

\*\*\* Standard errors of differences of means \*\*\*

Margins of two factor tables	0.151
Two factor tables	0.214
Three factor tables	0.303

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	6	0.428	8.1

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00075

87/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, second and third w. wheats after a break - Great Harpenden I.

Sponsors: D. Hornby, R.J. Gutteridge.

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

For previous years see 78-86/R/CS/212.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 5.33 x 10.7.

Treatments:

PREVCROP Previous crops before w. wheat 1987:

	1984	1985	1986
CONT W	W	W	W
FIRST W	W	BE	W
SECOND W	BE	W	W
THIRD W	W	W	W
BEANS 1	W	W	BE (duplicated)
BEANS 2	W	BE	BE

BE = s. beans, W = w. wheat

NOTE: One additional crop sequence was in s. beans 1987, yields not taken.

Standard applications:

W. wheat: Manures: Chalk at 5.0 t. 'Nitram' at 410 kg. Weedkillers: Isoproturon at 2.5 kg in 200 l. Fluroxypyr at 0.20 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 500 l.

Seed: W. wheat: Avalon, sown at 180 kg.  
S. beans: Minden, sown at 260 kg.

Cultivations, etc.:-

Both crops: Chalk applied: 24 Sept, 1986. Ploughed: 29 Sept. Rotary harrowed: 30 Sept.

W. wheat: Seed sown: 1 Oct, 1986. Isoproturon applied: 14 Apr, 1987. N applied: 17 Apr. Remaining weedkillers applied: 21 Apr. Combine harvested: 1 Sept.

S. beans: Rotary harrowed: 20 Mar, 1987. Seed sown: 31 Mar. Hand hoed: 27 May. Combine harvested: 21 Sept.

NOTE: Take-all was assessed in soil and in w. wheat roots.



87/R/CS/212

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PREVCROP	CONT W	FIRST W	SECOND W	THIRD W	BEANS 1	BEANS 2	Mean
	4.63	4.90	4.68	5.07	5.24	6.00	5.11

\*\*\* Standard errors of differences of means \*\*\*

Table	PREVCROP
s.e.d.	0.351 min.rep
	0.304 max-min

	PREVCROP
max-min	BEANS 1 v any of the remainder
min.rep	any of the remainder

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.430	8.4

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00303

87/W/CS/245

MINIMUM CULTIVATION AND DEEP PK

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

Sponsors: A.E. Johnston, J. McEwen, R.D. Prew, P.H. Nicholls.

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

For previous years see 80-86/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 SB1      Series I, s. barley in rotation after w. oilseed rape, w. wheat
  - SER2 WW10    Series II, w. wheat, tenth cereal after a break crop
  - SER3 WB10    Series III, w. barley, tenth cereal after a break crop

Column plots: All combinations (duplicated) of:

2. PK SUB      Extra PK and subsoil treatments:
  - None, mouldboard ploughed
  - S         None, subsoiled
  - PKS         PK to subsoil
3. YEAR        Years of applying PK SUB:
  - 1980         In autumn 1979
  - 1980/3/6    In autumn 1979, autumn 1982 and autumn 1985
4. DRILL       Drills and associated cultivations:
  - CONVENTIAL    Mouldboard ploughed, conventionally drilled
  - DIRECT        Direct drilled (duplicated) (conventionally drilled in years when factor 2 involves autumn ploughing)

87/W/CS/245

Row plots:

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

W. wheat

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

S. & W. barley

75 ENHD	75 kg N enhanced pathogen control
150 ENHD	150 kg N enhanced pathogen control
150/225E	150 kg N enhanced pathogen control (225 kg N in previous years)
150 STND	150 kg N standard pathogen control

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

EXTRA

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

- NOTES: (1) Rates of extra P and K were 500 kg P205, as superphosphate, 250 kg K20 as muriate of potash.
- (2) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
- (3) The topsoil PK dressing was equally divided before and after ploughing.
- (4) Standard pathogen control in 1987 was conventional seed dressing and, on Series II only, methiocarb pellets at sowing. Enhanced pathogen control had in addition, propiconazole at 0.25 kg in 200 l applied on 29 June, 1987, and, on Series II and III only, prochloraz at 0.40 kg in 200 l applied on 27 May.
- (5) All plots with the combination YEAR 1980/3/6; DRILL DIRECT were mouldboard ploughed and conventionally drilled in error in 1987.

Standard applications:

Series I, s. barley: Manures: (5:14:30) at 340 kg. Weedkillers: Paraquat at 0.40 kg ion in 200 l on two occasions. Clopyralid at 0.05 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l.

Series II, w. wheat: Manures: (5:14:30) at 340 kg. Weedkillers: Paraquat at 0.40 kg ion in 200 l. Isoproturon at 1.5 kg, clopyralid at 0.05 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 240 l. Growth regulator: Chlormequat chloride at 1.1 kg in 200 l.

87/W/CS/245

Series III, w. barley: Manures: (5:14:30) at 340 kg. Weedkillers: Paraquat at 0.40 kg ion in 200 l. Isoproturon at 1.5 kg, clopyralid at 0.05 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 240 l. Growth regulators: Mepiquat chloride at 0.61 kg, 2-chloroethylphosphonic acid at 0.31 kg applied with a wetting agent ('Citowett' at 0.8 l) in 200 l.

Seed: Series I, s. barley: Klaxon, sown at 160 kg.  
Series II, w. wheat: Avalon, with methiocarb pellets, sown at 200 kg.  
Series III: W. barley: Igri, sown at 180 kg.

Cultivations, etc.:-

Series I, s. barley: Straw burnt: 8 Sept, 1986. Heavy spring-tine cultivated: 9 Sept. Ploughed treatment applied: 12 Sept. These plots disced twice: 18 Sept. These plots rolled: 19 Sept. Disced: 27 Sept. Spike harrowed with crumbler attached: 2 Oct. Rolled: 3 Oct. Paraquat applied: 3 Nov, 16 Mar, 1987. Spike harrowed with crumbler attached, seed sown, NPK applied: 16 Mar. N treatments applied: 1 May. Clopyralid, bromoxynil and mecoprop applied: 27 May. Combine harvested: 8 Sept.

Series II, w. wheat: Straw burnt: 8 Sept, 1986. Heavy spring-tine cultivated: 9 Sept. Ploughed treatment applied: 12-15 Sept. These plots disced four times: 18 Sept. These plots rolled: 19 Sept. Disced: 27 Sept. Rotary harrowed: 2 Oct. Rolled: 3 Oct. Paraquat applied: 3 Nov. Seed sown, NPK applied, harrowed: 7 Nov. Isoproturon, clopyralid, bromoxynil and mecoprop applied: 27 Apr. N treatments applied: 1 May. Growth regulator applied: 27 May. Combine harvested: 14 Sept.

Series III, w. barley: Straw burnt: 8 Sept, 1986. Heavy spring-tine cultivated: 9 Sept. Ploughed treatment applied: 15 Sept. These plots disced twice: 18 Sept. These plots rolled: 19 Sept. Disced: 27 Sept. Spike harrowed with crumbler attached: 2 Oct. Rolled: 3 Oct. Paraquat applied: 3 Nov. Seed sown, NPK applied, harrowed: 5 Dec. Isoproturon, clopyralid, bromoxynil and mecoprop applied: 27 Apr, 1987. N treatments applied: 1 May. Growth regulators applied: 27 May. Combine harvested: 10 Sept.

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---	--S	PKS	Mean
N PATH				
75 ENHD	5.11	4.67	4.13	4.63
150 ENHD	4.71	4.07	4.48	4.42
150/225E	4.64	4.41	4.33	4.46
150 STND	4.27	4.23	3.56	4.02
Mean	4.68	4.35	4.12	4.38
YEAR	1980	1980/3/6	Mean	
N PATH				
75 ENHD	5.13	4.14	4.63	
150 ENHD	4.49	4.35	4.42	
150/225E	4.70	4.22	4.46	
150 STND	4.05	3.99	4.02	
Mean	4.59	4.18	4.38	
YEAR	1980	1980/3/6	Mean	
PK SUB				
---	4.72	4.64	4.68	
--S	4.81	3.89	4.35	
PKS	4.24	4.01	4.12	
Mean	4.59	4.18	4.38	
DRILL	CNVNTIAL	DIRECT	Mean	
N PATH				
75 ENHD	4.23	4.84	4.63	
150 ENHD	4.23	4.52	4.42	
150/225E	4.03	4.67	4.46	
150 STND	3.86	4.10	4.02	
Mean	4.09	4.53	4.38	
DRILL	CNVNTIAL	DIRECT	Mean	
PK SUB				
---	4.42	4.81	4.68	
--S	3.86	4.59	4.35	
PKS	3.99	4.19	4.12	
Mean	4.09	4.53	4.38	
DRILL	CNVNTIAL	DIRECT	Mean	
YEAR				
1980	4.39	4.69	4.59	
1980/3/6	3.78	4.37	4.18	
Mean	4.09	4.53	4.38	

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---	1980/3/6		--S	1980/3/6		PKS	1980/3/6	
YEAR	1980	1980/3/6		1980	1980/3/6		1980	1980/3/6	
N PATH									
75 ENHD	5.05	5.16		5.52	3.83		4.81	3.44	
150 ENHD	4.73	4.69		4.26	3.89		4.47	4.48	
150/225E	4.70	4.57		5.16	3.66		4.24	4.43	
150 STND	4.42	4.13		4.29	4.17		3.45	3.68	

PK SUB	---	1980/3/6		--S	1980/3/6		PKS	1980/3/6	
DRILL	CVNVTIAL	DIRECT		CVNVTIAL	DIRECT		CVNVTIAL	DIRECT	
N PATH									
75 ENHD	4.27	5.52		4.57	4.72		3.86	4.26	
150 ENHD	4.61	4.76		3.62	4.30		4.46	4.49	
150/225E	4.31	4.80		3.66	4.79		4.12	4.44	
150 STND	4.49	4.17		3.58	4.56		3.51	3.59	

YEAR	1980	1980/3/6		1980/3/6	
DRILL	CVNVTIAL	DIRECT		CVNVTIAL	DIRECT
N PATH					
75 ENHD	4.89	5.25		3.58	4.42
150 ENHD	4.26	4.60		4.20	4.43
150/225E	4.55	4.77		3.51	4.58
150 STND	3.87	4.14		3.85	4.07

YEAR	1980	1980/3/6		1980/3/6	
DRILL	CVNVTIAL	DIRECT		CVNVTIAL	DIRECT
PK SUB					
---	4.58	4.80		4.26	4.83
--S	4.45	4.99		3.27	4.20
PKS	4.15	4.29		3.82	4.10

PK SUB	---	1980/3/6		1980/3/6	
YEAR	1980	1980/3/6		1980/3/6	
DRILL	CVNVTIAL	DIRECT		CVNVTIAL	DIRECT
N PATH					
75 ENHD	4.62	5.27		3.92	5.78
150 ENHD	4.74	4.73		4.49	4.79
150/225E	4.78	4.65		3.84	4.94
150 STND	4.19	4.53		4.79	3.80

PK SUB	--S	1980/3/6		1980/3/6	
YEAR	1980	1980/3/6		1980/3/6	
DRILL	CVNVTIAL	DIRECT		CVNVTIAL	DIRECT
N PATH					
75 ENHD	5.81	5.37		3.33	4.08
150 ENHD	3.52	4.63		3.73	3.97
150/225E	4.40	5.54		2.92	4.04
150 STND	4.07	4.41		3.09	4.71

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB YEAR DRILL N PATH	PKS 1980 CNVTIAL	DIRECT	1980/3/6 CNVTIAL	DIRECT	
75 ENHD	4.24	5.10	3.47	3.42	
150 ENHD	4.54	4.44	4.38	4.53	
150/225E	4.47	4.12	3.77	4.76	
150 STND	3.36	3.49	3.67	3.68	
N PATH EXTRA					Mean
TPK 80 D	5.03	5.47	5.44	3.93	4.97
TPK 80 C	4.48	3.93	4.35	4.82	4.40
Mean	4.75	4.70	4.90	4.38	4.68

N PATH	PK SUB	YEAR DRILL	1980 CNVTIAL	1980/3/6 DIRECT CNVTIAL	DIRECT
75 ENHD	---		4.62	5.27	3.92
	--S		5.81	5.37	3.33
	PKS		4.24	5.10	3.47
150 ENHD	---		4.74	4.73	4.49
	--S		3.52	4.63	3.73
	PKS		4.54	4.44	4.38
150/225E	---		4.78	4.65	3.84
	--S		4.40	5.54	2.92
	PKS		4.47	4.12	3.77
150 STND	---		4.19	4.53	4.79
	--S		4.07	4.41	3.09
	PKS		3.36	3.49	3.67

\*\*\* Standard errors of differences of means \*\*\*

Table	EXTRA	PK SUB	YEAR	DRILL	
s.e.d.	0.568	0.232	0.189	0.201	
Table	N PATH*	N PATH*	PK SUB	N PATH*	
s.e.d.	PK SUB	YEAR	YEAR	DRILL	
	0.365	0.298	0.328	0.316	
Table	PK SUB	YEAR	N PATH*	N PATH*	
s.e.d.	DRILL	DRILL	EXTRA	PK SUB	
	0.402	0.328		YEAR	min rep
	0.348	0.284	0.894	0.516	max-min
	0.284	0.232			max rep
Table	N PATH*	N PATH*	PK SUB	N PATH*	
s.e.d.	PK SUB	YEAR	YEAR	PK SUB	
	DRILL	DRILL	DRILL	YEAR	
	0.632	0.516	0.568	0.894	min rep
	0.547	0.447	0.492	0.774	max-min
	0.447	0.365	0.402	0.632	max rep

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

\* Within the same level of N PATH only

DRILL  
Min-rep CNVNTIAL  
Max rep DIRECT  
Max min DIRECT v CNVNTIAL

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP1	6	0.402	9.1
WP1.WP2	18	0.563	12.8

GRAIN MEAN DM% 80.0

SUB PLOT AREA HARVESTED 0.00341



87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---	--S	PKS	Mean
N PATH				
75 ENHD	4.13	3.78	3.94	3.95
150 ENHD	4.66	4.43	4.56	4.55
225 ENHD	5.27	4.94	5.07	5.09
150 STND	3.77	3.62	3.30	3.56
Mean	4.46	4.19	4.22	4.29
YEAR	1980	1980/3/6	Mean	
N PATH				
75 ENHD	3.87	4.03	3.95	
150 ENHD	4.37	4.73	4.55	
225 ENHD	4.85	5.34	5.09	
150 STND	3.10	4.02	3.56	
Mean	4.05	4.53	4.29	
YEAR	1980	1980/3/6	Mean	
PK SUB				
---	4.39	4.52	4.46	
--S	3.91	4.47	4.19	
PKS	3.84	4.60	4.22	
Mean	4.05	4.53	4.29	
DRILL	CNVNTIAL	DIRECT	Mean	
N PATH				
75 ENHD	3.93	3.96	3.95	
150 ENHD	4.52	4.56	4.55	
225 ENHD	5.18	5.05	5.09	
150 STND	4.07	3.31	3.56	
Mean	4.43	4.22	4.29	
DRILL	CNVNTIAL	DIRECT	Mean	
PK SUB				
---	4.38	4.49	4.46	
--S	4.42	4.08	4.19	
PKS	4.48	4.08	4.22	
Mean	4.43	4.22	4.29	
DRILL	CNVNTIAL	DIRECT	Mean	
YEAR				
1980	4.54	3.80	4.05	
1980/3/6	4.32	4.63	4.53	
Mean	4.43	4.22	4.29	

87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---	1980/3/6		--S	1980/3/6		PKS	1980/3/6	
YEAR	1980			1980			1980		
N PATH									
75 ENHD	4.04	4.21		3.69	3.87		3.86	4.02	
150 ENHD	4.71	4.61		4.31	4.55		4.09	5.02	
225 ENHD	5.15	5.39		4.71	5.17		4.70	5.45	
150 STND	3.67	3.86		2.94	4.30		2.69	3.90	

PK SUB	---	1980/3/6		--S	1980/3/6		PKS	1980/3/6	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	
N PATH									
75 ENHD	3.94	4.22	3.83	3.76	4.04	3.89			
150 ENHD	4.42	4.78	4.47	4.41	4.66	4.50			
225 ENHD	5.20	5.30	5.22	4.80	5.13	5.05			
150 STND	3.97	3.67	4.16	3.35	4.09	2.90			

YEAR	1980	1980/3/6		
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	4.05	3.77	3.82	4.14
150 ENHD	4.48	4.32	4.56	4.81
225 ENHD	5.53	4.51	4.84	5.59
150 STND	4.09	2.61	4.06	4.00

YEAR	1980	1980/3/6		
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
PK SUB				
---	4.71	4.23	4.05	4.75
--S	4.47	3.63	4.37	4.53
PKS	4.42	3.54	4.54	4.63

PK SUB	---	1980/3/6		
YEAR	1980	DIRECT	CNVNTIAL	DIRECT
DRILL				
N PATH				
75 ENHD	4.07	4.03	3.80	4.42
150 ENHD	4.53	4.81	4.32	4.75
225 ENHD	6.00	4.72	4.40	5.89
150 STND	4.26	3.38	3.67	3.96

PK SUB	--S	1980/3/6		
YEAR	1980	DIRECT	CNVNTIAL	DIRECT
DRILL				
N PATH				
75 ENHD	3.89	3.60	3.77	3.92
150 ENHD	4.65	4.14	4.30	4.68
225 ENHD	5.30	4.41	5.14	5.19
150 STND	4.06	2.38	4.27	4.31

87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	PKS	1980		1980/3/6		
YEAR	1980	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	
N PATH	75 ENHD	150 ENHD	225 ENHD	150 STND	Mean	
75 ENHD	4.20	3.69	3.88	4.09		
150 ENHD	4.25	4.02	5.07	4.99		
225 ENHD	5.29	4.40	4.96	5.69		
150 STND	3.93	2.07	4.25	3.73		
N PATH	75 ENHD	150 ENHD	225 ENHD	150 STND	Mean	
EXTRA						
TPK 80 D	4.37	4.80	4.93	3.53	4.41	
TPK 80 C	4.02	4.16	5.10	4.36	4.41	
Mean	4.19	4.48	5.01	3.95	4.41	

N PATH	PK SUB	YEAR	1980	1980/3/6	DIRECT
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL
75 ENHD	---	---	4.07	4.03	3.80
	--S	---	3.89	3.60	3.77
	PKS	---	4.20	3.69	3.88
150 ENHD	---	---	4.53	4.81	4.32
	--S	---	4.65	4.14	4.30
	PKS	---	4.25	4.02	5.07
225 ENHD	---	---	6.00	4.72	4.40
	--S	---	5.30	4.41	5.14
	PKS	---	5.29	4.40	4.96
150 STND	---	---	4.26	3.38	3.67
	--S	---	4.06	2.38	4.27
	PKS	---	3.93	2.07	4.25

\*\*\* Standard errors of differences of means \*\*\*

Table	EXTRA	PK SUB	YEAR	DRILL	
s.e.d.	0.860	0.351	0.287	0.304	
Table	N PATH*	N PATH*	PK SUB	N PATH*	
s.e.d.	PK SUB	YEAR	YEAR	DRILL	
	0.408	0.333	0.496	0.354	
Table	PK SUB	YEAR	N PATH*	N PATH*	
s.e.d.	DRILL	DRILL	EXTRA	PK SUB	
	0.608	0.496		YEAR	
	0.527	0.430	1.000	0.578	min rep
	0.430	0.351			max-min
					max rep
Table	N PATH*	N PATH*	PK SUB	N PATH*	
s.e.d.	PK SUB	YEAR	YEAR	PK SUB	
	DRILL	DRILL	DRILL	YEAR	
	0.707	0.576	0.860	1.000	min rep
	0.613	0.500	0.745	0.866	max-min
	0.500	0.408	0.608	0.707	max rep

87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

\* Within the same level of N PATH only

DRILL  
Min-rep CNVTIAL  
Max rep DIRECT  
Max min DIRECT v CNVTIAL

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP1	6	0.608	14.1
WP1.WP2	18	0.418	9.7

GRAIN MEAN DM% 80.0

SUB PLOT AREA HARVESTED 0.00341

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---	--S	PKS	Mean
N PATH				
75 ENHD	4.13	4.47	4.78	4.46
150 ENHD	5.35	5.41	5.48	5.41
150/225E	5.34	5.31	5.40	5.35
150 STND	4.52	4.53	4.46	4.51
Mean	4.83	4.93	5.03	4.93

YEAR	1980	1980/3/6	Mean
N PATH			
75 ENHD	4.41	4.50	4.46
150 ENHD	5.50	5.32	5.41
150/225E	5.59	5.11	5.35
150 STND	4.57	4.44	4.51
Mean	5.02	4.84	4.93

YEAR	1980	1980/3/6	Mean
PK SUB			
---	5.02	4.65	4.83
--S	5.05	4.81	4.93
PKS	4.98	5.07	5.03
Mean	5.02	4.84	4.93

DRILL	CNVNTIAL	DIRECT	Mean
N PATH			
75 ENHD	4.46	4.46	4.46
150 ENHD	5.18	5.53	5.41
150/225E	4.96	5.55	5.35
150 STND	4.14	4.69	4.51
Mean	4.68	5.06	4.93

DRILL	CNVNTIAL	DIRECT	Mean
PK SUB			
---	4.52	4.99	4.83
--S	4.75	5.02	4.93
PKS	4.77	5.16	5.03
Mean	4.68	5.06	4.93

DRILL	CNVNTIAL	DIRECT	Mean
YEAR			
1980	4.62	5.22	5.02
1980/3/6	4.74	4.90	4.84
Mean	4.68	5.06	4.93

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB	---		--S		PKS	
YEAR	1980	1980/3/6	1980	1980/3/6	1980	1980/3/6
N PATH						
75 ENHD	3.89	4.36	4.61	4.32	4.73	4.83
150 ENHD	5.42	5.28	5.57	5.25	5.52	5.43
150/225E	5.87	4.82	5.50	5.13	5.40	5.39
150 STND	4.92	4.12	4.51	4.56	4.28	4.64

PK SUB	---		--S		PKS	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH						
75 ENHD	4.29	4.04	4.49	4.45	4.59	4.88
150 ENHD	4.83	5.60	5.39	5.43	5.31	5.56
150/225E	4.92	5.56	4.87	5.53	5.09	5.55
150 STND	4.05	4.76	4.25	4.67	4.10	4.64

YEAR	1980		1980/3/6	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	4.42	4.41	4.49	4.51
150 ENHD	5.11	5.70	5.25	5.36
150/225E	4.95	5.91	4.97	5.18
150 STND	4.02	4.84	4.25	4.54

YEAR	1980		1980/3/6	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
PK SUB				
---	4.77	5.15	4.28	4.83
--S	4.52	5.31	4.99	4.73
PKS	4.59	5.18	4.95	5.13

PK SUB	---		1980/3/6	
YEAR	1980		1980/3/6	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	4.43	3.63	4.15	4.46
150 ENHD	5.06	5.60	4.60	5.61
150/225E	5.24	6.18	4.60	4.93
150 STND	4.34	5.21	3.76	4.31

PK SUB	--S		1980/3/6	
YEAR	1980		1980/3/6	
DRILL	CNVNTIAL	DIRECT	CNVNTIAL	DIRECT
N PATH				
75 ENHD	4.46	4.69	4.53	4.22
150 ENHD	4.99	5.86	5.79	4.99
150/225E	4.75	5.87	4.99	5.19
150 STND	3.86	4.83	4.64	4.52

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PK SUB YEAR DRILL	PKS 1980 CNVNTIAL	DIRECT	1980/3/6 CNVNTIAL	DIRECT	
N PATH 75 ENHD	4.39	4.90	4.79	4.85	
150 ENHD	5.28	5.64	5.34	5.48	
150/225E	4.85	5.68	5.32	5.42	
150 STND	3.84	4.49	4.36	4.79	
N PATH EXTRA					Mean
TPK 80 D	4.87	5.89	6.34	5.01	5.53
TPK 80 C	4.16	4.72	4.77	4.37	4.50
Mean	4.51	5.30	5.56	4.69	5.02

N PATH	PK SUB	YEAR DRILL	1980 CNVNTIAL	DIRECT	1980/3/6 CNVNTIAL	DIRECT
75 ENHD	---		4.43	3.63	4.15	4.46
	--S		4.46	4.69	4.53	4.22
	PKS		4.39	4.90	4.79	4.85
150 ENHD	---		5.06	5.60	4.60	5.61
	--S		4.99	5.86	5.79	4.99
	PKS		5.28	5.64	5.34	5.48
150/225E	---		5.24	6.18	4.60	4.93
	--S		4.75	5.87	4.99	5.19
	PKS		4.85	5.68	5.32	5.42
150 STND	---		4.34	5.21	3.76	4.31
	--S		3.86	4.83	4.64	4.52
	PKS		3.84	4.49	4.36	4.79

\*\*\* Standard errors of differences of means \*\*\*

Table s.e.d.	EXTRA 0.438	PK SUB 0.179	YEAR 0.146	DRILL 0.155	
Table s.e.d.	N PATH* PK SUB 0.250	N PATH* YEAR 0.204	PK SUB YEAR 0.253	N PATH* DRILL 0.216	
Table s.e.d.	PK SUB DRILL 0.310 0.268 0.219	YEAR DRILL 0.253 0.219 0.179	N PATH* EXTRA 0.611	N PATH* PK SUB YEAR 0.353	min rep max-min max rep
Table s.e.d.	N PATH* PK SUB DRILL 0.432 0.374 0.306	N PATH* YEAR DRILL 0.354 0.306 0.250	PK SUB YEAR DRILL 0.438 0.379 0.310	N PATH* PK SUB YEAR DRILL 0.611 0.529 0.432	min rep max-min max rep

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

\* Within the same level of N PATH only

DRILL  
Min-rep CNVTIAL  
Max rep DIRECT  
Max min DIRECT v CNVTIAL

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP1	6	0.310	6.3
WP1.WP2	18	0.348	7.0

GRAIN MEAN DM% 83.1

SUB PLOT AREA HARVESTED 0.00341



87/W/CS/273

INTENSIVE POTATOES

Object: To study the effects of a range of frequencies of cropping on the occurrence of pests and diseases and on the yield of potatoes - Woburn Lansome III.

Sponsors: A.G. Whitehead, T.M. Addiscott, D.A. Govier, I.F. Henderson, G.A. Hide.

The sixth year, s. barley, potatoes.

For previous years see 82-86/W/CS/273.

Design: In the sixth year: 2 randomised blocks of 4 plots split into 8.

Whole plot dimensions: 9.00 x 24.7.

Treatments: All combinations of:-

Whole plots

1. VAR SEQ                      Sequence of potato varieties in 1983, 1985 and 1987, all s. barley in 1982, 1984 and 1986:

	1983	1985	1987
D P D	Desiree	Maris Piper	Desiree
D D D	Desiree	Desiree	Desiree
D O D	Desiree	None (s. barley)	Desiree
O O D	None (s. barley)	None (s. barley)	Desiree

Sub plots, two replicates of:-

2. SD TREAT                      Seed treatment:

NONE	None
TOL+PRO	Tolclofos methyl at 250 g and prochloraz at 35 g per tonne of tubers

3. NEMACIDE                      Nematicide:

NONE	None
OXAMYL	Oxamyl at 5.0 kg worked in to seedbed

NOTES: (1) Additional plots were sown to s. barley for cropping sequences with differing frequencies of potatoes. Barley yields were not taken.

(2) Irrigation was applied to the potatoes as follows (mm water):

6 July	12
10 July	12
Total	24

87/W/CS/273

Standard applications:

- Potatoes: Manures: (0:18:36) at 420 kg, (10:10:15+4.5 Mg) at 2900 kg.  
Weedkiller: Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions, with the pirimicarb on the second. Fentin hydroxide at 0.28 kg in 200 l on two occasions.  
Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg in 200 l.  
S. barley: Manure: 'Nitram' at 230 kg. Fungicides: Propiconazole at 0.12 kg with tridemorph at 0.19 kg in 200 l.

- Seed: Potatoes: Desiree, phorate applied at planting.  
S. barley: Triumph, dressed triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.:-

- Potatoes: PK applied: 29 Jan, 1987. Ploughed: 11 Mar.  
NPK Mg applied: 22 Apr. Subsoiled with 25 cm wide wings on tines 38 cm deep and 66 cm apart, oxamyl applied and rotary cultivated: 23 Apr. Potatoes planted: 24 Apr. Rotary ridged: 15 May. Linuron applied: 22 May. Mancozeb applied: 24 June, 26 July, 5 Aug. Mancozeb applied with pirimicarb: 8 July. Fentin hydroxide applied: 18 Aug, 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted: 2 Oct.  
S. barley: Deep-tine cultivated: 30 Jan, 1987. Ploughed: 11 Mar. Subsoiled with 25 cm wide wings on tines 38 cm deep and 66 cm apart: 23 Apr. Spike harrowed with crumbler attached, seed sown: 30 Apr. N applied: 6 May. Fungicides applied: 3 July. Combine harvested: 10 Sept.

NOTE: Soil samples were taken before nematicides were applied and after harvest for cyst and egg counts of *Globodera pallida*.

87/W/CS/273

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SD TREAT VAR SEQ	NONE	TOL+PRO	Mean
D P D	43.0	43.1	43.1
D D D	44.6	43.7	44.2
D O D	50.7	42.7	46.7
O O D	58.4	59.4	58.9
Mean	49.2	47.2	48.2

NEMACIDE VAR SEQ	NONE	OXAMYL	Mean
D P D	37.0	49.1	43.1
D D D	34.8	53.5	44.2
D O D	37.6	55.8	46.7
O O D	57.3	60.4	58.9
Mean	41.7	54.7	48.2

NEMACIDE SD TREAT	NONE	OXAMYL	Mean
NONE	42.4	55.9	49.2
TOL+PRO	41.0	53.5	47.2
Mean	41.7	54.7	48.2

SD TREAT NEMACIDE VAR SEQ	NONE	OXAMYL	TOL+PRO NONE	OXAMYL
D P D	37.9	48.1	36.1	50.2
D D D	33.9	55.2	35.8	51.7
D O D	40.7	60.6	34.4	51.0
O O D	56.9	59.8	57.8	61.1

\*\*\* Standard errors of differences of means \*\*\*

Table	SD TREAT	NEMACIDE	VAR SEQ*
s.e.d.	1.16	1.16	SD TREAT 2.31

Table	VAR SEQ*	SD TREAT	VAR SEQ*
s.e.d.	2.31	SD TREAT NEMACIDE 1.64	SD TREAT NEMACIDE 3.27

\* Within the same level of VAR SEQ only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	44	4.63	9.6

87/W/CS/273

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

SD TREAT VAR SEQ	NONE	TOL+PRO	Mean
D P D	62.3	67.4	64.9
D D D	66.0	64.1	65.1
D O D	73.3	64.0	68.6
O O D	79.7	77.7	78.7
Mean	70.3	68.3	69.3

NEMACIDE VAR SEQ	NONE	OXAMYL	Mean
D P D	59.3	70.4	64.9
D D D	56.0	74.2	65.1
D O D	60.8	76.4	68.6
O O D	78.2	79.2	78.7
Mean	63.6	75.0	69.3

NEMACIDE SD TREAT	NONE	OXAMYL	Mean
NONE	64.8	75.9	70.3
TOL+PRO	62.4	74.2	68.3
Mean	63.6	75.0	69.3

SD TREAT NEMACIDE VAR SEQ	NONE	OXAMYL	TOL+PRO NONE	OXAMYL
D P D	59.1	65.6	59.6	75.2
D D D	55.3	76.8	56.6	71.6
D O D	66.5	80.0	55.2	72.8
O O D	78.2	81.1	78.1	77.3

PLOT AREA HARVESTED 0.00075

87/R/CS/302

EYESPOT RESISTANCE TO MBC

Object: To study the development of resistance to MBC fungicides in eyespot and the ability of resistant strains to survive, spread and infect - Meadow.

Sponsors: G.L. Bateman, B.D.L. Fitt.

The third years, w. wheat.

For previous years see 85-86/R/CS/302.

Design: 2 randomised blocks of 4 plots split into 6.

Whole plot dimensions: 12.0 x 24.0.

Treatments: All combinations of:-

Whole plots

1. FUNGCIDE      Fungicides applied cumulatively to 1985 and 1986 treatments:

NONE	None
CARB	Carbendazim at 0.25 kg
PRO	Prochloraz at 0.40 kg
CARB+PRO	Carbendazim at 0.15 kg + prochloraz at 0.40 kg

Sub plots

2. EYE INOC      Eyespot inoculum, applied in first year only:

NATURAL	Natural background population (duplicated)
W 19R 1S	Inoculated with wheat strains in proportion 19 resistant to one sensitive
W 1R 19S	As above but one resistant to 19 sensitive
R 19R 1S	Inoculated with rye strains, 19 resistant to one sensitive
R 1R 19S	As above but one resistant to 19 sensitive

NOTES: (1) Fungicide treatments were applied in 500 l on 12 Nov, 1986 repeated in 200 l on 14 Apr, 1987.

(2) The eyespot inoculum was colonised on oat seed and this was broadcast in October, 1984.

Basal applications: Manures: 'Nitram' at 590 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.:- Heavy spring-tine cultivated twice: 27 Aug, 1986. Paraquat applied: 18 Sept. Discd, rotary harrowed, seed sown: 30 Sept. Remaining weedkillers applied: 16 Apr, 1987. N applied: 17 Apr. Combine harvested: 1 Sept.

NOTE: Yields were not taken. Eyespot and sharp eyespot were assessed in April and July. Eyespot was characterized according to type and MBC resistance.

87/R/CS/309 and 87/W/CS/309

LONG-TERM STRAW INCORPORATION

Object: To study the effects of mixing and depths of incorporation of straw on straw decomposition, soil nitrogen content, soil physical condition, pests, diseases and on the establishment, growth and yield of w. wheat - Rothamsted (R) Great Knott III and Woburn (W) Far Field I.

Sponsors: R.D. Prew, D.G. Christian, M.J. Goss, R.J. Gutteridge, S.H.T. Harper, J.F. Jenkyn, A.E. Johnston, B.R. Kerry, R. Moffitt, W. Powell, A.D. Todd.

Associate sponsors: D.S. Powlson, A.J. Thomasson.

The third year, w. wheat.

For previous years see 85-86/R&W/CS/309.

Design: 4 randomised blocks of 12 plots (R).  
2 randomised blocks of 12 plots (W).

Whole plot dimensions: 9.0 x 28.0 (R).  
9.0 x 30.0 (W).

Treatments, applied cumulatively in successive years: All combinations of:-

- |             |   |
|-------------|---|
| 1. STRAW    | Treatments to straw from previous wheat:          |
| BURNT       | Burnt   |
| CHOPPED     | Chopped and spread (duplicated)                   |
| 2. CULTIVTN | Cultivations:                                     |
| TINE 10     | Tine cultivated to 10 cm depth                    |
| TN10PL20    | Tine cultivated to 10 cm depth, ploughed to 20 cm |
| TN10TN20    | Tine cultivated to 10 cm depth and again to 20 cm |
| PLOUGH20    | Ploughed to 20 cm depth                           |

- NOTES: (1) Straw was chopped by trailed straw chopper and spread on 20 Aug, 1986 (R), 4 Sept (W) and burnt 2-4 Sept (R), 5 Sept (W).
- (2) A heavy spring-tine cultivator was used to cultivate to 10 cm depth, on 27 Aug, 28 Aug (R), 5 Sept, 18 Sept (W). A chisel plough was used to cultivate to 20 cm depth, on 28 Aug (R) and a deep-tine cultivator to 20 cm on 15 Sept (W).
- (3) Ploughed plots were ploughed to 20 cm depth on: Chopped plots 28 Aug (R), burnt plots 4 Sept (R), 19 Sept (W).
- (4) In error five plots of STRAW BURNT at Rothamsted were heavy spring-tine cultivated to 10 cm on 27 Aug before burning. Two were combinations with CULTIVTN TN10PL20 the others were combinations with CULTIVTN TINE 10, TN10TN20 and PLOUGH20. All were subsequently burnt with a flame gun on 4 Sept. Combinations with CULTIVTN TN10PL20 and with PLOUGH20 were ploughed, with TINE 10 heavy spring-tine cultivated and with TN10TN20 deep-tine cultivated on 8 Sept.

