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Yields of the Field Experiments 1987

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87/W/CS/245 Minimum Cultivation and Deep P K - W. Wheat, W. Barley, S. Barley

Rothamsted Research

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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.

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

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

Cultivations, etc.:-

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

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

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

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

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

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

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

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

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

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

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

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

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

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

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

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

| PK SUB YEAR DRILL N PATH | PKS 1980 CNVNTIAL | DIRECT | 1980/3/6 CNVNTIAL | DIRECT | |
|-----------------------------------|-------------------------|----------|----------------------|----------|------|
| 75 ENHD | 4.24 | 5.10 | 3.47 | 3.42 | |
| 150 ENHD | 4.54 | 4.44 | 4.38 | 4.53 | |
| 150/225E | 4.47 | 4.12 | 3.77 | 4.76 | |
| 150 STND | 3.36 | 3.49 | 3.67 | 3.68 | |
| N PATH EXTRA | 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 DRILL | 1980 CNVNTIAL | 1980/3/6 DIRECT | 1980/3/6 CNVNTIAL | DIRECT |
|----------|--------|---------------|------------------|--------------------|----------------------|--------|
| 75 ENHD | --- | | 4.62 | 5.27 | 3.92 | 5.78 |
| | --S | | 5.81 | 5.37 | 3.33 | 4.08 |
| | PKS | | 4.24 | 5.10 | 3.47 | 3.42 |
| 150 ENHD | --- | | 4.74 | 4.73 | 4.49 | 4.79 |
| | --S | | 3.52 | 4.63 | 3.73 | 3.97 |
| | PKS | | 4.54 | 4.44 | 4.38 | 4.53 |
| 150/225E | --- | | 4.78 | 4.65 | 3.84 | 4.94 |
| | --S | | 4.40 | 5.54 | 2.92 | 4.04 |
| | PKS | | 4.47 | 4.12 | 3.77 | 4.76 |
| 150 STND | --- | | 4.19 | 4.53 | 4.79 | 3.80 |
| | --S | | 4.07 | 4.41 | 3.09 | 4.71 |
| | PKS | | 3.36 | 3.49 | 3.67 | 3.68 |

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

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

87/W/CS/245 SPRING BARLEY SERIES I

GRAIN TONNES/HECTARE

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

* Within the same level of N PATH only

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

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

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

GRAIN MEAN DM% 80.0

SUB PLOT AREA HARVESTED 0.00341

87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

| PK SUB | --- | --S | PKS | Mean |
|----------|------|------|------|------|
| N PATH | | | | |
| 75 ENHD | 4.13 | 3.78 | 3.94 | 3.95 |
| 150 ENHD | 4.66 | 4.43 | 4.56 | 4.55 |
| 225 ENHD | 5.27 | 4.94 | 5.07 | 5.09 |
| 150 STND | 3.77 | 3.62 | 3.30 | 3.56 |
| Mean | 4.46 | 4.19 | 4.22 | 4.29 |

| YEAR | 1980 | 1980/3/6 | Mean |
|----------|------|----------|------|
| N PATH | | | |
| 75 ENHD | 3.87 | 4.03 | 3.95 |
| 150 ENHD | 4.37 | 4.73 | 4.55 |
| 225 ENHD | 4.85 | 5.34 | 5.09 |
| 150 STND | 3.10 | 4.02 | 3.56 |
| Mean | 4.05 | 4.53 | 4.29 |

| YEAR | 1980 | 1980/3/6 | Mean |
|--------|------|----------|------|
| PK SUB | | | |
| --- | 4.39 | 4.52 | 4.46 |
| --S | 3.91 | 4.47 | 4.19 |
| PKS | 3.84 | 4.60 | 4.22 |
| Mean | 4.05 | 4.53 | 4.29 |

| DRILL | CNVNTIAL | DIRECT | Mean |
|----------|----------|--------|------|
| N PATH | | | |
| 75 ENHD | 3.93 | 3.96 | 3.95 |
| 150 ENHD | 4.52 | 4.56 | 4.55 |
| 225 ENHD | 5.18 | 5.05 | 5.09 |
| 150 STND | 4.07 | 3.31 | 3.56 |
| Mean | 4.43 | 4.22 | 4.29 |

