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ROTHAMSTED  
RESEARCH

# Yields of the Field Experiments 1987

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## Crop Sequences

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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):

| R    | W    | Rothamsted total |         | Woburn total |         |
|------|------|------------------|---------|--------------|---------|
|      |      | 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  |
| 0  | 0          |  | 0     |  | 0     |  | 0    | 0  |
| P1 | 0          |  | P1    |  | P1    |  | 0    | P2 |
| P2 | P          |  | P1    |  | 0     |  | P2   | P2 |
| P3 | P          |  | P3    |  | P1    |  | P2   | P4 |

Rates 1981-83 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 |
|      |       | P2       | 2.25 | 2.32 |
|      |       | P3       | 3.24 | 2.71 |
| 15   |       | 0        | 2.73 | 2.98 |
|      |       | P1       | 2.27 | 2.22 |
|      |       | P2       | 3.52 | 3.43 |
|      |       | P3       | 2.26 | 3.03 |
| 24.5 |       | 0        | 3.02 | 2.94 |
|      |       | P1       | 2.48 | 1.99 |
|      |       | P2       | 3.86 | 3.52 |
|      |       | P3       | 2.56 | 2.56 |
| 52.5 |       | 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<br>P |
|--------|-------|-------|----------|------------|
| s.e.d. | 0.233 | 0.233 | 0.114    | 0.466      |

| Table                                                 | CHALK<br>MANGNESE | P<br>MANGNESE | CHALK<br>P<br>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 |      |      |
| CHALK    | MANGNESE | 0    | MN   |      |      |
| 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<br>P |
| s.e.d. | 0.107 | 0.107 | 0.098    | 0.214      |

|                                                       |                   |               |                        |
|-------------------------------------------------------|-------------------|---------------|------------------------|
| Table                                                 | CHALK<br>MANGNESE | P<br>MANGNESE | CHALK<br>P<br>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 nematocides 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 nematocides applied 1984:

ALDICARB  
SDS38697  
SDS46995

2. RATE Rates of nematocide (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<br>NEMACIDE[84] | SINGLE | DOUBLE | QUAD | Mean |
|----------------------|--------|--------|------|------|
| 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]<br>RATE<br>& 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<br>NEMACIDE[84] | SINGLE | DOUBLE | QUAD | Mean |
|----------------------|--------|--------|------|------|
| 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<br>& 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     |

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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 \*\*\*\*\*

|              |           |      |          |
|--------------|-----------|------|----------|
|              | NEMACIDE  | NONE | ALDICARB |
| FUNGICIDE[2] | INSECTCDE |      |          |
| NONE         | 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:

|          |                                                                                                       |
|----------|-------------------------------------------------------------------------------------------------------|
| CNVNTIAL | 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. Discd: 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. Discd: 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. Discd: 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   | ---  |          | --S  |          | PKS  |          |
|----------|------|----------|------|----------|------|----------|
| 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   | ---     |        | --S     |        | PKS     |        |
|----------|---------|--------|---------|--------|---------|--------|
| DRILL    | CNVTIAL | DIRECT | CNVTIAL | DIRECT | CNVTIAL | 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 |        |
|----------|---------|--------|----------|--------|
| DRILL    | CNVTIAL | DIRECT | CNVTIAL  | 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 |        |
|--------|---------|--------|----------|--------|
| DRILL  | CNVTIAL | DIRECT | CNVTIAL  | 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 |        |
|----------|---------|--------|----------|--------|
| YEAR     | 1980    |        | 1980/3/6 |        |
| DRILL    | CNVTIAL | DIRECT | CNVTIAL  | 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 |        |
|----------|---------|--------|----------|--------|
| YEAR     | 1980    |        | 1980/3/6 |        |
| DRILL    | CNVTIAL | DIRECT | CNVTIAL  | 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<br>YEAR<br>DRILL<br>N PATH | PKS<br>1980<br>CNVTIAL | DIRECT   | 1980/3/6<br>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<br>EXTRA                   | 75 ENHD                | 150 ENHD | 150/225E            | 150 STND | 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<br>DRILL | 1980<br>CNVTIAL | 1980/3/6<br>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    |         |
|        | 0.348   | 0.284   | 0.894   | 0.516   | min rep |
|        | 0.284   | 0.232   |         |         | 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    |         |
|        | 0.632   | 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   | ---  |          | --S  |          | PKS  |          |
|----------|------|----------|------|----------|------|----------|
| YEAR     | 1980 | 1980/3/6 | 1980 | 1980/3/6 | 1980 | 1980/3/6 |
| 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   | ---  |        | --S  |        | PKS  |        |
|----------|------|--------|------|--------|------|--------|
| DRILL    | ---  | DIRECT | ---  | DIRECT | ---  | 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    | ---  | DIRECT | ---      | 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  | ---  | DIRECT | ---      | 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 | ---      | DIRECT |
| 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 | ---      | DIRECT |
| 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<br>YEAR<br>DRILL<br>N PATH | PKS<br>1980<br>CNVTIAL | DIRECT   | 1980/3/6<br>CNVTIAL | DIRECT   |      |
|-----------------------------------|------------------------|----------|---------------------|----------|------|
| 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<br>EXTRA                   | 75 ENHD                | 150 ENHD | 225 ENHD            | 150 STND | Mean |
| 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<br>DRILL | 1980<br>CNVTIAL | DIRECT | 1980/3/6<br>CNVTIAL | DIRECT |
|----------|--------|---------------|-----------------|--------|---------------------|--------|
| 75 ENHD  | ---    |               | 4.07            | 4.03   | 3.80                | 4.42   |
|          | --S    |               | 3.89            | 3.60   | 3.77                | 3.92   |
|          | PKS    |               | 4.20            | 3.69   | 3.88                | 4.09   |
| 150 ENHD | ---    |               | 4.53            | 4.81   | 4.32                | 4.75   |
|          | --S    |               | 4.65            | 4.14   | 4.30                | 4.68   |
|          | PKS    |               | 4.25            | 4.02   | 5.07                | 4.99   |
| 225 ENHD | ---    |               | 6.00            | 4.72   | 4.40                | 5.89   |
|          | --S    |               | 5.30            | 4.41   | 5.14                | 5.19   |
|          | PKS    |               | 5.29            | 4.40   | 4.96                | 5.69   |
| 150 STND | ---    |               | 4.26            | 3.38   | 3.67                | 3.96   |
|          | --S    |               | 4.06            | 2.38   | 4.27                | 4.31   |
|          | PKS    |               | 3.93            | 2.07   | 4.25                | 3.73   |

## \*\*\* 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 CNVNTIAL  
Max rep DIRECT  
Max min DIRECT v CNVNTIAL

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

| Stratum | d.f. | s.e.  | cv%  |
|---------|------|-------|------|
| WP1     | 6    | 0.608 | 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<br>YEAR<br>DRILL<br>N PATH | PKS<br>1980<br>CNVNTIAL | DIRECT   | 1980/3/6<br>CNVNTIAL | DIRECT   |      |
|-----------------------------------|-------------------------|----------|----------------------|----------|------|
| 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<br>EXTRA                   | 75 ENHD                 | 150 ENHD | 150/225E             | 150 STND | 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<br>DRILL | 1980<br>CNVNTIAL | 1980/3/6<br>DIRECT | 1980/3/6<br>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  | EXTRA   | PK SUB  | YEAR    | DRILL   |         |
| s.e.d. | 0.438   | 0.179   | 0.146   | 0.155   |         |
| Table  | N PATH* | N PATH* | PK SUB  | N PATH* |         |
| s.e.d. | PK SUB  | YEAR    | YEAR    | DRILL   |         |
|        | 0.250   | 0.204   | 0.253   | 0.216   |         |
| Table  | PK SUB  | YEAR    | N PATH* | N PATH* |         |
| s.e.d. | DRILL   | DRILL   | EXTRA   | PK SUB  |         |
|        | 0.310   | 0.253   |         | YEAR    | min rep |
|        | 0.268   | 0.219   | 0.611   | 0.353   | max-min |
|        | 0.219   | 0.179   |         |         | max rep |
| Table  | N PATH* | N PATH* | PK SUB  | N PATH* |         |
| s.e.d. | PK SUB  | YEAR    | YEAR    | PK SUB  |         |
|        | DRILL   | DRILL   | DRILL   | YEAR    |         |
|        | 0.432   | 0.354   | 0.438   | 0.611   | min rep |
|        | 0.374   | 0.306   | 0.379   | 0.529   | max-min |
|        | 0.306   | 0.250   | 0.310   | 0.432   | 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 CNVNTIAL  
Max rep DIRECT  
Max min DIRECT v CNVNTIAL