87/R/CS/309 and 87/W/CS/309

Basal applications:

Great Knott III (R): Manures: 'Nitram' at 130 kg followed by 580 kg.  
Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg in 200 l. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 1.8 kg applied with the prochloraz and carbendazim in 200 l. Fungicides: Prochloraz at 0.40 kg with carbendazim at 0.15 kg. Propiconazole at 0.12 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l.  
Far Field I (W): Manures: 'Nitram' at 120 kg followed by 600 kg.  
Weedkillers: Tri-allate (as 'Avadex BW' at 4.2 l) in 250 l. Isoproturon at 2.0 kg, clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 240 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Propiconazole at 0.12 kg with tridemorph at 0.52 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l.

Seed: Great Knott III (R) and Far Field I (W): Mission, sown at 190 kg.

Cultivations, etc.:-

Great Knott III (R): Paraquat applied: 27 Sept, 1986. Rolled: 29 Sept. Disced: 1 Oct. Rotary harrowed, seed sown, harrowed: 6 Oct. Rolled: 8 Oct. N applied: 19 Mar, 1987 and 18 Apr. Isoproturon applied: 31 Mar. Clopyralid, bromoxynil, mecoprop, prochloraz and carbendazim applied: 18 Apr. Propiconazole applied: 28 May. Propiconazole, carbendazim and maneb applied: 30 June. Combine harvested: 17 Aug.  
Far Field I (W): Disced: 29 Sept, 1986. Rolled: 1 Oct. Rotary cultivated with crumbler attached, seed sown: 8 Oct. Rolled: 9 Oct. Tri-allate applied, harrowed: 10 Oct. N applied: 31 Mar, 1987 and 16 Apr. Isoproturon, clopyralid, bromoxynil and mecoprop applied: 17 Apr. Prochloraz and carbendazim applied: 7 May. Propiconazole and tridemorph applied: 5 June. Propiconazole, carbendazim and maneb applied: 30 June. Combine harvested: 18 Sept.

- NOTES: (1) Establishment counts were made in the autumn and measurements were made of total dry matter in spring.  
(2) Fungal diseases and pests were assessed at intervals during the season.  
(3) Components of yield were measured and numbers of volunteer ears assessed.

87/R/CS/309 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CULTIVTN STRAW	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
BURNT	6.04	5.92	5.67	6.36	6.00
CHOPPED	6.24	5.80	5.48	5.86	5.84
Mean	6.17	5.84	5.54	6.03	5.89

\*\*\* Standard errors of differences of means \*\*\*

Table	STRAW	CULTIVTN	STRAW CULTIVTN	
s.e.d.	0.174	0.232	0.401	min.rep
			0.347	max-min
			0.284	max.rep

min.rep STRAW  
BURNT only  
max-min BURNT v CHOPPED  
max.rep CHOPPED only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	37	0.567	9.6

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00648



87/W/CS/309 FAR FIELD I (W)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CULTIVTN STRAW	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
BURNT	4.34	3.78	4.17	3.90	4.05
CHOPPED	4.80	3.75	4.45	3.63	4.16
Mean	4.64	3.76	4.36	3.72	4.12

\*\*\* Standard errors of differences of means \*\*\*

Table	STRAW	CULTIVTN	STRAW CULTIVTN	
s.e.d.	0.243	0.324	0.561	min.rep
			0.486	max-min
			0.397	max.rep

min.rep STRAW  
BURNT only  
max-min BURNT v CHOPPED  
max.rep CHOPPED only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.561	13.6
GRAIN MEAN DM%	82.8		
PLOT AREA HARVESTED	0.00884		

87/R/CS/311

EFFECTS OF SHALLOW STRAW INCORPORATION

Object: To study the effects of shallow straw incorporation on straw decomposition, toxin production, pests and diseases and on the establishment, growth and yield of winter wheat - West Barnfield I.

Sponsors: R.D. Prew, D.G. Christian, R.J. Gutteridge, S.H.T. Harper, J.F. Jenkyn, A.E. Johnston, B.R. Kerry, R. Moffitt, W. Powell, A.D. Todd.

The third year, w. wheat.

For previous years see 85-86/R/CS/311.

Design: Single replicate of 3 x a half replicate of 2 x 2 x 2 x 2 x 2.

Whole plot dimensions: 9.0 x 57.0.

Treatments: Combinations of:-

Whole plots

1. STRAW Treatments to straw of previous wheat:

BURNT	Burnt on 8 Sept, 1986
BALED	Baled and removed on 21 Aug
CHOPPED	Chopped on 21 Aug

2. CULTTIME Time of cultivation, to 10 cm depth:

EARLY	Cultivated by rotary grubber on 9 Sept, 1986
LATER	Cultivated by rotary grubber on 26 Sept

Sub plots

3. AUT N Autumn N as 'Nitram' applied just before cultivation:

0	None
50	50 kg N on 9 Sept, 1986 (CULTTIME EARLY), 25 Sept (CULTTIME LATER)

4. FUNGCIDE Fungicides:

0	None
FULL	Full programme:- Triadimefon at 0.125 kg and carbendazim at 0.25 kg in 500 l on 14 Apr, 1987 Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l on 27 Apr Propiconazole at 0.125 kg in 200 l on 28 May Propiconazole at 0.125 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l on 23 June

5. INSCTCDE Insecticide:

0	None
PIR	Pirimicarb at 0.14 kg in 200 l on 23 June, 1987

87/R/CS/311

6. MOLLICIDE Molluscicide:

0 None  
METHCARB Methiocarb at 0.22 kg, as pellets, broadcast on  
29 Sept, 1986

Basal applications: Manures: 'Nitram' at 130 kg and later at 590 kg.  
Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg  
in 200 l. Clopyralid at 0.05 kg and bromoxynil at 0.24 kg with  
mecoprop at 1.8 kg in 200 l.

Seed: Mission, sown at 190 kg.

Cultivations, etc.: - Paraquat applied: 3 Oct, 1986. Rotary harrowed:  
6 Oct. Seed sown: 7 Oct. First N applied: 19 Mar, 1987.  
Isoproturon applied: 31 Mar. Second N, clopyralid, bromoxynil and  
mecoprop applied: 18 Apr. Combine harvested: 19 Aug.

NOTE: Growth was measured and incidence of pests and diseases assessed  
at intervals during the season. Ears of volunteers were counted  
prior to harvest and components of yield were measured.

87/R/CS/311

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CULTTIME	EARLY	LATER	Mean
STRAW			
BURNT	6.19	6.10	6.14
BALED	6.78	6.83	6.81
CHOPPED	6.82	5.89	6.36
Mean	6.60	6.28	6.44
AUT N	0	50	Mean
STRAW			
BURNT	6.07	6.21	6.14
BALED	6.68	6.93	6.81
CHOPPED	6.41	6.31	6.36
Mean	6.39	6.48	6.44
AUT N	0	50	Mean
CULTTIME			
EARLY	6.54	6.65	6.60
LATER	6.23	6.32	6.28
Mean	6.39	6.48	6.44
MOLLCIDE	0	METHCARB	Mean
STRAW			
BURNT	6.00	6.29	6.14
BALED	6.69	6.92	6.81
CHOPPED	6.42	6.30	6.36
Mean	6.37	6.50	6.44
MOLLCIDE	0	METHCARB	Mean
CULTTIME			
EARLY	6.46	6.73	6.60
LATER	6.28	6.27	6.28
Mean	6.37	6.50	6.44
MOLLCIDE	0	METHCARB	Mean
AUT N			
0	6.39	6.39	6.39
50	6.35	6.62	6.48
Mean	6.37	6.50	6.44
FUNGCIDE	0	FULL	Mean
STRAW			
BURNT	5.86	6.43	6.14
BALED	6.43	7.18	6.81
CHOPPED	6.03	6.68	6.36
Mean	6.11	6.77	6.44

87/R/CS/311

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNGCIDE	0	FULL	Mean
CULTTIME			
EARLY	6.32	6.88	6.60
LATER	5.90	6.65	6.28
Mean	6.11	6.77	6.44
FUNGCIDE	0	FULL	Mean
AUT N			
0	6.09	6.68	6.39
50	6.12	6.85	6.48
Mean	6.11	6.77	6.44
FUNGCIDE	0	FULL	Mean
MOLLCIDE			
0	5.99	6.75	6.37
METHCARB	6.23	6.78	6.50
Mean	6.11	6.77	6.44
INSCTCDE	0	PIR	Mean
STRAW			
BURNT	5.99	6.29	6.14
BALED	6.78	6.83	6.81
CHOPPED	6.27	6.45	6.36
Mean	6.35	6.52	6.44
INSCTCDE	0	PIR	Mean
CULTTIME			
EARLY	6.51	6.69	6.60
LATER	6.19	6.36	6.28
Mean	6.35	6.52	6.44
INSCTCDE	0	PIR	Mean
AUT N			
0	6.29	6.48	6.39
50	6.40	6.57	6.48
Mean	6.35	6.52	6.44
INSCTCDE	0	PIR	Mean
MOLLCIDE			
0	6.18	6.56	6.37
METHCARB	6.51	6.49	6.50
Mean	6.35	6.52	6.44

87/R/CS/311

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSCTCDE FUNG CIDE	0	PIR	Mean
0	6.05	6.17	6.11
FULL	6.65	6.88	6.77
Mean	6.35	6.52	6.44

\*\*\* Standard errors of differences of means \*\*\*

Table s.e.d.	AUT N 0.105	FUNG CIDE 0.105	INSCTCDE 0.105	MOLL CIDE 0.105
Table s.e.d.	STRAW* AUT N 0.183	CULTTIME* AUT N 0.149	STRAW* FUNG CIDE 0.183	CULTTIME* FUNG CIDE 0.149
Table s.e.d.	AUT N FUNG CIDE 0.149	STRAW* INSCTCDE 0.183	CULTTIME* INSCTCDE 0.149	AUT N INSCTCDE 0.149
Table s.e.d.	FUNG CIDE INSCTCDE 0.149	STRAW* MOLL CIDE 0.183	CULTTIME* MOLL CIDE 0.149	AUT N MOLL CIDE 0.149
Table s.e.d.	FUNG CIDE MOLL CIDE 0.149	INSCTCDE MOLL CIDE 0.149		

\* Within the same level of STRAW, CULTTIME or STRAW.CULTTIME only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP.SP	20	0.365	5.7

GRAIN MEAN DM% 84.2

SUB PLOT AREA HARVESTED 0.00288

87/R/CS/312

STRAW DECOMPOSITION

Object: To test the effects of two basidiomycetes on the decomposition of wheat straw from a preceding crop and on the establishment and yield of a following crop - West Barnfield I.

Sponsor: S.H.T. Harper.

The third year, w. wheat.

For previous years see 85-86/R/CS/312.

Design: 4 randomised blocks of 4 plots.

Whole plot area: 4.5 x 12.0.

Treatments: All combinations of treatments applied to chopped straw in the field, cumulative to applications in the first year:

1. TREATMNT[1]      Treatment one:  
    NONE              None  
    BASID 1           Basidiomycete 1, cumulative to whey at 15 kg in 1985 and 1986
2. TREATMNT[2]      Treatment two:  
    NONE              None  
    BASID 2           Basidiomycete 2, cumulative to a fungal accelerator in 1985 and 1986

- NOTES: (1) Basidiomycetes 1 and 2 were naturally occurring fungi found in soil at Rothamsted and Woburn respectively.  
(2) The basidiomycete fungus was colonised on wheat seed and this was spread on the surface at 1 seed per square cm on 25 Sept, 1986.  
(3) Straw was chopped by a trailed straw chopper and incorporated to a depth of about 10 cm by a rotary grubber.

Basal applications: Manures: 'Nitram' at 130 kg and later at 590 kg.  
Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg in 200 l. Clopyralid at 0.05 kg and bromoxynil at 0.24 kg with mecoprop at 1.8 kg in 200 l. Fungicides: Triadimefon at 0.12 kg and carbendazim at 0.25 kg in 200 l. Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Propiconazole at 0.12 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg in 200 l. Molluscicide: Methiocarb at 0.22 kg.

Seed: Mission, sown at 190 kg.

87/R/CS/312

Cultivations, etc.:— Straw chopped: 21 Aug, 1986. Cultivated with rotary grubber: 26 Sept. Methiocarb applied: 29 Sept. Paraquat applied: 3 Oct. Rotary harrowed: 6 Oct. Seed sown: 7 Oct. First N applied: 19 Mar, 1987. Isoproturon applied: 31 Mar. Triadimefon and carbendazim applied: 14 Apr. Second N, clopyralid, bromoxynil and mecoprop applied: 18 Apr. Prochloraz and carbendazim applied: 27 Apr. Propiconazole applied: 28 May. Propiconazole with carbendazim and maneb applied, insecticide applied separately: 23 June. Combine harvested: 19 Aug.

NOTE: Samples of straw were taken throughout the season for observations on the rate of decomposition.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

TREATMNT[2] TREATMNT[1]	NONE	BASID 2	Mean
NONE	6.85	6.54	6.70
BASID 1	6.68	6.28	6.48
Mean	6.76	6.41	6.59

\*\*\* Standard errors of difference's of means \*\*\*

Table	TREATMNT[1]	TREATMNT[2]	TREATMNT[1] TREATMNT[2]
s.e.d.	0.258	0.258	0.364

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.515	7.8

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00288



87/W/CS/316

VARIETIES AND PCN TOLERANCE

Object: To study the effects of a range of populations of potato cyst nematode (PCN) on varieties differing in susceptibility - Woburn, Horsepool.

Sponsor: A.G. Whitehead.

The third year, potatoes.

For previous years see 85-86/W/CS/316.

Design: 3 randomised blocks of 32 plots.

Whole plot dimensions: 2.84 x 6.10.

Treatments: All combinations of:-

1. VARIETY[85] Potato varieties in 1985 (to establish different populations of PCN):

CARA	Cara
CROWN	Pentland Crown
CA CR	Cara plants alternating with Pentland Crown plants within the ridges
CA CA CR	Two Cara plants alternating with one Pentland Crown plant within the ridges
  
2. VARIETY[87] Potato varieties in 1987 (all fallow in 1986):

CROWN	Pentland Crown
DELL	Pentland Dell
DESIREE	Desiree
PIPER	Maris Piper
  
3. NEMACIDE[87] Nematicide applied to seedbed in 1987:

NONE	None
OXAMYL	Oxamyl at 5 kg

Basal applications: Manures: (10:10:15+4.5 Mg) at 2500 kg. Weedkiller: Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg on four occasions in 200 l, with the insecticide on the second. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.

Cultivations, etc.: - Deep-tine cultivated: 16 Feb, 1987. NPK Mg applied: 16 Apr. Oxamyl applied, rotary cultivated, potatoes planted: 23 Apr. Rotary ridged: 15 May. Weedkiller applied: 25 May. Mancozeb applied: 24 June, 26 July, 5 Aug. Mancozeb and pirimicarb applied: 8 July. Fentin hydroxide applied: 18 Aug, 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 30 Sept. Lifted: 19 Oct.

87/W/CS/316

- NOTES: (1) Soil samples were taken before nematicide was applied and after harvest for cyst and egg counts of *Globodera pallida*.  
 (2) The weight of one plot was not recorded, with treatment combination CA CR, DESIREE and NONE. An estimated value was used in the analysis.

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY[87]	CROWN	DELL	DESIREE	PIPER	Mean
VARIETY[85]					
CARA	61.8	48.6	53.8	63.9	57.0
CROWN	39.1	27.6	31.9	47.5	36.5
CA CR	54.7	38.2	44.6	54.4	48.0
CA CA CR	57.3	39.2	43.2	54.8	48.6
Mean	53.3	38.4	43.4	55.1	47.5
NEMACIDE[87]	NONE	OXAMYL	Mean		
VARIETY[85]					
CARA	54.4	59.7	57.0		
CROWN	20.8	52.2	36.5		
CA CR	37.5	58.4	48.0		
CA CA CR	39.2	58.1	48.6		
Mean	38.0	57.1	47.5		
NEMACIDE[87]	NONE	OXAMYL	Mean		
VARIETY[87]					
CROWN	44.4	62.1	53.3		
DELL	25.8	51.0	38.4		
DESIREE	33.9	52.9	43.4		
PIPER	47.9	62.4	55.1		
Mean	38.0	57.1	47.5		
VARIETY[85]	NEMACIDE[87]	NONE	OXAMYL		
CARA	VARIETY[87]				
	CROWN	57.5	66.1		
	DELL	44.4	52.7		
	DESIREE	52.6	55.1		
	PIPER	63.0	64.7		
CROWN	CROWN	22.7	55.5		
	DELL	9.9	45.3		
	DESIREE	17.3	46.6		
	PIPER	33.5	61.4		
CA CR	CROWN	47.3	62.2		
	DELL	21.7	54.7		
	DESIREE	32.3	56.9		
	PIPER	48.9	59.8		
CA CA CR	CROWN	50.0	64.7		
	DELL	27.3	51.1		
	DESIREE	33.5	52.9		
	PIPER	46.0	63.7		

87/W/CS/316

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY[85]	VARIETY[87]	NEMACIDE[87]	VARIETY[85] VARIETY[87]
s.e.d.	1.58	1.58	1.12	3.15

Table	VARIETY[85] NEMACIDE[87]	VARIETY[87] NEMACIDE[87]	VARIETY[85] VARIETY[87] NEMACIDE[87]
s.e.d.	2.23	2.23	4.46

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	61	5.46	11.5

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY[87] VARIETY[85]	CROWN	DELL	DESIREE	PIPER	Mean
CARA	92.8	87.0	91.1	87.1	89.5
CROWN	86.1	72.2	80.0	88.1	81.6
CA CR	92.4	71.7	90.2	89.4	85.9
CA CA CR	93.2	81.2	90.1	87.5	88.0
Mean	91.1	78.0	87.9	88.0	86.3
NEMACIDE[87] VARIETY[85]	NONE	OXAMYL	Mean		
CARA	89.5	89.5	89.5		
CROWN	71.3	92.0	81.6		
CA CR	80.9	90.9	85.9		
CA CA CR	85.1	91.0	88.0		
Mean	81.7	90.8	86.3		
NEMACIDE[87] VARIETY[87]	NONE	OXAMYL	Mean		
CROWN	87.9	94.4	91.1		
DELL	66.3	89.7	78.0		
DESIREE	83.1	92.6	87.9		
PIPER	89.4	86.7	88.0		
Mean	81.7	90.8	86.3		

87/W/CS/316

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

		NEMACIDE[87]	NONE	OXAMYL
VARIETY[85]	VARIETY[87]			
CARA	CROWN		92.5	93.0
	DELL		84.5	89.6
	DESIREE		91.7	90.4
	PIPER		89.2	85.0
CROWN	CROWN		77.2	95.0
	DELL		54.3	90.2
	DESIREE		66.5	93.6
	PIPER		87.2	89.1
CA CR	CROWN		90.0	94.9
	DELL		54.6	88.8
	DESIREE		87.7	92.8
	PIPER		91.6	87.2
CA CA CR	CROWN		92.0	94.5
	DELL		71.9	90.4
	DESIREE		86.6	93.7
	PIPER		89.7	85.4

PLOT AREA HARVESTED 0.00087

87/R/CS/320

COMPARISON OF COMBINABLE CROPS

Object: To compare yields and other attributes of a range of combinable crops and to study their effects on a following crop of w. wheat - Long Hoos VI/VII 5.

Sponsors: J. McEwen, D.P. Yeoman, A.E. Johnston, R.J. Darby.

The second year, w. wheat, s. wheat.

For previous year see 86/R/CS/320.

Design: 3 randomised blocks of 10 plots split into 2.

Whole plot dimensions: 2.5 x 8.0.

Treatments: All combinations of:-

Whole plots

1. PREVCROP	Crops in 1986:
W BEANS	W. field beans, <i>Vicia faba</i>
W OATS	W. oats
W RAPE	W. oilseed rape
W PEAS	W. peas, <i>Pisum sativum</i>
W WHEAT	W. wheat
S BEANS	S. field beans, <i>Vicia faba</i>
S LUPINS	S. lupins, <i>Lupinus albus</i>
S PEAS	S. peas, <i>Pisum sativum</i>
SNFLOWER	Sunflower
FALLOW	Fallow

Sub plots

2. SPRING N	Nitrogen fertilizer applied on 10 Apr, 1987:
0	None
N	Applied, amount depending on quantity in crop and soil in spring

NOTES: (1) Amounts of N applied (kg N) as 'Nitro-Chalk' were:

After PREVCROP	W RAPE, S PEAS, FALLOW	190
	W BEANS	200
	S BEANS, SUNFLOWERS	210
	W OATS, W WHEAT	230
	W PEAS, S LUPINS	240

(2) W. wheat after PREVCROP S LUPINS failed and was resown to s. wheat.

87/R/CS/320

Standard applications:

After all treatments except after lupins: Weedkillers: Terbutryne at 2.8 kg with paraquat at 0.40 kg ion in 220 l. Isoproturon at 2.1 kg (2.5 kg after s. beans and sunflowers) with mecoprop at 2.8 l (2.0 l after s. beans and sunflowers) in 220 l. Cyanazine at 0.35 kg, clopyralid at 0.06 kg and mecoprop at 1.7 l in 220 l applied with the fungicides. Fungicides: Prochloraz at 0.40 kg, carbendazim at 0.15 kg.

After lupins: Weedkillers: Bentazone at 0.80 kg, dichlorprop at 1.1 kg and MCPA at 0.64 kg in 220 l applied with the fungicide. Fungicide: Tridemorph at 0.52 Kg.

Seed: W. wheat: Avalon, sown at 200 kg.  
S. wheat: Wembley, sown at 180 kg.

Cultivations, etc.:-

After w. beans, w. oats, w. rape, w. peas, w. wheat and s. peas. Deep-tine cultivated, rotary cultivated: 13 Aug, 1986 (after w. oats, w. rape, w. peas and fallow only). Shallow-tine cultivated, rotary cultivated: 15 Aug (after w. wheat only). Shallow-tine cultivated: 1 Sept (after s. peas only). Spring-tine cultivated: 11 Sept (after w. beans only). Rotary cultivated: 1 Sept (11 Sept after w. beans). Power harrowed, seed sown, rolled: 23 Sept. Terbutryne and paraquat applied: 24 Sept. Isoproturon and mecoprop applied: 29 Oct and 2 Apr, 1987. Cyanazine, clopyralid, mecoprop and fungicides applied: 16 Apr. Combine harvested: 1 Sept.

After s. beans and sunflowers: Spring-tine cultivated, rotary cultivated: 2 Oct, 1986 (after s. beans only). Ploughed: 13 Oct. Spring-tine cultivated, seed sown, rolled, terbutryne and paraquat applied: 14 Oct. Isoproturon and mecoprop applied: 2 Apr, 1987. Cyanazine, clopyralid, mecoprop, prochloraz and carbendazim applied: 16 Apr. Combine harvested: 1 Sept.

After lupins: W. wheat sown, spring-tine cultivated: 4 Dec, 1986. Spring-tine cultivated, s. wheat sown, rolled: 31 Mar, 1987. Bentazone, dichlorprop, MCPA and tridemorph applied: 19 May. Combine harvested: 10 Sept.

- NOTES: (1) Take-all was assessed in mid July.  
(2) Amounts of ammonium and nitrate nitrogen in the soil were measured in autumn and late winter.  
(3) N contents of grain were measured.  
(4) The wrong rate of SPRING N was applied to two plots, those with treatment combinations S PEAS 0 and SNFLOWER N. Estimated values were used in the analysis.

87/R/CS/320

W. WHEAT (S. WHEAT AFTER S. LUPINS)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SPRING N PREVCROP	0	N	Mean
W BEANS	3.53	8.10	5.82
W OATS	2.18	8.13	5.16
W RAPE	4.10	8.63	6.37
W PEAS	3.28	7.83	5.56
W WHEAT	2.50	6.73	4.62
S BEANS	3.98	7.89	5.93
S LUPINS	3.26	4.93	4.09
S PEAS	3.43	7.88	5.65
SNFLOWER	2.71	7.78	5.24
FALLOW	5.28	7.94	6.61
Mean	3.42	7.59	5.50

\*\*\* Standard errors of differences of means \*\*\*

Table	PREVCROP	SPRING N	PREVCROP SPRING N
s.e.d.	0.349	0.188	0.546
Except when comparing means with the same level(s) of PREVCROP			0.593

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.428	7.8
BLOCK.WP.SP	18	0.726	13.2

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00055

87/W/CS/322

EFFECTS OF GLOBODERA PALLIDA

Object: To study the residual effects of a range of potato varieties differing in susceptibility to *Globodera pallida* and of nematicides on the numbers of *Globodera pallida* and on the yield of a susceptible variety grown in the second year - Far Field II.

Sponsor: A.G. Whitehead.

The second year, potatoes.

For first year see 86/W/P/3.

Design: 3 randomised blocks of 32 plots.

Whole plot dimensions: 3.0 x 4.57.

Treatments: All combinations of:-

1. VARIETY[86] Varieties in 1986, all Pentland Crown in 1987:

12290 AF	12290 AF20
A 25/11	A 25/11
CARA	Cara
CROMWELL	Cromwell
DESIREE	Desiree
DIANA	Diana
HEATHER	Heather
KIRSTY	Kirsty
MARFONA	Marfona
MORAG	Morag
PIPER	Maris Piper
ROMANO	Romano
SANTE	Sante
ZB 35/29	ZB 35/29

2. OXAMYL[86] Oxamyl (kg) in 1986, none in 1987:

0.0  
5.6

plus four extra treatments:

VAR NEM[86] Varieties and nematicides in 1986, Pentland Crown, no nematicide in 1987:

CARA ALD	Cara with slow-release aldicarb at 5.6 kg
CARA CAR	Cara with carbofuran at 5.6 kg
PIPR ALD	Maris Piper with slow-release aldicarb at 5.6 kg
PIPR CAR	Maris Piper with carbofuran at 5.6 kg

Basal applications: Manures: (10:10:15+4.5 Mg) at 2290 kg. Weedkiller: Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions with the pirimicarb on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.



87/W/CS/322

Cultivations, etc.:- Deep-tine cultivated: 30 Jan, 1987 and 16 Feb. NPK Mg applied: 22 Apr. Rotary cultivated and potatoes planted: 28 Apr. Rotary ridged: 15 May. Weedkiller applied: 18 May. Mancozeb applied: 24 June, 26 July, 5 Aug. Mancozeb and pirimicarb applied: 8 July. Fentin hydroxide applied: 18 Aug, 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted: 7 Oct.

NOTE: Soil samples were taken before nematicides were applied for cyst and egg counts of *Globodera pallida*.

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

OXAMYL[86]	0.0	5.6	Mean
VARIETY[86]			
12290 AF	45.7	58.7	52.2
A 25/11	55.1	59.5	57.3
CARA	36.9	55.2	46.0
CROMWELL	46.8	57.7	52.3
DESIREE	42.3	52.3	47.3
DIANA	37.5	56.7	47.1
HEATHER	52.0	62.7	57.3
KIRSTY	42.9	54.7	48.8
MARFONA	45.1	55.0	50.1
MORAG	53.1	58.5	55.8
PIPER	44.3	54.2	49.2
ROMANO	46.1	59.1	52.6
SANTE	46.6	55.1	50.8
ZB 35/29	54.5	55.1	54.8
Mean	46.3	56.8	51.5

  

VAR NEM[86]	CARA ALD	CARA CAR	PIPR ALD	PIPR CAR	Mean
	55.8	42.6	61.1	43.5	50.8

Grand mean 51.4

\*\*\* Standard errors of differences of means \*\*\*

Table	VAR NEM[86]	VARIETY[86]	OXAMYL[86]	VARIETY[86] OXAMYL[86]
s.e.d.	3.80	2.69	1.02	3.80

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	62	4.66	9.1

87/W/CS/322

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

OXAMYL[86]	0.0	5.6	Mean		
VARIETY[86]					
12290 AF	95.4	95.0	95.2		
A 25/11	94.9	95.3	95.1		
CARA	93.2	95.7	94.4		
CROMWELL	96.0	95.4	95.7		
DESIREE	94.6	96.0	95.3		
DIANA	92.6	95.9	94.2		
HEATHER	96.0	95.8	95.9		
KIRSTY	94.2	95.0	94.6		
MARFONA	94.5	95.3	94.9		
MORAG	96.0	96.2	96.1		
PIPER	94.0	95.8	94.9		
ROMANO	95.8	96.7	96.2		
SANTE	95.2	95.5	95.3		
ZB 35/29	96.0	96.5	96.2		
Mean	94.9	95.7	95.3		
VAR NEM[86]	CARA ALD	CARA CAR	PIPR ALD	PIPR CAR	Mean
	95.5	94.2	96.2	94.5	95.1
Grand mean	95.3				
PLOT AREA HARVESTED	0.00070				

87/R/CS/324

COMPARISON OF COMBINABLE CROPS

Object: To compare yields and other attributes of a range of combinable crops and to study their effects on a following crop of w. wheat - Long Hoos VI/VII 2.

Sponsors: J. McEwen, D.P. Yeoman, R.J. Darby, M.V. Hewitt.

The first year, w. oats, w. oilseed rape, w. peas, w. wheat, s. beans, s. lupins, s. peas, sunflowers and fallow.

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.5 x 8.0.

Treatments:

CROP	Crops:
W OATS	W. oats
W RAPE	W. oilseed rape
W PEAS	W. peas, <i>Pisum sativum</i>
W WHEAT	W. wheat
S BEANS	S. field beans, <i>Vicia faba</i>
S LUPINS	S. lupins, <i>Lupinus albus</i>
S PEAS	S. peas, <i>Pisum sativum</i>
SNFLOWER	Sunflower

NOTE: Two plots in each block were fallowed, one of them after w. beans which failed.

Standard applications:-

- All crops and fallow: Manures: Muriate of potash at 520 kg.  
W. oats: Manure: N at 120 kg as 'Nitro-Chalk'. Weedkillers: Terbutryne at 1.5 kg with paraquat at 0.40 kg ion in 220 l. Cyanazine at 0.35 kg, clopyralid at 0.06 kg, mecoprop at 1.7 kg in 220 l applied with the fungicides. Fungicides: Prochloraz at 0.40 kg, carbendazim at 0.15 kg.  
W. rape: Manure: N at 200 kg as 'Nitro-Chalk'. Weedkillers: Fluazifop-butyl at 0.25 kg in 220 l. Propyzamide and clopyralid applied twice (as 'Matrikerb' at 1.6 kg) in 220 l. Insecticide: Deltamethrin at 0.075 kg in 220 l on two occasions. Fungicide: Prochloraz at 0.50 kg in 220 l. Desiccant: Diquat at 0.40 kg ion in 220 l.  
W. peas: Weedkillers: Paraquat at 0.40 kg ion. Trietazine at 1.2 kg with simazine at 0.17 kg in 220 l. Insecticides: Cypermethrin at 0.025 kg in 220 l applied twice, pirimicarb at 0.14 kg in 220 l. Fungicide: Benomyl at 0.55 kg applied with the pirimicarb. Desiccant: Diquat at 0.40 kg ion in 220 l.  
W. wheat: Manure: N at 230 kg as 'Nitro-Chalk'. Weedkillers: Terbutryne at 2.8 kg with paraquat at 0.40 kg ion in 220 l. Isoproturon at 2.5 kg with mecoprop at 2.0 kg in 220 l. Cyanazine at 0.35 kg, clopyralid at 0.06 kg with mecoprop at 1.7 kg in 220 l applied with the fungicides. Fungicides: Prochloraz at 0.40 kg, carbendazim at 0.15 kg.

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Standard applications cont'd:-

- S. beans, s. peas and s. lupins: Weedkillers: Paraquat at 0.40 kg ion in 220 l. Insecticides: Cypermethrin at 0.025 kg in 220 l applied twice, pirimicarb at 0.14 kg in 220 l. Fungicide: Benomyl at 0.55 kg applied with the pirimicarb.
- S. beans and s. peas: Weedkillers: Trietazine at 1.2 kg with simazine 0.17 kg in 220 l.
- S. lupins: Weedkillers: Paraquat at 0.33 kg ion with monolinuron at 0.46 kg in 220 l. Metamitron at 2.8 kg in 220 l.
- Sunflowers: Manures: N at 70 kg as 'Nitro-Chalk'. Weedkillers: Paraquat at 0.40 kg ion in 220 l. Trifluralin at 1.1 kg in 220 l. Linuron at 0.50 kg in 220 l.
- W. beans: Weedkiller: Paraquat at 0.40 kg ion in 220 l. Trietazine at 1.2 kg with simazine at 0.17 kg in 220 l. Insecticide: Cypermethrin at 0.025 kg in 220 l applied twice.
- Fallow plots only: Paraquat at 0.40 kg ion in 220 l.

- Seed: W. oats: Bulwark, sown at 180 kg.  
W. rape: Ariana, sown at 8 kg.  
W. peas: Frijaune, sown at 220 kg.  
W. wheat: Avalon, sown at 200 kg.  
S. beans: Minden, sown at 280 kg.  
S. lupins: Vladimir, sown at 220 kg.  
S. peas: Progreta, sown at 220 kg.  
Sunflowers: Asmer 9, sown at 10 kg.

Cultivations, etc.:-

- All plots: Shallow rotary cultivated: 19 Aug, 1986. K applied: 20 Aug. Ploughed, furrow pressed: 22 Aug.
- W. oats: Spring-tine cultivated, seed sown, rolled, terbutryne and paraquat applied: 6 Oct, 1986. N applied: 8 Apr, 1987. Cyanazine, clopyralid, mecoprop, prochloraz and carbendazim applied: 16 Apr. Combine harvested: 10 Sept.
  - W. rape: Seed sown: 27 Aug. Fluazifop-butyl applied: 3 Oct. Deltamethrin applied: 14 Oct and 20 Nov. Propyzamide and clopyralid applied: 29 Oct and 6 Jan, 1987. Prochloraz applied: 17 Nov, 1986. N applied: 20 Feb, 1987. Diquat applied: 10 Aug. Combine harvested: 17 Aug.
  - W. peas: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. Seed sown: 12 Nov. Trietazine and simazine applied: 18 Nov. Cypermethrin applied: 8 May, 1987 and 11 June. Pirimicarb and benomyl applied: 13 July. Diquat applied: 10 Aug. Combine harvested: 18 Aug.
  - W. wheat: Power harrowed, seed sown, rolled: 23 Sept, 1986. Terbutryne and paraquat applied: 24 Sept. Isoproturon and mecoprop applied: 29 Oct. N applied: 8 Apr, 1987. Cyanazine, clopyralid, mecoprop, prochloraz and carbendazim applied: 16 Apr. Combine harvested: 1 Sept.
  - S. beans and s. peas: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. Seed sown: 18 Mar, 1987. Trietazine and simazine applied: 19 Mar. Cypermethrin applied: 8 May and 11 June. Benomyl and pirimicarb applied: 13 July. Combine harvested: S. beans 11 Sept, s. peas 14 Sept.
  - S. lupins: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. Rotary cultivated, seed sown, rolled, monolinuron and paraquat applied: 16 Apr, 1987. Cypermethrin applied: 8 May and 11 June. Metamitron applied: 18 June. Benomyl and pirimicarb applied: 13 July. Combine harvested: 17 Nov.

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Cultivations cont'd, etc.:-

Sunflowers: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. N applied, trifluralin applied, spring-tine cultivated twice and seed sown: 30 Apr, 1987. Rolled: 5 May. Linuron applied: 6 May. Harvested by hand and one plot stationary combine harvested: 28 Oct.

W. beans, later fallowed: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. Seed sown: 4 Dec. Trietazine and simazine applied: 10 Dec. Cypermethrin applied: 8 May, 1987 and 11 June. Spring-tine cultivated, rotary cultivated: 29 June.

Fallow: Spring-tine cultivated: 6 Oct, 1986. Paraquat applied: 29 Oct. Spring-tine cultivated, rotary cultivated: 29 June, 1987. Previous crops: Potatoes 1985, s. barley 1986.

NOTE: Two sunflower plot yields were lost because of bird damage. Estimated values were used in the analysis.

VARIOUS CROPS

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CROP	
W OATS	4.31
W RAPE	2.12
W PEAS	1.29
W WHEAT	7.35
S BEANS	5.22
S LUPINS	0.93
S PEAS	2.73
SNFLOWER	0.91
Mean	3.11

\*\*\* Standard errors of differences of means \*\*\*

Table	CROP
s.e.d.	0.507

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.621	20.0

GRAIN MEAN DM% 77.1

SUB PLOT AREA HARVESTED

W. OATS, W. RAPE, W. WHEAT 0.00124  
 W. PEAS, S. BEANS, S. LUPINS, S. PEAS, SNFLOWER 0.00115

87/R/CS/326 and 87/W/CS/326

AMOUNTS OF STRAW

Object: To study the effects of a range of amounts of straw incorporated into the soil on w.wheat - Rothamsted (R) Great Knott III, Woburn (W) Far Field I.

