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# Yields of the Field Experiments 1976

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## 76/R/RN/11 Irrigation - Barley, Maize

### Rothamsted Research

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IRRIGATION

Object: To study the effects of irrigation on a rotation of crops. Other agronomic factors are also included - Great Field I and II.

Sponsors: B.J. Legg, B.K. French.

The twelfth year, barley (Great Field I); forage maize (Great Field II).

For previous years see 64/C/15(t), 65/C/14(t), 66/C/9(t), 67/C/7(t), 68/C/6(t), 69/R/11(t), 70/R/RN/11(t), 71/R/RN/11(t), 72/R/RN/11(t), and 73-75/R/RN/11.

Design: 4 randomised blocks of 4 plots split into half and quarter plots (Great Field I).  
4 randomised blocks of 2 plots split into quarter plots (Great Field II).

Whole plot dimensions: Barley - 15.2 x 32.0, forage maize - 15.2 x 15.2.

Treatments to barley: All combinations of:-

Whole plots

1. IRRIGTN      Irrigation (by oscillating spray line), cumulative to previous years:-

|       |       |
|-------|-------|
| NONE  | None  |
| EARLY | Early |
| LATE  | Late  |
| FULL  | Full  |

Half plots

2. FUNGCIDE      Fungicides:

|       |   |
|-------|---|
| NONE  | None  |
| E+T+B | Ethirimol seed dressing, tridemorph spray on 28 May and 7 July, benodanil spray on 7-July |

Quarter plots

3. ALDICARB(75) Residuals of aldicarb applied to beans 1975:

|      |       |
|------|-------|
| (0)  | None  |
| (14) | 14 kg |

4. N TIME      Time of applying nitrogen fertiliser (total dressing 50 kg N):

|         |   |
|---------|---|
| SEEDBED | All to seedbed, dressing divided before (6 Mar) and after (23 Mar) sowing |
| SB+TD   | Half to seedbed (6 Mar), half top dressed (28 June)                       |

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NOTE: Tridemorph at 0.53 kg in 220 l for first spray; with benodanil at 1.12 kg in 450 l for second spray.

Treatments to forage maize: All combinations of:-

Whole plots

1. IRRIGTN          Irrigation:

|      |      |
|------|------|
| NONE | None |
| FULL | Full |

Quarter plots

2. N                  Nitrogen fertiliser (kg N):

|        |   |
|--------|---|
| 50     | 50 to seedbed   |
| 100    | 100 to seedbed  |
| 150    | 150 to seedbed  |
| 100+50 | 100 to seedbed, 50 top dressed five weeks after establishment |

NOTE: Seedbed N applied on 5 May, top dressed on 28 June.

Standard applications: Barley: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Forage maize: Manures: (0:20:20) at 450 kg. Weedkillers: Atrazine at 1.7 kg in 220 l. Paraquat at 0.42 kg ion in 220 l. Insecticide: Dimethoate at 0.07 kg in 450 l.

Seed: Barley: Julia, sown at 160 kg.

Forage maize: Cargill Primeur 170, sown at 100,000 seeds per hectare.

Cultivations, etc.: Barley: Ploughed: 20 Nov, 1975. Spring-tine cultivated: 3 Mar, 1976, 6 Mar. Seed sown: 8 Mar. Weedkiller applied: 7 May. Combine harvested: 26 July.

Forage maize: Paraquat applied: 27 Oct, 1975. Ploughed: 17 Oct. Spring-tine cultivated: 3 Mar, 1976. PK applied: 5 May. Atrazine applied and harrowed in: 7 May. Power harrowed: 10 May. Seed sown: 11 May. Insecticide applied: 8 June. Harvested by hand: 7 Oct.

NOTES: (1) Mildew on the barley was assessed on two occasions.

(2) Soil moisture measurements were made during the season.