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

| Stratum | d.f. | s.e.  | cv% |
|---------|------|-------|-----|
| WP1     | 6    | 0.310 | 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<br>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<br>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<br>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<br>NEMACIDE<br>VAR SEQ | NONE | OXAMYL | TOL+PRO<br>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<br>2.31 |

| Table  | VAR SEQ*         | SD TREAT         | VAR SEQ*                     |
|--------|------------------|------------------|------------------------------|
| s.e.d. | NEMACIDE<br>2.31 | NEMACIDE<br>1.64 | SD TREAT<br>NEMACIDE<br>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 | NONE | TOL+PRO | Mean |
| VAR SEQ  |      |         |      |
| 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 | NONE | OXAMYL | Mean |
| VAR SEQ  |      |        |      |
| 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 | NONE | OXAMYL | Mean |
| SD TREAT |      |        |      |
| NONE     | 64.8 | 75.9   | 70.3 |
| TOL+PRO  | 62.4 | 74.2   | 68.3 |

|      |      |      |      |
|------|------|------|------|
| Mean | 63.6 | 75.0 | 69.3 |
|------|------|------|------|

|          |      |        |         |        |
|----------|------|--------|---------|--------|
| SD TREAT | NONE |        | TOL+PRO |        |
| NEMACIDE | NONE | OXAMYL | NONE    | OXAMYL |
| VAR SEQ  |      |        |         |        |
| 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. FUNGICIDE      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 | TINE 10 | TN10PL20 | TN10TN20 | PLOUGH20 | Mean |
|----------|---------|----------|----------|----------|------|
| STRAW    |         |          |          |          |      |
| 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<br>CULTIVTN |         |
|--------|-------|----------|-------------------|---------|
| s.e.d. | 0.174 | 0.232    | 0.401             | min.rep |
|        |       |          | 0.347             | max-min |
|        |       |          | 0.284             | max.rep |

min.rep STRAW  
max-min BURNT only  
max.rep BURNT v CHOPPED  
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 | TINE 10 | TN10PL20 | TN10TN20 | PLOUGH20 | Mean |
|----------|---------|----------|----------|----------|------|
| STRAW    |         |          |          |          |      |
| 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<br>CULTIVTN |         |
|--------|-------|----------|-------------------|---------|
| s.e.d. |       |          | 0.561             | min.rep |
|        | 0.243 | 0.324    | 0.486             | max-min |
|        |       |          | 0.397             | max.rep |

min.rep STRAW  
min.rep 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:-<br>Triadimefon at 0.125 kg and carbendazim at 0.25 kg in 500 l on 14 Apr, 1987<br>Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l on 27 Apr<br>Propiconazole at 0.125 kg in 200 l on 28 May<br>Propiconazole at 0.125 kg with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l on 23 June |

5. INSECTCIDE 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 |
| FUNGICIDE | 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 |

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GRAIN TONNES/HECTARE

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

| INSCTCDE<br>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  | AUT N     | FUNG CIDE | INSCTCDE  | MOLLCIDE  |
| s.e.d. | 0.105     | 0.105     | 0.105     | 0.105     |
| Table  | STRAW*    | CULTTIME* | STRAW*    | CULTTIME* |
| s.e.d. | AUT N     | AUT N     | FUNG CIDE | FUNG CIDE |
|        | 0.183     | 0.149     | 0.183     | 0.149     |
| Table  | AUT N     | STRAW*    | CULTTIME* | AUT N     |
| s.e.d. | FUNG CIDE | INSCTCDE  | INSCTCDE  | INSCTCDE  |
|        | 0.149     | 0.183     | 0.149     | 0.149     |
| Table  | FUNG CIDE | STRAW*    | CULTTIME* | AUT N     |
| s.e.d. | INSCTCDE  | MOLLCIDE  | MOLLCIDE  | MOLLCIDE  |
|        | 0.149     | 0.183     | 0.149     | 0.149     |
| Table  | FUNG CIDE | INSCTCDE  |           |           |
| s.e.d. | MOLLCIDE  | MOLLCIDE  |           |           |
|        | 0.149     | 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.