Sponsors: D.G. Christian, J.F. Jenkyn, E.T.G. Bacon, R.D. Prew.

The first year, w. wheat.

Design: 4 randomised blocks of 4 plots (R).  
3 randomised blocks of 4 plots (W).

Whole plot dimensions: 3.0 x 13.5 (R).  
3.0 x 14.5 (W).

Treatments:

STRAW Amounts of straw incorporated into seedbed (t ha 85% DM):

		R	W
NONE	None	-	-
NORMAL	Normal	5.8	4.3
2 NORMAL	Twice normal	11.6	8.6
4 NORMAL	Four times normal	23.2	17.3

- NOTES: (1) Straw was chopped by trailed straw chopper and spread on 20 Aug, 1986 (R), 4 Sept (W). Straw treatments were applied on 22 Aug (R), 8 Sept (W).  
(2) At Rothamsted straw was incorporated by 'N.I.A.E. Mixaplough' on 29 Aug. At Woburn it was deep-tine cultivated in to 20 cm twice on 15 Sept, heavy spring-tine cultivated to 10 cm and disced three times on 18 Sept and disced twice on 29 Sept.

Basal applications:

Great Knott III (R): Manures: 'Nitram' at 130 kg followed by 590 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg in 200 l. Clopyralid at 0.05 kg, bromoxynil at 0.24 kg with mecoprop at 1.8 kg in 200 l. Fungicides: Propiconazole at 0.12 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l.

Far Field I (W): Manures: 'Nitram' at 120 kg followed by 600 kg. Weedkillers: Tri-allate (as 'Avadex BW' at 4.2 l) in 250 l. Isoproturon at 2.0 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 240 l. Fungicides: Propiconazole at 0.12 kg with tridemorph at 0.52 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l.

Seed: Great Knott III (R) and Far Field I (W): Mission, sown at 190 kg.

Cultivations, etc.:-

Great Knott III (R): Paraquat applied: 27 Sept, 1986. Rolled: 29 Sept. Disced: 1 Oct. Rotary harrowed, seed sown and harrowed: 6 Oct. N applied: 19 Mar, 1987, 18 Apr. Isoproturon applied: 31 Mar. Clopyralid, bromoxynil and mecoprop applied: 18 Apr. Propiconazole applied: 28 May. Propiconazole, carbendazim and maneb applied: 30 June. Combine harvested: 19 Aug. Previous crops: W. wheat 1985 and 1986.

87/R/CS/326 and 87/W/CS/326

Cultivations, etc.:-

Far Field I (W): Rotary cultivated with crumbler attached, seed sown: 8 Oct, 1986. Rolled: 9 Oct. Tri-allate applied, harrowed: 10 Oct. N applied: 31 Mar, 1987, 16 Apr. Isoproturon, clopyralid, bromoxynil and mecoprop applied: 17 Apr. Propiconazole and tridemorph applied: 5 June. Propiconazole, carbendazim and maneb applied: 30 June. Combine harvested: 7 Sept. Previous crops: W. wheat 1985 and 1986.

NOTES: (1) Establishment counts were made in autumn and measurements were made of total dry matter in spring.  
(2) Foliar diseases and foot and root rots were assessed in summer.

87/R/CS/326

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

STRAW	NONE	NORMAL	2 NORMAL	4 NORMAL	Mean
	4.95	4.77	4.62	5.05	4.85

\*\*\* Standard errors of differences of means \*\*\*

Table s.e.d.	STRAW
	0.155

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.219	4.5
GRAIN MEAN DM%	82.8		
PLOT AREA HARVESTED	0.00324		

87/W/CS/326

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

STRAW	NONE	NORMAL	2 NORMAL	4 NORMAL	Mean
	2.93	2.88	3.01	2.43	2.81

\*\*\* Standard errors of differences of means \*\*\*

Table s.e.d.	STRAW
	0.209

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.256	9.1
GRAIN MEAN DM%	75.2		
PLOT AREA HARVESTED	0.00442		

87/W/CS/328

DEEP-WORKED SOIL AND PCN

Object: To study the effects of deep working of soil, on a site infested with potato cyst-nematode (PCN), on varieties resistant or susceptible to PCN, with and without a nematicide - Stackyard A II.

Sponsor: A.G. Whitehead.

The first year, potatoes.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 3.0 x 8.0.

Treatments: All combinations of:-

- |             |   |
|-------------|---|
| 1. SOIL TRT | Soil treatment:   |
| NONE        | None  |
| SUBSOIL     | Subsoiled, with 25 cm wide wings on tines 38 cm deep and 66 cm apart, on 23 Apr, 1987 |
| 2. NEMACIDE | Nematicides:  |
| NONE        | None  |
| OXAMYL      | Oxamyl at 5.5 kg worked into seedbed on 27 Apr  |
| 3. VARIETY  | Varieties:  |
| CARA        | Cara  |
| DESIREE     | Desiree   |

NOTE: The experiment was sited on Series III of W/CS/35 (see 86/W/CS/35). Series II was planted to uniform Desiree potatoes for fresh tests of the above treatments in 1988.

Basal applications: Series II and III: Manures: (10:10:15+4.5Mg) at 2290 kg. Weedkillers: Sodium trichloroacetate at 38 kg in 240 l. EPTC at 4.5 kg in 240 l. Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg on four occasions in 200 l, applied with the pirimicarb on the second. Fentin hydroxide at 0.28 kg on two occasions in 200 l. Desiccant: Diquat at 0.80 kg ion in 200 l.

Cultivations, etc.:- Series II and III: Sodium trichloroacetate applied, spring-tine cultivated twice: 13 Nov, 1986. Spring-tine cultivated: 18 Feb, 1987. NPK Mg applied: 21 Apr. EPTC applied, rotary cultivated, potatoes planted: 29 Apr. Rotary ridged: 15 May. Linuron applied: 22 May. Mancozeb applied: 22 June, 26 July and 5 Aug. Mancozeb and pirimicarb applied: 8 July. Fentin hydroxide applied: 18 Aug and 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted: 14 Oct.

NOTE: Soil samples were taken before nematicides were applied and after harvest for cyst and egg counts of *Globodera pallida*.



87/W/CS/328

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

NEMACIDE	NONE	OXAMYL	Mean
SOIL TRT			
NONE	15.7	27.7	21.7
SUBSOIL	16.8	38.8	27.8
Mean	16.2	33.2	24.7
VARIETY	CARA	DESIREE	Mean
SOIL TRT			
NONE	28.1	15.3	21.7
SUBSOIL	35.7	19.8	27.8
Mean	31.9	17.6	24.7
VARIETY	CARA	DESIREE	Mean
NEMACIDE			
NONE	27.5	5.0	16.2
OXAMYL	36.3	30.2	33.2
Mean	31.9	17.6	24.7
SOIL TRT	VARIETY	CARA	DESIREE
NONE	NEMACIDE		
	NONE	25.8	5.6
	OXAMYL	30.4	25.0
SUBSOIL	NONE	29.2	4.3
	OXAMYL	42.2	35.4

\*\*\* Standard errors of differences of means \*\*\*

Table	SOIL TRT	NEMACIDE	VARIETY	SOIL TRT NEMACIDE
s.e.d.	1.63	1.63	1.63	2.30
Table	SOIL TRT VARIETY	NEMACIDE VARIETY	SOIL TRT NEMACIDE VARIETY	
s.e.d.	2.30	2.30	3.25	

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	3.98	16.1

87/W/CS/328

PERCENTAGE WARE 4CM (1.57 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

NEMACIDE	NONE	OXAMYL	Mean
SOIL TRT			
	NONE	76.4	71.9
	SUBSOIL	85.3	79.0
Mean	70.1	80.8	75.5

VARIETY	CARA	DESIREE	Mean
SOIL TRT			
	NONE	60.5	71.9
	SUBSOIL	69.2	79.0
Mean	86.1	64.8	75.5

VARIETY	CARA	DESIREE	Mean
NEMACIDE			
	NONE	51.1	70.1
	OXAMYL	78.6	80.8
Mean	86.1	64.8	75.5

	VARIETY	CARA	DESIREE
SOIL TRT	NEMACIDE		
	NONE	88.0	46.8
	OXAMYL	78.7	74.1
SUBSOIL	NONE	90.3	55.4
	OXAMYL	87.5	83.0

PLOT AREA HARVESTED 0.00120

87/R/WW/1

WINTER WHEAT

VARIETIES

Object: To study a selection of newer varieties of w. wheat on land in rotation (pathogen free) and after wheat (pathogen infected) - Great Knott I (pathogen free RH) and Highfield VI (pathogen infected RD).

Sponsors: R. Moffitt, R.J. Gutteridge.

Design: Two randomised blocks of 2 whole plots split into (RH) 11, (RD) 13.

Sub plot dimensions: 3.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. INSCTCDE	Insecticide:
NONE	None
PIRIMICA	Pirimicarb at 0.14 kg in 200 l on 23 June, 1987

Sub plots

2. VARIETY	Varieties:
AVALON	Avalon (on RH only)
AVALON A	Avalon (grown after Avalon, RD only)
AVALON N	Avalon (grown after Norman, RD only)
BRIMSTON	Brimstone
FORTRESS	Fortress
GALAHAD	Galahad
HORNET	Hornet
MERCIA	Mercia
MISSION	Mission
NORMAN	Norman (on RH only)
NORMAN A	Norman (grown after Avalon, RD only)
NORMAN N	Norman (grown after Norman, RD only)
PARADE	Parade
RAPIER	Rapier
RENDEZVO	Rendezvous

NOTES: (1) A planned test of urea was not applied.  
(2) A further experiment on a pathogen free site at Woburn was not sown because of unsuitable conditions.

Basal applications:

Great Knott I (RH): Manures: 'Nitram' at 380 kg. Weedkillers: Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l. Fungicides: Propiconazole at 0.25 kg with tridemorph at 0.19 kg in 200 l.

Highfield VI (RD): Manures: 'Nitram' at 590 kg. Weedkillers: Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l.

87/R/WW/1

Seed: Varieties sown at 190 kg on both sites.

Cultivations, etc.:-

Great Knott I (RH): Heavy spring-tine cultivated: 17 Oct, 1986.  
 Rotary harrowed, seed sown: 30 Oct. N applied: 16 Apr, 1987.  
 Weedkillers applied: 6 May. Fungicides applied: 29 June. Combine  
 harvested: 31 Aug. Previous crops: S. beans 1985, potatoes 1986.  
 Highfield VI (RD): Ploughed: 1 Oct, 1986. Disced twice: 14 Oct.  
 Rotary harrowed, seed sown: 17 Oct. N applied, weedkillers  
 applied: 15 Apr, 1987. Prochloraz and carbendazim applied: 5 May.  
 Propiconazole, carbendazim and maneb applied: 29 June. Combine  
 harvested: 1 Sept. Previous crops: Potatoes 1985, w. wheat 1986.

NOTES: (1) Foot and roots rots were assessed in June on Highfield VI (RD).  
 (2) One plot with treatment combination BRIMSTON NONE on the  
 Highfield site was treated as missing because of severe  
 lodging. An estimated value was used in the analysis.

87/R/WW/1 GREAT KNOTT I (RH)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSCTCDE VARIETY	NONE	PIRIMICA	Mean
AVALON	8.35	7.75	8.05
BRIMSTON	9.44	9.51	9.47
FORTRESS	8.89	9.25	9.07
GALAHAD	9.06	9.29	9.17
HORNET	9.41	9.62	9.52
MERCIA	8.75	9.04	8.89
MISSION	8.20	8.15	8.17
NORMAN	8.27	8.61	8.44
PARADE	8.95	8.98	8.97
RAPIER	9.37	9.64	9.51
RONDEZVO	9.07	9.43	9.25
Mean	8.89	9.02	8.96

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	INSCTCDE* VARIETY
s.e.d.	0.148	0.209

\* Within the same level of INSCTCDE only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.209	2.3
GRAIN MEAN DM%	81.8		
PLOT AREA HARVESTED	0.00245		

87/R/WW/1 HIGHFIELD (RD)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSCTCDE VARIETY	NONE	PIRIMICA	Mean
AVALON A	7.82	8.00	7.91
AVALON N	7.87	8.13	8.00
BRIMSTON	5.52	8.34	6.93
FORTRESS	8.49	8.93	8.71
GALAHAD	8.95	8.93	8.94
HORNET	9.05	9.36	9.20
MERCIA	8.37	8.64	8.51
MISSION	7.05	7.07	7.06
NORMAN A	8.52	8.55	8.53
NORMAN N	8.16	8.51	8.34
PARADE	8.42	8.98	8.70
RAPIER	7.89	8.13	8.01
RONDEZVO	7.62	8.53	8.08
Mean	7.98	8.47	8.22

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	INSCTCDE* VARIETY
s.e.d.	0.342	0.483

\* Within the same level of INSCTCDE

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	23	0.483	5.9

GRAIN MEAN DM% 82.8

PLOT AREA HARVESTED 0.00244

87/R/WW/3

WINTER WHEAT

FACTORS AFFECTING TILLERING AND YIELD

Object: To study the effects of soil residual nitrogen and applied fertilizer nitrogen on tillering, growth and yield of winter wheat sown early or later - Fosters corner.

Sponsors: R.D. Prew, R.J. Darby, W. Day, D.W. Lawlor, G.F.J. Milford, A. Penny, G.N. Thorne, A.D. Todd.

Design: A single replicate of 2 x 2 x 2 x 2 x 2 + 32 extra plots.

Whole plot dimensions: 3.0 x 16.0.

Treatments: All combinations of the following:-

- 1. PREVCROP                  Previous cropping:
  - RAPE                         S. oilseed rape
  - OATS                         S. oats
- 2. SOWDATE                 Dates of sowing:
  - 18 SEPT                    Sown on 18 September, 1986
  - 16 OCT                     Sown on 16 October
- 3. WINTER N                Nitrogen (kg N) in winter (as urea):
  - 0                             None
  - 40                            40 kg applied on 20 November, 1986
- 4. SPRING N                 Application of 200 kg N in spring (as 'Nitro-Chalk'):
  - SINGLE                     Single application at date of 3rd divided application
  - DIVIDED                  Applied as 4 equal dressings
- 5. N TIME                    Timing of spring nitrogen:
  - N NORM                    Normal timing on 12 Feb, 1987, 11 Mar, 6 Apr and 5 May
  - N LATE                     Late timing on 11 Mar, 6 Apr, 5 May and 27 May

plus all combinations of the following (all sown early, given spring N divided and at normal time):-

- 1. PRECROPN                Previous cropping:
  - RAPE                         S. oilseed rape
  - OATS                         S. oats
- 2. WINTR NN                Nitrogen (kg N) in winter (as urea):
  - 0                             None
  - 40                            40 kg applied on 19 November, 1986

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3. SPRNG NN	Nitrogen (kg N) in spring (as 'Nitro-Chalk'):
0	None
150	150
250	250

plus 3 replicates of all combinations of the following (all following oats, sown on 18 Sept and not given Winter N, Spring N given as divided applications at normal time):-

1. SPRNG NP	Nitrogen (kg N) in spring (as 'Nitro-Chalk'):
0	None
80	80
200	200

2. SUMMR NP	Nitrogen (kg N) in summer, as a foliar spray of urea:
0	None
40	40 kg applied half on 27 May half on 28 May, 1987

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Chlortoluron at 5.6 kg in 200 l. Diclofop-methyl at 1.1 kg in 500 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg applied with the growth regulator in 200 l. Propiconazole at 0.12 kg in 200 l, and on a second occasion with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l. Growth regulator: Chlormequat chloride at 1.6 kg. Molluscicide: Methiocarb at 0.22 kg.

Seed: Avalon, sown at 190 kg.

Cultivations, etc.:- PK applied: 15 Sept, 1986. Ploughed: 16 Sept. Rotary harrowed, methiocarb applied: 17 Sept. SOWDATE 18 SEPT plots rotary harrowed, seed sown: 18 Sept. SOWDATE 16 OCT plots rotary harrowed, seed sown: 16 Oct. Chlortoluron applied: 17 Oct. Diclofop-methyl applied: 5 Jan, 1987. Prochloraz with carbendazim and the growth regulator applied: 14 Apr. Propiconazole applied: 28 May. Propiconazole with carbendazim and maneb applied: 23 June. Combine harvested: 31 Aug. Previous crops: W. oats 1985, s. oats and s. rape 1986.

NOTE: Soil samples were taken to measure nitrate and ammonia contents in September, 1986, November and February, 1987. Photosynthesis, dry weight, leaf area, shoot numbers, N content of the above-ground crop and stem nitrate contents were measured on several occasions. Foliar diseases were assessed.

87/R/WW/3

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOWDATE	18 SEPT	16 OCT	Mean
PREVCROP			
RAPE	8.58	8.46	8.52
OATS	8.50	8.23	8.36
Mean	8.54	8.34	8.44
WINTER N	0	40	Mean
PREVCROP			
RAPE	8.57	8.47	8.52
OATS	8.15	8.58	8.36
Mean	8.36	8.52	8.44
WINTER N	0	40	Mean
SOWDATE			
18 SEPT	8.51	8.57	8.54
16 OCT	8.21	8.47	8.34
Mean	8.36	8.52	8.44
SPRING N	SINGLE	DIVIDED	Mean
PREVCROP			
RAPE	8.48	8.56	8.52
OATS	8.15	8.57	8.36
Mean	8.32	8.57	8.44
SPRING N	SINGLE	DIVIDED	Mean
SOWDATE			
18 SEPT	8.39	8.69	8.54
16 OCT	8.24	8.45	8.34
Mean	8.32	8.57	8.44
SPRING N	SINGLE	DIVIDED	Mean
WINTER N			
0	8.16	8.57	8.36
40	8.48	8.57	8.52
Mean	8.32	8.57	8.44
N TIME	N NORM	N LATE	Mean
PREVCROP			
RAPE	8.50	8.54	8.52
OATS	8.48	8.25	8.36
Mean	8.49	8.39	8.44
N TIME	N NORM	N LATE	Mean
SOWDATE			
18 SEPT	8.64	8.44	8.54
16 OCT	8.34	8.34	8.34
Mean	8.49	8.39	8.44



87/R/WW/3

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N TIME	N NORM	N LATE	Mean
WINTER N			
0	8.44	8.29	8.36
40	8.55	8.50	8.52
Mean	8.49	8.39	8.44
N TIME	N NORM	N LATE	Mean
SPRING N			
SINGLE	8.49	8.14	8.32
DIVIDED	8.49	8.64	8.57
Mean	8.49	8.39	8.44
PREVCROP	WINTER N	0	40
RAPE	SOWDATE		
	18 SEPT	8.72	8.45
	16 OCT	8.43	8.49
OATS	18 SEPT	8.30	8.70
	16 OCT	8.00	8.46
PREVCROP	SPRING N	SINGLE	DIVIDED
RAPE	SOWDATE		
	18 SEPT	8.55	8.61
	16 OCT	8.41	8.51
OATS	18 SEPT	8.24	8.76
	16 OCT	8.07	8.38
PREVCROP	SPRING N	SINGLE	DIVIDED
RAPE	WINTER N		
	0	8.44	8.70
	40	8.52	8.42
OATS	0	7.87	8.43
	40	8.44	8.71
SOWDATE	SPRING N	SINGLE	DIVIDED
18 SEPT	WINTER N		
	0	8.30	8.72
	40	8.49	8.66
16 OCT	0	8.01	8.41
	40	8.47	8.48
PREVCROP	N TIME	N NORM	N LATE
RAPE	SOWDATE		
	18 SEPT	8.55	8.62
	16 OCT	8.46	8.46
OATS	18 SEPT	8.73	8.27
	16 OCT	8.23	8.23

87/R/WW/3

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N TIME	N NORM	N LATE	
PREVCROP	WINTER N			
RAPE	0	8.59	8.55	
	40	8.42	8.52	
OATS	0	8.28	8.02	
	40	8.68	8.48	
	N TIME	N NORM	N LATE	
SOWDATE	WINTER N			
18 SEPT	0	8.65	8.37	
	40	8.63	8.51	
16 OCT	0	8.23	8.20	
	40	8.46	8.49	
	N TIME	N NORM	N LATE	
PREVCROP	SPRING N			
RAPE	SINGLE	8.58	8.38	
	DIVIDED	8.43	8.69	
OATS	SINGLE	8.41	7.90	
	DIVIDED	8.55	8.60	
	N TIME	N NORM	N LATE	
SOWDATE	SPRING N			
18 SEPT	SINGLE	8.67	8.12	
	DIVIDED	8.61	8.77	
16 OCT	SINGLE	8.32	8.17	
	DIVIDED	8.37	8.52	
	N TIME	N NORM	N LATE	
WINTER N	SPRING N			
0	SINGLE	8.41	7.90	
	DIVIDED	8.46	8.67	
40	SINGLE	8.58	8.38	
	DIVIDED	8.51	8.62	
WINTR NN	0	40	Mean	
PRECROPN				
RAPE	7.66	7.90	7.78	
OATS	7.07	7.46	7.26	
Mean	7.36	7.68	7.52	
SPRNG NN	0	150	250	Mean
PRECROPN				
RAPE	5.91	8.60	8.83	7.78
OATS	4.49	8.34	8.96	7.26
Mean	5.20	8.47	8.89	7.52
SPRNG NN	0	150	250	Mean
WINTR NN				
0	4.76	8.43	8.89	7.36
40	5.64	8.51	8.89	7.68
Mean	5.20	8.47	8.89	7.52

87/R/WW/3

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	SPRNG NN	0	150	250
PRECROPN	WINTR NN			
RAPE	0	5.56	8.61	8.80
	40	6.26	8.59	8.85
OATS	0	3.96	8.26	8.99
	40	5.01	8.42	8.94

\*\*\* Standard errors of differences of means \*\*\*

Table	PREVCROP	SOWDATE	WINTER N	SPRING N
s.e.d.	0.102	0.102	0.102	0.102
Table	N TIME	PREVCROP	PREVCROP	SOWDATE
s.e.d.	0.102	SOWDATE	WINTER N	WINTER N
		0.145	0.145	0.145
Table	PREVCROP	SOWDATE	WINTER N	PREVCROP
s.e.d.	SPRING N	SPRING N	SPRING N	N TIME
	0.145	0.145	0.145	0.145
Table	SOWDATE	WINTER N	SPRING N	PREVCROP
s.e.d.	N TIME	N TIME	N TIME	SOWDATE
	0.145	0.145	0.145	WINTER N
				0.205
Table	PREVCROP	PREVCROP	SOWDATE	PREVCROP
s.e.d.	SOWDATE	WINTER N	WINTER N	SOWDATE
	SPRING N	SPRING N	SPRING N	N TIME
	0.205	0.205	0.205	0.205
Table	PREVCROP	SOWDATE	PREVCROP	SOWDATE
s.e.d.	WINTER N	WINTER N	SPRING N	SPRING N
	N TIME	N TIME	N TIME	N TIME
	0.205	0.205	0.205	0.205
Table	WINTER N			
s.e.d.	SPRING N			
	N TIME			
	0.205			

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	6	0.290	3.4

GRAIN MEAN DM% 82.6

PLOT AREA HARVESTED 0.00207

87/R/WW/3

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SUMMR NP	0	40	Mean
SPRNG NP			
0	3.51	4.21	3.86
80	6.57	6.94	6.76
200	8.23	8.46	8.34
Mean	6.11	6.54	6.32

\*\*\* Standard errors of differences of means \*\*\*

Table	SPRNG NP	SUMMR NP	SPRNG NP SUMMR NP
s.e.d.	0.223	0.182	0.315

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	10	0.386	6.1

GRAIN MEAN DM% 80.6

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SUMMR NP	0	40	Mean
SPRNG NP			
0	3.65	3.86	3.76
80	6.39	6.53	6.46
200	7.83	8.33	8.08
Mean	5.95	6.24	6.10

STRAW MEAN DM% 60.7

PLOT AREA HARVESTED 0.00047

87/R/WW/4

WINTER WHEAT

FACTORS AFFECTING TAKE-ALL

Object: To study the effects of a range of factors on the incidence of take-all and on the yield of w. wheat - Summerdells I.

Sponsors: D. Hornby, G.L. Bateman, R.J. Gutteridge.

Design: A single replicate of 2 x 2 x 2 x 2 x 2.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. SOWDATE                      Dates of sowing:  
    25 SEPT                      25 September, 1986  
    31 OCT                        31 October
2. SOILFUNG                    Application of fungicide to the seedbed:  
    NONE                         None  
    NUARIMOL                    Nuarimol at 1.3 kg in 375 l
3. SEEDRESS                    Seed dressings:  
    ORGANO M                    Organo mercury  
    TRIADIME                    Triadimenol plus fuberidazole
4. AUTUMN N                    N application to the seedbed:  
    0                              None  
    60                             60 kg N as 'Nitro-Chalk' on 25 Sept, 1986 or 31 Oct  
                                      for successive SOWDATES
5. N TIME                        Spring application of 200 kg N:  
    SINGLE                        Single application on 16 Apr, 1987  
    DIVIDED                      40 kg early, on 13 Feb, 160 kg later, on 16 Apr
6. N FORM                        Forms of spring nitrogen:  
    SUL AMM                      Sulphate of ammonia  
    AMM NITR                     Ammonium nitrate as 'Nitro-Chalk'

NOTE: Nuarimol was applied at 1.3 kg in error for the intended rate of 1.0 kg.

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides: Carbendazim at 0.15 kg and prochloraz at 0.40 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l.

Seed: Avalon, sown at 170 kg.

87/R/WW/4

Cultivations, etc.:— Heavy spring-tine cultivated, disced: 19 Aug, 1986. Chalk applied: 4 Sept. Paraquat applied: 11 Sept. Spring-tine cultivated: 24 Sept. SOWDATE 25 SEPT plots rotary harrowed, seed sown: 25 Sept. SOWDATE 31 OCT plots rotary harrowed, seed sown: 31 Oct. Remaining weedkillers applied: 16 Apr, 1987. Carbendazim and prochloraz applied: 7 May. Propiconazole, carbendazim and maneb applied: 1 July. Combine harvested: 4 Sept. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Plant samples were taken in mid-March, end of April and the beginning of July to assess take-all. Eyespot and sharp eyespot were assessed in July. Components of yield were measured and quality assessments were made on the grain.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOILFUNG	NONE	NUARIMOL	Mean
SOWDATE			
25 SEPT	5.97	6.23	6.10
31 OCT	5.67	6.09	5.88
Mean	5.82	6.16	5.99
SEEDRESS	ORGANO M	TRIADIME	Mean
SOWDATE			
25 SEPT	6.13	6.06	6.10
31 OCT	5.88	5.88	5.88
Mean	6.01	5.97	5.99
SEEDRESS	ORGANO M	TRIADIME	Mean
SOILFUNG			
NONE	5.74	5.90	5.82
NUARIMOL	6.28	6.04	6.16
Mean	6.01	5.97	5.99
AUTUMN N	0	60	Mean
SOWDATE			
25 SEPT	5.85	6.34	6.10
31 OCT	5.71	6.05	5.88
Mean	5.78	6.20	5.99
AUTUMN N	0	60	Mean
SOILFUNG			
NONE	5.65	5.99	5.82
NUARIMOL	5.91	6.40	6.16
Mean	5.78	6.20	5.99

87/R/WW/4

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

AUTUMN N	0	60	Mean
SEEDRESS			
ORGANO M	5.79	6.23	6.01
TRIADIME	5.77	6.17	5.97
Mean	5.78	6.20	5.99
N TIME	SINGLE	DIVIDED	Mean
SOWDATE			
25 SEPT	6.03	6.16	6.10
31 OCT	5.87	5.88	5.88
Mean	5.95	6.02	5.99
N TIME	SINGLE	DIVIDED	Mean
SOILFUNG			
NONE	5.80	5.83	5.82
NUARIMOL	6.11	6.21	6.16
Mean	5.95	6.02	5.99
N TIME	SINGLE	DIVIDED	Mean
SEEDRESS			
ORGANO M	6.05	5.96	6.01
TRIADIME	5.85	6.08	5.97
Mean	5.95	6.02	5.99
N TIME	SINGLE	DIVIDED	Mean
AUTUMN N			
0	5.70	5.85	5.78
60	6.20	6.19	6.20
Mean	5.95	6.02	5.99
N FORM	SUL AMM	AMM NITR	Mean
SOWDATE			
25 SEPT	5.90	6.30	6.10
31 OCT	5.90	5.86	5.88
Mean	5.90	6.08	5.99
N FORM	SUL AMM	AMM NITR	Mean
SOILFUNG			
NONE	5.68	5.95	5.82
NUARIMOL	6.11	6.20	6.16
Mean	5.90	6.08	5.99

87/R/WW/4

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N FORM	SUL	AMM	AMM	NITR	Mean
SEEDRESS					
ORGANO M	5.90		6.11		6.01
TRIADIME	5.89		6.05		5.97
Mean	5.90		6.08		5.99

  

N FORM	SUL	AMM	AMM	NITR	Mean
AUTUMN N					
0	5.63		5.93		5.78
60	6.16		6.23		6.20
Mean	5.90		6.08		5.99

  

N FORM	SUL	AMM	AMM	NITR	Mean
N TIME					
SINGLE	5.83		6.07		5.95
DIVIDED	5.96		6.08		6.02
Mean	5.90		6.08		5.99

  

SOWDATE	SOILFUNG	NONE	NUARIMOL
25 SEPT	SEEDRESS	ORGANO M	ORGANO M TRIADIME
31 OCT			
		5.95	5.99 6.32 6.13
		5.53	5.80 6.23 5.95

  

SOWDATE	SOILFUNG	NONE	NUARIMOL
25 SEPT	AUTUMN N	0	60
31 OCT			
		5.70	6.23 6.00 6.45
		5.59	5.74 5.82 6.36

  

SOWDATE	SEEDRESS	ORGANO M	TRIADIME
25 SEPT	AUTUMN N	0	60
31 OCT			
		5.86	6.40 5.84 6.28
		5.71	6.05 5.70 6.05

  

SOILFUNG	SEEDRESS	ORGANO M	TRIADIME
NONE	AUTUMN N	0	60
NUARIMOL			
		5.58	5.90 5.71 6.08
		6.00	6.56 5.83 6.25

  

SOWDATE	SOILFUNG	NONE	NUARIMOL
25 SEPT	N TIME	SINGLE	DIVIDED
31 OCT			
		5.92	6.01 6.15 6.31
		5.68	5.65 6.07 6.11

  

SOWDATE	SEEDRESS	ORGANO M	TRIADIME
25 SEPT	N TIME	SINGLE	DIVIDED
31 OCT			
		6.20	6.07 5.87 6.26
		5.90	5.86 5.84 5.91



87/R/WW/4

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOILFUNG	SEEDRESS	ORGANO M		TRIADIME	
	N TIME	SINGLE	DIVIDED	SINGLE	DIVIDED
NONE		5.75	5.73	5.85	5.94
NUARIMOL		6.35	6.20	5.86	6.22

SOWDATE	AUTUMN N	0		60	
	N TIME	SINGLE	DIVIDED	SINGLE	DIVIDED
25 SEPT		5.69	6.02	6.38	6.31
31 OCT		5.72	5.69	6.02	6.07

SOILFUNG	AUTUMN N	0		60	
	N TIME	SINGLE	DIVIDED	SINGLE	DIVIDED
NONE		5.52	5.78	6.08	5.89
NUARIMOL		5.89	5.93	6.32	6.49

SEEDRESS	AUTUMN N	0		60	
	N TIME	SINGLE	DIVIDED	SINGLE	DIVIDED
ORGANO M		5.68	5.90	6.42	6.03
TRIADIME		5.73	5.81	5.98	6.35

SOWDATE	SOILFUNG	NONE			NUARIMOL				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
25 SEPT		5.70	6.23	6.09	6.36				
31 OCT		5.66	5.67	6.13	6.05				

SOWDATE	SEEDRESS	ORGANO M			TRIADIME				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
25 SEPT		5.84	6.43	5.96	6.16				
31 OCT		5.97	5.79	5.82	5.93				

SOILFUNG	SEEDRESS	ORGANO M			TRIADIME				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
NONE		5.56	5.92	5.80	5.99				
NUARIMOL		6.25	6.30	5.97	6.11				

SOWDATE	AUTUMN N	0			60				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
25 SEPT		5.49	6.21	6.30	6.39				
31 OCT		5.77	5.64	6.02	6.08				

SOILFUNG	AUTUMN N	0			60				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
NONE		5.40	5.90	5.96	6.01				
NUARIMOL		5.87	5.96	6.36	6.45				

SEEDRESS	AUTUMN N	0			60				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
ORGANO M		5.56	6.02	6.25	6.20				
TRIADIME		5.71	5.83	6.07	6.26				

SOWDATE	N TIME	SINGLE			DIVIDED				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
25 SEPT		5.75	6.31	6.04	6.28				
31 OCT		5.91	5.83	5.88	5.89				

87/R/WW/4

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOILFUNG	N TIME	SINGLE			DIVIDED				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
NONE			5.53		6.07		5.83		5.84
NUARIMOL			6.13		6.08		6.09		6.33

SEEDRESS	N TIME	SINGLE			DIVIDED				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
ORGANO M			5.95		6.15		5.86		6.07
TRIADIME			5.71		6.00		6.06		6.10

AUTUMN N	N TIME	SINGLE			DIVIDED				
	N FORM	SUL	AMM	AMM	NITR	SUL	AMM	AMM	NITR
0			5.44		5.97		5.82		5.89
60			6.22		6.18		6.10		6.28

\*\*\* Standard errors of differences of means \*\*\*

Margins of two factor tables	0.173
Two factor tables	0.245
Three factor tables	0.347

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	19	0.693	11.6

GRAIN MEAN DM% 72.5

PLOT AREA HARVESTED 0.00272

87/R/WW/5

WINTER WHEAT

APHICIDE, N AND FUNGICIDE

Object: To determine the economic thresholds for cereal aphids with different levels of inputs - Delafield.

Sponsor: N. Carter.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 3.0 x 12.0.

Treatments: All combinations of:-

1. APHICIDE            Aphicides (applied in 200 l):  
    NONE                None  
    PIRIMICA            Pirimicarb applied at 0.14 kg on 23 June, 1987, 3 July and 16 July
2. N RATE             Nitrogen fertilizers (kg N) as 'Nitram' on 14 Apr, 1987:  
  
    80  
    120  
    160
3. FUNGICIDE         Fungicides:  
  
    NONE                None  
    31+39+59            Fungicide sprays at growth stage 31, 39, 59:  
                          G.S. 31 - Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 380 l on 6 May, 1987  
                          G.S. 39 - Propiconazole at 0.12 kg in 200 l on 28 May  
                          G.S. 59 - Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l on 23 June

Basal applications: Weedkillers: Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l. Glyphosate at 1.4 kg in 200 l. Growth regulator: Chlormequat at 1.6 kg in 200 l.

Seed: Avalon, sown at 200 kg.

Cultivations, etc.:- Rotary harrowed, seed sown: 6 Nov, 1986. Clopyralid, bromoxynil and mecoprop applied: 23 Apr, 1987. Growth regulator applied: 6 May. Glyphosate applied: 17 Aug. Combine harvested: 1 Sept. Previous crops: W. wheat 1985, potatoes 1986.

NOTE: Aphids were counted from early June until late July. Plant samples were taken at anthesis for dry weight measurements. Disease assessments were made in late June and late July. Components of yield were measured.

87/R/WW/5

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N RATE	80	120	160	Mean
APHICIDE				
NONE	6.62	6.96	7.21	6.93
PIRIMICA	6.73	7.27	7.47	7.16
Mean	6.68	7.12	7.34	7.04

FUNGCIDE	NONE	31+39+59	Mean
APHICIDE			
NONE	6.40	7.46	6.93
PIRIMICA	6.66	7.65	7.16
Mean	6.53	7.56	7.04

FUNGCIDE	NONE	31+39+59	Mean
N RATE			
80	6.39	6.96	6.68
120	6.57	7.66	7.12
160	6.64	8.04	7.34
Mean	6.53	7.56	7.04

	N RATE	80	120	160			
APHICIDE	FUNGCIDE	NONE	31+39+59	NONE	31+39+59	NONE	31+39+59
NONE		6.25	7.00	6.50	7.42	6.46	7.95
PIRIMICA		6.54	6.92	6.65	7.90	6.81	8.13

\*\*\* Standard errors of differences of means \*\*\*

Table	APHICIDE	N RATE	FUNGCIDE	APHICIDE N RATE
s.e.d.	0.124	0.152	0.124	0.215

Table	APHICIDE FUNGCIDE	N RATE FUNGCIDE	APHICIDE N RATE FUNGCIDE
s.e.d.	0.176	0.215	0.304

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	22	0.373	5.3

GRAIN MEAN DM% 83.9

PLOT AREA HARVESTED 0.00258

87/R/WW/6

WINTER WHEAT

N AND DCD

Object: To study the effects of a nitrification inhibitor in combination with different rates and timings of N on yield - Claycroft.

