Seeding rates – high or low?

The aim of this trial was to assess seeding rates in wheat and barley for optimum production and grain quality.

Summary

The seeding rate debate will continue for some time to come. The BCG has shown in previous trial work that in normal seasons there are yield benefits with higher seeding rates and in low rainfall seasons there is little or no loss in yield with sowing wheat at 200 plants/m^2. Barley appears to require a lower sowing rate of around 150 plants/m^2.

High seeding rates, which obtain between 175 to 200 plants/m^2 for wheat and 150 plants/m^2 for barley are also more competitive against weeds.

In the dry season of 2004 similar results were obtained. At Birchip the wheat and barley yields were very low (for wheat, less than 0.8 t/ha and for the May sowing time there was a 0.1 t/ha higher yield for the lower seeding rate). Barley yields were even lower and there was no significant effect of sowing rate on yield. At Laen the yields were much better (2.5 t/ha plus) and there were no effects of sowing rate on yield.

At both sites, June sown crops yielded less than May sown crops.

Background

The issue of seeding rates for wheat and barley continues to be hotly debated in the farming community. Many farmers believe that a low seeding rate, which achieves around 100 to 125 plants/m^2, is optimum. There are many other farmers who use higher seeding rates and the trial work undertaken by the BCG over the last seven years is suggesting that seeding rates in wheat need to be between 175 to 200plants/m^2 to optimise yield and quality. In previous work with barley, the BCG showed that high seeding rates (200 plants/m^2) resulted in a depressed yield and lower quality. Optimum plant number for barley seemed to be closer to 150 plants/m^2.

Methods

In 2004, seeding rate trials were undertaken on wheat (variety Yitpi) and barley (variety Gairdner) at both Birchip and Laen. Plots were sown in a fully replicated design. The sowing rate treatments were 100 and 200 plants/m^2 for both wheat and barley. To further investigate the effect of sowing time on crop yield and quality crops were sown in May and June. At Birchip the crops were sown on 14th May and 4th June; and at Laen the sowing dates were 21st May and 22nd June.

Results

The actual plant densities achieved were higher than planned for wheat and lower for barley (planned sowing rates were calculated from seed weight and an expected loss

in germination of 15%). The actual plant densities were approximately 10% higher in wheat, and 10% lower in barley compared to the planned sowing rates.

Wheat

In 2004, at Birchip the average wheat yield across the trial was 0.67 t/ha and there was no significant difference between the sowing date (May versus June) or sowing rate (100 vs 200 plants/m^2) (Figure 1). However, at Laen there was a very small but significant difference (0.1 t/ha) in favour of the lower seeding rate. At Laen, the crop sown in May yielded 0.3 t/ha more compared to the June sown crop (Figure 1).

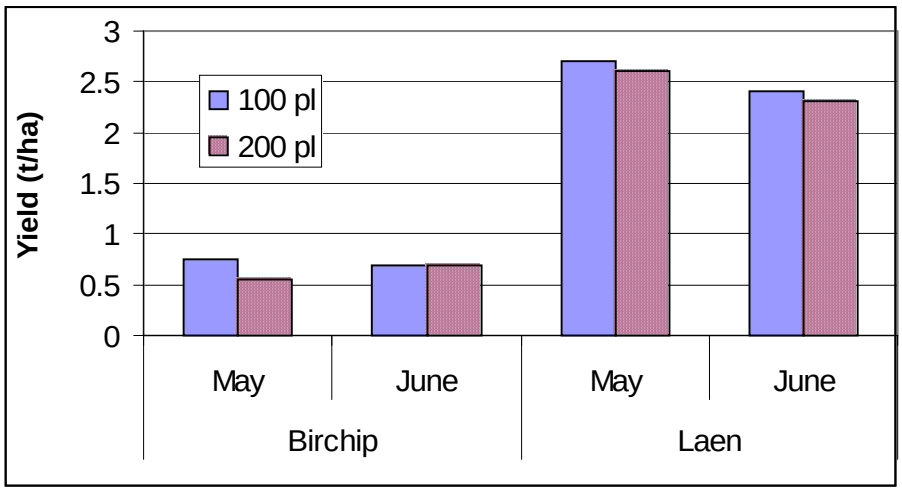

Figure 1. Yield of Yitpi wheat sown in May and June at 100 and 200 plants/m^2 at Birchip and Laen.