| DRILL | CNVNTIAL | DIRECT | Mean |
|--------|----------|--------|------|
| PK SUB | | | |
| --- | 4.38 | 4.49 | 4.46 |
| --S | 4.42 | 4.08 | 4.19 |
| PKS | 4.48 | 4.08 | 4.22 |
| Mean | 4.43 | 4.22 | 4.29 |

| DRILL | CNVNTIAL | DIRECT | Mean |
|----------|----------|--------|------|
| YEAR | | | |
| 1980 | 4.54 | 3.80 | 4.05 |
| 1980/3/6 | 4.32 | 4.63 | 4.53 |
| Mean | 4.43 | 4.22 | 4.29 |

87/W/CS/245 WINTER WHEAT SERIES II

GRAIN TONNES/HECTARE

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

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

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

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

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

| N PATH | PK SUB | YEAR | 1980 | 1980/3/6 | |
|----------|----------|--------|----------|----------|------|
| DRILL | CNVNTIAL | DIRECT | CNVNTIAL | 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 CNVTIAL
Max rep DIRECT
Max min DIRECT v CNVTIAL

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

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

GRAIN MEAN DM% 80.0

SUB PLOT AREA HARVESTED 0.00341

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

| | | | | |
|----------|----------|----------|------|------|
| PK SUB | --- | --S | PKS | Mean |
| N PATH | | | | |
| 75 ENHD | 4.13 | 4.47 | 4.78 | 4.46 |
| 150 ENHD | 5.35 | 5.41 | 5.48 | 5.41 |
| 150/225E | 5.34 | 5.31 | 5.40 | 5.35 |
| 150 STND | 4.52 | 4.53 | 4.46 | 4.51 |
| Mean | 4.83 | 4.93 | 5.03 | 4.93 |
| YEAR | 1980 | 1980/3/6 | Mean | |
| N PATH | | | | |
| 75 ENHD | 4.41 | 4.50 | 4.46 | |
| 150 ENHD | 5.50 | 5.32 | 5.41 | |
| 150/225E | 5.59 | 5.11 | 5.35 | |
| 150 STND | 4.57 | 4.44 | 4.51 | |
| Mean | 5.02 | 4.84 | 4.93 | |
| YEAR | 1980 | 1980/3/6 | Mean | |
| PK SUB | | | | |
| --- | 5.02 | 4.65 | 4.83 | |
| --S | 5.05 | 4.81 | 4.93 | |
| PKS | 4.98 | 5.07 | 5.03 | |
| Mean | 5.02 | 4.84 | 4.93 | |
| DRILL | CNVNTIAL | DIRECT | Mean | |
| N PATH | | | | |
| 75 ENHD | 4.46 | 4.46 | 4.46 | |
| 150 ENHD | 5.18 | 5.53 | 5.41 | |
| 150/225E | 4.96 | 5.55 | 5.35 | |
| 150 STND | 4.14 | 4.69 | 4.51 | |
| Mean | 4.68 | 5.06 | 4.93 | |
| DRILL | CNVNTIAL | DIRECT | Mean | |
| PK SUB | | | | |
| --- | 4.52 | 4.99 | 4.83 | |
| --S | 4.75 | 5.02 | 4.93 | |
| PKS | 4.77 | 5.16 | 5.03 | |
| Mean | 4.68 | 5.06 | 4.93 | |
| DRILL | CNVNTIAL | DIRECT | Mean | |
| YEAR | | | | |
| 1980 | 4.62 | 5.22 | 5.02 | |
| 1980/3/6 | 4.74 | 4.90 | 4.84 | |
| Mean | 4.68 | 5.06 | 4.93 | |

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

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

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

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

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

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

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

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

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

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

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

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

87/W/CS/245 WINTER BARLEY SERIES III

GRAIN TONNES/HECTARE

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

* Within the same level of N PATH only

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

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

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

GRAIN MEAN DM% 83.1

SUB PLOT AREA HARVESTED 0.00341