Sponsors: A. Penny, R.J. Darby, M.V. Hewitt.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 3.0 x 11.0.

Treatments: All combinations of:-

1. N INHIB            Nitrification inhibitor added to nitrogen fertilizer:

NONE	None
DICYANDI	Dicyandiamide at 16 kg, divided equally between applications

2. N TIME            Time and division of aqueous nitrogen fertilizer:

1 1 1 1	Quarter of N on each of 25 Feb, 1987, 30 Mar, 21 Apr, 19 May
2 2 - -	Half of N on each of 25 Feb, 30 Mar
2 - 2 -	Half of N on each of 25 Feb, 21 Apr
- 2 2 -	Half of N on each of 30 Mar, 21 Apr
4 - - -	All of N on 25 Feb
- - 4 -	All of N on 21 Apr

3. N RATE            Amount of nitrogen fertilizer applied (kg N):

160	160
240	240

plus extra treatments given no nitrification inhibitor all combinations of:-

1. N TIMENC            Time and division of nitrogen fertilizer as 'Nitro-Chalk':

- 2 2 -	Half of N on each of 30 Mar, 1987, 21 Apr
- - 4 -	All of N on 21 Apr

2. N RATENC            Amount of nitrogen fertilizer applied (kg N):

160	160
240	240

plus one extra treatment

EXTRA

NONE            No nitrogen fertilizer or inhibitor (duplicated)

NOTE: Nitrogen was applied as a mixture of urea and ammonium nitrate (28% N).

87/R/WW/6

Basal applications: Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg in 200 l. Clopyralid at 0.05 kg and bromoxynil at 0.24 kg with mecoprop at 1.8 kg applied with the prochloraz and carbendazim in 200 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.: - Heavy spring-tine cultivated: 5 Sept, 1986. Paraquat applied: 30 Sept. Disced: 2 Oct. Disced, rotary harrowed: 3 Oct. Seed sown: 4 Oct. Isoproturon applied: 31 Mar, 1987. Clopyralid, bromoxynil, mecoprop, prochloraz and carbendazim applied: 18 Apr. Propiconazole with carbendazim and maneb applied: 23 June. Combine harvested: 31 Aug. Previous crops: S. barley 1985, w. wheat 1986.

NOTE: The crop was sampled in mid-June to measure dry matter, ear numbers and N content. The N content of the grain was determined.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N INHIB N TIME	NONE	DICYANDI	Mean
1 1 1 1	5.94	6.27	6.10
2 2 - -	5.96	6.03	6.00
2 - 2 -	5.88	5.96	5.92
- 2 2 -	5.91	5.94	5.92
4 - - -	5.75	6.11	5.93
- - 4 -	6.12	5.92	6.02
Mean	5.93	6.04	5.98
N RATE N TIME	160	240	Mean
1 1 1 1	5.84	6.37	6.10
2 2 - -	5.72	6.27	6.00
2 - 2 -	5.70	6.14	5.92
- 2 2 -	5.80	6.04	5.92
4 - - -	5.75	6.11	5.93
- - 4 -	5.93	6.11	6.02
Mean	5.79	6.17	5.98
N RATE N INHIB	160	240	Mean
NONE	5.86	5.99	5.93
DICYANDI	5.72	6.35	6.04
Mean	5.79	6.17	5.98

87/R/WW/6

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N INHIB	NONE	240	DICYANDI	240
N RATE	160		160	
N TIME				
1 1 1 1	5.93	5.95	5.76	6.78
2 2 - -	6.02	5.90	5.42	6.63
2 - 2 -	5.80	5.97	5.60	6.32
- 2 2 -	5.67	6.15	5.94	5.94
4 - - -	5.58	5.92	5.92	6.30
- - 4 -	6.17	6.08	5.69	6.15
N RATENC	160	240	Mean	
N TIMENC				
- 2 2 -	6.17	6.02	6.09	
- - 4 -	5.72	5.62	5.67	
Mean	5.95	5.82	5.88	
NONE	2.96			
Grand mean	5.77			

\*\*\* Standard errors of differences of means \*\*\*

Table	N INHIB	N TIME	N RATE	N TIMEC
s.e.d.	0.136	0.236	0.136	0.334
Table	N RATENC	N INHIB	N INHIB	N TIME
s.e.d.	0.334	N TIME	N RATE	N RATE
		0.334	0.193	0.334
Table	N TIMENC	N INHIB		
s.e.d.	N RATENC	N TIME		
		N RATE		
	0.472	0.472		

SED of NONE v any item in N TIMEC.N RATENC table or N INHIB.N TIME.N RATE table is 0.409

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.472	8.2
GRAIN MEAN DM%	81.5		
PLOT AREA HARVESTED	0.00253		

87/R/B/1

WINTER BARLEY

FACTORS LIMITING YIELD

Object: To study the effects of a range of factors on the quality and yield of winter barley - Summerdells II.

Sponsors: J.F. Jenkyn, R.J.Gutteridge, R.T. Plumb, D.G. Christian, R.J. Darby, S.H.T. Harper, L.A. Mullen, N. Carter, G.J.S. Ross.

Associate sponsors: B.R. Kerry, W.Day.

Design: A single replicate of 2 x 2 x 2 x 2 x 2 x 2 + 24 extra plots.

Whole plot dimensions: 3.0 x 15.2.

Treatments: All combinations of the following, all sown early (18 Sept, 1986) and given cypermethrin at 0.025 kg in 220 l on 31 Oct:

1. PREVCROP            Previous cropping:  

BARLEY	W. wheat 1984, s. barley 1985, w. barley 1986
OATS	W. wheat 1984, s. barley 1985, w. oats ploughed out and resown to s. oats 1986
  
2. WINTER N            Nitrogen fertilizer in winter (kg N) as prilled urea (46% N):  

0	None
26+25	26 on 17 Nov, 1986, 25 on 16 Feb, 1987
  
3. SPRING N            Nitrogen fertilizer in spring (kg N) as 'Nitro-Chalk':  

105	
155	
  
4. N TIME              Timing of spring nitrogen application:  

16 MARCH	16 March, 1987
13 APRIL	13 April
  
5. E FUNG              Early fungicides:  

NONE	None
TFSD	Triadimenol and fuberidazole seed dressing
  
6. L FUNG              Late fungicides:  

NONE	None
SPRAYS	Prochloraz at 0.40 kg, carbendazim at 0.15 kg and tridemorph at 0.52 kg in 220 l on 15 Apr, 1987. Propiconazole at 0.12 kg and tridemorph at 0.22 kg in 220 l on 27 May



87/R/B/1

plus all combinations of the following all after barley and given late fungicides and 105 kg N in spring, not given cypermethrin in the autumn:

1. SOWDATEV

18 SEPT	18 September, 1986
17 OCT	17 October

2. WINTR NV Nitrogen fertilizer in winter (kg N) as prilled urea (46 %N):

0	None
26+25	26 on 17 Nov, 1986, 25 on 16 Feb, 1987

3. E FUNGV Early fungicides:

NONE	None
TFSD	Triadimenol and fuberidazole seed dressing

4. N TIMEV Timing of spring nitrogen application:

16 MARCH	16 March, 1987
13 APRIL	13 April

plus 2 extra treatments following fallow, sown 18 September and given early and late fungicides, cypermethrin, 105 kg spring nitrogen but not given winter nitrogen:

N TIMEF Timing of spring nitrogen application:

16 MARCH	16 March, 1987 (duplicated)
13 APRIL	13 April (duplicated)

plus 1 extra treatment following barley, sown 18 September given early and late fungicides, cypermethrin, 155 kg spring nitrogen in April:

WINTER NX Extra winter nitrogen (kg N):

51+25	51 kg on 17 Nov, 1986, 25 kg on 16 Feb, 1987 (duplicated)
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plus 1 extra treatment following barley, sown 18 September, and given early and late fungicides, cypermethrin but no nitrogen:

EXTRA NO

0+0+0	No nitrogen (duplicated)
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Basal applications: Weedkillers: Paraquat at 0.60 kg ion in 200 l on two occasions. Isoproturon at 2.5 kg, clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Glyphosate at 1.4 kg in 220 l. Growth regulators: Mepiquat chloride at 0.61 kg and 2-chloroethylphosphonic acid at 0.31 kg with a wetting agent ('Cittowet' at 0.08 l) in 200 l.

Seed: Magie, sown at 300 seeds per square metre.

87/R/B/1

Cultivations, etc.:- Paraquat applied: 12 Aug, 1986. Heavy spring-tine cultivated, cultivated by rotary grubber: 18 Aug. Paraquat applied: 10 Sept. SOWDATE 18 SEPT plots spring-tine cultivated, rotary harrowed and seed sown: 18 Sept. SOWDATE 17 OCT plots rotary harrowed and seed sown: 17 Oct. Isoproturon, clopyralid, bromoxynil and mecoprop applied: 16 Apr, 1987. Growth regulators with wetting agent applied: 27 Apr. Glyphosate applied: 30 July. Combine harvested: 6 Aug. Previous crops: S. barley 1985, w. barley, s oats, fallow 1986.

- NOTES: (1) Soil samples were taken to measure nitrate and ammonium contents in September, 1986, November and February, 1987. Crop samples were taken to measure nitrate N concentrations from November to April.
- (2) Plants were sampled in March, April and June, to measure plant and shoot numbers, dry weights and nitrogen uptakes. After harvest thousand grain weights were measured.
- (3) Leaf diseases, take-all, eyespot, barley yellow dwarf virus and aphid incidence were assessed.
- (4) A cage was erected over the crop from early June to maturity to prevent damage by birds.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

WINTER N	0	26+25	Mean
PREVCROP			
BARLEY	4.83	5.63	5.23
OATS	6.33	7.07	6.70
Mean	5.58	6.35	5.96
E FUNG	NONE	TFSD	Mean
PREVCROP			
BARLEY	5.21	5.25	5.23
OATS	6.74	6.66	6.70
Mean	5.97	5.95	5.96
E FUNG	NONE	TFSD	Mean
WINTER N			
0	5.58	5.58	5.58
26+25	6.36	6.33	6.35
Mean	5.97	5.95	5.96
L FUNG	NONE	SPRAYS	Mean
PREVCROP			
BARLEY	4.89	5.57	5.23
OATS	6.21	7.18	6.70
Mean	5.55	6.38	5.96

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

L FUNG	NONE	SPRAYS	Mean
WINTER N			
0	5.18	5.98	5.58
26+25	5.92	6.77	6.35
Mean	5.55	6.38	5.96
L FUNG	NONE	SPRAYS	Mean
E FUNG			
NONE	5.56	6.39	5.97
TFSD	5.55	6.36	5.95
Mean	5.55	6.38	5.96
SPRING N	105	155	Mean
PREVCROP			
BARLEY	5.07	5.39	5.23
OATS	6.47	6.93	6.70
Mean	5.77	6.16	5.96
SPRING N	105	155	Mean
WINTER N			
0	5.30	5.86	5.58
26+25	6.23	6.46	6.35
Mean	5.77	6.16	5.96
SPRING N	105	155	Mean
E FUNG			
NONE	5.81	6.14	5.97
TFSD	5.73	6.18	5.95
Mean	5.77	6.16	5.96
SPRING N	105	155	Mean
L FUNG			
NONE	5.43	5.67	5.55
SPRAYS	6.10	6.65	6.38
Mean	5.77	6.16	5.96
N TIME	16 MARCH	13 APRIL	Mean
PREVCROP			
BARLEY	5.81	4.65	5.23
OATS	6.97	6.43	6.70
Mean	6.39	5.54	5.96

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N TIME	16 MARCH	13 APRIL	Mean
WINTER N			
0	6.16	5.00	5.58
26+25	6.61	6.08	6.35
Mean	6.39	5.54	5.96
N TIME	16 MARCH	13 APRIL	Mean
E FUNG			
NONE	6.38	5.57	5.97
TFSD	6.40	5.51	5.95
Mean	6.39	5.54	5.96
N TIME	16 MARCH	13 APRIL	Mean
L FUNG			
NONE	5.97	5.14	5.55
SPRAYS	6.81	5.95	6.38
Mean	6.39	5.54	5.96
N TIME	16 MARCH	13 APRIL	Mean
SPRING N			
105	6.18	5.36	5.77
155	6.60	5.73	6.16
Mean	6.39	5.54	5.96
	E FUNG	NONE	TFSD
PREVCROP	WINTER N		
BARLEY	0	4.80	4.86
	26+25	5.61	5.65
OATS	0	6.36	6.29
	26+25	7.12	7.02
	L FUNG	NONE	SPRAYS
PREVCROP	WINTER N		
BARLEY	0	4.48	5.18
	26+25	5.30	5.95
OATS	0	5.89	6.77
	26+25	6.54	7.60
	L FUNG	NONE	SPRAYS
PREVCROP	E FUNG		
BARLEY	NONE	4.90	5.51
	TFSD	4.88	5.62
OATS	NONE	6.22	7.27
	TFSD	6.21	7.10

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	L FUNG	NONE	SPRAYS
WINTER N	E FUNG		
0	NONE	5.19	5.98
	TFSD	5.18	5.97
26+25	NONE	5.93	6.80
	TFSD	5.91	6.75
	SPRING N	105	155
PREVCROP	WINTER N		
BARLEY	0	4.57	5.10
	26+25	5.57	5.69
OATS	0	6.04	6.62
	26+25	6.90	7.24
	SPRING N	105	155
PREVCROP	E FUNG		
BARLEY	NONE	5.10	5.31
	TFSD	5.03	5.47
OATS	NONE	6.52	6.96
	TFSD	6.42	6.89
	SPRING N	105	155
WINTER N	E FUNG		
0	NONE	5.35	5.81
	TFSD	5.25	5.90
26+25	NONE	6.27	6.46
	TFSD	6.20	6.46
	SPRING N	105	155
PREVCROP	L FUNG		
BARLEY	NONE	4.80	4.98
	SPRAYS	5.33	5.81
OATS	NONE	6.06	6.37
	SPRAYS	6.88	7.49
	SPRING N	105	155
WINTER N	L FUNG		
0	NONE	5.03	5.34
	SPRAYS	5.57	6.38
26+25	NONE	5.83	6.01
	SPRAYS	6.63	6.92
	SPRING N	105	155
E FUNG	L FUNG		
NONE	NONE	5.46	5.65
	SPRAYS	6.15	6.62
TFSD	NONE	5.40	5.69
	SPRAYS	6.05	6.67

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N TIME	16 MARCH	13 APRIL
PREVCROP	WINTER N		
BARLEY	0	5.53	4.13
	26+25	6.08	5.17
OATS	0	6.79	5.87
	26+25	7.15	6.99
	N TIME	16 MARCH	13 APRIL
PREVCROP	E FUNG		
BARLEY	NONE	5.74	4.68
	TFSD	5.88	4.63
OATS	NONE	7.02	6.47
	TFSD	6.92	6.39
	N TIME	16 MARCH	13 APRIL
WINTER N	E FUNG		
0	NONE	6.14	5.02
	TFSD	6.18	4.97
26+25	NONE	6.61	6.12
	TFSD	6.62	6.05
	N TIME	16 MARCH	13 APRIL
PREVCROP	L FUNG		
BARLEY	NONE	5.43	4.36
	SPRAYS	6.19	4.95
OATS	NONE	6.51	5.91
	SPRAYS	7.42	6.94
	N TIME	16 MARCH	13 APRIL
WINTER N	L FUNG		
0	NONE	5.79	4.58
	SPRAYS	6.53	5.42
26+25	NONE	6.15	5.70
	SPRAYS	7.08	6.47
	N TIME	16 MARCH	13 APRIL
E FUNG	L FUNG		
NONE	NONE	5.98	5.14
	SPRAYS	6.78	6.00
TFSD	NONE	5.97	5.13
	SPRAYS	6.83	5.89
	N TIME	16 MARCH	13 APRIL
PREVCROP	SPRING N		
BARLEY	105	5.64	4.50
	155	5.98	4.81
OATS	105	6.73	6.21
	155	7.21	6.64

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N TIME	16 MARCH	13 APRIL
WINTER N	SPRING N		
0	105	5.85	4.75
	155	6.47	5.24
26+25	105	6.51	5.96
	155	6.72	6.21

	N TIME	16 MARCH	13 APRIL
E FUNG	SPRING N		
NONE	105	6.24	5.38
	155	6.52	5.76
TFSD	105	6.13	5.33
	155	6.67	5.69

	N TIME	16 MARCH	13 APRIL
L FUNG	SPRING N		
NONE	105	5.85	5.02
	155	6.09	5.25
SPRAYS	105	6.51	5.69
	155	7.10	6.20

WINTR NV	0	26+25	Mean
SOWDATEV			
18 SEPT	4.70	5.90	5.30
17 OCT	5.25	5.60	5.42
Mean	4.97	5.75	5.36

N TIMEV	16 MARCH	14 APRIL	Mean
SOWDATEV			
18 SEPT	5.90	4.70	5.30
17 OCT	5.85	4.99	5.42
Mean	5.88	4.85	5.36

N TIMEV	16 MARCH	14 APRIL	Mean
WINTR NV			
0	5.63	4.31	4.97
26+25	6.12	5.38	5.75
Mean	5.88	4.85	5.36

E FUNGV	NONE	TFSD	Mean
SOWDATEV			
18 SEPT	5.35	5.24	5.30
17 OCT	5.38	5.47	5.42
Mean	5.37	5.36	5.36

87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

E FUNGV	NONE	TFSD	Mean
WINTR NV			
0	4.88	5.06	4.97
26+25	5.85	5.65	5.75
Mean	5.37	5.36	5.36
E FUNGV	NONE	TFSD	Mean
N TIMEV			
16 MARCH	5.88	5.88	5.88
14 APRIL	4.86	4.83	4.85
Mean	5.37	5.36	5.36
	N TIMEV	16 MARCH	14 APRIL
SOWDATEV	WINTR NV		
18 SEPT	0	5.34	4.05
	26+25	6.46	5.34
17 OCT	0	5.92	4.58
	26+25	5.79	5.41
	E FUNGV	NONE	TFSD
SOWDATEV	WINTR NV		
18 SEPT	0	4.42	4.97
	26+25	6.29	5.51
17 OCT	0	5.34	5.16
	26+25	5.42	5.78
	E FUNGV	NONE	TFSD
SOWDATEV	N TIMEV		
18 SEPT	16 MARCH	5.99	5.81
	14 APRIL	4.72	4.67
17 OCT	16 MARCH	5.77	5.94
	14 APRIL	4.99	5.00
	E FUNGV	NONE	TFSD
WINTR NV	N TIMEV		
0	16 MARCH	5.55	5.71
	14 APRIL	4.21	4.42
26+25	16 MARCH	6.20	6.04
	14 APRIL	5.50	5.25
	E FUNGV	NONE	TFSD
SOWDATEV	WINTR NV	N TIMEV	
18 SEPT	0	16 MARCH	4.91
		14 APRIL	3.93
	26+25	16 MARCH	7.06
		14 APRIL	5.51
17 OCT	0	16 MARCH	6.19
		14 APRIL	4.49
	26+25	16 MARCH	5.34
		14 APRIL	5.49



87/R/B/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N TIMEF	16 MARCH	14 APRIL	Mean
		7.34	6.79	7.06
WINTR NX	51+25			
	6.36			
EXTRA NO	0+0+0			
	2.45			

Grand mean 5.83

\*\*\* Standard errors of differences of means \*\*\*

(not including extra plots)

Margin of two factor tables	0.101
Two factor tables	0.143
Three factor tables	0.202

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	22	0.404	6.8

GRAIN MEAN DM% 85.3

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

WINTER N	0	26+25	Mean
PREVCROP			
BARLEY	2.36	2.73	2.55
OATS	2.72	2.91	2.81
Mean	2.54	2.82	2.68
E FUNG	NONE	TFSD	Mean
PREVCROP			
BARLEY	2.55	2.55	2.55
OATS	2.83	2.79	2.81
Mean	2.69	2.67	2.68
E FUNG	NONE	TFSD	Mean
WINTER N			
0	2.56	2.52	2.54
26+25	2.83	2.81	2.82
Mean	2.69	2.67	2.68

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

L FUNG	NONE	SPRAYS	Mean
PREVCROP			
BARLEY	2.31	2.79	2.55
OATS	2.41	3.21	2.81
Mean	2.36	3.00	2.68
L FUNG	NONE	SPRAYS	Mean
WINTER N			
0	2.26	2.82	2.54
26+25	2.46	3.18	2.82
Mean	2.36	3.00	2.68
L FUNG	NONE	SPRAYS	Mean
E FUNG			
NONE	2.36	3.03	2.69
TFSD	2.37	2.97	2.67
Mean	2.36	3.00	2.68
SPRING N	105	155	Mean
PREVCROP			
BARLEY	2.48	2.62	2.55
OATS	2.77	2.85	2.81
Mean	2.63	2.73	2.68
SPRING N	105	155	Mean
WINTER N			
0	2.43	2.65	2.54
26+25	2.82	2.81	2.82
Mean	2.63	2.73	2.68
SPRING N	105	155	Mean
E FUNG			
NONE	2.67	2.71	2.69
TFSD	2.58	2.75	2.67
Mean	2.63	2.73	2.68
SPRING N	105	155	Mean
L FUNG			
NONE	2.34	2.38	2.36
SPRAYS	2.91	3.08	3.00
Mean	2.63	2.73	2.68
N TIME	16 MARCH	13 APRIL	Mean
PREVCROP			
BARLEY	2.62	2.48	2.55
OATS	2.75	2.87	2.81
Mean	2.68	2.68	2.68

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N TIME	16 MARCH	13 APRIL	Mean
WINTER N			
0	2.61	2.47	2.54
26+25	2.75	2.88	2.82
Mean	2.68	2.68	2.68
N TIME	16 MARCH	13 APRIL	Mean
E FUNG			
NONE	2.69	2.69	2.69
TFSD	2.67	2.66	2.67
Mean	2.68	2.68	2.68
N TIME	16 MARCH	13 APRIL	Mean
L FUNG			
NONE	2.34	2.39	2.36
SPRAYS	3.03	2.97	3.00
Mean	2.68	2.68	2.68
N TIME	16 MARCH	13 APRIL	Mean
SPRING N			
105	2.68	2.57	2.63
155	2.68	2.78	2.73
Mean	2.68	2.68	2.68
PREVCROP	E FUNG	NONE	TFSD
BARLEY	WINTER N		
	0	2.33	2.40
	26+25	2.77	2.69
OATS	0	2.78	2.65
	26+25	2.88	2.93
PREVCROP	L FUNG	NONE	SPRAYS
BARLEY	WINTER N		
	0	2.14	2.59
	26+25	2.49	2.98
OATS	0	2.39	3.05
	26+25	2.44	3.37
PREVCROP	L FUNG	NONE	SPRAYS
BARLEY	E FUNG		
	NONE	2.27	2.83
	TFSD	2.35	2.74
OATS	NONE	2.44	3.23
	TFSD	2.38	3.19
WINTER N	L FUNG	NONE	SPRAYS
0	E FUNG		
	NONE	2.25	2.86
	TFSD	2.27	2.78
26+25	NONE	2.46	3.20
	TFSD	2.46	3.15

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	SPRING N	105	155
PREVCROP	WINTER N		
BARLEY	0	2.21	2.52
	26+25	2.75	2.72
OATS	0	2.64	2.79
	26+25	2.90	2.91
	SPRING N	105	155
PREVCROP	E FUNG		
BARLEY	NONE	2.49	2.61
	TFSD	2.47	2.62
OATS	NONE	2.86	2.81
	TFSD	2.69	2.88
	SPRING N	105	155
WINTER N	E FUNG		
0	NONE	2.44	2.67
	TFSD	2.42	2.63
26+25	NONE	2.91	2.75
	TFSD	2.74	2.88
	SPRING N	105	155
PREVCROP	L FUNG		
BARLEY	NONE	2.27	2.35
	SPRAYS	2.69	2.88
OATS	NONE	2.41	2.41
	SPRAYS	3.13	3.29
	SPRING N	105	155
WINTER N	L FUNG		
0	NONE	2.16	2.36
	SPRAYS	2.69	2.94
26+25	NONE	2.52	2.40
	SPRAYS	3.13	3.23
	SPRING N	105	155
E FUNG	L FUNG		
NONE	NONE	2.36	2.35
	SPRAYS	2.98	3.07
TFSD	NONE	2.32	2.41
	SPRAYS	2.84	3.10
	N TIME	16 MARCH	13 APRIL
PREVCROP	WINTER N		
BARLEY	0	2.48	2.25
	26+25	2.76	2.71
OATS	0	2.74	2.69
	26+25	2.75	3.06
	N TIME	16 MARCH	13 APRIL
PREVCROP	E FUNG		
BARLEY	NONE	2.63	2.48
	TFSD	2.61	2.48
OATS	NONE	2.75	2.91
	TFSD	2.74	2.83

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

WINTER N 0	N TIME	16 MARCH	13 APRIL
	E FUNG		
	NONE	2.60	2.51
	TFSD	2.62	2.42
	26+25		
	NONE	2.78	2.88
	TFSD	2.73	2.89
PREVCROP BARLEY	N TIME	16 MARCH	13 APRIL
	L FUNG		
	NONE	2.38	2.24
	SPRAYS	2.85	2.72
	OATS		
	NONE	2.29	2.54
	SPRAYS	3.21	3.21
WINTER N 0	N TIME	16 MARCH	13 APRIL
	L FUNG		
	NONE	2.34	2.19
	SPRAYS	2.89	2.75
	26+25		
	NONE	2.34	2.59
	SPRAYS	3.17	3.18
E FUNG NONE	N TIME	16 MARCH	13 APRIL
	L FUNG		
	NONE	2.31	2.40
	SPRAYS	3.07	2.99
	TFSD		
	NONE	2.36	2.37
	SPRAYS	2.99	2.94
PREVCROP BARLEY	N TIME	16 MARCH	13 APRIL
	SPRING N		
	105	2.59	2.37
	155	2.65	2.59
	OATS		
	105	2.78	2.76
	155	2.71	2.98
WINTER N 0	N TIME	16 MARCH	13 APRIL
	SPRING N		
	105	2.54	2.32
	155	2.69	2.62
	26+25		
	105	2.83	2.82
	155	2.68	2.95
E FUNG NONE	N TIME	16 MARCH	13 APRIL
	SPRING N		
	105	2.80	2.54
	155	2.58	2.85
	TFSD		
	105	2.56	2.60
	155	2.79	2.72
L FUNG NONE	N TIME	16 MARCH	13 APRIL
	SPRING N		
	105	2.44	2.25
	155	2.23	2.53
	SPRAYS		
	105	2.93	2.89
	155	3.13	3.04

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

WINTR NV	0	26+25	Mean
SOWDATEV			
18 SEPT	2.45	2.95	2.70
17 OCT	3.15	3.29	3.22
Mean	2.80	3.12	2.96
N TIMEV	16 MARCH	14 APRIL	Mean
SOWDATEV			
18 SEPT	2.99	2.41	2.70
17 OCT	3.45	2.99	3.22
Mean	3.22	2.70	2.96
N TIMEV	16 MARCH	14 APRIL	Mean
WINTR NV			
0	3.13	2.47	2.80
26+25	3.31	2.94	3.12
Mean	3.22	2.70	2.96
E FUNGV	NONE	TFSD	Mean
SOWDATEV			
18 SEPT	2.81	2.59	2.70
17 OCT	3.11	3.34	3.22
Mean	2.96	2.96	2.96
E FUNGV	NONE	TFSD	Mean
WINTR NV			
0	2.71	2.89	2.80
26+25	3.21	3.04	3.12
Mean	2.96	2.96	2.96
E FUNGV	NONE	TFSD	Mean
N TIMEV			
16 MARCH	3.29	3.14	3.22
14 APRIL	2.62	2.79	2.70
Mean	2.96	2.96	2.96
SOWDATEV	N TIMEV	16 MARCH	14 APRIL
18 SEPT	WINTR NV		
	0	2.79	2.10
	26+25	3.18	2.73
17 OCT	0	3.46	2.84
	26+25	3.44	3.15
SOWDATEV	E FUNGV	NONE	TFSD
18 SEPT	WINTR NV		
	0	2.36	2.53
	26+25	3.25	2.66
17 OCT	0	3.05	3.25
	26+25	3.16	3.43

87/R/B/1

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	E FUNGV	NONE	TFSD
SOWDATEV	N TIMEV		
18 SEPT	16 MARCH	3.21	2.76
	14 APRIL	2.40	2.43
17 OCT	16 MARCH	3.37	3.53
	14 APRIL	2.84	3.14

	E FUNGV	NONE	TFSD
WINTR NV	N TIMEV		
0	16 MARCH	3.10	3.15
	14 APRIL	2.31	2.63
26+25	16 MARCH	3.48	3.14
	14 APRIL	2.93	2.95

		E FUNGV	NONE	TFSD
SOWDATEV	WINTR NV	N TIMEV		
18 SEPT	0	16 MARCH	2.83	2.75
		14 APRIL	1.89	2.31
	26+25	16 MARCH	3.60	2.76
		14 APRIL	2.91	2.55
17 OCT	0	16 MARCH	3.37	3.55
		14 APRIL	2.74	2.94
	26+25	16 MARCH	3.37	3.51
		14 APRIL	2.95	3.34

N TIMEF	16 MARCH	14 APRIL	Mean
	3.37	3.28	3.32

WINTR NX	51+25
	3.45

EXTRA NO	0+0+0
	0.84

Grand mean 2.74

STRAW MEAN DM% 88.0

PLOT AREA HARVESTED 0.00245

87/R/B/2

WINTER BARLEY

SOWING DATES, APHIDS AND BYDV

Object: To study the relationship of aphid numbers in suction trap samples to crop populations and the incidence of BYDV on winter barley sown on a range of dates - Great Field II.

Sponsors: N. Carter, R.T. Plumb.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 3.0 x 18.0.

Treatments: All combinations of:-

- |             |   |
|-------------|---|
| 1. SOWDATE  | Dates of sowing:                                  |
| 12 SEPT     | 12 September, 1986                                |
| 22 SEPT     | 22 September                                      |
| 1 OCT       | 1 October   |
| 10 OCT      | 10 October  |
| 24 OCT      | 24 October  |
| 2. APHICIDE | Aphicide:   |
| NONE        | None  |
| CYPERMET    | Cypermethrin at 0.025 kg in 380 l on 12 Nov, 1986 |

- NOTES: (1) All SOWDATE treatments were rotary harrowed on the day of sowing.  
(2) The crop was netted against birds from late June until maturity.

Basal applications: Manures: 'Nitram' at 460 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Triadimenol at 0.12 kg in 200 l.

Seed: Igri, sown at 150 kg.

Cultivations, etc.:- Cultivated by rotary grubber: 13 Aug, 1986. Heavy spring-tine cultivated: 28 Aug. Paraquat applied: 10 Sept. Heavy spring-tine cultivated, rotary harrowed: 11 Sept. N applied: 21 Mar, 1987. Remaining weedkillers applied: 16 Apr. Prochloraz and carbendazim applied: 21 Apr. Triadimenol applied: 27 May. Combine harvested: 7 Aug. Previous crops: S. barley 1985, w. barley 1986.

NOTE: Aphids were counted from late September to January and again in May. Visual estimates of BYDV were made at the end of April. Components of yield were measured. Take-all was assessed in summer.



87/R/B/2

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

APHICIDE	NONE	CYPERMET	Mean
SOWDATE			
12 SEPT	5.28	5.20	5.24
22 SEPT	5.14	5.46	5.30
1 OCT	5.54	5.63	5.58
10 OCT	5.47	5.39	5.43
24 OCT	5.61	5.64	5.63
Mean	5.41	5.46	5.44

\*\*\* Standard errors of differences of means \*\*\*

Table	SOWDATE	APHICIDE	SOWDATE APHICIDE
s.e.d.	0.159	0.101	0.225

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.319	5.9

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.00230

87/R/B/3

WINTER BARLEY

ANTI-FEEDANTS AND BYDV

Object: To study the effects of insecticides and insect anti-feedants and their interaction with control of autumn volunteers on the incidence of BYDV - Scout N.

Sponsors: D.C. Griffiths, R.T. Plumb.

Design: 3 blocks of 2 whole plots, split into 6 sub-plots.

Whole plot dimensions: 15.0 x 30.0.

Treatments: All combinations of:-

Whole plots

- |             |   |
|-------------|---|
| 1. VOLNTEER | Control of volunteers prior to sowing:        |
| KILLED      | Control of all green plant matter             |
| PRESENT     | Volunteer germination and survival encouraged |

Sub plots

- |             |   |
|-------------|---|
| 2. SPRY INS | Sprays of insecticides and pheromone derivatives applied electrostatically in 10 l: |
| NONE        | None  |
| CYP         | Cypermethrin at 25 g on 29 Oct, 1986  |
| POLYG R1    | Polygodial, racemic, one spray on 29 Oct  |
| POLYG R2    | Polygodial, racemic, two sprays, on 15 Oct and 29 Oct                               |
| POLYG R3    | Polygodial, racemic, three sprays, on 3 Oct, 15 Oct and 29 Oct                      |
| POLYG N3    | Polygodial, normal, three sprays, on 3 Oct, 15 Oct and 29 Oct                       |

NOTE: VOLNTEER KILLED plots were sprayed with paraquat at 0.60 kg ion in 280 l on 9 Sept, 1986.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitram' at 460 kg. Weedkillers: Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 500 l. Fungicides: Carbendazim at 0.15 kg and prochloraz at 0.40 kg in 200 l. Propiconazole at 0.25 kg in 200 l. Desiccant: Diquat at 0.80 kg ion with a wetting agent ('Agral' at 0.20 l) in 200 l.

Seed: Igri, sown at 150 kg.

Cultivations, etc.: - PK applied, cultivated by rotary grubber: 7 Aug, 1986. Spring-tine cultivated: 11 Sept. Rotary harrowed, seed sown: 12 Sept. N applied: 20 Mar, 1987. Weedkillers applied: 15 Apr. Carbendazim and prochloraz applied: 29 Apr. Propiconazole applied: 27 May. Diquat with wetting agent applied: 31 July. Combine harvested: 7 Aug. Previous crops: W. barley 1985 and 1986.

87/R/B/3

NOTES: (1) Aphid counts were made in early November 1986, late November and early April, 1987.  
 (2) VOLNTEER PRESENT plots were severely infested with blackgrass.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SPRY INS VOLNTEER	NONE	CYP	POLYG R1	POLYG R2	POLYG R3	POLYG N3	Mean
KILLED	6.96	7.35	7.14	7.24	7.27	7.38	7.22
PRESENT	4.75	4.19	4.71	2.43	5.10	4.25	4.24
Mean	5.85	5.77	5.92	4.83	6.19	5.81	5.73

\*\*\* Standard errors of differences of means \*\*\*

Table	SPRY INS	VOLNTEER* SPRY INS
s.e.d.	0.657	0.930

\* Within the same level of VOLNTEER only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	20	1.139	19.9

GRAIN MEAN DM% 85.9

SUB PLOT AREA HARVESTED 0.00163

87/R/B/5

WINTER BARLEY

VARIETIES

Object: To study the yields of some of the newer winter barley varieties  
- Summerdells II.

Sponsors: R. Moffitt, J.F. Jenkyn.

Design: 4 randomised blocks of 11 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

VARIETY	Varieties:
GERBEL	Gerbel
IGRI	Igri
KASKADE	Kaskade
MAGIE	Magie
MG 26+0	Magie with 26 kg extra N applied on 17 Nov, 1986
MG 0+25	Magie with 25 kg extra N applied on 16 Feb, 1987
MG 26+25	Magie with extra N applied on both the above dates
MG S600	Magie with 'Seamac 600' spray
MARINKA	Marinka
PIRATE	Pirate
PLAISANT	Plaisant

NOTES: (1) The extra N for VARIETY MG was applied as urea.  
(2) The 'Seamac 600' was applied at 5.6 l in 220 l on 14 Apr, 1987.

Basal applications: Manures: 'Nitram' at 450 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Isoproturon at 2.5 kg with clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Triadimenol at 0.12 kg in 200 l. Growth regulators: Mepiquat chloride at 0.61 kg and 2-chloroethylphosphonic acid at 0.31 kg with a wetting agent ('Cittowet' at 0.08 l) in 200 l.

Seed: Varieties sown at 150 kg.