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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]<br>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]<br>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.

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- 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]<br>VARIETY[85]  | CROWN                       | DELL   | DESIREE | PIPER | Mean |
|-----------------------------|-----------------------------|--------|---------|-------|------|
| 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]<br>VARIETY[85] | NONE                        | OXAMYL | Mean    |       |      |
| 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]<br>VARIETY[87] | NONE                        | OXAMYL | Mean    |       |      |
| 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]<br>VARIETY[87] | NONE   | OXAMYL  |       |      |
| CARA                        | 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    |       |      |

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

| Table  | VARIETY[85] | VARIETY[87] | NEMACIDE[87] | VARIETY[85]<br>VARIETY[87] |
|--------|-------------|-------------|--------------|----------------------------|
| s.e.d. | 1.58        | 1.58        | 1.12         | 3.15                       |

| Table  | VARIETY[85]<br>NEMACIDE[87] | VARIETY[87]<br>NEMACIDE[87] | VARIETY[85]<br>VARIETY[87]<br>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]<br>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]<br>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]<br>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, Vicia faba |
| W OATS      | W. oats                    |
| W RAPE      | W. oilseed rape            |
| W PEAS      | W. peas, Pisum sativum     |
| W WHEAT     | W. wheat                   |
| S BEANS     | S. field beans, Vicia faba |
| S LUPINS    | S. lupins, Lupinus albus   |
| S PEAS      | S. peas, Pisum sativum     |
| SNFLOWER    | Sunflower                  |
| FALLOW      | Fallow                     |

## Sub plots

|             |                                                                  |
|-------------|------------------------------------------------------------------|
| 2. SPRING N | Nitrogen fertilizer applied on 10 Apr, 1987:                     |
| O           | 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.

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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<br>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<br>SPRING N |
|-------------------------------------------------------------------|----------|----------|----------------------|
| s.e.d.                                                            | 0.349    | 0.188    | 0.546                |
| Except when comparing means with the same level(s) of<br>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 |
|             | 55.8     | 42.6     | 61.1     | 43.5     |
| Mean        |          |          |          | 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: Progrete, 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  | STRAW |
| s.e.d. | 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  | STRAW |
| s.e.d. | 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<br>NEMACIDE |
| s.e.d. | 1.63                | 1.63                | 1.63                            | 2.30                 |
| Table  | SOIL TRT<br>VARIETY | NEMACIDE<br>VARIETY | SOIL TRT<br>NEMACIDE<br>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     | 67.4 | 76.4   | 71.9 |
| SUBSOIL  | 72.8 | 85.3   | 79.0 |
| Mean     | 70.1 | 80.8   | 75.5 |

|          |      |         |      |
|----------|------|---------|------|
| VARIETY  | CARA | DESIREE | Mean |
| SOIL TRT |      |         |      |
| NONE     | 83.3 | 60.5    | 71.9 |
| SUBSOIL  | 88.9 | 69.2    | 79.0 |
| Mean     | 86.1 | 64.8    | 75.5 |

|          |      |         |      |
|----------|------|---------|------|
| VARIETY  | CARA | DESIREE | Mean |
| NEMACIDE |      |         |      |
| NONE     | 89.1 | 51.1    | 70.1 |
| OXAMYL   | 83.1 | 78.6    | 80.8 |
| Mean     | 86.1 | 64.8    | 75.5 |

|          |          |      |         |
|----------|----------|------|---------|
|          | VARIETY  | CARA | DESIREE |
| SOIL TRT | NEMACIDE |      |         |
| NONE     | 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