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RAINFALL AND IRRIGATION: MM

| Week ending | Rainfall | IRRIGATION |                |      |               |
|-------------|----------|------------|----------------|------|---------------|
|             |          | EARLY      | BARLEY<br>LATE | FULL | MAIZE<br>FULL |
| May 1       | 0.4      |            |                |      |               |
| May 8       | 0.8      |            |                |      |               |
| May 15      | 7.2      |            |                |      |               |
| May 22      | 4.9      | 30         |                | 30   |               |
| May 29      | 5.2      | 25         |                | 25   |               |
| June 5      | 1.8      |            |                |      |               |
| June 12     | Trace    | 25         |                | 25   | 20            |
| June 19     | 16.5     |            |                |      |               |
| June 26     | Trace    |            | 25             | 25   |               |
| July 3      | 0.1      |            | 25             | 20   | 25            |
| July 10     | 0.4      |            | 30             |      | 30            |
| July 17     | 39.0     |            |                |      |               |
| July 24     | 2.1      |            |                |      |               |
| July 31     | Trace    |            |                |      | 25            |
| Aug 7       | Trace    |            |                |      | 25            |
| Aug 14      | Trace    |            |                |      | 25            |
| Aug 21      | 0        |            |                |      |               |
| Aug 28      | 2.8      |            |                |      | 30            |
| Sept 4      | 9.0      |            |                |      |               |
| Sept 11     | 30.6     |            |                |      |               |
| Sept 18     | 5.9      |            |                |      |               |
| Sept 25     | 36.7     |            |                |      |               |
| Oct 2       | 44.6     |            |                |      |               |
| -----       |          |            |                |      |               |
| Total       | 208.0    | 80         | 80             | 125  | 180           |

- NOTES: (1) BARLEY IRRIGTN FULL plots started to lodge at the beginning of July and irrigation was stopped to prevent further lodging.
- (2) Analysis of two blocks given ALDICARB(75) showed the residual effect to be negligible, therefore all four blocks were analysed together ignoring this factor.
- (3) There was a systematic difference between the yields recorded from even and odd sub plots in the order of harvesting. An adjustment has been made for this in the yields presented. An explanation is being sought.

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BARLEY

GRAIN TONNES/HECTARE

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

| FUNGCIDE | NONE | E+T+B | MEAN |
|----------|------|-------|------|
| IRRIGTN  |      |       |      |
| NONE     | 4.04 | 4.87  | 4.45 |
| EARLY    | 4.89 | 5.61  | 5.25 |
| LATE     | 5.04 | 5.09  | 5.07 |
| FULL     | 4.81 | 5.95  | 5.38 |

|      |      |      |      |
|------|------|------|------|
| MEAN | 4.69 | 5.38 | 5.04 |
|------|------|------|------|

| N TIME  | SEEDBED | SB+TD | MEAN |
|---------|---------|-------|------|
| IRRIGTN |         |       |      |
| NONE    | 4.45    | 4.45  | 4.45 |
| EARLY   | 5.26    | 5.23  | 5.25 |
| LATE    | 4.98    | 5.16  | 5.07 |
| FULL    | 5.42    | 5.35  | 5.38 |

|      |      |      |      |
|------|------|------|------|
| MEAN | 5.03 | 5.05 | 5.04 |
|------|------|------|------|

| N TIME   | SEEDBED | SB+TD | MEAN |
|----------|---------|-------|------|
| FUNGCIDE |         |       |      |
| NONE     | 4.74    | 4.65  | 4.69 |
| E+T+B    | 5.32    | 5.44  | 5.38 |
| MEAN     | 5.03    | 5.05  | 5.04 |

| FUNGCIDE | NONE    | E+T+B   | SB+TD |
|----------|---------|---------|-------|
| N TIME   | SEEDBED | SEEDBED | SB+TD |
| IRRIGTN  |         |         |       |
| NONE     | 4.08    | 3.99    | 4.83  |
| EARLY    | 5.01    | 4.77    | 5.51  |
| LATE     | 4.85    | 5.24    | 5.11  |
| FULL     | 5.02    | 4.60    | 5.82  |