Cultivations, etc.: - Heavy spring-tine cultivated, disced: 18 Aug, 1986. Paraquat applied: 10 Sept. Rotary harrowed, seed sown: 22 Sept. N applied: 19 Mar, 1987. Remaining weedkillers applied: 16 Apr. Prochloraz and carbendazim applied, growth regulators with the wetting agent applied: 27 Apr. Triadimenol applied: 27 May. Combine harvested: 7 Aug. Previous crops: S. barley 1985, w. barley 1986.

NOTE: Leaf samples were taken for disease assessment in June.

87/R/B/5

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	
GERBEL	8.32
IGRI	7.29
KASKADE	7.42
MAGIE	7.95
MG 26+0	8.28
MG 0+25	7.72
MG 26+25	8.58
MG S600	7.77
MARINKA	8.19
PIRATE	7.87
PLAISANT	7.69
Mean	7.92

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY
s.e.d.	0.197

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.279	3.5
GRAIN MEAN DM%	85.2		
PLOT AREA HARVESTED	0.00204		

87/R/B/6 and 87/W/B/6

SPRING BARLEY

VARIETIES AND N

Object: To study the yields of some of the newer varieties of s. barley at two rates of nitrogen - Rothamsted (R), Highfield IV and Woburn (W), Lansome II.

Sponsor: R. Moffitt.

Design: 3 randomised blocks of 2 plots split into 10.

Sub-plot dimensions: (R) 3.0 x 10.0. (W) 4.0 x 9.0.

Treatments: All combinations of:-

Whole plots

1. N		Nitrogen fertilizer:
(R)	(W)	
125	80	125 kg N on 20 Mar, 1987 (R), 80 kg N on 5 May (W)
125+46	120	125 kg N on 20 Mar plus 46 kg N on 29 Apr (R), 120 kg N on 5 May (W)

Sub plots

2. VARIETY	Varieties:
BLENHEIM	Blenheim
CAMEO	Cameo
CORNICHE	Corniche
DIGGER	Digger
DOUBLET	Doublet
KLAXON	Klaxon
KLAXON B	Klaxon with 'Baytan' seed dressing
NATASHA	Natasha
REGATTA	Regatta
TRIUMPH	Triumph

NOTE: Nitrogen fertilizer was applied as 'Nitram'.

Basal applications:

Highfield IV (R): Weedkillers: Clopyralid at 0.07 kg, bromoxynil at 0.34 kg with mecoprop at 2.5 kg in 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.

Lansome II (W): Fungicides: Tridemorph at 0.19 kg with propiconazole at 0.12 kg in 200 l. Desiccant: Diquat at 0.60 kg ion applied with a wetting agent ('Agral' at 0.10 l) in 200 l.

Seed: Highfield IV (R), and Lansome II (W): Sown at 160 kg.

Cultivations, etc.:-

Highfield IV (R): Ploughed: 5 Nov, 1986. Spring-tine cultivated, rotary harrowed, seed sown, harrowed: 20 Mar, 1987. Rolled: 21 Mar. Weedkillers applied: 6 May. Fungicide applied: 23 June. Combine harvested: 20 Aug. Previous crops: Potatoes 1985, w. wheat 1986.

87/R/B/6 and 87/W/B/6

Cultivations, etc.:-

Lansome II (W): Deep-tine cultivated: 30 Jan, 1987. Spike harrowed with crumbler attached, seed sown: 30 Mar. Fungicides applied: 3 July. Desiccant applied: 21 Aug. Combine harvested: 10 Sept. Previous crops: W. oats 1985, potatoes 1986.

87/R/B/6 HIGHFIELD IV (R)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N	125	125+46	Mean
VARIETY			
BLENHEIM	6.20	6.59	6.39
CAMEO	6.99	7.63	7.31
CORNICHE	6.61	6.62	6.62
DIGGER	5.99	7.96	6.97
DOUBLET	6.81	7.52	7.17
KLAXON	6.24	6.55	6.39
KLAXON B	6.10	7.19	6.64
NATASHA	6.67	6.85	6.76
REGATTA	7.55	7.58	7.57
TRIUMPH	5.67	6.67	6.17
Mean	6.48	7.12	6.80

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	N*
s.e.d.	0.270	0.382

\* Within the same level of N only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	36	0.467	6.9

GRAIN MEAN DM% 86.7

SUB PLOT AREA HARVESTED 0.00204

87/W/B/6 LANSOME II (W)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N	80	120	Mean
VARIETY				
BLENHEIM		4.92	4.78	4.85
CAMEO		5.00	4.22	4.61
CORNICHE		5.17	4.63	4.90
DIGGER		5.94	6.68	6.31
DOUBLET		4.85	5.23	5.04
KLAXON		5.39	4.44	4.91
KLAXON B		5.02	4.86	4.94
NATASHA		4.57	4.22	4.39
REGATTA		5.43	5.17	5.30
TRIUMPH		5.26	4.03	4.64
Mean		5.15	4.83	4.99

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	N*
s.e.d.	0.236	0.334

\* Within the same level of N only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	36	0.409	8.2
GRAIN MEAN DM%	85.5		
SUB PLOT AREA HARVESTED	0.00247		



87/R/BE/1

WINTER BEANS

CONTROL OF CHOCOLATE SPOT AND RUST

Object: To compare maneb plus mancozeb with benomyl plus chlorothalonil for the control of chocolate spot (*Botrytis* spp.) and rust (*Uromyces viciae-fabae*) on w. beans sown at two densities - Great Harpenden I.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 2 randomised blocks of 18 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments: All combinations of:-

1. SEEDRATE            Seeds sown per square metre:  
    12  
    36
2. CS FUNG            Fungicides applied to control chocolate spot until first rust pustules seen:  
  
    NONE                None  
    BEN+CHL            Benomyl at 0.50 kg plus chlorothalonil at 1.0 kg on 18 June, 1987  
    MAN+MANC          Maneb plus mancozeb each at 0.80 kg on 18 June
3. RUSTFUNG          Fungicides applied to control rust first applied as soon as rust pustules seen:  
  
    NONE                None  
    BEN+CHL            Benomyl at 0.50 kg plus chlorothalonil at 1.0 kg on 9 July, 5 Aug  
    MAN+MANC          Maneb plus mancozeb each at 0.80 kg on 9 July, 5 Aug

NOTES: (1) All spray treatments were applied in 200 l.  
(2) All benomyl plus chlorothalonil treatments had a wetting agent ('Agral' at 0.06 l) added.

Basal applications: Manures: Chalk at 5.0 t. Weedkillers: Paraquat at 0.80 kg ion in 500 l. Simazine at 1.2 kg with propyzamide at 0.85 kg in 500 l. Insecticide: Deltamethrin at 0.0079 kg in 200 l on two occasions. Desiccant: Diquat at 0.60 kg ion and a wetting agent ('Agral' at 0.3 l) in 300 l.

Seed: Bourdon, dressed with thiram and thiabendazole.

Cultivations, etc.: - Heavy spring-tine cultivated: 10 Sept, 1986. Chalk applied: 24 Sept. Paraquat applied: 6 Nov. Seed broadcast and ploughed in: 12 Nov. Simazine and propyzamide applied: 5 Jan, 1987. Insecticide applied: 22 Apr, 27 May. Desiccant with wetting agent applied: 21 Sept. Combine harvested: 25 Sept. Previous crops: W. wheat 1985 and 1986.

NOTE: Establishment counts were made in autumn, disease assessments were made in July and August and components of yield were measured at maturity.

87/R/BE/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CS FUNG SEEDRATE	NONE	BEN+CHL	MAN+MANC	Mean
12	3.12	2.78	3.40	3.10
36	5.19	5.27	5.11	5.19
Mean	4.15	4.02	4.25	4.14

RUSTFUNG SEEDRATE	NONE	BEN+CHL	MAN+MANC	Mean
12	2.88	3.21	3.20	3.10
36	4.63	5.25	5.68	5.19
Mean	3.76	4.23	4.44	4.14

RUSTFUNG CS FUNG	NONE	BEN+CHL	MAN+MANC	Mean
NONE	3.76	4.25	4.45	4.15
BEN+CHL	3.68	3.90	4.48	4.02
MAN+MANC	3.83	4.54	4.39	4.25
Mean	3.76	4.23	4.44	4.14

SEEDRATE	CS FUNG	RUSTFUNG	NONE	BEN+CHL	MAN+MANC
12	NONE		2.89	3.17	3.29
	BEN+CHL		2.78	2.76	2.80
	MAN+MANC		2.96	3.72	3.51
36	NONE		4.62	5.33	5.61
	BEN+CHL		4.59	5.05	6.17
	MAN+MANC		4.69	5.37	5.26

\*\*\* Standard errors of differences of means \*\*\*

Table	SEEDRATE	CS FUNG	RUSTFUNG	SEEDRATE CS FUNG
s.e.d.	0.156	0.191	0.191	0.269

Table	SEEDRATE RUSTFUNG	CS FUNG RUSTFUNG	SEEDRATE CS FUNG RUSTFUNG
s.e.d.	0.269	0.330	0.467

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	17	0.467	11.3

GRAIN MEAN DM% 78.0

PLOT AREA HARVESTED 0.00310

87/R/BE/4

SPRING BEANS

VARIETIES, ROW SPACING AND PLANT HEALTH

Object: To compare four varieties of spring-sown field beans at two row spacings and two amounts of pest and disease control - Pastures.

Sponsors: J. McEwen, D.P. Yeoman.

Design: 3 randomised blocks of 16 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments: All combinations of:-

1. VARIETY                      Varieties sown at 60 seeds per square metre:  
    ALFRED  
    MINDEN  
    TICOL  
    TROY
2. ROW SPAC                    Spacing between rows (cm):  
    12  
    48
3. PATHCONT                    Pest and pathogen control:  
    STANDARD                    None  
    ENHANCED                    Deltamethrin at 0.0079 kg in 500 l on 22 Apr, 1987,  
  and in 200 l on 27 May  
  Chlorothalonil at 1.0 kg with benomy1 at 0.50 kg and  
  a wetting agent ('Agral' at 0.06 l) in 200 l on  
  18 June  
  Maneb at 0.80 kg and mancozeb at 0.80 kg in 200 l on  
  9 July

Basal applications: Weedkillers: Trietazine at 1.2 kg and simazine at 0.17 kg in 500 l.

Cultivations, etc.:- Ploughed: 27 Oct, 1986. Spring-tine cultivated, rotary harrowed, seed sown: 17 Mar, 1987. Weedkillers applied: 30 Mar. Combine harvested: 21 Sept. Previous crops: W. wheat 1985 and 1986.

NOTE: Establishment counts were made. Disease assessments were made in July and August. At maturity, plant heights, lodging and components of yield were assessed.

87/R/BE/4

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

ROWSPACE	12	48	Mean
VARIETY			
ALFRED	4.88	4.87	4.88
MINDEN	4.47	4.36	4.42
TICOL	3.79	3.68	3.73
TROY	3.95	3.71	3.83
Mean	4.28	4.16	4.22

PATHCONT	STANDARD	ENHANCED	Mean
VARIETY			
ALFRED	3.82	5.94	4.88
MINDEN	3.88	4.95	4.42
TICOL	2.90	4.57	3.73
TROY	3.47	4.20	3.83
Mean	3.52	4.91	4.22

PATHCONT	STANDARD	ENHANCED	Mean
ROWSPACE			
12	3.53	5.03	4.28
48	3.51	4.80	4.16
Mean	3.52	4.91	4.22

	ROWSPACE	12	48		STANDARD	ENHANCED
VARIETY	PATHCONT	STANDARD	ENHANCED	STANDARD	ENHANCED	
ALFRED		3.86	5.91	3.78	5.96	
MINDEN		3.98	4.96	3.78	4.93	
TICOL		2.87	4.72	2.94	4.42	
TROY		3.39	4.51	3.54	3.88	

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	ROWSPACE	PATHCONT	VARIETY ROWSPACE
s.e.d.	0.123	0.087	0.087	0.174

Table	VARIETY PATHCONT	ROWSPACE PATHCONT	VARIETY ROWSPACE PATHCONT
s.e.d.	0.174	0.123	0.246

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.302	7.2
GRAIN MEAN DM%	76.4		
PLOT AREA HARVESTED	0.00315		

87/R/LP/2 and 87/W/LP/2

LUPINS

VARIETIES, SOWING DATES AND PLANT HEALTH

Object: To study the effects of sowing dates and pest and pathogen control on the growth and yield of two varieties of lupin (*Lupinus albus*) - Rothamsted (R) Sawyers I East and Woburn (W) Butt Close IV.

Sponsors: J. McEwen, D.P. Yeoman, A.W. Ferguson, J.F. Jenkyn.

Design: 3 randomised blocks of 16 plots.

Whole plot dimensions: 2.4 x 6.0 (R), 3.0 x 6.0 (W).

Treatments: All combinations of:-

1. SOW DATE

Dates of sowing:

R	W	R	W
4 FEB	4 FEB	4 February, 1987	4 February
24 FEB	23 FEB	24 February	23 February
18 MAR	16 MAR	18 March	16 March
14 APR	6 APR	14 April	6 April

2. VARIETY

Varieties:

KALINA  
VLADIMIR

3. PATHCON

Pest and pathogen control:

NONE  
FULL

None

- (R) Insecticides: Cypermethrin at 0.025 kg in 220 l: 8 May, 1987, 12 June. Pirimicarb at 0.14 kg with a wetting agent ('Citowett' at 0.14 l) in 220 l: 10 July. Fungicide: Benomyl at 0.55 kg in 220 l: 30 July. Seed dressing: Bendiocarb, thiabendazole and thiram.
- (W) Insecticides: Deltamethrin at 0.038 kg in 250 l: 8 May, 29 May. Pirimicarb at 0.077 kg with a wetting agent ('Enhance' at 0.015 l) in 200 l: 13 July. Fungicide: Benomyl at 0.50 kg applied with the pirimicarb.

NOTES: (1) At Rothamsted plots were netted from sowing to mid-June.  
(2) At Woburn netting was available only from April to May and as a result yields were obtained only from SOW DATE 6 APR.

Basal applications:

Sawyers I East (R): Manures: Chalk at 5.0 t. Weedkillers: Monolinuron at 0.46 kg with paraquat at 0.33 kg ion in 220 l. Metamitron at 2.8 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 220 l.  
Butt Close IV (W). Weedkillers: Terbutryne at 0.56 kg with terbuthylazine at 0.24 kg in 240 l.

Seed: Sown at 210 kg (R), 250 kg (W).

87/R/LP/2 and 87/W/LP/2

Cultivations, etc.:-

Sawyers I East (R): Chalk applied: 24 Sept, 1986. Ploughed: 22 Oct.  
 Monolinuron and paraquat applied after each sowing: 4 Feb, 1987,  
 24 Feb, 18 Mar, 14 Apr. Metamitron applied: 18 June. Diquat  
 applied: 15 Sept, 25 Sept, 3 Nov. Combine harvested: 25 Sept,  
 22 Oct, 4, 18 Nov. Previous crops: W. wheat 1985 and 1986.  
 Butt Close IV (W): Ploughed: 10 Nov, 1986. Terbutryne and  
 terbuthylazine applied after each sowing: 11 Feb, 1987, 23 Feb,  
 16 Mar, 9 Apr. Combine harvested: 18 Nov. Previous crops:  
 Potatoes 1985, w. wheat 1986.

NOTE: Establishment counts were made at the four-leaf stage. Pests  
 and diseases were observed and dates of flowering and maturity  
 recorded.

87/R/LP/2 SAWYERS I E (R)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	KALINA	VLADIMIR	Mean		
SOW DATE					
4 FEB	0.24	0.29	0.27		
24 FEB	0.34	0.27	0.31		
18 MAR	2.66	2.20	2.43		
14 APR	2.90	3.44	3.17		
Mean	1.54	1.55	1.55		
PATHCON	NONE	FULL	Mean		
SOW DATE					
4 FEB	0.43	0.11	0.27		
24 FEB	0.42	0.20	0.31		
18 MAR	2.73	2.13	2.43		
14 APR	3.19	3.16	3.17		
Mean	1.69	1.40	1.55		
PATHCON	NONE	FULL	Mean		
VARIETY					
KALINA	1.73	1.35	1.54		
VLADIMIR	1.66	1.45	1.55		
Mean	1.69	1.40	1.55		
SOW DATE	VARIETY	KALINA	VLADIMIR		
	PATHCON	NONE	FULL	NONE	FULL
4 FEB		0.40	0.08	0.45	0.14
24 FEB		0.50	0.18	0.33	0.22
18 MAR		3.02	2.30	2.45	1.96
14 APR		2.98	2.82	3.40	3.49

87/R/LP/2 SAWYERS I E (R)

\*\*\* Standard errors of differences of means \*\*\*

Table	SOW DATE	VARIETY	PATHCON	SOW DATE VARIETY
s.e.d.	0.108	0.077	0.077	0.153

Table	SOW DATE PATHCON	VARIETY PATHCON	SOW DATE VARIETY PATHCON
s.e.d.	0.153	0.108	0.216

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.265	17.2

GRAIN MEAN DM% 58.6

PLOT AREA HARVESTED 0.00086

87/W/LP/2 BUTT CLOSE IV (W)

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PATHCON VARIETY	NONE	FULL	Mean
KALINA	0.71	0.73	0.72
VLADIMIR	0.47	0.64	0.56
Mean	0.59	0.69	0.64

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	PATHCON	VARIETY PATHCON
s.e.d.	0.193	0.193	0.273

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.335	52.4

GRAIN MEAN DM% 58.7

PLOT AREA HARVESTED 0.00133

87/R/LP/4

LUPINS

DESICCANTS AND FUNGICIDES

Object: To study the effects of times of applying desiccants and fungicides on senescence, grain quality and yield of lupins (*Lupinus albus*) - Long Hoos III 1.

Sponsors: H.L. Jones, J. Lacey.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 2.4 x 5.0.

Treatments: All combinations of:-

- |              |  |
|--------------|--|
| 1. DESICCANT | Desiccants:  |
| DIQUAT       | Diquat at 0.15 kg ion                                |
| MET+FEN      | Metoxuron at 2.0 kg plus fentin hydroxide at 0.20 kg |
| GLYPHOS      | Glyphosate at 1.08 kg                                |
| NACL         | Sodium chloride at 6.25 kg                           |
| 2. FUNGICIDE | Fungicide:   |
| NONE         | None   |
| PROPICON     | Propiconazole at 0.125 kg                            |
| 3. APP TIME  | Times of applying desiccants and fungicide:          |
| EARLY        | Fungicide on 25 Sept 1987, desiccants 12 Oct         |
| MIDDLE       | Fungicide on 25 Sept, desiccants 19 Oct              |
| LATE         | Fungicide on 25 Sept, desiccants 28 Oct              |

plus five extra treatments not given desiccants:

- |          |   |
|----------|---|
| FUNGIC X | Fungicides applied on 12 Oct:                     |
| NONE     | None (duplicated)                                 |
| IPRODION | Iprodione at 1.0 kg                               |
| PROPICON | Propiconazole at 0.125 kg                         |
| PROP+DIQ | Propiconazole at 0.125 kg + diquat at 0.60 kg ion |
| VINCLOZ  | Vinclozalin at 0.375 kg                           |

- NOTES: (1) APP TIME for desiccants was chosen for the three stages EARLY-all leaves below pods fallen, MIDDLE-pods fully developed, LATE-no leaves remaining on plant.  
(2) All spray treatments were applied in 220 l.  
(3) The crop was netted from early Apr to early June.

Basal applications: Weedkillers: Glyphosate at 1.44 kg in 220 l. Monolinuron at 0.46 kg with paraquat at 0.33 kg ion in 220 l. Metamitron at 2.8 kg in 220 l. Insecticides: Cypermethrin at 0.025 kg in 220 l. Pirimicarb at 0.14 kg in 220 l applied with the fungicide. Fungicide: Benomyl at 0.55 kg.

Seed: Vladimir, dressed with thiram, inoculated with Rhizobium, sown at 240 kg.



87/R/LP/4

Cultivations, etc.:- Glyphosate applied: 1 Oct, 1986. Ploughed: 17-29 Oct. Seed sown, harrowed, rolled: 31 Mar, 1987. Monolinuron and paraquat applied: 2 Apr. Cypermethrin applied: 8 May. Metamitron applied: 18 June. Benomyl and pirimicarb applied: 13 July. Combine harvested: 17 Nov. Previous crops: S. beans 1985, fallow 1986.

NOTE: Plant populations were measured and disease assessments made during the season. After desiccation, changes in dry matter were measured and fungal development on the pods assessed. Components of yield were measured. Seed microflora, germinability and discolouration of the seed coat were also assessed.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNGCIDE	NONE	PROPICON	Mean			
DESICCNT						
DIQUAT	1.63	1.89	1.76			
MET+FEN	1.79	1.46	1.62			
GLYPHOS	1.59	1.71	1.65			
NACL	1.81	1.80	1.80			
Mean	1.71	1.71	1.71			
APP TIME	EARLY	MIDDLE	LATE	Mean		
DESICCNT						
DIQUAT	1.59	1.92	1.77	1.76		
MET+FEN	1.34	1.81	1.73	1.62		
GLYPHOS	1.93	1.68	1.35	1.65		
NACL	1.86	2.01	1.55	1.80		
Mean	1.68	1.85	1.60	1.71		
APP TIME	EARLY	MIDDLE	LATE	Mean		
FUNGCIDE						
NONE	1.73	1.90	1.49	1.71		
PROPICON	1.63	1.80	1.71	1.71		
Mean	1.68	1.85	1.60	1.71		
DESICCNT	APP TIME	EARLY	MIDDLE	LATE		
DIQUAT	FUNGCIDE					
NONE		1.60	1.78	1.52		
PROPICON		1.57	2.07	2.03		
MET+FEN	FUNGCIDE					
NONE		1.61	2.08	1.69		
PROPICON		1.07	1.53	1.76		
GLYPHOS	FUNGCIDE					
NONE		1.91	1.59	1.28		
PROPICON		1.94	1.77	1.43		
NACL	FUNGCIDE					
NONE		1.79	2.17	1.47		
PROPICON		1.93	1.84	1.62		
FUNGIC X	NONE	IPRODION	PROPICON	PROP+DIQ	VINCLOZ	Mean
	1.78	1.54	1.71	1.41	1.84	1.68
Grand mean	1.70					

87/R/LP/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

Table	DESICCNT	FUNGCIDE	APP TIME	DESICCNT FUNGCIDE
s.e.d.	0.162	0.114	0.140	0.228

Table	DESICCNT APP TIME	FUNGCIDE APP TIME	DESICCNT FUNGCIDE APP TIME	FUNGC X
s.e.d.	0.280	0.198	0.396	0.396

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.396	23.2

GRAIN MEAN DM% 63.3

PLOT AREA HARVESTED 0.00072

87/R/PE/1

PEAS

EFFECTS OF PEA SEED-BORNE MOSAIC VIRUS

Object: To study the transmission, symptoms and effects on yield of pea seed-borne mosaic virus in two varieties of peas with and without insecticide - Long Hoos III 2.

Sponsor: A.J. Cockbain.

Design: 4 randomised blocks of 2 whole plots split into 3.

Whole plot dimensions: 9.2 x 5.0.

Treatments: All combinations of:-

Whole plots

1. INSCDCDE	Insecticide:
NONE	None
PP 321	'PP 321' applied at 0.20 l and pirimicarb at 0.14 kg in 220 l on 1 July, 1986, 10 July and 24 July

Sub plots

2. VARIETY	Varieties:
PROGR H	Progreta, healthy stock, sown at 200 kg
WAVER H	Waverex, healthy stock, sown at 200 kg
WAVER I	Waverex, seed infected pea seed-borne mosaic virus, sown at 140 kg

NOTE: Plots were netted against bird damage from the end of May until harvest.

Basal applications: Manure: Muriate of potash at 520 kg. Weedkillers: Glyphosate at 1.4 kg. Simazine at 0.17 kg and trietazine at 1.2 kg in 220 l. Desiccant: Diquat at 0.84 kg ion in 220 l.

Cultivations, etc.:- K applied: 16 Sept, 1986. Glyphosate applied: 1 Oct. Ploughed: 28 Nov. Deep-tine cultivated twice: 28 Apr, 1987. Spring-tine cultivated, seed sown, rolled: 29 Apr. Simazine and trietazine applied: 5 May. Desiccant applied: 15 Sept. Combine harvested: 22 Sept. Previous crops: Potatoes 1985, s. barley 1986.

NOTES: (1) Aphid numbers were assessed during the growing season. Virus incidence was assessed in the plants during the season and in the seed from all plots after harvest.  
(2) Because of weather conditions there was a long period between crop maturity and combine harvesting during which much grain was shed.

87/R/PE/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY INSC TCDE	PROGR H	WAVER H	WAVER I	Mean
NONE	1.10	0.33	0.20	0.54
PP 321	1.23	0.60	0.28	0.70
Mean	1.16	0.46	0.24	0.62

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	INSC TCDE*
s.e.d.	0.070	0.099

\* Within the same level of INSC TCDE only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.141	22.6

GRAIN MEAN DM% 73.6

SUB PLOT AREA HARVESTED 0.00072

87/R/RA/1

WINTER OILSEED RAPE

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. oilseed rape - Black Horse I.

Sponsors: C.J. Rawlinson, R.J. Darby, P.G.N. Digby, K. Evans, J.E. Leach, I.H. Williams, D.P. Yeoman.

Associate sponsors: P.B. Barraclough, D.S. Jenkinson, J. Lacey, S.P. McGrath, D.S. Powelson, A.J. Thomasson, A.H. Weir.

Design: A half replicate of 2 x 2 x 2 x 2 x 2 x 2 x 2 + a replicate of 2 x 2 x 4 + half replicates of 2 x 2 x 2 x 2 and 2 x 2 x 2 + 14 extra plots

Whole plot dimensions: 3.0 x 21.0.

Treatments: Combinations of:-

1. VARIETY                      Varieties:  
    ARIANA  
    BIENVENU
2. SOW DATE                    Dates of sowing:  
    14 AUG                      14 August, 1986  
    4 SEP                        4 September
3. N RATE                      Amounts of N fertilizer (kg N), as 'Nitro-Chalk',  
   in addition to a basal application of 50 kg N  
   as 'Nitram' to the seedbed:  
    150  
    250
4. N DIVIS                      Division of N fertilizer application:  
    SINGLE                        All on 16 Feb, 1987  
    DIVIDED                      50 kg on 16 Feb, remainder on 16 Mar
5. GROWREG                    Growth regulator:  
    NONE                         None  
    TRIAPEN                      Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987
6. INSCTCDE                    Insecticides:  
    NONE                         None  
    DE+TR                        Deltamethrin at 7.5 g in 220 l on 3 Oct, 1986 and  
   20 Nov and triazophos at 0.42 g in 220 l on  
   15 June, 1987

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7. FUNGCIDE            Fungicide in autumn, spring and summer:  
  
    NONE                None  
    PR+IP               Prochloraz in autumn and in spring at 0.50 kg in  
                              200 l on 17 Nov, 1986 and 10 Apr, 1987, iprodione  
                              in summer at 0.50 kg in 200 l on 15 June

plus combinations of the following (all given growth regulator,  
insecticides and fungicides as above):

1. VARIETYN            Varieties:  
  
    ARIANA  
    BIENVENU  
  
2. SOWDAT N            Dates of sowing:  
  
    14 AUG              14 August, 1986  
    4 SEP                4 September  
  
3. N RATE N            Amounts of N fertilizer (kg N), as 'Nitro-Chalk',  
                              in addition to a basal application of 50 kg N as  
                              'Nitram' to the seedbed. Applied as a single  
                              dressing on 16 Feb, 1987:  
  
    0  
    100  
    200  
    300

plus combinations of the following (all given insecticides and  
fungicides as above, combinations chosen are those not provided by  
the main factorial):

1. VARIETY P           Varieties:  
  
    ARIANA  
    BIENVENU  
  
2. SOWDAT P            Dates of sowing:  
  
    14 AUG              14 August, 1986  
    4 SEP                4 September  
  
3. N RATE P            Amounts of N fertilizer (kg N), as 'Nitro-Chalk',  
                              in addition to a basal application of 50 kg N as  
                              'Nitram' to the seedbed. Applied as a single  
                              dressing on 16 Feb, 1987:  
  
    150  
    250  
  
4. GROREG P            Growth regulator:  
  
    NONE                None  
    TRIAPEN             Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987

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plus combinations of the following (all Ariana given N as N RATE 150, SINGLE, fungicides as above and oxamyl at 5 kg to the seedbed):

1. SODATE OX            Dates of sowing:  
    14 AUG            14 August, 1986  
    4 SEP            4 September
2. GRORG OX            Growth regulator:  
    NONE            None  
    TRIAPEN        Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987
3. INSCT OX            Insecticides:  
    NONE            None  
    DE+TR        Deltamethrin at 7.5 g in 220 l on 3 Oct, 1986 and  
                    20 Nov, triazophos at 0.42 l in 220 l on 15 June,  
                    1987

plus two replicates (all sown 4 SEP and given N as N RATE 250, DIVIDED and insecticides and fungicides as above) of all combinations of:

1. VAR NUT            Varieties:  
    ARIANA  
    BIENVENU
2. FOL NUT            Foliar nutrients:  
    N            N at 3.2 kg (1.0 kg as ammonium nitrate, 2.2 kg as  
                    urea; solution applied at 12 l in 220 l on 16 Apr,  
                    1987, 12 June and 23 June)  
    N+MIC+S        N (as above) plus micronutrients: Mg at 480 g, Mn at  
                    162 g, Cu at 32.4 g, Fe at 3.6 g, B at 3.6 g, Zn  
                    at 1.68 g and Mo at 0.84 g (as 'BASF Foliar 36' at  
                    12 l), plus sulphur at 8.0 kg (as 'Thiovit')  
                    applied in 220 l on 16 Apr, 1987, 12 June and  
                    23 June

plus all combinations of (all given no other inputs):

1. VAR NIL            Varieties:  
    ARIANA        Ariana (duplicated)  
    BIENVENU      Bienvenu
2. SDAT NIL            Dates of sowing:  
    14 AUG        14 August, 1986  
    4 SEP        4 September

plus 4 plots for N15 studies and 2 plots for root studies not taken for yield.

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Basal applications: Manures: (0:18:36) at 700 kg. 'Nitram' at 140 kg.  
 Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor  
 at 0.75 kg in 280 l. Metazachlor at 0.50 kg with fluazifop-P-butyl  
 at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l.  
 Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at  
 0.50 l) in 500 l.

Seed: Varieties, dressed gamma HCH, thiram and fenpropimorph, sown  
 at 8.0 kg.

Cultivations, etc.:— Spring-tine cultivated: 8 Aug, 1986. PK applied:  
 11 Aug. Sodium trichloroacetate applied, basal N applied, oxamyl  
 treatments to SOWDATE 14 AUG applied, harrowed: 13 Aug. Seed sown  
 for SOWDATE 14 AUG: 14 Aug. Metazachlor applied to SOWDATE 14 AUG:  
 15 Aug. Oxamyl treatments applied and seed sown to SOWDATE 4 SEPT,  
 harrowed in, metazachlor applied to these plots: 4 Sept. Metazachlor  
 with fluazifop-P-butyl and the wetting agent applied: 4 Oct.  
 Desiccant with wetting agent applied: 30 July, 1987. Combine  
 harvested: 4 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Detailed observations were made during the season on diseases,  
 pests, N in plants and soil, dry matter accumulation, leaf areas,  
 root growth, light interception and lodging. Measurements were  
 taken of N15 uptake and the fate of N in crop residues.  
 Microflora of leaf and pods were assessed up to harvest and some  
 seed analysed for mineral composition and glucosinolate contents.  
 Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOW DATE	14 AUG	4 SEP	Mean
VARIETY			
ARIANA	3.66	3.78	3.72
BIENVENU	3.91	4.10	4.00
Mean	3.78	3.94	3.86
N RATE	150	250	Mean
VARIETY			
ARIANA	3.65	3.78	3.72
BIENVENU	3.90	4.11	4.00
Mean	3.77	3.95	3.86
N RATE	150	250	Mean
SOW DATE			
14 AUG	3.58	3.98	3.78
4 SEP	3.96	3.91	3.94
Mean	3.77	3.95	3.86
N DIVIS	SINGLE	DIVIDED	Mean
VARIETY			
ARIANA	3.67	3.77	3.72
BIENVENU	4.07	3.94	4.00
Mean	3.87	3.85	3.86



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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\*Tables of means \*\*\*\*\*

N DIVIS	SINGLE	DIVIDED	Mean
SOW DATE			
14 AUG	3.75	3.82	3.78
4 SEP	3.99	3.89	3.94
Mean	3.87	3.85	3.86
N DIVIS	SINGLE	DIVIDED	Mean
N RATE			
150	3.74	3.80	3.77
250	3.99	3.91	3.95
Mean	3.87	3.85	3.86
GROWREG	NONE	TRIAPEN	Mean
VARIETY			
ARIANA	3.49	3.94	3.72
BIENVENU	3.60	4.40	4.00
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
SOW DATE			
14 AUG	3.31	4.26	3.78
4 SEP	3.79	4.09	3.94
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
N RATE			
150	3.48	4.06	3.77
250	3.61	4.29	3.95
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
N DIVIS			
SINGLE	3.60	4.14	3.87
DIVIDED	3.50	4.21	3.85
Mean	3.55	4.17	3.86
INSCTCDE	NONE	DE+TR	Mean
VARIETY			
ARIANA	3.64	3.80	3.72
BIENVENU	4.04	3.97	4.00
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
SOW DATE			
14 AUG	3.80	3.76	3.78
4 SEP	3.87	4.01	3.94
Mean	3.84	3.88	3.86

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSCTCDE	NONE	DE+TR	Mean
N RATE			
150	3.72	3.82	3.77
250	3.95	3.95	3.95
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
N DIVIS			
SINGLE	3.78	3.96	3.87
DIVIDED	3.89	3.81	3.85
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
GROWREG			
NONE	3.57	3.53	3.55
TRIAPEN	4.11	4.24	4.17
Mean	3.84	3.88	3.86
FUNGCIDE	NONE	PR+IP	Mean
VARIETY			
ARIANA	3.53	3.90	3.72
BIENVENU	3.82	4.19	4.00
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
SOW DATE			
14 AUG	3.65	3.91	3.78
4 SEP	3.70	4.17	3.94
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
N RATE			
150	3.55	3.99	3.77
250	3.80	4.09	3.95
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
N DIVIS			
SINGLE	3.70	4.04	3.87
DIVIDED	3.66	4.05	3.85
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
GROWREG			
NONE	3.33	3.77	3.55
TRIAPEN	4.03	4.32	4.17
Mean	3.68	4.04	3.86

87/R/RA/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

FUNGCIDE	NONE	PR+IP	Mean		
INSCTCDE					
NONE	3.63	4.04	3.84		
DE+TR	3.72	4.04	3.88		
Mean	3.68	4.04	3.86		
SOWDAT N	14 AUG	4 SEP	Mean		
VARIETY N					
ARIANA	3.70	3.47	3.59		
BIENVENU	4.18	4.05	4.11		
Mean	3.94	3.76	3.85		
N RATE N	0	100	200	300	Mean
VARIETY N					
ARIANA	2.39	3.58	4.19	4.19	3.59
BIENVENU	2.84	4.20	4.60	4.81	4.11
Mean	2.61	3.89	4.40	4.50	3.85
N RATE N	0	100	200	300	Mean
SOWDAT N					
14 AUG	2.93	3.94	4.43	4.45	3.94
4 SEP	2.30	3.84	4.36	4.55	3.76
Mean	2.61	3.89	4.40	4.50	3.85
SOWDAT P	14 AUG	4 SEP	Mean		
VARIETY P					
ARIANA	4.14	3.86	4.00		
BIENVENU	4.25	4.56	4.41		
Mean	4.19	4.21	4.20		
N RATE P	150	250	Mean		
VARIETY P					
ARIANA	3.85	4.15	4.00		
BIENVENU	3.89	4.92	4.41		
Mean	3.87	4.53	4.20		
N RATE P	150	250	Mean		
SOWDAT P					
14 AUG	3.75	4.64	4.19		
4 SEP	3.99	4.43	4.21		
Mean	3.87	4.53	4.20		
GROREG P	NONE	TRIAPEN	Mean		
VARIETY P					
ARIANA	3.87	4.13	4.00		
BIENVENU	4.27	4.54	4.41		
Mean	4.07	4.34	4.20		

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

GROREG P	NONE	TRIAPEN	Mean
SOWDAT P			
14 AUG	4.06	4.33	4.19
4 SEP	4.08	4.34	4.21
Mean	4.07	4.34	4.20
GROREG P	NONE	TRIAPEN	Mean
N RATE P			
150	3.74	4.00	3.87
250	4.40	4.67	4.53
Mean	4.07	4.34	4.20
GRORG OX	NONE	TRIAPEN	Mean
SODATE O			
14 AUG	2.97	4.32	3.65
4 SEP	3.89	4.00	3.95
Mean	3.43	4.16	3.80
INSCT OX	NONE	DE+TR	Mean
SODATE O			
14 AUG	2.97	4.32	3.65
4 SEP	4.00	3.89	3.95
Mean	3.49	4.11	3.80
INSCT OX	NONE	DE+TR	Mean
GRORG OX			
NONE	2.97	3.89	3.43
TRIAPEN	4.00	4.32	4.16
Mean	3.49	4.11	3.80
FOL NUT	N	N+MIC+S	Mean
VAR NUT			
ARIANA	3.95	4.15	4.05
BIENVENU	4.70	4.24	4.47
Mean	4.32	4.19	4.26
SDAT NIL	14 AUG	4 SEP	Mean
VAR NIL			
ARIANA	2.31	2.25	2.28
BIENVENU	2.59	2.44	2.52
Mean	2.41	2.31	2.36
GRAIN MEAN	3.83		

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\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	SOW DATE	N RATE	N DIVIS
s.e.d.	0.094	0.094	0.090	0.090

Table	GROWREG	INSCTCDE	FUNGCIDE	VARIETY
s.e.d.	0.090	0.090	0.090	SOW DATE
				0.133

Table	VARIETY	SOW DATE	VARIETY	SOW DATE
s.e.d.	N RATE	N RATE	N DIVIS	N DIVIS
	0.131	0.131	0.131	0.131
Except when comparing means with the same level(s) of				
	VARIETY		0.128	
	SOW DATE	0.128		0.128

Table	N RATE	VARIETY	SOW DATE	N RATE
s.e.d.	N DIVIS	GROWREG	GROWREG	GROWREG
	0.128	0.131	0.131	0.128
Except when comparing means with the same level(s) of				
	VARIETY	0.128		
	SOW DATE		0.128	
	N RATE			0.131
	GROWREG			0.131

Table	N DIVIS	VARIETY	SOW DATE	N RATE
s.e.d.	GROWREG	INSCTCDE	INSCTCDE	INSCTCDE
	0.128	0.131	0.131	0.128
Except when comparing means with the same level(s) of				
	VARIETY	0.128		
	SOW DATE		0.128	

Table	N DIVIS	GROWREG	VARIETY	SOW DATE
s.e.d.	INSCTCDE	INSCTCDE	FUNGCIDE	FUNGCIDE
	0.128	0.128	0.131	0.131
Except when comparing means with the same level(s) of				
	VARIETY		0.128	
	SOW DATE			0.128

Table	N RATE	N DIVIS	GROWREG	INSCTCDE
s.e.d.	FUNGCIDE	FUNGCIDE	FUNGCIDE	FUNGCIDE
	0.128	0.128	0.128	0.128
Except when comparing means with the same level(s) of				
	N RATE			
	GROWREG		0.131	
	FUNGCIDE	0.131	0.131	

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.189	4.9
BLOCK.WP.SP	26	0.361	9.4

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00299

87/R/RA/2

WINTER OILSEED RAPE

SEED RATES AND ROW SPACINGS

Object: To compare c.v. Ariana on a range of row-widths and seed rates - Great Knott II.

