### 3.6.5 Barley response to incremental irrigation - Cressy, Tas

**Location:** Cressy Research and Demonstration Station, Cressy, Tas

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**Background/Aim:**
Barley is commonly grown where there is the potential for opportunistic irrigation. This trial was designed to calculate the incremental benefit of irrigation to barley to maximise water use efficiency and determine the growth stage to cease irrigation. This project continues research from the past two years on water use efficiency in a range of irrigated crops.

**Results and discussion:**
Irrigating beyond the soft dough stage gave no increase in yield Table 2. This is clearly shown where the incremental benefit of irrigation (Table 3) is negligible for the hard dough irrigations. Similar outcomes from late irrigation were found in the previous year's trial.

Irrigation can be stopped at any stage from late booting without penalising the water use efficiency. The yield is in direct proportion to the quantity of irrigation applied. Reducing the rate of irrigation to 68% of pan evaporation did not significantly reduce the yield but there is a trend in both the soft dough and hard dough treatments for a lower yield. The unintentional grazing of the trial by sheep has reduced the yield of the barley. While this has affected the yield and consequently the water use efficiency, a substantial yield component has not been accounted for, as it should not affect the response of the barley to the timing of the irrigation.

**Take home messages:**
- There was no yield benefit to late irrigation past the soft dough stage
- Reducing the irrigation rate from 90% of pan evaporation to 68% of pan evaporation did not significantly reduce yield.

**Rainfall:**
Avg. Annual: 627mm
Avg. G.S.R.: 214mm
2008 Total: 507mm
2008 G.S.R.: April – November = 216mm

**Treatments:**
All plots were fully irrigated until mid booting (130mm). Treatments imposed after booting are listed in Table 1. Irrigation scheduling was based on 90% of pan evaporation except the 75% treatments which received 68% of pan evaporation (75% x 90%). Sheep grazed the trial in mid November when the barley was booting, the remaining ears were cut off and irrigation and a further nitrogen top dressing applied. Estimated losses from the grazing were about 3-4 t/ha dry matter.

**Measurements:** Grain yield and water use.

**Variety:** Gardiner

**Sowing rate:** 92 kg/ha
**Sowing date:** 6th Sept 08

**Paddock history:**
2006: lupini beans
2007: wheat

**Fertiliser:**
- 250 kg 4:11:13:9 +Mo
- 50 kg N as urea 29 Oct
- 50 kg N as urea 20 Nov

**Herbicides:**
- epoxiconazole (125g/L) @500 ml/ha 20 Nov
- alpha-cypermethrin (100g/L) @100 ml/ha 20 Nov

**Table 1:** Irrigation treatments

| | Treatment | Irrigation (mm) | Date of last irrigation |
|---|---|---|---|
| 1 | late booting | 130 | 23-Dec |
| 2 | flower | 140 | 28-Dec |
| 3 | late milk 75% | 165 | 4-Jan |
| 4 | late milk | 180 | 4-Jan |
| 5 | soft dough 75% | 195 | 13-Jan |
| 6 | soft dough | 220 | 13-Jan |
| 7 | hard dough 75% | 210 | 15-Jan |
| 8 | hard dough | 240 | 15-Jan |

**Summary:**
There was no benefit to irrigating beyond the hard dough stage with barley. Water applied at a 68% of pan evaporation did not significantly reduce the yield compared to that at 90% of pan evaporation.

**Table 2:** Irrigation, rainfall, yield and water use efficiency

| | Treatment | Irrigation (mm) | rainfall (mm) | total (mm) | yield (t/ha) | | kg/mm |
|---|---|---|---|---|---|---|---|
| 1 | late booting | 130 | 216 | 346 | 3.47 | c | 10.0 |
| 2 | flower | 140 | 216 | 356 | 3.56 | c | 10.0 |
| 3 | late milk 75% | 165 | 216 | 381 | 3.86 | bc | 10.1 |
| 4 | late milk | 180 | 216 | 396 | 3.85 | bc | 9.7 |
| 5 | soft dough 75% | 195 | 216 | 411 | 4.21 | ab | 10.2 |
| 6 | soft dough | 220 | 216 | 436 | 4.28 | a | 9.8 |
| 7 | hard dough 75% | 210 | 216 | 426 | 4.21 | ab | 9.9 |
| 8 | hard dough | 240 | 216 | 456 | 4.31 | a | 9.4 |
| | **LSD** | | | | **0.43** | | |
| | **F prob.** | | | | **0.002** | | |

**Table 3:** Incremental benefit to irrigation

| | Treatment | Treatment comparison | Irrigation (mm) | Yield (kg) | kg/mm |
|---|---|---|---|---|---|
| *1* | *late booting* | *1* | *346* | *3469* | *10.0* |
| 2 | flower | 1 to 2 | 10 | 95 | 9.5 |
| 3 | late milk 75% | 1 to 3 | 35 | 388 | 11.1 |
| 4 | late milk | 1 to 4 | 50 | 379 | 7.6 |
| 5 | soft dough 75% | 3 to 5 | 30 | 350 | 11.7 |
| 6 | soft dough | 4 to 6 | 40 | 435 | 10.9 |
| 7 | hard dough 75% | 5 to 7 | 15 | -2 | -0.1 |
| 8 | hard dough | 6 to 8 | 20 | 26 | 1.3 |