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

| TABLE   | IRRIGTN | FUNGCIDE | N TIME | IRRIGTN<br>FUNGCIDE |
|---|---------|----------|--------|---------------------|
| SED   | 0.205   | 0.079    | 0.074  | 0.233               |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:<br>IRRIGTN |         |          |        | 0.157               |

| TABLE   | IRRIGTN<br>N TIME | FUNGCIDE<br>N TIME | IRRIGTN<br>FUNGCIDE<br>N TIME |
|---|-------------------|--------------------|-------------------------------|
| SED   | 0.235             | 0.110              | 0.281                         |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:<br>IRRIGTN | 0.151             |                    | 0.219                         |
| FUNGCIDE  |                   | 0.107              |                               |
| IRRIGTN.FUNGCIDE  |                   |                    | 0.212                         |
| IRRIGTN.N TIME  |                   |                    | 0.219                         |

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BARLEY

GRAIN TONNES/HECTARE

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

| STRATUM        | DF | SE    | CV% |
|----------------|----|-------|-----|
| BLOCK.WP       | 9  | 0.290 | 5.8 |
| BLOCK.WP.HP    | 12 | 0.222 | 4.4 |
| BLOCK.WP.HP.SP | 23 | 0.295 | 5.9 |

GRAIN MEAN DM% 87.5

STRAW TONNES/HECTARE

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

| FUNGCIDE | NONE | E+T+B | MEAN |
|----------|------|-------|------|
| IRRIGTN  |      |       |      |
| NONE     | 3.04 | 3.44  | 3.24 |
| EARLY    | 4.22 | 4.59  | 4.41 |
| LATE     | 3.11 | 3.33  | 3.22 |
| FULL     | 4.05 | 4.50  | 4.28 |
| MEAN     | 3.61 | 3.96  | 3.78 |

| N TIME  | SEEDBED | SB+TD | MEAN |
|---------|---------|-------|------|
| IRRIGTN |         |       |      |
| NONE    | 3.28    | 3.20  | 3.24 |
| EARLY   | 4.61    | 4.20  | 4.41 |
| LATE    | 3.30    | 3.13  | 3.22 |
| FULL    | 4.38    | 4.18  | 4.28 |
| MEAN    | 3.89    | 3.68  | 3.78 |

| N TIME   | SEEDBED | SB+TD | MEAN |
|----------|---------|-------|------|
| FUNGCIDE |         |       |      |
| NONE     | 3.75    | 3.46  | 3.61 |
| E+T+B    | 4.03    | 3.90  | 3.96 |
| MEAN     | 3.89    | 3.68  | 3.78 |

| FUNGCIDE | NONE | SB+TD | E+T+B | SEEDBED | SB+TD |
|----------|------|-------|-------|---------|-------|
| N TIME   |      |       |       |         |       |
| IRRIGTN  |      |       |       |         |       |
| NONE     | 3.13 | 2.94  | 3.42  | 3.46    | 3.46  |
| EARLY    | 4.51 | 3.93  | 4.70  | 4.47    | 4.47  |
| LATE     | 3.22 | 3.00  | 3.39  | 3.27    | 3.27  |
| FULL     | 4.15 | 3.96  | 4.60  | 4.40    | 4.40  |

STRAW MEAN DM% 90.4

SUB PLOT AREA HARVESTED 0.00347

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FORAGE MAIZE DRY MATTER TONNES/HECTARE

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

|         | N | 50    | 100   | 150   | 100+50 | MEAN  |
|---------|---|-------|-------|-------|--------|-------|
| IRRIGTN |   |       |       |       |        |       |
| NONE    |   | 9.45  | 10.00 | 10.33 | 9.61   | 9.85  |
| FULL    |   | 11.79 | 13.08 | 13.34 | 13.42  | 12.91 |
| MEAN    |   | 10.62 | 11.54 | 11.84 | 11.51  | 11.38 |

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

| TABLE | N     | IRRIGTN* |
|-------|-------|----------|
|       |       | N        |
| ----- |       |          |
| SED   | 0.556 | 0.786    |

\* WITHIN THE SAME LEVEL OF IRRIGTN ONLY

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

| STRATUM     | DF | SE    | CV% |
|-------------|----|-------|-----|
| BLOCK.WP.SP | 18 | 1.111 | 9.8 |

MEAN DM% 40.8

SUB PLOT AREA HARVESTED 0.00156