Sponsor: D.P. Yeoman.

Design: 3 randomised blocks of 11 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. SEEDRATE            Seed rates:  
4 KG  
6 KG  
8 KG
2. ROWSPACE           Row spacings:  
17.5 CM  
35 CM  
52.5 CM

plus two extra treatments, sown at 2 kg seed rate:-

- | EXTRA     | Row spacings: |
|-----------|---------------|
| 2 KG 35   | 35 cm         |
| 2 KG 52.5 | 52.5 cm       |

Basal applications: Manures: 'Nitram' at 140 kg and later at 720 kg.  
Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Fungicides: Prochloraz at 0.50 kg in 200 l. Iprodione at 0.50 kg in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Triazophos at 0.42 l in 200 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

Seed: Ariana, dressed iprodione, gamma HCH and captan.

Cultivations, etc.: - Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. First N applied: 15 Aug. Rotary harrowed: 31 Aug. Sodium trichloroacetate applied, harrowed: 1 Sept. Seed sown: 3 Sept. Remaining weedkillers applied: 20 Nov. Bird repellent applied: 12 Dec. Second N applied: 18 Feb, 1987. Prochloraz applied: 22 Apr. Azinphos methyl and demeton-S-methyl sulphone applied: 29 Apr. Iprodione and triazophos applied: 15 June. Desiccant with wetting agent applied: 28 July. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Plant counts were made at establishment and again in spring.

87/R/RA/2

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

ROWSPACE	17.5 CM	35 CM	52.5 CM	Mean
SEEDRATE				
4 KG	3.45	3.36	3.48	3.43
6 KG	3.17	3.13	2.90	3.07
8 KG	3.02	3.02	2.94	2.99
Mean	3.21	3.17	3.11	3.16

EXTRA	2 KG	35	2 KG	52.5	Mean
	3.61			3.39	3.50

GRAND MEAN 3.22

\*\*\* Standard errors of differences of means \*\*\*

Table	EXTRA	SEEDRATE	ROWSPACE	SEEDRATE ROWSPACE
s.e.d.	0.229	0.132	0.132	0.229

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.280	8.7

GRAIN MEAN DM% 71.3

PLOT AREA HARVESTED 0.00345

87/R/RA/3

WINTER OILSEED RAPE

VARIETIES AND FUNGICIDES

Object: To study the effects of times of applying fungicides on the incidence of diseases and on the yield of six varieties of w. oilseed rape - Black Horse I.

Sponsor: C.J. Rawlinson.

Design: 2 randomised blocks of 8 plots split into 6.

Whole plot dimensions: 21.0 x 15.0.

Treatments: All combinations of:-

Whole plots

- |             |  |
|-------------|--|
| 1. AUT FUNG | Fungicide in autumn:                           |
| NONE        | None   |
| PROCHLOR    | Prochloraz at 0.50 kg in 500 l on 12 Nov, 1986 |
| 2. SPR FUNG | Fungicide in spring:                           |
| NONE        | None   |
| PROCHLOR    | Prochloraz at 0.50 kg in 200 l on 21 Apr, 1987 |
| 3. SUM FUNG | Fungicide in summer:                           |
| NONE        | None   |
| IPRODION    | Iprodione at 0.50 kg in 200 l on 15 June, 1987 |

Sub plots

- |            |            |
|------------|------------|
| 4. VARIETY | Varieties: |
| ARIANA     | Ariana     |
| BIENVENU   | Bienvenu   |
| JET NEUF   | Jet Neuf   |
| LIRADONN   | Liradonna  |
| MIKADO     | Mikado     |
| RAFAL      | Rafal      |

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitram' at 140 kg and later at 800 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor at 1.2 kg with fluazifop-P-butyl at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Deltamethrin at 0.0062 kg in 200 l. Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.



87/R/RA/3

Seed : Varieties, sown at 8.0 kg.

Cultivations, etc.:- Spring-tine cultivated: 8 Aug, 1986. PK applied: 11 Aug. Sodium trichloroacetate applied, N applied: 13 Aug. Seed sown: 2 Sept. Remaining weedkillers applied: 4 Oct. Deltamethrin applied: 11 Oct. Bird repellent applied: 12 Dec. Second N applied: 17 Feb, 1987. Remaining insecticides applied: 28 Apr. Desiccant with wetting agent applied: 28 July. Combine harvested: 3 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Diseases were assessed between November and July. Growth stage, height and plant development were recorded from May to harvest. Ripening and lodging were assessed before harvest and stubble stem population counts made immediately after harvest.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SPR FUNG	NONE	PROCHLOR						Mean	
AUT FUNG									
	NONE		3.16	3.43				3.29	
	PROCHLOR		3.53	3.32				3.43	
	Mean		3.35	3.38				3.36	
SUM FUNG	NONE	IPRODION						Mean	
AUT FUNG									
	NONE		3.18	3.41				3.29	
	PROCHLOR		3.28	3.58				3.43	
	Mean		3.23	3.49				3.36	
SUM FUNG	NONE	IPRODION						Mean	
SPR FUNG									
	NONE		3.22	3.48				3.35	
	PROCHLOR		3.24	3.51				3.38	
	Mean		3.23	3.49				3.36	
VARIETY	ARIANA	BIENVENU	JET	NEUF	LIRADONN	MIKADO	RAFAL	Mean	
AUT FUNG									
	NONE		3.28	3.88	2.56	2.89	3.91	3.23	3.29
	PROCHLOR		3.25	3.83	2.73	3.16	4.27	3.32	3.43
	Mean		3.27	3.86	2.65	3.03	4.09	3.27	3.36
VARIETY	ARIANA	BIENVENU	JET	NEUF	LIRADONN	MIKADO	RAFAL	Mean	
SPR FUNG									
	NONE		3.23	3.79	2.70	2.96	4.03	3.37	3.35
	PROCHLOR		3.31	3.93	2.59	3.10	4.14	3.18	3.38
	Mean		3.27	3.86	2.65	3.03	4.09	3.27	3.36

87/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL	Mean
SUM FUNG							
NONE	3.14	3.76	2.54	2.88	3.93	3.14	3.23
IPRODION	3.40	3.96	2.76	3.17	4.25	3.41	3.49
Mean	3.27	3.86	2.65	3.03	4.09	3.27	3.36

AUT FUNG	SUM FUNG	NONE	IPRODION
NONE	SPR FUNG		
	NONE	3.00	3.32
PROCHLOR	PROCHLOR	3.36	3.49
	NONE	3.44	3.63
	PROCHLOR	3.12	3.53

AUT FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SPR FUNG						
	NONE	3.15	3.66	2.43	2.83	3.79	3.11
PROCHLOR	PROCHLOR	3.41	4.10	2.70	2.96	4.03	3.36
	NONE	3.31	3.91	2.98	3.08	4.28	3.62
	PROCHLOR	3.20	3.76	2.49	3.23	4.25	3.01

AUT FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SUM FUNG						
	NONE	3.02	3.79	2.56	2.68	3.78	3.26
PROCHLOR	IPRODION	3.54	3.98	2.57	3.11	4.04	3.20
	NONE	3.25	3.73	2.51	3.09	4.08	3.01
	IPRODION	3.26	3.94	2.95	3.23	4.45	3.62

SPR FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SUM FUNG						
	NONE	3.12	3.64	2.62	2.76	3.86	3.30
PROCHLOR	IPRODION	3.33	3.94	2.79	3.15	4.21	3.43
	NONE	3.15	3.88	2.45	3.01	4.00	2.97
	IPRODION	3.46	3.98	2.73	3.18	4.29	3.40

87/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	AUT FUNG	SUM FUNG	NONE	IPRODION
ARIANA	NONE	SPR FUNG		
		NONE	2.86	3.44
	PROCHLOR	PROCHLOR	3.19	3.64
BIENVENU	NONE	NONE	3.39	3.23
		PROCHLOR	3.11	3.29
	PROCHLOR	NONE	3.57	3.75
		PROCHLOR	4.00	4.21
JET NEUF	NONE	NONE	3.70	4.12
		PROCHLOR	3.76	3.76
	PROCHLOR	NONE	2.33	2.52
		PROCHLOR	2.78	2.61
LIRADONN	NONE	NONE	2.91	3.05
		PROCHLOR	2.12	2.85
	PROCHLOR	NONE	2.55	3.10
		PROCHLOR	2.80	3.11
MIKADO	NONE	NONE	2.96	3.21
		PROCHLOR	3.21	3.26
	PROCHLOR	NONE	3.56	4.02
		PROCHLOR	4.00	4.07
RAFAL	NONE	NONE	4.17	4.39
		PROCHLOR	3.99	4.51
	PROCHLOR	NONE	3.10	3.11
		PROCHLOR	3.42	3.30
	PROCHLOR	NONE	3.50	3.75
		PROCHLOR	2.53	3.50

\*\*\* Standard errors of differences of means \*\*\*

Table	AUT FUNG	SPR FUNG	SUM FUNG	VARIETY
s.e.d.	0.136	0.136	0.136	0.104
Table	AUT FUNG	AUT FUNG	SPR FUNG	AUT FUNG
s.e.d.	SPR FUNG	SUM FUNG	SUM FUNG	VARIETY
0.193	0.193	0.193	0.191	
Except when comparing means with the same level(s) of				
AUT FUNG				0.147
Table	SPR FUNG	SUM FUNG	AUT FUNG	AUT FUNG
s.e.d.	VARIETY	VARIETY	SPR FUNG	SPR FUNG
0.191		0.191	SUM FUNG	VARIETY
Except when comparing means with the same level(s) of				
SPR FUNG	0.147			
SUM FUNG		0.147		
AUT FUNG.SPR FUNG				0.208

87/R/RA/3

\*\*\* Standard errors of differences of means \*\*\*

Table	AUT FUNG SUM FUNG VARIETY	SPR FUNG SUM FUNG VARIETY	AUT FUNG SPR FUNG SUM FUNG VARIETY
s.e.d.	0.271	0.271	0.383
Except when comparing means with the same level(s) of			
AUT FUNG.SUM FUNG	0.208		
SPR FUNG.SUM FUNG		0.208	
AUT FUNG.SPR FUNG.SUM FUNG			0.294

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.273	8.1
BLOCK.WP.SP	40	0.294	8.7

GRAIN MEAN DM% 83.9

SUB PLOT AREA HARVESTED 0.00345

87/R/RA/4

WINTER OILSEED RAPE

GROWTH REGULATORS AND FUNGICIDES

Object: To study the effects of a range of materials on the control of fungi and on the growth and the yield of w. oilseed rape - Black Horse I.

Sponsor: C.J. Rawlinson.

Design: Single replicate of 3 x 4 x 2 x 2.

Whole plot dimensions: 3.0 x 20.0.

Treatments: All combinations of:-

Whole plots

- |              |   |
|--------------|---|
| 1. FUNGICIDE | Fungicides:   |
| NONE         | None  |
| PROCHLOR     | Prochloraz at 0.50 kg   |
| PROPICON     | Propiconazole at 0.12 kg  |
| 2. GRTH REG  | Growth regulators:  |
| NONE         | None  |
| MEPIQUAT     | Mepiquat chloride at 0.915 kg + 2-chlorethyl-phosphonic acid at 0.465 kg              |
| TRIAPENT     | Triapenthenol (as 'U.K.244a' at 0.70 kg) with a wetting agent ('Cittowett' at 0.10 l) |
| BAS11100     | 'BAS 11100W' at 3.0 l   |
| 3. VARIETY   | Varieties:  |
| ARIANA       |   |
| PRIMOR       |   |
| 4. APP TIME  | Times of application:   |
| AUTUMN       | Autumn, on 27 Nov, 1986   |
| SPRING       | Spring, on 15 Apr, 1987   |

NOTE: Treatment sprays were applied in 220 l.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitram' at 140 kg, and later at 800 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor at 1.2 kg with fluazifop-P-butyl at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Deltamethrin at 0.0062 kg in 200 l. Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

87/R/RA/4

Seed: Varieties, sown at 8.0 kg.

Cultivations, etc.: - Spring-tine cultivated: 8 Aug, 1986. PK applied: 11 Aug. Sodium trichloroacetate applied, N applied: 13 Aug. Seed sown: 2 Sept. Remaining weedkillers applied: 4 Oct. Deltamethrin applied: 11 Oct. Bird repellent applied: 12 Dec. Second N applied: 17 Feb, 1987. Remaining insecticides applied: 28 Apr. Desiccant with wetting agent applied: 28 July. Combine harvested: 3 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Plant heights and diseases were assessed throughout the season. Flowering dates were noted and plant population counts made at harvest. Growth analysis and plant structure measurements were made just before harvest, stubble stem population counts were made immediately after harvest. Components of yield were measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

GRTH REG	NONE	MEPIQUAT	TRIAPENT	BAS11100	Mean
FUNGICIDE					
NONE	2.71	2.84	3.10	2.75	2.85
PROCHLOR	3.19	2.98	3.24	3.20	3.15
PROPICON	2.82	2.78	3.17	3.04	2.95
Mean	2.90	2.86	3.17	2.99	2.98
VARIETY	ARIANA	PRIMOR	Mean		
FUNGICIDE					
NONE	3.24	2.45	2.85		
PROCHLOR	3.54	2.76	3.15		
PROPICON	3.25	2.66	2.95		
Mean	3.34	2.62	2.98		
VARIETY	ARIANA	PRIMOR	Mean		
GRTH REG					
NONE	3.36	2.45	2.90		
MEPIQUAT	3.30	2.43	2.86		
TRIAPENT	3.41	2.93	3.17		
BAS11100	3.30	2.69	2.99		
Mean	3.34	2.62	2.98		
APP TIME	AUTUMN	SPRING	Mean		
FUNGICIDE					
NONE	2.83	2.86	2.85		
PROCHLOR	3.19	3.11	3.15		
PROPICON	2.96	2.95	2.95		
Mean	2.99	2.97	2.98		

87/R/RA/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

APP TIME	AUTUMN	SPRING	Mean
GRTH REG			
NONE	2.88	2.93	2.90
MEPIQUAT	2.95	2.78	2.86
TRIAPENT	3.12	3.22	3.17
BAS11100	3.02	2.97	2.99

Mean	2.99	2.97	2.98
------	------	------	------

APP TIME	AUTUMN	SPRING	Mean
VARIETY			
ARIANA	3.39	3.29	3.34
PRIMOR	2.60	2.65	2.62

Mean	2.99	2.97	2.98
------	------	------	------

FUNGICIDE	VARIETY	ARIANA	PRIMOR
GRTH REG			
NONE	NONE	3.30	2.12
	MEPIQUAT	3.24	2.44
	TRIAPENT	3.41	2.78
	BAS11100	3.01	2.48
PROCHLOR	NONE	3.59	2.79
	MEPIQUAT	3.47	2.49
	TRIAPENT	3.55	2.93
	BAS11100	3.54	2.85
PROPICON	NONE	3.18	2.45
	MEPIQUAT	3.19	2.37
	TRIAPENT	3.28	3.07
	BAS11100	3.34	2.74

FUNGICIDE	APP TIME	AUTUMN	SPRING
GRTH REG			
NONE	NONE	2.68	2.74
	MEPIQUAT	2.81	2.86
	TRIAPENT	3.04	3.15
	BAS11100	2.79	2.70
PROCHLOR	NONE	3.28	3.10
	MEPIQUAT	3.23	2.72
	TRIAPENT	3.13	3.35
	BAS11100	3.14	3.26
PROPICON	NONE	2.69	2.94
	MEPIQUAT	2.81	2.75
	TRIAPENT	3.19	3.16
	BAS11100	3.13	2.94

FUNGICIDE	VARIETY	ARIANA	PRIMOR	SPRING
APP TIME				
NONE		3.21	3.27	2.45
PROCHLOR		3.56	3.51	2.82
PROPICON		3.39	3.11	2.52
				2.46
				2.70
				2.79

87/R/RA/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

GRTH REG	VARIETY	ARIANA		PRIMOR	
	APP TIME	AUTUMN	SPRING	AUTUMN	SPRING
NONE		3.24	3.47	2.52	2.38
MEPIQUAT		3.38	3.22	2.53	2.33
TRIAPENT		3.43	3.39	2.81	3.04
BAS11100		3.50	3.09	2.54	2.84

\*\*\* Standard errors of differences of means \*\*\*

Table	FUNGCIDE	GRTH REG	VARIETY	APP TIME
s.e.d.	0.103	0.119	0.084	0.084

Table	FUNGCIDE GRTH REG	FUNGCIDE VARIETY	GRTH REG VARIETY	FUNGCIDE APP TIME
s.e.d.	0.206	0.145	0.168	0.145

Table	GRTH REG APP TIME	VARIETY APP TIME	FUNGCIDE GRTH REG VARIETY	FUNGCIDE GRTH REG APP TIME
s.e.d.	0.168	0.119	0.291	0.291

Table	FUNGCIDE VARIETY APP TIME	GRTH REG VARIETY APP TIME
s.e.d.	0.206	0.237

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	6	0.291	9.7

GRAIN MEAN DM% 83.6

PLOT AREA HARVESTED 0.00460



87/R/RA/5

WINTER OILSEED RAPE

PRECISION SOWING

Object: To compare four drills at two seed rates on two sowing dates with and without an insecticide - Great Knott II.

Sponsor: D.P. Yeoman.

Design: 2 replicates of 4 x 2 x 2 x 2 arranged in 4 blocks of 16 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. DRILL                      Drills used to sow seed:

ALPHA AC	Alpha Accord sown in rows 12.5 cm apart, seeds randomly spaced
CNVNTIAL	Conventional, sown in rows 17.6 cm apart, seeds randomly spaced
MONOCENT	Monocentra, sown in rows 25 cm apart, seeds precisely spaced
STANHAY	Stanhay, sown in rows 25 cm apart, seeds precisely spaced
  
2. SOW DATE                Dates of sowing:

18 AUG	18 August, 1986
5 SEP	5 September
  
3. SEEDRATE                Seed rates:

4 KG
8 KG
  
4. INSC TCDE                Insecticide:

NONE	None
DELTAMET	Deltamethrin at 0.0075 kg in 220 l on 3 Oct, 1986

NOTES: (1) For the Monocentra drill the seed within the row was spaced at 5.5 cm for the 4 kg seed rate and 2.7 cm for the 8 kg seed rate.

(2) For the Stanhay drill the seed within the row was spaced at 4.8 cm for the 4 kg seed rate and 2.8 cm for the 8 kg seed rate.

Basal applications: Manures: 'Nitram' at 140 kg and later at 720 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Fungicides: Prochloraz at 0.50 kg in 200 l. Iprodione at 0.50 kg in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

87/R/RA/5

Seed: Ariana, dressed gamma HCH, thiram and fenpropimorph.

Cultivations, etc.:- Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. First N applied, sodium trichloroacetate applied, harrowed: 15 Aug. SOWDATE 18 AUG seed sown: 18 Aug. SOWDATE 5 SEPT seed sown: 5 Sept. 'Matrikerb' applied: 20 Nov. Bird repellent applied: 24 Dec. Second N applied: 18 Feb, 1987. Prochloraz applied: 22 Apr. Insecticides applied: 29 Apr. Iprodione applied: 15 June. Desiccant with wetting agent applied: 28 July. Combine harvested: 6 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Plant counts were made at establishment and in spring.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOW DATE	18 AUG	5 SEP	Mean
DRILL			
ALPHA AC	3.88	3.44	3.66
CNVNTIAL	3.85	3.27	3.56
MONOCENT	3.84	3.40	3.62
STANHAY	3.92	3.69	3.81
Mean	3.87	3.45	3.66
SEEDRATE	4 KG	8 KG	Mean
DRILL			
ALPHA AC	3.84	3.48	3.66
CNVNTIAL	3.87	3.25	3.56
MONOCENT	3.83	3.41	3.62
STANHAY	3.93	3.68	3.81
Mean	3.87	3.46	3.66
SEEDRATE	4 KG	8 KG	Mean
SOW DATE			
18 AUG	4.02	3.72	3.87
5 SEP	3.71	3.19	3.45
Mean	3.87	3.46	3.66
INSCTCDE	NONE	DELTAMET	Mean
DRILL			
ALPHA AC	3.51	3.81	3.66
CNVNTIAL	3.52	3.60	3.56
MONOCENT	3.60	3.65	3.62
STANHAY	3.91	3.70	3.81
Mean	3.63	3.69	3.66

87/R/RA/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INSCTCDE	NONE	DELTAMET	Mean	
SOW DATE				
18 AUG	3.84	3.91	3.87	
5 SEP	3.43	3.47	3.45	
Mean	3.63	3.69	3.66	

  

INSCTCDE	NONE	DELTAMET	Mean	
SEEDRATE				
4 KG	3.85	3.88	3.87	
8 KG	3.41	3.50	3.46	
Mean	3.63	3.69	3.66	

  

DRILL	SOW DATE	18 AUG		5 SEP	
	SEEDRATE	4 KG	8 KG	4 KG	8 KG
ALPHA AC		3.96	3.80	3.72	3.16
CNVNTIAL		4.08	3.62	3.65	2.89
MONOCENT		3.99	3.69	3.67	3.13
STANHAY		4.06	3.79	3.81	3.57

  

DRILL	INSCTCDE	18 AUG		5 SEP	
		NONE	DELTAMET	NONE	DELTAMET
ALPHA AC		3.82	3.94	3.20	3.68
CNVNTIAL		3.73	3.97	3.30	3.24
MONOCENT		3.82	3.87	3.37	3.43
STANHAY		3.98	3.87	3.84	3.53

  

DRILL	INSCTCDE	4 KG		8 KG	
		NONE	DELTAMET	NONE	DELTAMET
ALPHA AC		3.63	4.05	3.39	3.57
CNVNTIAL		3.90	3.84	3.13	3.37
MONOCENT		3.90	3.77	3.29	3.53
STANHAY		3.98	3.88	3.84	3.52

  

SOW DATE	INSCTCDE	4 KG		8 KG	
		NONE	DELTAMET	NONE	DELTAMET
18 AUG		3.95	4.10	3.73	3.72
5 SEP		3.76	3.67	3.10	3.27

  

DRILL	SOW DATE	SEEDRATE	4 KG		8 KG	
			INSCTCDE	NONE	DELTAMET	NONE
ALPHA AC	18 AUG		3.81	4.12	3.83	3.77
	5 SEP		3.46	3.98	2.95	3.37
CNVNTIAL	18 AUG		4.00	4.17	3.47	3.77
	5 SEP		3.81	3.50	2.80	2.97
MONOCENT	18 AUG		3.94	4.05	3.70	3.69
	5 SEP		3.85	3.50	2.89	3.37
STANHAY	18 AUG		4.04	4.07	3.92	3.66
	5 SEP		3.93	3.69	3.76	3.38

87/R/RA/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

Table	DRILL	SOW DATE	SEEDRATE	INSCTCDE
s.e.d.	0.072	0.051	0.051	0.051
Table	DRILL SOW DATE	DRILL SEEDRATE	SOW DATE SEEDRATE	DRILL INSCTCDE
s.e.d.	0.101	0.101	0.072	0.101
Table	SOW DATE INSCTCDE	SEEDRATE INSCTCDE	DRILL SOW DATE SEEDRATE	DRILL SOW DATE INSCTCDE
s.e.d.	0.072	0.072	0.143	0.143
Table	DRILL SEEDRATE INSCTCDE	DRILL* SOW DATE SEEDRATE INSCTCDE		
s.e.d.	0.143	0.203		

\* Within the same level of SOW DATE.SEEDRATE.INSCTCDE

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.203	5.5

GRAIN MEAN DM% 79.1

PLOT AREA HARVESTED 0.00345

87/R/RA/6

WINTER OILSEED RAPE

STRAW TREATMENTS BEFORE SOWING

Object: To study the effects of a range of methods of treating cereal straw on the establishment and yield of w. oilseed rape sown on two dates, with and without seedbed N - Great Knott II.

Sponsors: R.J. Darby, D.P Yeoman.

Design: 2 randomised blocks of 6 plots split into 2 sub plots each split into 2 sub sub plots.

Whole plot dimensions: 6.0 x 33.0.

Treatments: All combinations of:-

Whole plots

- |             |                                    |
|-------------|------------------------------------|
| 1. STR DISP | Disposal of straw:                 |
| BURN        | Burnt on 13 Aug, 1986              |
| CHOP        | Chopped on 8 Aug                   |
| BALE        | Baled on 7 Aug                     |
| 2. CULTIVTN | Method of primary cultivation:     |
| TINE CULT   | Tine cultivated, without inversion |
| PLOUGH      | Ploughed on 15 Aug, 1986           |

Sub plots

- |             |                  |
|-------------|------------------|
| 3. SOW DATE | Dates of sowing: |
| 20 AUG      | 20 Aug, 1986     |
| 5 SEPT      | 5 Sept           |

Sub sub plots

- |            |  |
|------------|--|
| 4. SDBED N | Seedbed nitrogen (kg N) as 'Nitram' on 18 Aug, 1986: |
| 0          |  |
| 50         |  |

- NOTES: (1) All plots were disced and rotary harrowed on 18 Aug, 1986.  
(2) STR DISP BURN plots were spring-tine cultivated on 14 Aug.  
(3) CULTIVTN TINE CULT plots were heavy spring-tine cultivated on 18 Aug, and except for STR DISP BURN plots were also rotary cultivated the same day.  
(4) CULTIVTN PLOUGH plots were rolled immediately after ploughing.  
(5) All plots were harrowed immediately after sowing. All SOW DATE 5 SEPT plots were rolled immediately after harrowing.

87/R/RA/6

Basal applications: Manures: 'Nitram' at 580 kg. Weedkillers: Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Metazachlor at 0.75 kg in 280 l. Molluscicide: Methiocarb at 0.22 kg. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

Seed: Bienvenu, dressed gamma HCH, thiram and fenpropimorph, sown at 8.0 kg.

Cultivations, etc.:— Molluscicide applied to all plots, metazachlor applied to SOWDATE 20 AUG only: 20 Aug, 1986. Metazachlor applied to SOWDATE 5 SEPT: 6 Sept. Remaining weedkillers applied: 20 Nov. Bird repellent applied: 24 Dec. N applied: 18 Feb, 1987. Desiccant with wetting agent applied: 30 July. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Emergence counts were made in autumn and plant counts in mid-March.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CULTIVTN	TINE CLT	PLOUGH	Mean
STR DISP			
BURN	3.84	3.78	3.81
CHOP	3.48	3.74	3.61
BALED	3.67	3.63	3.65
Mean	3.66	3.72	3.69
SOW DATE	20 AUG	5 SEPT	Mean
STR DISP			
BURN	3.83	3.79	3.81
CHOP	3.79	3.43	3.61
BALED	3.86	3.44	3.65
Mean	3.82	3.55	3.69
SOW DATE	20 AUG	5 SEPT	Mean
CULTIVTN			
TINE CLT	3.82	3.51	3.66
PLOUGH	3.83	3.60	3.72
Mean	3.82	3.55	3.69
SDBED N	0	50	Mean
STR DISP			
BURN	3.67	3.95	3.81
CHOP	3.56	3.66	3.61
BALED	3.52	3.77	3.65
Mean	3.58	3.79	3.69

87/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SDBED N	0	50	Mean
CULTIVTN			
TINE CLT	3.52	3.81	3.66
PLOUGH	3.65	3.78	3.72
Mean	3.58	3.79	3.69
SDBED N	0	50	Mean
SOW DATE			
20 AUG	3.72	3.93	3.82
5 SEPT	3.45	3.66	3.55
Mean	3.58	3.79	3.69
STR DISP	SOW DATE	20 AUG	5 SEPT
BURN	CULTIVTN		
	TINE CLT	3.84	3.84
CHOP	PLOUGH	3.82	3.74
	TINE CLT	3.66	3.30
BALED	PLOUGH	3.92	3.56
	TINE CLT	3.95	3.38
	PLOUGH	3.76	3.50
STR DISP	SDBED N	0	50
BURN	CULTIVTN		
	TINE CLT	3.66	4.02
CHOP	PLOUGH	3.68	3.88
	TINE CLT	3.43	3.53
BALED	PLOUGH	3.69	3.79
	TINE CLT	3.46	3.87
	PLOUGH	3.59	3.67
STR DISP	SDBED N	0	50
BURN	SOW DATE		
	20 AUG	3.61	4.04
CHOP	5 SEPT	3.73	3.86
	20 AUG	3.83	3.75
BALED	5 SEPT	3.29	3.57
	20 AUG	3.73	3.99
	5 SEPT	3.32	3.56
CULTIVTN	SDBED N	0	50
TINE CLT	SOW DATE		
	20 AUG	3.66	3.97
PLOUGH	5 SEPT	3.37	3.64
	20 AUG	3.78	3.88
	5 SEPT	3.52	3.68

87/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	SOW DATE	20 AUG	5 SEPT	
STR DISP CULTIVTN SDBED N		0	50	0 50
BURN TINE CLT		3.55	4.12	3.76 3.92
PLOUGH		3.66	3.97	3.69 3.79
CHOP TINE CLT		3.69	3.64	3.17 3.43
PLOUGH		3.96	3.87	3.42 3.71
BALED TINE CLT		3.74	4.17	3.19 3.58
PLOUGH		3.72	3.81	3.46 3.54

\*\*\* Standard errors of differences of means \*\*\*

Table	STR DISP	CULTIVTN	SOW DATE	SDBED N
s.e.d.	0.158	0.129	0.043	0.055

Table	STR DISP CULTIVTN	STR DISP SOW DATE	CULTIVTN SOW DATE	STR DISP SDBED N
s.e.d.	0.223	0.166	0.136	0.172
Except when comparing means with the same level(s) of				
STR DISP		0.075		0.096
CULTIVTN			0.061	

Table	CULTIVTN SDBED N	SOW DATE SDBED N	STR DISP CULTIVTN SOW DATE	STR DISP CULTIVTN SDBED N
s.e.d.	0.140	0.070	0.235	0.243
Except when comparing means with the same level(s) of				
CULTIVTN	0.078			
SOW DATE		0.078		
STR DISP.CULTIVTN			0.106	0.135

Table	STR DISP SOW DATE SDBED N	CULTIVTN SOW DATE SDBED N	STR DISP CULTIVTN SOW DATE SDBED N
s.e.d.	0.192	0.157	0.271
Except when comparing means with the same level(s) of			
STR DISP	0.122		
CULTIVTN		0.099	
STR DISP.CULTIVTN			0.172
STR DISP.SOW DATE	0.135		
CULTIVTN.SOW DATE		0.111	
STR DISP.SDBED N	0.122		
CULTIVTN.SDBED N		0.099	
STR DISP.CULTIVTN.SOW DATE			0.192
STR DISP.CULTIVTN.SDBED N			0.172

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	5	0.223	6.0
BLOCK.WP.SP	6	0.106	2.9
BLOCK.WP.SP.SSP	12	0.192	5.2

GRAIN MEAN DM% 86.7 SUB PLOT AREA HARVESTED 0.00368



87/R/RA/7

WINTER OILSEED RAPE

FORMS AND TIMES OF N

Object: To compare the effects of single and divided dressings of urea and 'Nitro-Chalk' on the yield of w. oilseed rape - Great Knott II.

Sponsor: R.J. Darby.

Design: 2 randomised blocks of 2 plots split into 15 sub plots.

Whole plot dimensions: 30.0 x 27.0.

Treatments: All combinations of:-

Whole plots

1. VARIETY Variety:

ARIANA  
MIKADO

Sub plots

2. N FORM Forms of nitrogen fertilizer:

AMM NIT Ammonium nitrate (as 'Nitro-Chalk')  
UREA Prilled urea

3. N TIME Times of applying a total dressing of 200 kg N:

4 - - - All on 23 Feb, 1987  
3 1 - - Three quarters on 23 Feb, one quarter on 16 Mar  
3 - 1 - Three quarters on 23 Feb, one quarter on 9 Apr  
2 2 - - Half on 23 Feb, half on 16 Mar  
2 - 2 - Half on 23 Feb, half on 9 Apr  
2 1 1 - Half on 23 Feb, quarter on 16 Mar, quarter on 9 Apr  
1 1 1 1 One quarter on 23 Feb and 16 Mar and 9 Apr and 27 Apr

plus two extra treatments

EXTRA

NONE AR No nitrogen fertilizer ARIANA  
NONE MI No nitrogen fertilizer MIKADO

NOTE: Seed was dressed with gamma HCH, thiram and fenpropimorph and sown at 8 kg on 3 Sept, 1986.

Basal applications: Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

87/R/RA/7

Cultivations, etc.: - Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. Rotary harrowed: 31 Aug. Sodium trichloroacetate applied, harrowed: 1 Sept. Clopyralid and propyzamide applied: 20 Nov. Bird repellent applied: 24 Dec. Desiccant with wetting agent applied: 30 July, 1987. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Alternaria infection was assessed in July. Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N FORM N TIME	AMM NIT	UREA	Mean
4 - - -	2.65	2.79	2.72
3 1 - -	2.77	2.74	2.76
3 - 1 -	2.61	2.76	2.68
2 2 - -	2.76	2.73	2.74
2 - 2 -	2.64	2.62	2.63
2 1 1 -	2.67	2.83	2.75
1 1 1 1	2.78	2.78	2.78

Mean 2.70 2.75 2.72

VARIETY N TIME	ARIANA	MIKADO	Mean
4 - - -	2.73	2.71	2.72
3 1 - -	2.81	2.71	2.76
3 - 1 -	2.63	2.74	2.68
2 2 - -	2.63	2.86	2.74
2 - 2 -	2.60	2.67	2.63
2 1 1 -	2.75	2.74	2.75
1 1 1 1	2.64	2.92	2.78

Mean 2.68 2.76 2.72

VARIETY N FORM	ARIANA	MIKADO	Mean
AMM NIT	2.68	2.72	2.70
UREA	2.69	2.81	2.75
Mean	2.68	2.76	2.72

87/R/RA/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

N FORM VARIETY N TIME	AMM NIT ARIANA	MIKADO	UREA ARIANA	MIKADO
4 - - -	2.69	2.62	2.78	2.80
3 1 - -	2.84	2.71	2.77	2.71
3 - 1 -	2.55	2.67	2.70	2.81
2 2 - -	2.66	2.85	2.59	2.87
2 - 2 -	2.60	2.68	2.59	2.66
2 1 1 -	2.83	2.52	2.68	2.97
1 1 1 1	2.59	2.96	2.68	2.88
EXTRA	NONE AR 1.13	NONE MI 1.13	Mean 1.13	

Grand mean 2.62

\*\*\* Standard errors of differences of means \*\*\*

Table	EXTRA	N TIME	N FORM	
s.e.d.	0.190	0.095	0.051	
Table	N TIME N FORM	N TIME* VARIETY	N FORM* VARIETY	N TIME* N FORM VARIETY*
s.e.d.	0.134	0.134	0.072	0.190

\* Within the same level of VARIETY only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	28	0.190	7.3
MEAN DM%	84.4		
SUB PLOT AREA HARVESTED	0.00299		

87/R/RA/11

WINTER OILSEED RAPE

OVERSOWING IN WHEAT

Object: To study the establishment of rape after wheat by oversowing into the wheat - Great Knott III.

Sponsors: R.J. Darby, D.P. Yeoman.

Design: 3 randomised blocks of 3 plots split into 3 sub plots.

Whole plot dimensions: 15.0 x 16.0.

Treatments: All combinations of:-

Whole plots

- |           |   |
|-----------|---|
| 1. SOWING | Methods of sowing and straw disposal:   |
| OVERS BA  | Oversown on 20 Aug, 1986, straw baled on 21 Aug                                 |
| OVERS CH  | Oversown on 20 Aug, 1986, straw chopped and spread on 21 Aug                    |
| CONVEN S  | Straw baled on 21 Aug, conventionally sown into conventionally prepared seedbed |

Sub plots

- |           |   |
|-----------|---|
| 2. N TIME | Timing of nitrogen as 'Nitram'. (Total spring N same for all treatments): |
| SN FN MN  | 50 kg N to seedbed, 50 kg N on 19 Feb, 1987 and 150 kg N on 19 Mar        |
| - FN -    | 200 kg N on 19 Feb  |
| - FN MN   | 50 kg N on 19 Feb and 150 kg N on 19 Mar                                  |

- NOTES: (1) Oversowing was done into standing wheat. The wheat was harvested later that day.  
(2) SOWING CONVEN S plots were ploughed and rolled on 22 Aug, rotary harrowed on 31 Aug.  
(3) SOWING OVERS BA and OVERS CH plots were sprayed with fluazifop-P-butyl at 0.19 kg with a wetting agent ('Agral' at 0.38 l) in 380 l on 26 Sept.  
(4) One whole plot CONVEN S was missing. An estimated value was used in the analysis.

Basal applications: Weedkillers: Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

Seed: Ariana, dressed gamma HCH, thiram and fenpropimorph, sown at 8.0 kg.

Cultivations, etc.:- Weedkillers applied: 20 Nov, 1986. Desiccant with wetting agent applied: 31 July, 1987. Combine harvested: 6 Aug. Previous crops: W. wheat 1985 and 1986.

NOTE: Plant counts were made in autumn and again in mid-March.

87/R/RA/11

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N TIME	SN FN MN	- FN -	- FN MN	Mean
SOWING					
OVERS BA		3.61	3.51	3.38	3.50
OVERS CH		3.47	2.86	2.66	3.00
CONVEN S		3.51	3.28	3.22	3.34
Mean		3.53	3.22	3.09	3.28

\*\*\* Standard errors of differences of means \*\*\*

Table	N TIME	SOWING*
s.e.d.	0.184	0.319

\* Within same level of SOWING only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	10	0.391	11.9

GRAIN MEAN DM% 75.2

SUB PLOT AREA HARVESTED 0.00368

87/R/RA/13

WINTER OILSEED RAPE

TIMES AND METHODS OF HARVEST

Object: To investigate the effects of times and methods of harvest on the yield and glucosinolate content of the seed - Webbs and Drapers.

Sponsor: C.J. Rawlinson.

Design: 4 blocks of 2 whole plots each split into 3 sub-plots each split into 3 sub-sub plots.

Whole plot dimensions: Webbs (2 blocks): 78 x 14.  
Drapers (2 blocks): 24 x 64.

Treatments: All combinations of:-

Whole plots

- |              |  |
|--------------|--|
| 1. FUNGICIDE | Fungicide at stem extension:                   |
| NONE         | None   |
| PROCHLOR     | Prochloraz at 0.50 kg in 500 l on 23 Apr, 1987 |

Sub plots

- |             |  |
|-------------|--|
| 2. HAR METH | Method of harvest:                       |
| COMBINE     | Combined direct, without prior treatment |
| DESICATE    | Desiccated with diquat                   |
| SWATHE      | Swathed before combining                 |

Sub sub plots

- |             |                                 |
|-------------|---------------------------------|
| 3. HAR TIME | Time of harvest:                |
| EARLY       | Early (seed above 20% moisture) |
| NORMAL      | Normal (seed 10 - 15% moisture) |
| LATE        | Late (7 - 10 days after NORMAL) |

- NOTES: (1) The HAR METH DESICATE plots were desiccated on 9 July, 1987 24 July and 5 Aug respectively for early, normal and late HAR TIME using diquat at 0.60 kg ion with a wetting agent in 500 l. The wetting agent was 'Enhance' at 0.50 l on the first two occasions, 'Agral' at 0.50 l on the third.
- (2) The HAR METH SWATHE plots were swathed on 9 July, 1987, 23 July and 5 Aug respectively for early, normal and late HAR TIME.
- (3) All HAR METH plots for early and normal HAR TIME were combine harvested on 5 Aug, 1987 and for late HAR TIME on 12 Aug.

Basal applications: Manures: 'Nitram' at 720 kg. Weedkillers: Fluazifop-P-butyl at 0.19 kg with metazachlor at 1.2 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l.

Seed: Ariana, dressed iprodione, sown at 6.0 kg.

87/R/RA/13

Cultivations, etc.:- Heavy spring-tine cultivated: 5 Sept, 1986. Rotary harrowed: 6 Sept. Seed sown: 7 Sept. Weedkillers applied: 4 Oct (Webbs) and 17 Oct (Drapers). Bird repellent applied: 23 Dec. N applied: 20 Feb, 1987. Insecticides applied: 28 Apr. Previous crops: W. wheat 1985 and 1986 on both sites.

NOTE: Seed samples were taken frequently from early July until harvest for glucosinolate analysis.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

HAR METH	COMBINE	DESICATE	SWATHE	Mean
FUNGICIDE				
NONE	3.07	2.63	2.27	2.65
PROCHLOR	3.52	2.71	2.62	2.95
Mean	3.29	2.67	2.44	2.80
HAR TIME	EARLY	NORMAL	LATE	Mean
FUNGICIDE				
NONE	1.99	3.00	2.97	2.65
PROCHLOR	2.18	3.33	3.33	2.95
Mean	2.09	3.17	3.15	2.80
HAR TIME	EARLY	NORMAL	LATE	Mean
HAR METH				
COMBINE	3.26	3.21	3.41	3.29
DESICATE	1.46	3.06	3.48	2.67
SWATHE	1.54	3.22	2.56	2.44
Mean	2.09	3.17	3.15	2.80
FUNGICIDE	HAR TIME	EARLY	NORMAL	LATE
NONE	HAR METH			
	COMBINE	3.04	3.02	3.14
	DESICATE	1.41	2.98	3.49
	SWATHE	1.52	3.01	2.27
PROCHLOR	COMBINE	3.47	3.41	3.67
	DESICATE	1.51	3.14	3.47
	SWATHE	1.57	3.44	2.86

87/R/RA/13

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

Table	HAR METH	HAR TIME	FUNGCIDE* HAR METH
s.e.d.	0.058	0.063	0.082

Table	FUNGCIDE* HAR TIME	HAR METH HAR TIME	FUNGCIDE* HAR METH HAR TIME
s.e.d.	0.090	0.107	0.151
Except when comparing means with the same level(s) of			
	HAR METH	0.110	
	FUNGCIDE.HAR METH		0.155

\* Within the same level of FUNGCIDE only

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.116	4.1
BLOCK.WP.SP.SSP	36	0.219	7.8

GRAIN MEAN DM% 79.8

PLOT AREA HARVESTED

HAR METH SWATHE 0.00519

HAR METH COMBINE OR DESICATE 0.00322



87/R/SU/1

SUNFLOWERS

EARLY VARIETIES AND PLANT HEALTH

Object: To compare six varieties of sunflower with and without sprays to control pathogens - Hoosfield.

Sponsor: C.J. Rawlinson.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 4.5 x 10.0.

Treatments: All combinations of:-

- |             |   |
|-------------|---|
| 1. VARIETY  | Varieties:  |
| SUNBRED     | Sunbred 246   |
| EX 10       | Ex 10   |
| EX 34       | Ex 34   |
| S 2004      | S 2004  |
| CERFLOR     | Cerflor   |
| SUNWHEAT    | Sunwheat  |
| 2. PATHCONT | Pathogen control:   |
| NONE        | None  |
| FULL        | Full: Carbendazim at 0.25 kg with vinclozolin at 0.50 kg in 220 l on 25 July, 1987, 5 Aug, 19 Aug, 2 Sept and 16 Sept |

- NOTES: (1) Varieties SUNBRED and CERFLOR were desiccated with diquat at 0.60 kg ion in 220 l on 12 Oct, 1987 but were not harvested for yield because of subsequent storm and bird damage.
- (2) The remaining varieties were desiccated with diquat at 0.60 kg ion in 220 l on 18 Sept and combine harvested on 25 Sept.

Basal applications: Manures: 'Nitram' at 200 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Trifluralin at 0.84 kg in 200 l. Linuron at 0.75 kg in 500 l.

Seed: Varieties, sown at 80,000 seeds per hectare.

Cultivations, etc.:- Glyphosate applied: 6 Nov, 1986. Ploughed: 1 Dec. Spring-tine cultivated: 14 Apr, 1987. N applied, trifluralin applied, rotary harrowed twice: 15 Apr. Seed sown: 17 Apr. Linuron applied: 21 Apr. Previous crops: Sugar beet 1985, s. barley 1986.

NOTE: Disease assessments were made on five occasions from June until September. Growth stages and plant height were assessed on ten occasions throughout the season. Oil contents of the grain were measured.

87/R/SU/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PATHCONT VARIETY	NONE	FULL	Mean
EX 10	1.79	1.71	1.75
EX 34	0.52	0.78	0.65
S 2004	2.71	2.38	2.55
SUNWHEAT	1.50	1.88	1.69
Mean	1.63	1.69	1.66

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	PATHCONT	VARIETY PATHCONT
s.e.d.	0.168	0.119	0.238

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.291	17.6
GRAIN MEAN DM%	61.9		
PLOT AREA HARVESTED	0.00200		

87/R/SU/3

SUNFLOWERS

PESTS AND PATHOGENS

Object: To study the separate and combined effects of pest and pathogen control on sunflowers - Garden Plot 2.

Sponsors: A.W. Ferguson, C.J. Rawlinson.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 2.13 x 10.1.

Treatments: All combinations of:-

1. PESTCONT            Sprays to control pests:

NONE	None
FULL	Full: Pirimicarb at 0.14 kg on 25 July, 1987, 5, 19 Aug, 3, 17 Sept. Malathion at 1.3 l on 4, 11, 19 Aug

2. PATHCONT            Sprays to control pathogens:

NONE	None
FULL	Full: Carbendazim at 0.25 kg with vinclozolin at 0.50 kg on 25 July, 5, 19 Aug, 3, 17 Sept, 1 Oct

- NOTES: (1) Pesticides were applied in the same 220 l when applied on the same day otherwise in 220 l each. Fungicides were always applied together in 220 l.  
(2) The crop was netted against bird damage from late Aug to harvest.  
(3) A planned test of varieties was thwarted by bird damage.

Basal applications : Manures: 'Nitro-Chalk' at 225 kg. Weedkillers: Glyphosate at 1.4 kg in 220 l. Trifluralin at 1.1 kg in 220 l. Linuron at 0.50 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 220 l.

Seed: Asmer 9, sown at 90,000 seeds per hectare.

Cultivations, etc.:- Glyphosate applied: 1 Oct, 1986. Ploughed: 15 Oct. N applied: 21 Apr, 1987. Trifluralin applied, rotary cultivated: 23 Apr. Seed sown, rolled: 24 Apr. Linuron applied: 29 Apr. Diquat applied: 19 Oct. Harvested by hand: 23 Oct (threshed by stationary combine harvester). Previous crops: Mixed legumes 1985, s. barley 1986.

- NOTES: (1) Aphids and pollen beetles were counted weekly in late summer.  
(2) Growth stages and diseases were observed on six occasions during the season.

87/R/SU/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

PATHCONT	NONE	FULL	Mean
PESTCONT			
NONE	1.98	2.06	2.02
FULL	1.84	2.05	1.95
Mean	1.91	2.05	1.98

\*\*\* Standard errors of differences of means \*\*\*

Table	PESTCONT	PATHCONT	PESTCONT PATHCONT
s.e.d.	0.110	0.110	0.156

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.221	11.1

GRAIN MEAN DM% 60.0

PLOT AREA HARVESTED 0.00215

87/R/SU/4

SUNFLOWERS

FUNGICIDE AND BOTRYTIS

Object: To study the effects of five times and two methods of applying a mixture of fungicides on the control of Botrytis head infection and on the yield of sunflowers - Annables and Long Hoos III 3.

Sponsor: C.J. Rawlinson.

Design: 3 randomised blocks of 12 plots on each site.

Whole plot dimensions: Annables: 4.2 x 7.0. Long Hoos: 2.7 x 8.0.

Treatments: All combinations of:-

1. SPRAYDTE            Dates of applying vinclozolin at 0.50 kg and carbendazim at 0.25 kg:

	Annables	Long Hoos
1	25 July, 1987	21 Aug
2	25 July and 5 Aug	21 Aug and 4 Sept
3	25 July, 5 and 19 Aug	21 Aug, 4 and 17 Sept
4	25 July, 5, 19 Aug and 3 Sept	21 Aug, 4, 17 Sept and 1 Oct (duplicated)
5	25 July, 5, 19 Aug, 3 and 16 Sept	
  
  2. SPRAYMET            Method of spraying:

ELECTRO	Electrostatic sprayer in 5.3 l (Annables only)
CNVNTIAL	Conventional hydraulic sprayer in 220 l (duplicated on Long Hoos)
- plus one extra treatment
- EXTRA
- NONE            None (duplicated)

NOTE: On Long Hoos the crop was netted from early June to harvest.

Basal applications:

Annables: Manures: 'Nitram' at 170 kg. Weedkiller: Trifluralin at 1.1 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 220 l.  
Long Hoos: Manures: 'Nitro-Chalk' at 255 kg. Weedkillers: Trifluralin at 1.1 kg in 220 l. Linuron at 0.50 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 220 l.

Seed: Annables: Asmer 3 sown at 90,000 seeds per hectare.  
Long Hoos: Asmer 3 failed and site was resown with EX10, both at 90,000 seeds per hectare.

87/R/SU/4

Cultivations, etc.:-

Annables: Ploughed: Autumn 1986, date not recorded. Rotary cultivated, 'Nitram' applied, trifluralin applied, rotary cultivated, seed sown: 15 Apr, 1987. Desiccant applied: 23 Sept. Combine harvested: 29 Sept. Previous crops: W. wheat 1985 and 1986.

Long Hoos: Ploughed: 29 Dec, 1986. 'Nitro-Chalk' applied: 21 Apr, 1987. Spring-tine cultivated, trifluralin applied, rotary cultivated, Asmer 3 sown and rolled: 24 Apr. Linuron applied: 29 Apr. EX10 sown: 28 May. Desiccant applied: 15 Oct. Harvested by hand: 23 Oct (threshed by stationary combine harvester). Previous crops: Fallow 1985, lupins 1986.

NOTE: Botrytis in heads and stems and growth stages were assessed on both sites. More detailed observations on crop growth were made on Annables.

ANNABLES

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	SPRAYMET	ELECTRO	CNVNTIAL	Mean
	SPRAYDTE			
	1	0.73	0.74	0.73
	2	0.85	0.79	0.82
	3	0.77	0.76	0.77
	4	0.77	0.79	0.78
	5	0.72	0.72	0.72
	Mean	0.77	0.76	0.76
EXTRA NONE		0.84		
Grand mean		0.78		

\*\*\* Standard errors of differences of means \*\*\*

Table	SPRAYDTE	SPRAYMET	SPRAYDTE SPRAYMET
s.e.d.	0.128	0.081	0.181

SED for comparing NONE with any item in SPRAYMET.SPRAYDTE table is 0.156

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	23	0.221	28.5
GRAIN MEAN DM%	69.2		
PLOT AREA HARVESTED	0.00223		

87/R/SU/4

LONG HOOS III

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SPRAYDTE	NONE	1	2	3	4	5	Mean
	1.02	0.99	1.11	1.10	1.04	0.91	1.03

\*\*\* Standard errors of differences of means \*\*\*

Table	SPRAYDTE
s.e.d.	0.093

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.161	15.6

GRAIN MEAN DM% 48.2

PLOT AREA HARVESTED 0.00216

87/R/SU/7

SUNFLOWERS

SOWING DATES

Object: To study the effects of sowing dates on the rates of vegetative and floral development, seed growth, dates of maturity and yield of sunflowers - Garden Plot X.

Sponsor: G.F.J. Milford.

Design: 2 randomised blocks of 6 plots.

Whole plot dimensions: 2.5 x 3.0.

Treatments:

SOWDATE	Sowing dates:
18 MAR	18 March, 1987
2 APR	2 April
15 APR	15 April
6 MAY	6 May
19 MAY	19 May
3 JUNE	3 June

NOTE: Yields were not taken for SOWDATE 3 JUNE.

Basal applications: Manures: 'Nitro-Chalk' at 255 kg. Weedkillers: Trifluralin at 1.1 kg in 220 l. Linuron at 0.50 kg in 220 l.

Seed: Asmer 3 sown at 260,000 seeds per hectare and thinned to 86,000 plants per hectare.

Cultivations, etc.: - Ploughed: 16 Dec, 1986. N and trifluralin applied, rotary cultivated: 16 Mar, 1987. Linuron applied to each successive sowing date: 19 Mar, 6 Apr, 15 Apr, 6 May, 19 May, 3 June. First two sowings harvested by hand: 7 Oct. Remaining sowings harvested by hand: 13 Oct. Previous crops: Lupins 1985, s. barley 1986.

NOTES: (1) Phenological development was monitored during the season.  
(2) Dry matters of stems and heads, heights, head diameter and oil content were measured at harvest.



87/R/SU/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SOWDATE	18 MAR	2 APR	15 APR	6 MAY	19 MAY	Mean
	1.45	1.70	1.26	2.39	2.26	1.81

\*\*\* Standard errors of differences of means \*\*\*

Table	SOWDATE
s.e.d.	0.277

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.277	15.2

GRAIN MEAN DM% NOT RECORDED

PLOT AREA HARVESTED 0.00030

87/R/MA/2

MAIZE

DAZOMET AND N

Object: To study the effects of dazomet, nitrogen rates, sowing dates and polythene covers on the growth, pathogens and yield of maize grown for forage - Long Hoos V 2.

Sponsor: D. Hornby.

Design: 3 randomised blocks of 16 plots.

Whole plot dimensions: 1.6 x 5.2.

Treatments: All combinations of:-

1. DAZOMET            Dazomet (kg):

0  
450

2. N                    Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

60  
140

3. SOWDATE            Dates of sowing:

21 APR                21 April, 1987  
13 MAY                13 May

4. COVERS             Covers to seedbed after sowing:

NONE                  None  
POLYTHNE             Polythene sheet

NOTES: (1) Dazomet was applied by hand on 17 Mar, 1987 for the earlier-sown plots, 31 Mar for the later-sown.

(2) The covers were photo-degradable and were laid by hand, on 23 Apr for the earlier-sown plots, 20 May for the later-sown. They were perforated at about 10 cm intervals over the drill rows to allow seedling emergence.

Basal applications: Weedkiller: Atrazine at 1.7 kg in 220 l.

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

Cultivations, etc.: - Ploughed: 27 Nov, 1986. Spring-tine cultivated: 20 Feb, 1987. Earlier-sown plots disc harrowed, seed sown, atrazine applied: 21 Apr. N applied: 22 Apr. Later-sown plots spring-tine cultivated, seed sown: 13 May. Atrazine applied to later-sown plots: 19 May. Harvested by hand: 19 Oct. Previous crops: Potatoes 1985, sunflowers 1986.

NOTE: Germination counts were made. Growth stages, leaf numbers and heights were measured fortnightly. Cob measurements were made in late summer.

87/R/MA/2

FORAGE TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	N	60	140	Mean	
DAZOMET					
0		12.50	12.92	12.71	
450		13.86	14.09	13.98	
Mean		13.18	13.50	13.34	
SOWDATE	21 APR	13 MAY	Mean		
DAZOMET					
0		11.49	13.93	12.71	
450		13.16	14.79	13.98	
Mean		12.32	14.36	13.34	
SOWDATE	21 APR	13 MAY	Mean		
N					
60		11.82	14.53	13.18	
140		12.82	14.18	13.50	
Mean		12.32	14.36	13.34	
COVERS	NONE	POLYTHNE	Mean		
DAZOMET					
0		12.39	13.03	12.71	
450		14.36	13.59	13.98	
Mean		13.37	13.31	13.34	
COVERS	NONE	POLYTHNE	Mean		
N					
60		13.35	13.01	13.18	
140		13.40	13.61	13.50	
Mean		13.37	13.31	13.34	
COVERS	NONE	POLYTHNE	Mean		
SOWDATE					
21 APR		13.60	11.05	12.32	
13 MAY		13.15	15.57	14.36	
Mean		13.37	13.31	13.34	
DAZOMET	N	60	140		
0	SOWDATE	21 APR	13 MAY	21 APR	13 MAY
450		10.87	14.13	12.11	13.73
		12.78	14.94	13.54	14.64
DAZOMET	N	60	140		
0	COVERS	NONE	POLYTHNE	NONE	POLYTHNE
450		12.08	12.92	12.69	13.14
		14.63	13.10	14.10	14.08

87/R/MA/2

FORAGE TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

DAZOMET	SOWDATE COVERS	21 APR		13 MAY	
		NONE	POLYTHNE	NONE	POLYTHNE
0		12.44	10.54	12.33	15.52
450		14.76	11.56	13.97	15.62

N	SOWDATE COVERS	21 APR		13 MAY	
		NONE	POLYTHNE	NONE	POLYTHNE
60		13.63	10.02	13.08	15.99
140		13.57	12.07	13.22	15.15

DAZOMET	N	SOWDATE COVERS	21 APR		13 MAY	
			NONE	POLYTHNE	NONE	POLYTHNE
0	60		11.67	10.07	12.48	15.77
	140		13.21	11.01	12.18	15.27
450	60		15.58	9.98	13.67	16.22
	140		13.93	13.14	14.27	15.02

\*\*\* Standard errors of differences of means \*\*\*

Margins of two factor tables	0.451
Two factor tables	0.638
Three factor tables	0.902
Four factor table	1.276

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	1.562	11.7

FORAGE MEAN DM% 25.3

PLOT AREA HARVESTED 0.00028

87/R/BR/1

BROCCOLI

ANTI-FEEDANTS

Object: To study the effects of anti-feedants on insect pests and on the yield of broccoli - Garden Plot 7.

Sponsors: D.C. Griffiths, L.E. Smart.

Design: 5 randomised blocks of 4 plots.

Whole plot dimensions: 2.4 x 5.0.

Treatments:

CHEMICAL                      Chemical foliar sprays:

NONE	None
AJUGA EX	Ajuga extract at 0.15 kg
DELTAMET	Deltamethrin at 0.01 kg
PIPERINE	Piperine at 0.20 kg

NOTES: (1) Treatments were applied on 7 July, 1987, 24 July, 30 July, 11 Aug, 20 Aug, 4 Sept, 11 Sept, 21 Sept and 1 Oct.  
(2) They were applied by electrostatic sprayer in 10 l.

Basal applications: Manures: Chalk at 2.9 t. 'Nitro-Chalk' at 390 kg.  
Weedkillers: Glyphosate at 1.4 kg in 220 l, bentazone at 0.80 kg, dichlorprop at 1.1 kg, MCPA at 0.64 kg in 220 l applied with the fungicide. Trifluralin at 1.1 kg in 220 l. Tebutam at 2.9 kg in 220 l. Fungicide: Tridemorph at 0.52 kg.

Seed: Sown at 140,000 seeds per hectare.

Cultivations, etc.- Chalk applied: 29 Sept, 1986. Glyphosate applied: 1 Oct. Ploughed: 22 Dec. Bentazone, dichlorprop, MCPA and tridemorph applied: 6 May, 1987. Deep-tine cultivated twice, trifluralin applied, rotary cultivated, seed sown, rolled, tebutam applied: 7 May. 'Nitro-Chalk' applied: 11 May. Seed resown: 22 June. Harvested by hand: 4 Nov. Previous crops: Potatoes 1985, fallow 1986.

NOTES: (1) The first sowing failed and was resown.  
(2) Flea beetle, aphid and caterpillar damage were assessed at intervals during the season.

87/R/BR/1

FRESH WEIGHT TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

CHEMICAL	NONE	AJUGA EX	DELTAMET	PIPERINE	Mean
	33.8	31.0	34.0	27.8	31.7

\*\*\* Standard errors of differences of means \*\*\*

Table	CHEMICAL
s.e.d.	2.63

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	4.16	13.2
PLOT AREA HARVESTED	0.00048		

87/R/P/1 and 87/W/P/1

POTATOES

VARIETIES

Object: To compare the quality and yield of some of the newer varieties of potato with current standards on two soil types - Rothamsted Little Hoos (R), Woburn Horsepool Lane Close West (W).

Sponsor: R. Moffitt.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 3.0 x 6.1.

Treatments:

VARIETY	Varieties:
CARA	Cara
CROWN	Pentland Crown
DESIREE	Desiree
ESTIMA	Estima
KINGSTON	Kingston
ROMANO	Romano
WILJA	Wilja

Basal applications:

Little Hoos (R): Manures: (0:18:36) at 690 kg. Chalk at 5 t. FYM at 35 t. (10:10:15+4.5 Mg) at 1960 kg. Weedkillers: Linuron at 1.7 kg with paraquat at 0.50 kg ion in 500 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions applied with the insecticide on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 300 l.

Horsepool Lane Close West (W): Manures: (0:18:36) at 690 kg. (10:10:15+4.5 Mg) at 2290 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Linuron at 1.7 kg in 200 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions applied with the insecticide on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.

Cultivations, etc.:-

Little Hoos (R): PK applied: 17 Sept, 1986. Chalk applied: 24 Sept. FYM applied: 12 Nov. Ploughed: 17 Nov. NPK Mg applied: 14 Apr, 1987. Rotary harrowed and ridged: 21 Apr. Potatoes hand planted, split back: 22 Apr. Ridged: 29 Apr. Weedkillers applied: 8 May. Mancozeb applied: 24 June, 8 July, 28 July, 10 Aug. Fentin hydroxide applied: 28 Aug, 9 Sept. Insecticide applied: 8 July. Desiccant applied: 21 Sept. Haulm mechanically destroyed: 26 Sept. Lifted: 25 Nov. Previous crops: W. barley 1985, oilseed rape 1986.

87/R/P/1 and 87/W/P/1

Cultivations, etc.:-

Horsepool Lane Close West (W): PK applied: 16 Sept, 1986. Glyphosate applied: 19 Sept. Ploughed: 12 Nov. NPK Mg applied: 22 Apr, 1987. Rotary cultivated, ridged, potatoes hand planted, split back: 28 Apr. Rotary ridged: 15 May. Linuron applied: 25 May. Mancozeb applied: 29 June, 8 July, 26 July, 5 Aug. Fentin hydroxide applied: 18 Aug, 4 Sept. Insecticide applied: 8 July. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted: 6 Nov. Previous crops: W. wheat 1985, w. oats 1986.

87/R/P/1

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	
CARA	45.8
CROWN	37.6
DESIREE	37.9
ESTIMA	43.4
KINGSTON	33.3
ROMANO	31.5
WILJA	37.8
Mean	38.2

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY
s.e.d.	3.69

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	5.22	13.7

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	
CARA	92.7
CROWN	96.2
DESIREE	95.5
ESTIMA	92.9
KINGSTON	93.0
ROMANO	95.6
WILJA	90.2
Mean	93.7

PLOT AREA HARVESTED 0.00091



87/W/P/1

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	
CARA	42.0
CROWN	40.8
DESIREE	26.0
ESTIMA	37.0
KINGSTON	39.1
ROMANO	34.0
WILJA	32.9
Mean	35.9

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY
s.e.d.	5.04

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	7.13	19.8

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	
CARA	83.4
CROWN	85.9
DESIREE	82.5
ESTIMA	85.5
KINGSTON	86.1
ROMANO	86.8
WILJA	79.0
Mean	84.2

PLOT AREA HARVESTED 0.00091

87/R/P/2

POTATOES

SEED HEALTH PROGENY

Object: To compare the health and yield of two varieties of potatoes grown once or twice for seed at Rothamsted under three sets of treatments with the same varieties grown to AA standard in Scotland in 1986 - Bones Close.

Sponsors: R.W. Gibson, G.A. Hide, R. Harrington.

Design: 4 randomised blocks of 28 plots.

Whole plot dimensions: 1.5 x 19.0.

Treatments: All combinations of:-

1. VARIETY                      Varieties:  
  
    EDWARD                    King Edward  
    PIPER                      Maris Piper
  
2. ROTHGROW                 Frequency of cropping at Rothamsted:  
  
    ONCE                      In 1986 only from Scottish FS seed  
    TWICE                     In 1985 and 1986, from Scottish FS seed in 1985
  
3. PATHCONT[86]            Pest and pathogen control in 1985, to ROTHGROW TWICE only, and in 1986 to ROTHGROW ONCE and TWICE (in addition to basal):  
  
    STANDARD                1985 and 1986: Plants with virus symptoms were removed in June.  
  
    ENHANCED                1985 and 1986: Seed treatment with tolclofos methyl at 0.24 kg and imazalil at 0.01 kg per tonne of tubers, applied by hydraulic and uncharged electrostatic sprayers respectively. Cypermethrin at 0.04 kg with 7.0 l oil in 500 l applied by hydraulic sprayer on 14 June, 1985, and on 13 and 19 June, 1986. Plants with virus symptoms were removed in June 1985 and 1986.  
  
    FULL                      1985: As for ENHANCED 1985, plus:-  
                                  The imazalil was applied by charged electrostatic sprayer. Cypermethrin at 0.04 kg with 7.0 l oil in 500 l was also applied on 28 June, 11 July, 26 July and (to HAULM D LATER plots only) 14 Aug.  
                                  1986: As for ENHANCED 1986, plus:-  
                                  The imazalil was applied by charged electrostatic sprayer. Cypermethrin at 0.04 kg with oil at 7.0 l in 500 l was also applied on 3 July, 18 July, 1 Aug, 19 Aug and (to HAULM D LATER plots only) 4 Sept.

87/R/P/2

4. HAULM D[86]      Dates of destroying haulm and of lifting in 1985 to ROTHGROW TWICE only and in 1986 to ROTHGROW ONCE and TWICE:
- EARLY              1985: Haulm mechanically destroyed, 12 Aug. Haulm desiccant applied 14 Aug and potatoes lifted 18 Sept.  
1986: Haulm desiccant applied 29 Aug. Haulm mechanically destroyed 16 Sept and potatoes lifted 23 Sept.
- LATER              1985: Haulm mechanically destroyed 4 Sept. Haulm desiccant applied 5 Sept and potatoes lifted 11 Oct.  
1986: Haulm mechanically destroyed 25 Sept. Haulm desiccant applied 27 Sept and potatoes lifted 13 Oct.

plus two extra treatments:

SCOTS AA

KE SAA            King Edward Scottish AA seed bought in 1987  
(duplicated)

MP SAA            Maris Piper Scottish AA seed bought in 1987  
(duplicated)

- NOTES: (1) Basal pest and pathogen control in 1985 (to ROTHGROW TWICE only) was phorate at 1.7 kg with the seed and mancozeb at 1.4 kg in 200 l on five occasions applied with pirimicarb at 0.14 kg on all but the first occasion.
- (2) Basal pest and pathogen control in 1986 was phorate at 1.7 kg with the seed, mancozeb at 1.4 kg in 200 l on four occasions with pirimicarb at 0.14 kg on each occasion and (to HAULM D LATER plots only) fentin hydroxide at 0.28 kg in 200 l on two occasions applied with pirimicarb at 0.14 kg on the first.

Basal applications: Manures: FYM at 35 t. (0:18:36) at 690 kg. (10:10:15+4.5 Mg) at 1960 kg. Weedkillers: Linuron at 1.6 kg and paraquat at 0.50 kg ion in 500 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions, applied with the pirimicarb on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.80 kg ion in 300 l.

Cultivations, etc.: (0:18:36) applied: 28 Oct, 1986. FYM applied: 11 Nov. Ploughed: 21 Nov. (10:10:15+4.5 Mg) applied: 13 Apr, 1987. Rotary harrowed: 20 Apr. Potatoes planted by hand: 21 Apr. Rotary ridged: 27 Apr. Weedkillers applied: 8 May. Mancozeb applied: 24 June, 8 July, 28 July and 10 Aug. Pirimicarb applied: 8 July. Fentin hydroxide applied: 28 Aug, 9 Sept. Haulm desiccant applied: 21 Sept. Haulm mechanically destroyed: 26 Sept. Lifted: 29 Oct. Previous crops: S. barley 1985, w. beans 1986.

NOTE: Viruses were assessed during the season. Tuber samples were taken at harvest to assess storage diseases.

87/R/P/2

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

ROTHGROW	ONCE	TWICE	Mean	
VARIETY				
EDWARD	76.4	77.9	77.1	
PIPER	84.6	81.2	82.9	
Mean	80.5	79.5	80.0	
PATHCONT[86]	STANDARD	ENHANCED	FULL	Mean
VARIETY				
EDWARD	76.9	76.9	77.7	77.1
PIPER	83.3	82.2	83.0	82.9
Mean	80.1	79.5	80.4	80.0
PATHCONT[86]	STANDARD	ENHANCED	FULL	Mean
ROTHGROW				
ONCE	80.8	80.4	80.2	80.5
TWICE	79.4	78.7	80.5	79.5
Mean	80.1	79.5	80.4	80.0
HAULM D[86]	EARLY	LATER	Mean	
VARIETY				
EDWARD	78.5	75.8	77.1	
PIPER	83.3	82.4	82.9	
Mean	80.9	79.1	80.0	
HAULM D[86]	EARLY	LATER	Mean	
ROTHGROW				
ONCE	81.4	79.5	80.5	
TWICE	80.4	78.6	79.5	
Mean	80.9	79.1	80.0	
HAULM D[86]	EARLY	LATER	Mean	
PATHCONT[86]				
STANDARD	81.3	78.9	80.1	
ENHANCED	80.0	79.0	79.5	
FULL	81.4	79.3	80.4	
Mean	80.9	79.1	80.0	
VARIETY	PATHCONT[86]	STANDARD	ENHANCED	FULL
EDWARD	ROTHGROW			
	ONCE	76.5	76.8	75.9
	TWICE	77.2	77.0	79.5
PIPER	ONCE	85.2	84.0	84.5
	TWICE	81.5	80.4	81.5

87/R/P/2

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

		HAULM D[86]	EARLY	LATER
VARIETY	ROTHGROW			
EDWARD	ONCE		77.3	75.5
	TWICE		79.7	76.1
PIPER	ONCE		85.6	83.5
	TWICE		81.1	81.2
		HAULM D[86]	EARLY	LATER
VARIETY	PATHCONT[86]			
EDWARD	STANDARD		80.2	73.5
	ENHANCED		77.1	76.7
	FULL		78.2	77.1
PIPER	STANDARD		82.3	84.3
	ENHANCED		83.0	81.3
	FULL		84.6	81.5
		HAULM D[86]	EARLY	LATER
ROTHGROW	PATHCONT[86]			
ONCE	STANDARD		82.4	79.3
	ENHANCED		80.8	80.0
	FULL		81.1	79.3
TWICE	STANDARD		80.2	78.5
	ENHANCED		79.3	78.1
	FULL		81.7	79.3
		HAULM D[86]	EARLY	LATER
VARIETY	ROTHGROW	PATHCONT[86]		
EDWARD	ONCE	STANDARD	80.1	72.9
		ENHANCED	75.9	77.7
		FULL	75.9	75.9
	TWICE	STANDARD	80.4	74.1
		ENHANCED	78.2	75.8
		FULL	80.6	78.4
PIPER	ONCE	STANDARD	84.6	85.7
		ENHANCED	85.7	82.3
		FULL	86.4	82.6
	TWICE	STANDARD	80.0	83.0
		ENHANCED	80.4	80.4
		FULL	82.8	80.3
SCOTS AA	KE SAA	MP SAA	Mean	
	67.5	78.3	72.9	
Grand mean	79.0			

87/R/P/2

TOTAL TUBERS TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	ROTHGROW	PATHCONT[86]	HAULM D[86]
s.e.d.	0.71	0.71	0.87	0.71

Table	VARIETY ROTHGROW	VARIETY PATHCONT[86]	ROTHGROW PATHCONT[86]	VARIETY HAULM D[86]
s.e.d.	1.01	1.23	1.23	1.01

Table	ROTHGROW HAULM D[86]	PATHCONT[86] HAULM D[86]	VARIETY ROTHGROW PATHCONT[86]	VARIETY ROTHGROW HAULM D[86]
s.e.d.	1.01	1.23	1.74	1.42

Table	VARIETY PATHCONT[86] HAULM D[86]	ROTHGROW PATHCONT[86] HAULM D[86]	VARIETY ROTHGROW PATHCONT[86] HAULM D[86]	SCOTS AA
s.e.d.	1.74	1.74	2.46	1.74

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	83	3.48	4.4

87/R/P/2

PERCENTAGE WARE 4.44 CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

ROTHGROW	ONCE	TWICE	Mean	
VARIETY				
EDWARD	81.9	81.3	81.6	
PIPER	83.7	83.5	83.6	
Mean	82.8	82.4	82.6	
PATHCONT[86]	STANDARD	ENHANCED	FULL	Mean
VARIETY				
EDWARD	82.1	80.1	82.7	81.6
PIPER	83.6	82.5	84.6	83.6
Mean	82.8	81.3	83.6	82.6
PATHCONT[86]	STANDARD	ENHANCED	FULL	Mean
ROTHGROW				
ONCE	82.7	81.9	83.8	82.8
TWICE	83.0	80.7	83.4	82.4
Mean	82.8	81.3	83.6	82.6
HAULM D[86]	EARLY	LATER	Mean	
VARIETY				
EDWARD	82.3	81.0	81.6	
PIPER	83.5	83.7	83.6	
Mean	82.9	82.3	82.6	
HAULM D[86]	EARLY	LATER	Mean	
ROTHGROW				
ONCE	83.5	82.1	82.8	
TWICE	82.2	82.6	82.4	
Mean	82.9	82.3	82.6	
HAULM D[86]	EARLY	LATER	Mean	
PATHCONT[86]				
STANDARD	83.8	81.9	82.8	
ENHANCED	81.1	81.5	81.3	
FULL	83.7	83.5	83.6	
Mean	82.9	82.3	82.6	
VARIETY	PATHCONT[86]	STANDARD	ENHANCED	FULL
EDWARD	ROTHGROW			
	ONCE	82.3	81.1	82.3
	TWICE	81.8	79.1	83.1
PIPER	ONCE	83.0	82.6	85.4
	TWICE	84.2	82.4	83.8

87/R/P/2

PERCENTAGE WARE 4.44 CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

VARIETY	HAULM D[86]	EARLY	LATER	
EDWARD	ROTHGROW ONCE	82.9	80.9	
	TWICE	81.6	81.0	
	PIPER ONCE	84.2	83.2	
	TWICE	82.8	84.2	
VARIETY	HAULM D[86]	EARLY	LATER	
EDWARD	PATHCONT[86] STANDARD	84.0	80.1	
	ENHANCED	79.9	80.3	
	FULL	82.9	82.5	
PIPER	STANDARD	83.5	83.7	
	ENHANCED	82.3	82.8	
	FULL	84.6	84.6	
ROTHGROW	HAULM D[86]	EARLY	LATER	
ONCE	PATHCONT[86] STANDARD	84.1	81.3	
	ENHANCED	82.9	80.8	
	FULL	83.5	84.1	
TWICE	STANDARD	83.4	82.5	
	ENHANCED	79.3	82.2	
	FULL	83.9	83.0	
VARIETY	ROTHGROW	HAULM D[86]	EARLY	LATER
EDWARD	ONCE	PATHCONT[86] STANDARD	84.2	80.5
		ENHANCED	82.1	80.2
		FULL	82.4	82.1
	TWICE	STANDARD	83.9	79.7
		ENHANCED	77.7	80.4
		FULL	83.3	82.8
PIPER	ONCE	STANDARD	84.1	82.0
		ENHANCED	83.8	81.5
		FULL	84.7	86.1
	TWICE	STANDARD	83.0	85.4
		ENHANCED	80.8	84.0
		FULL	84.5	83.1
SCOTS AA	KE SAA	MP SAA	Mean	
	84.8	85.1	84.9	
Grand mean	82.9			
PLOT AREA HARVESTED	0.00286			



87/W/P/2

POTATOES

VARIETIES AND CONTROL OF GLOBODERA PALLIDA

Object: To study the effects of rates of nematicide on seven varieties of potato differing in their resistance to the pale cyst nematode (*Globodera pallida*) - Woburn Far Field II.

Sponsor: A.G. Whitehead.

Design: 3 randomised blocks of 21 plots.

Whole plot dimensions: 3.0 x 4.6.

Treatments: All combinations of:-

1. VARIETY                      Varieties:

CAXTON  
DESIREE  
FINGAL  
GLENNA  
MORAG  
ROMANO  
SANTE

2. OXAMYL                      Rates of oxamyl (kg):

0.0  
2.8  
5.6

Basal applications: Manures: (10:10:15+4.5 Mg) at 2290 kg. Weedkiller: Linuron at 1.6 kg in 200 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions applied with the insecticide on the second. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.

Cultivations, etc.: - Spring-tine cultivated: 30 Jan, 1987 and 16 Feb. NPK Mg applied: 22 Apr. Oxamyl applied, rotary cultivated and potatoes planted: 28 Apr. Rotary ridged: 15 May. Weedkiller applied: 25 May. Mancozeb applied: 24 June, 26 July, 5 Aug. Mancozeb and pirimicarb applied: 8 July. Fentin hydroxide applied: 18 Aug, 4 Sept. Desiccant applied: 18 Sept. Haulm mechanically destroyed: 1 Oct. Lifted: 5 Oct. Previous crops: Potatoes 1985 and 1986.

NOTE: Soil samples were taken before applying nematicide and after harvest for cyst and egg counts of *G. pallida*.

87/W/P/2

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

OXAMYL VARIETY	0.0	2.8	5.6	Mean
CAXTON	42.2	52.4	49.7	48.1
DESIREE	29.4	50.1	51.7	43.7
FINGAL	45.9	65.7	64.6	58.7
GLENNA	47.9	59.3	58.8	55.3
MORAG	46.2	56.1	58.7	53.7
ROMANO	18.4	40.9	44.4	34.6
SANTE	31.1	53.9	48.7	44.5
Mean	37.3	54.1	53.8	48.4

\*\*\* Standard errors of differences of means \*\*\*

Table	VARIETY	OXAMYL	VARIETY OXAMYL
s.e.d.	3.36	2.20	5.81

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	40	7.12	14.7

PERCENTAGE WARE 4.44CM (1.75 INCH) RIDDLE

\*\*\*\*\* Tables of means \*\*\*\*\*

OXAMYL VARIETY	0.0	2.8	5.6	Mean
CAXTON	93.7	87.5	87.7	89.6
DESIREE	85.3	95.2	92.0	90.8
FINGAL	91.1	95.5	93.2	93.3
GLENNA	97.1	96.7	95.9	96.5
MORAG	91.3	92.5	92.8	92.2
ROMANO	86.7	93.7	94.1	91.5
SANTE	91.1	94.8	93.0	93.0
Mean	90.9	93.7	92.7	92.4

PLOT AREA HARVESTED 0.00070

87/R/P/4

POTATOES

EFFECTS OF SEED TUBER TREATMENTS

Object: To study the effects of seed tuber health, size and fungicide treatment on crop growth, yield and quality of potatoes after storage - Little Hoos.

Sponsor: K.J. Boorer.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 6.0 x 12.2.

Treatments: All combinations of:-

1. SEED STK            Seed stock:  
    STOCK A  
    STOCK B
2. SIZE                Size of seed tubers:  
    SMALL            25 - 55 g  
    LARGE            100 - 160 g
3. FUNGICIDE        Fungicide to seed tubers:  
    NONE             None  
    TOL+IMAZ        Tolclofos methyl plus imazalil

NOTES: (1) The fungicide treatments were applied as a dip in a mixture containing 0.5 % tolclofos methyl and 0.05 % imazalil.  
(2) It was intended that on STOCK A there would be few tuber borne diseases at planting and on STOCK B many. In practice the differences were slight and varied with particular pathogens.

Basal applications: Manures: Chalk at 5.0 t. FYM at 35 t. (0:18:36) at 690 kg. (10:10:15+4.5 Mg) at 1960 kg. Weedkillers: Linuron at 1.6 kg with paraquat at 0.50 kg ion in 500 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions, applied with the pirimicarb on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 300 l.

Seed: Estima.

Cultivations, etc.:- (0:18:36) applied: 17 Sept, 1986. Chalk applied: 24 Sept. FYM applied: 12 Nov. Ploughed: 17 Nov. (10:10:15+4.5 Mg) applied: 14 Apr, 1987. Rotary harrowed: 21 Apr. Potatoes planted: 22 Apr. Rotary ridged: 29 Apr. Weedkillers applied: 8 May. Mancozeb applied: 24 June, 28 July and 10 Aug. Mancozeb and pirimicarb applied: 8 July. Fentin hydroxide applied: 28 Aug, 9 Sept. Desiccant applied: 21 Sept. Haulm mechanically destroyed: 26 Sept. Lifted: 28 Sept and 10 Nov. Previous crops: W. barley 1985, w. oilseed rape 1986.

87/R/P/4

NOTE: Emergence and ground cover percentages were recorded. Samples were taken on six occasions, from late June to early September, for measurements of haulm weight, leaf area, weight and disease assessments of stem bases and tubers.

TOTAL TUBERS TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SIZE	SMALL	LARGE	Mean
SEED STK			
STOCK A	65.3	57.9	61.6
STOCK B	58.1	57.4	57.7
Mean	61.7	57.6	59.7
FUNGCIDE	NONE	TOL+IMAZ	Mean
SEED STK			
STOCK A	60.8	62.4	61.6
STOCK B	56.7	58.8	57.7
Mean	58.7	60.6	59.7
FUNGCIDE	NONE	TOL+IMAZ	Mean
SIZE			
SMALL	62.9	60.5	61.7
LARGE	54.6	60.7	57.6
Mean	58.7	60.6	59.7
SEED STK	FUNGCIDE	NONE	TOL+IMAZ
STOCK A	SIZE		
	SMALL	66.0	64.6
	LARGE	55.6	60.2
STOCK B	SMALL	59.7	56.4
	LARGE	53.6	61.2

\*\*\* Standard errors of differences of means \*\*\*

Table	SEED STK	SIZE	FUNGCIDE	SEED STK
s.e.d.	2.56	2.56	2.56	SIZE 3.63
Table	SEED STK	SIZE	SEED STK	
s.e.d.	FUNGCIDE	FUNGCIDE	SIZE FUNGCIDE	5.13
	3.63	3.63		

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	6.28	10.5
PLOT AREA HARVESTED	SIZE SMALL	0.00018	
PLOT AREA HARVESTED	SIZE LARGE	0.00030	
PERCENTAGE WARE NOT RECORDED			

87/R/M/1 and 87/W/M/1

MIXED 1

INPUTS FOR WINTER CEREALS

Object: To compare amounts of disease and the yield of triticale with those of w. wheat, w. barley and w. rye on two contrasted sites each given contrasted amounts of agrochemicals - Rothamsted Summerdells I (R), Woburn Great Hill II (W).

Sponsors: R.J. Gutteridge, D. Hornby, R.D. Prew (R), P.R. Scott, W. Hollins, R.L. Gregory (P.B.I., Cambridge).

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 3.0 x 10.0 (R), 4.0 x 10.0 (W).

Treatments: All combinations of :-

1. CROP VAR	Crop and variety:	(R)	(W)
B PANDA	W. barley, Panda sown at	230 kg,	230 kg
R DOMINT	W. rye, Dominant sown at	170 kg,	170 kg
T LASKO	W. triticale, Lasko sown at	170 kg,	160 kg
T CWT	W. triticale, CWT/1977/290 sown at	180 kg,	170 kg
W AVALON	W. wheat, Avalon sown at	190 kg,	190 kg

2. INPUT Inputs of agrochemicals, in addition to basals:

LARGE	(R): Manures: N at 40 kg: 11 Feb, 1987, and at 160 kg: 2 Apr, both as 'Nitro-Chalk'. Fungicides: Prochloraz at 0.40 kg, carbendazim at 0.15 kg, tridemorph at 0.52 kg in 220 l: 8 May. Carbendazim at 0.25 kg, maneb at 1.6 kg with propiconazole at 0.12 kg in 220 l: 2 July. Growth regulators: Mepiquat chloride at 0.61 kg with 2-chloroethylphosphonic acid at 0.31 kg in 220 l to barley, chlormequat at 1.1 kg in 220 l to wheat and triticale: 8 May.
	(W): Manures: N at 40 kg: 13 Feb, 1987 and at 160 kg: 31 Mar, both as 'Nitram'. Fungicides: Prochloraz at 0.40 kg, carbendazim at 0.15 kg, tridemorph at 0.52 kg in 240 l: 21 Apr. Propiconazole at 0.12 kg, tridemorph at 0.52 kg in 200 l: 27 May. Propiconazole at 0.12 kg, carbendazim at 0.25 kg in 200 l: 29 June. Growth regulators: Mepiquat chloride at 0.53 kg with 2-chloroethylphosphonic acid at 0.27 kg in 200 l, to barley and triticale: 7 May.
SMALL	(R) Manures: 120 kg N as 'Nitro-Chalk': 2 Apr, 1987. (W) Manures: 160 kg N as 'Nitram': 31 Mar.

87/R/M/1 and 87/W/M/1

Basal applications:

Summerdells (R): Manures: Chalk at 5.0 t. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Methabenzthiazuron at 1.6 kg in 200 l. Isoproturon at 2.5 kg with bromoxynil and ioxynil (as 'Deloxil' at 2.0 l) in 380 l to barley only. Diclofop-methyl at 1.1 kg with bromoxynil and ioxynil (as 'Deloxil' at 2.0 l) in 380 l to rye, triticale and wheat.  
Great Hill II (W): Weedkillers: Bromoxynil and ioxynil (as 'Deloxil' at 2.0 l) in 240 l. Fluroxypyr at 0.20 kg in 400 l to barley and wheat.

Cultivations, etc.:-

Summerdells (R): Heavy spring-tine cultivated and disced: 19 Aug, 1986. Chalk applied: 4 Sept. Paraquat applied: 11 Sept. Spring-tine cultivated, rotary harrowed, seed sown, harrowed: 24 Sept. Rolled: 27 Sept. Methabenzthiazuron applied: 30 Sept. Isoproturon, bromoxynil and ioxynil applied to barley, diclofop-methyl, bromoxynil and ioxynil applied to rye, triticale and wheat: 17 Apr, 1987. Combine harvested barley: 7 Aug, rye, triticale and wheat: 1 Sept. Previous crops: W. wheat 1985, w. barley 1986.  
Great Hill II (W): Ploughed, rolled: 20 Sept, 1986. Rotary harrowed with crumbler attached, seed sown: 25 Sept. Bromoxynil and ioxynil applied: 17 Apr, 1987. Fluroxypyr applied to barley and wheat: 23 Apr. Combine harvested barley: 5 Aug, rye, triticale and wheat: 18 Aug. Previous crops: Lucerne 1985, w. wheat 1986.

NOTES: (1) Soil samples were taken for take-all bioassay before sowing and after harvest.  
(2) Assessments were made of foot and root rots and foliar diseases during the season.

87/R/M/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INPUT	LARGE	SMALL	Mean
CROP VAR			
B PANDA	6.59	6.46	6.53
R DOMINT	6.54	6.04	6.29
T LASKO	5.74	4.62	5.18
T CWT	6.02	5.81	5.91
W AVALON	6.66	6.17	6.42
Mean	6.31	5.82	6.06

\*\*\* Standard errors of differences of means \*\*\*

Table	CROP VAR	INPUT	CROP VAR INPUT
s.e.d.	0.270	0.170	0.381

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.467	7.7

GRAIN MEAN DM% 85.0

PLOT AREA HARVESTED 0.00274

87/W/M/1

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

INPUT	LARGE	SMALL	Mean
CROP VAR			
B PANDA	6.56	6.16	6.36
R DOMINT	6.39	5.66	6.02
T LASKO	4.42	3.79	4.11
T CWT	4.57	4.70	4.64
W AVALON	4.72	3.70	4.21
Mean	5.33	4.80	5.07

\*\*\* Standard errors of differences of means \*\*\*

Table	CROP VAR	INPUT	CROP VAR INPUT
s.e.d.	0.396	0.251	0.560

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.686	13.5

GRAIN MEAN DM% 80.1

PLOT AREA HARVESTED 0.00275



87/R/M/2

MIXED 2

FACTORS AFFECTING EYESPOT

Object: To study eyespot (*Pseudocercospora herpotrichoides*) development after inoculation with different pathotypes in relation to host crop and seed rate - White Horse II.

Sponsor: A. Goulds.

Design: 2 blocks of 12 plots split into 3.

Whole plot dimensions: 3.0 x 37.0.

Treatments: All combinations of:-

Whole plots

- |             |  |
|-------------|--|
| 1. W CEREAL | Winter cereals sown on 30 September, 1986:         |
| BARLEY      | Winter barley cv. Opera                            |
| WHEAT       | Winter wheat cv. Avalon                            |
| 2. SEEDRATE | Seed rates (seeds per square metre):               |
| NORMAL      | Normal - 300 barley, 400 wheat                     |
| HALF N      | Half normal - 150 barley, 200 wheat                |
| 3. INOCULUM | Inoculation with different eyespot pathogen types: |
| NONE        | None   |
| RYE INOC    | Rye type   |
| WHE INOC    | Wheat type   |

Sub plots

- |             |  |
|-------------|--|
| 4. FUNGTIME | Times of applying prochloraz at 0.40 kg and carbendazim at 0.15 kg in 220 l: |
| NONE        | None   |
| EARLY       | Sprayed at growth stage 30/31 on 23 Apr, 1987                                |
| LATE        | Sprayed at growth stage, 33/37 wheat, 41/49 barley on 19 May                 |

NOTES: (1) One additional sub-plot in each whole plot was systematically arranged for sampling, yields not taken.  
(2) Strains of wheat and rye type inoculum were colonised on oat seed and broadcast within two weeks of emergence.

Basal applications: Manures: 'Nitram' at 350 kg. Weedkillers: Isoproturon at 2.5 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides: Propiconazole at 0.25 kg with tridemorph at 0.19 kg in 200 l.

Cultivations, etc.:- Heavy spring-tine cultivated twice, disced: 29 Sept, 1986. Rotary harrowed, seed sown: 30 Sept. Weedkillers applied: 15 Apr, 1987. N applied: 17 Apr. Basal fungicides applied: 29 June. Combine harvested: 7 Aug (barley), 1 Sept (wheat). Previous crops: W oats 1985, potatoes 1986.

87/R/M/2

NOTE: Eyespot was assessed on plants at fortnightly intervals from December to G.S. 30 and weekly thereafter.

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SEEDRATE	NORMAL	HALF N	Mean	
W CEREAL				
BARLEY	7.74	7.67	7.71	
WHEAT	7.98	7.85	7.92	
Mean	7.86	7.76	7.81	
INOCULUM	NONE	RYE INOC	WHE INOC	Mean
W CEREAL				
BARLEY	7.97	7.74	7.41	7.71
WHEAT	7.94	8.03	7.77	7.92
Mean	7.95	7.89	7.59	7.81
INOCULUM	NONE	RYE INOC	WHE INOC	Mean
SEEDRATE				
NORMAL	8.09	7.91	7.57	7.86
HALF N	7.81	7.87	7.61	7.76
Mean	7.95	7.89	7.59	7.81
FUNGTIME	NONE	EARLY	LATE	Mean
W CEREAL				
BARLEY	7.18	8.06	7.88	7.71
WHEAT	7.56	7.95	8.23	7.92
Mean	7.37	8.00	8.05	7.81
FUNGTIME	NONE	EARLY	LATE	Mean
SEEDRATE				
NORMAL	7.32	8.08	8.18	7.86
HALF N	7.43	7.93	7.92	7.76
Mean	7.37	8.00	8.05	7.81
FUNGTIME	NONE	EARLY	LATE	Mean
INOCULUM				
NONE	7.47	8.22	8.17	7.95
RYE INOC	7.72	7.78	8.16	7.89
WHE INOC	6.92	8.02	7.82	7.59
Mean	7.37	8.00	8.05	7.81
W CEREAL	INOCULUM	NONE	RYE INOC	WHE INOC
BARLEY	SEEDRATE			
NORMAL		8.15	7.83	7.24
HALF N		7.78	7.65	7.58
WHEAT	NORMAL	8.04	7.98	7.91
	HALF N	7.85	8.08	7.63

87/R/M/2

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

	FUNGTIME	NONE	EARLY	LATE
W CEREAL	SEEDRATE			
BARLEY	NORMAL	7.03	8.17	8.02
	HALF N	7.33	7.95	7.73
WHEAT	NORMAL	7.60	7.98	8.35
	HALF N	7.53	7.92	8.12
W CEREAL	FUNGTIME	NONE	EARLY	LATE
BARLEY	INOCULUM			
	NONE	7.54	8.18	8.17
	RYE INOC	7.45	7.99	7.79
WHEAT	WHE INOC	6.55	8.02	7.66
	NONE	7.40	8.25	8.18
	RYE INOC	8.00	7.57	8.53
	WHE INOC	7.29	8.03	7.99
SEEDRATE	FUNGTIME	NONE	EARLY	LATE
NORMAL	INOCULUM			
	NONE	7.56	8.36	8.36
	RYE INOC	7.77	7.74	8.22
HALF N	WHE INOC	6.62	8.13	7.97
	NONE	7.39	8.07	7.99
	RYE INOC	7.68	7.82	8.10
	WHE INOC	7.23	7.91	7.68
W CEREAL	FUNGTIME	NONE	EARLY	LATE
BARLEY	INOCULUM			
	NONE	7.74	8.39	8.33
	RYE INOC	7.52	8.03	7.96
	WHE INOC	5.84	8.11	7.78
	HALF N	NONE	7.34	7.97
	RYE INOC	7.39	7.95	7.63
	WHE INOC	7.27	7.93	7.54
WHEAT	NORMAL	NONE	7.38	8.34
	RYE INOC	8.02	7.45	8.49
	WHE INOC	7.40	8.16	8.17
	HALF N	NONE	7.43	8.17
	RYE INOC	7.98	7.69	8.58
	WHE INOC	7.19	7.89	7.81

87/R/M/2

GRAIN TONNES/HECTARE

\*\*\* Standard errors of differences of means \*\*\*

Table	W CEREAL	SEEDRATE	INOCULUM	FUNGTIME
s.e.d.	0.093	0.093	0.114	0.114
Table	W CEREAL SEEDRATE	W CEREAL INOCULUM	SEEDRATE INOCULUM	W CEREAL FUNGTIME
s.e.d.	0.132	0.162	0.162	0.162
Table	SEEDRATE FUNGTIME	INOCULUM FUNGTIME	W CEREAL SEEDRATE INOCULUM	W CEREAL SEEDRATE FUNGTIME
s.e.d.	0.162	0.198	0.229	0.228
Table	W CEREAL INOCULUM FUNGTIME	SEEDRATE INOCULUM FUNGTIME	W CEREAL SEEDRATE INOCULUM FUNGTIME	
s.e.d.	0.280	0.280	0.396	

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.229	2.9
BLOCK.WP.SP	24	0.396	5.1

GRAIN MEAN DM% 84.3

SUB PLOT AREA HARVESTED 0.00235

87/W/M/2

MIXED 2

COMPARISON OF COMBINES

Object: To evaluate the suitability of two combines for plot work in respect of purity of sample and accuracy when working on slopes - Great Hill III.

Sponsor: R. Moffitt.

Design: A systematic split-plot design, 56 whole plots arranged as shown below:

R	W	R	W	R	W	R	W	Top of slope
W	W	W	W	W	W	W	W	
W	W	W	W	W	W	W	W	
R	R	R	R	R	R	R	R	
W	W	W	W	W	W	W	W	
W	W	W	W	W	W	W	W	
R*	W	R	W	R	W	R	W	Bottom of slope

\* Combines started here (after harvesting a dummy wheat plot downhill), worked up the column of plots then down the next column etc.

R = Rye      W = wheat

- NOTES: (1) Each whole plot was systematically divided to compare the two combine harvesters.  
(2) There were 10 m headlands between contiguous rye and wheat plots. These were removed before combining the plots. There were 1 m paths between contiguous wheat plots.

Whole plot dimensions: 8.0 x 11.0.

Treatments:

Whole plots

- CROP                      Crop and variety:  
    WHEAT                  W. wheat, Avalon  
    RYE                     W. rye, Dominant
- DIRECTN                 Combine direction in relation to slope:  
    UP                      Up slope  
    DOWN                   Down slope
- ORDER                    Order of combining:  
    BEGIN                   First plot in column  
    STRAIGHT               Central plots in column  
    END                     Last plot in column

87/W/M/2

Sub plots

4. COMBINE                      Combine type:

CLAYSON	Clayson 1530
DEUTZ-F	Deutz-Fahr 660

Basal applications: Manures: FYM at 100 t. (0:18:36) at 700 kg, 'Nitram' at 470 kg. Weedkillers: Bromoxynil and ioxynil (as 'Deloxil' at 2.0 l) in 240 l. Fungicide: Triadimenol at 0.062 kg in 200 l.

Seed: W. rye: Dominant, sown at 170 kg.  
W. wheat: Avalon, sown at 160 kg.

Cultivations, etc.: - FYM applied: 3 July, 1986. Ploughed: 9-11, July. Rolled: 22 July. PK applied: 16 Sept. Rotary harrowed with crumbler attached, sown: 7 Oct. Rolled: 8 Oct. N applied: 15 Apr, 1987. Weedkillers applied: 17 June. Fungicide applied: 1 July. Combine harvested: 15 Sept. Previous crops: Lucerne 1985 and 1986.

87/W/M/2

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

COMBINE	CLAYSON	DEUTZ-F					
	5.63	5.78					
	DIRECTN	UP				DOWN	
CROP	ORDER	BEGIN	STRAIGHT	END	BEGIN	STRAIGHT	END
WHEAT			6.40		5.49	6.58	6.67
RYE		3.94	3.65	4.25		3.93	
CROP	DIRECTN	ORDER	COMBINE	CLAYSON	DEUTZ-F		
WHEAT	UP	STRAIGHT		6.24	6.55		
	DOWN	BEGIN		5.57	5.41		
		STRAIGHT		6.46	6.70		
		END		6.55	6.78		
RYE	UP	BEGIN		4.49	3.39		
		STRAIGHT		3.76	3.54		
		END		3.80	4.70		
	DOWN	STRAIGHT		3.78	4.09		

Grand mean 5.70

\*\*\* Standard errors of differences of means \*\*\*

Table	COMBINE	CROP DIRECTN ORDER	CROP DIRECTN ORDER COMBINE	
s.e.d.	0.066	0.242	0.299	min.rep
		0.191	0.236	max-min
		0.121	0.149	max.rep
Except when comparing means with the same level(s) of				
CROP.DIRECTN.ORDER				
			0.249	min.rep
			0.197	max-min
			0.124	max.rep

max.rep CROP WHEAT and ORDER STRAIGHT

min.rep any of the remainder

max-min CROP WHEAT and ORDER STRAIGHT v any of the remainder

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

Stratum	d.f.	s.e.	cv%
WP	48	0.342	6.0
WP.SP	48	0.352	6.2

GRAIN MEAN DM% 82.0

PLOT AREA HARVESTED	CLAYSON	DEUTZ-F
	0.00302	0.00220

METEOROLOGICAL RECORDS 1987 - ROTHAMSTED

(Departure from long-period means in brackets)

MONTH	Total sunshine: hours	Air(1)	Mean temperature: C		
			Dew point	In ground under grass	
				30cm	100cm
JAN	61 ( +1)	0.0 (-2.8)	-2.1	3.4	6.1
FEB	58 ( -4)	3.1 ( 0.0)	1.5	3.7	5.1
MAR	96 ( -13)	3.5 (-1.7)	1.1	4.5	5.2
APR	147 ( +8)	10.0 (+2.3)	7.1	8.6	6.9
MAY	195 ( +6)	9.6 (-1.5)	6.2	11.0	9.4
JUNE	120 ( -77)	12.7 (-1.3)	10.2	13.8	11.4
JULY	174 ( -7)	15.4 (-0.3)	12.3	16.4	13.9
AUG	149 ( -18)	15.4 (-0.3)	12.6	16.2	14.5
SEPT	142 ( +2)	13.4 (-0.2)	10.8	15.3	14.5
OCT	124 ( 24)	9.7 (-0.5)	8.0	11.7	12.7
NOV	44 ( -18)	5.8 (-0.1)	4.6	8.7	10.4
DEC	29 ( -17)	5.3 (+1.2)	3.9	6.4	8.0
YEAR*	1338 (-103)	8.7 (-0.5)	6.3	10.0	9.8

  

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)
FEB	18	28 ( -24)	13	15	7.9
MAR	23	56 ( +4)	20	34	10.4
APR	14	47 ( 0)	9	32	7.8
MAY	11	64 ( +12)	15	6	7.9
JUNE	4	90 ( +32)	21	38	5.3
JULY	0	62 ( +10)	16	21	5.4
AUG	1	60 ( -1)	12	18	4.7
SEPT	4	40 ( -19)	15	6	5.4
OCT	14	199 (+139)	23	157	6.4
NOV	14	59 ( -10)	18	50	7.5
DEC	15	30 ( -39)	12	23	9.4
YEAR*	143	749 ( +56)	185	416	7.2

(1)Mean of maximum and minimum  
(2)Number of nights grass min. was below 0.0 C  
(3)Number of days rainfall was 0.2 mm or more  
(4)At 2 metres above ground level  
\*Mean or total



METEOROLOGICAL RECORDS 1987 - WOBURN

(Departure from long-period means in brackets)

MONTH	Total sunshine: hours	Mean temperature: C					Ground frosts (2)	Total rainfall: mm 12.7 cm (5in) gauge	Rain days (3)	Wind km per hour (4)
		Air(1)	Dew point	In ground under grass		30 cm				
JAN	47 ( -4)	0.0 (-3.3)	-1.0	3.3	6.4	23	18 ( -35)	12	4.8	
FEB	46 ( -15)	4.3 (+1.0)	2.5	3.7	5.4	18	29 ( -13)	14	7.2	
MAR	90 ( -17)	3.9 (-1.4)	1.9	4.7	5.4	21	48 ( -1)	18	9.3	
APR	150 ( +18)	10.3 (+2.6)	7.4	9.3	7.2	9	56 ( +11)	12	7.2	
MAY	157 ( -26)	10.2 (-0.9)	6.6	11.8	9.9	12	48 ( -3)	14	7.0	
JUNE	129 ( -64)	12.9 (-1.1)	10.5	14.4	11.6	1	109 ( +53)	22	6.4	
JULY	168 ( -8)	15.6 (-0.2)	12.2	17.7	14.7	0	72 ( +21)	14	5.5	
AUG	156 ( -7)	15.5 (-0.1)	12.6	17.1	15.2	1	48 ( -19)	13	5.5	
SEPT	137 ( +2)	13.8 (+0.3)	11.2	15.6	15.1	4	38 ( -17)	16	6.7	
OCT	119 ( +19)	9.6 (-0.7)	7.6	11.4	13.0	7	152 ( +100)	20	6.5	
NOV	36 ( -26)	6.1 (-0.1)	4.3	8.4	10.5	12	57 ( -3)	14	7.4	
DEC	21 ( -25)	5.3 (+1.0)	3.7	5.9	8.1	14	25 ( -34)	10	9.4	
YEAR*	1255 (-154)	8.9 (-0.2)	6.6	10.3	10.2	122	698 ( +61)	179	6.9	

- (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

ROTHAMSTED REPORT FOR 1977, PART 1

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 (yd <sup>2</sup> )	= 0.8361 m <sup>2</sup>
1 acre (ac) (=4840 yd <sup>2</sup> )	= 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

<i>To convert</i>	<i>Multiply by</i>
oz ac <sup>-1</sup> to g ha <sup>-1</sup>	70.06
lb ac <sup>-1</sup> to kg ha <sup>-1</sup>	1.121
cwt ac <sup>-1</sup> to kg ha <sup>-1</sup>	125.5
cwt ac <sup>-1</sup> to t ha <sup>-1</sup>	0.1255
ton ac <sup>-1</sup> to kg ha <sup>-1</sup>	2511
ton ac <sup>-1</sup> to t ha <sup>-1</sup>	2.511
gal ac <sup>-1</sup> to l ha <sup>-1</sup>	11.233

*The following factors are accurate to about 2 parts in 100:*

$$1 \text{ lb ac}^{-1} = 1.1 \text{ kg ha}^{-1}$$

$$1 \text{ gal ac}^{-1} = 11 \text{ litres ha}^{-1}$$

$$1 \text{ ton ac}^{-1} = 2.5 \text{ t ha}^{-1}$$

*In general reading of the text there will be no great inaccuracy in regarding:*

$$1 \text{ lb} = 0.5 \text{ kg}$$

$$1 \text{ lb ac}^{-1} = 1 \text{ kg ha}^{-1}$$

**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

## 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 <sup>2</sup> )	= 1.196 square yards (yd <sup>2</sup> )
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 <sup>3</sup> )

<i>To convert</i>	<i>Multiply by</i>
g ha <sup>-1</sup> to oz ac <sup>-1</sup>	0.01427
kg ha <sup>-1</sup> to lb ac <sup>-1</sup>	0.8921
kg ha <sup>-1</sup> to cwt ac <sup>-1</sup>	0.007966
t ha <sup>-1</sup> to cwt ac <sup>-1</sup>	7.966
kg ha <sup>-1</sup> to tons ac <sup>-1</sup>	0.0003983
t ha <sup>-1</sup> to tons ac <sup>-1</sup>	0.3983
l ha <sup>-1</sup> to gal ac <sup>-1</sup>	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<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, CaO, MgO, SO<sub>3</sub>) is still used in work involving fertilisers and liming since Regulations require statements of P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, etc.

### For quick conversions

(accurate to within 2%) the following factors may be used:

$2\frac{1}{2} \times P = P_2O_5$	$\frac{3}{7} \times P_2O_5 = P$
$1\frac{1}{2} \times K = K_2O$	$\frac{5}{6} \times K_2O = K$
$1\frac{3}{8} \times Ca = CaO$	$\frac{7}{10} \times CaO = Ca$
$1\frac{3}{4} \times Mg = MgO$	$\frac{3}{5} \times MgO = Mg$

### For accurate conversions:

<i>To convert</i>	<i>Multiply by</i>	<i>To convert</i>	<i>Multiply by</i>
P <sub>2</sub> O <sub>5</sub> to P	0.4364	P to P <sub>2</sub> O <sub>5</sub>	2.2915
K <sub>2</sub> O to K	0.8301	K to K <sub>2</sub> O	1.2047
CaO to Ca	0.7146	Ca to CaO	1.3994
MgO to Mg	0.6031	Mg to MgO	1.6581