At Birchip the protein content was very high (average 18.3%) and at Laen it was 13.6%. At both sites there was a higher protein content with sowing in June compared to May (Birchip 1.5% and Laen 1.1% higher in June compared to May). Only at Birchip there was a small but significantly higher protein (0.8%) with the low sowing rate compared to the high sowing rate. Sowing rate at Laen had no impact on protein content.

Screenings at Birchip were low (average 3.9%) and at Laen (average 2.0 %) – there were no significant effects of sowing rate and sowing time on screenings at either site.

Barley

Barley yields at Birchip were very low (average 0.3 t/ha) and there were no significant effects of sowing time or sowing rate on yield. At Laen, there was no effect on yield from sowing rate; however, the later sowing time in June yielded 1.4 t/ha less compared to sowing in May (Figure 2).

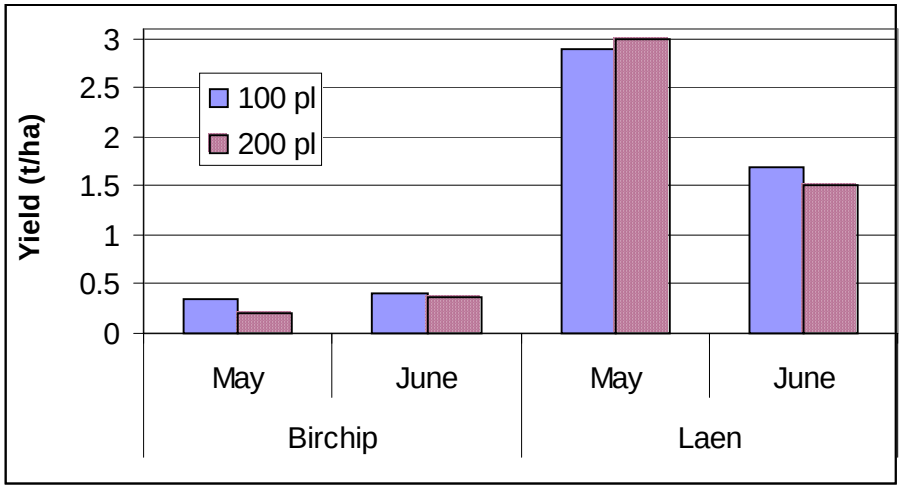

Figure 2. Yield of Gairdner barley sown in May and June at 100 and 200 plants/m^2 at Birchip and Laen.

Protein was higher at Laen for the June sowing (14.3%) compared to the May sowing (11.4%). At Birchip the average protein content was high (average 16.4%) and there were no differences in protein content between a May and June sowing.

Screenings in Barley were very high at Birchip (average 39%) and there were no effects on screenings from either sowing date or sowing rate. At Laen, screenings were 17%.

Interpretation

2004 was a difficult year to show differences in sowing rate in wheat or barley. There was little or no spring rain in 2004, and any differences in potential yield were masked by the very harsh finish.

Later sowing in June compared to earlier sowing in May resulted in significantly lower yield at Laen in both wheat and barley. Later sowing of Gairdner barley at Laen resulted in a yield penalty of 50%. The yield penalty of late sowing Yitpi wheat was much less (12%).

In 2004 there were few and only small effects of sowing rate on grain quality (protein and screenings). However, later sowing of both wheat and barley resulted in higher protein contents at both sites.

The canopy management trial reported in this manual also included a sowing rate component. At Birchip the wheat sown at 100 plants/m^2 consistently yielded higher (from 0.8 to 0.9 t/ha) compared to the 200 plants/m^2 sowing rate (irrespective of the N treatments).

Commercial Practice

The sowing rate debate will continue until we have definitive data on what happens in relation to yield and quality in a wet season. The BCG have shown that sowing rate has little impact on yield or quality in dry seasons. The work needs to continue until we can determine what happens in a wet season. High seeding rates in wheat (between 175 and 200 plants/m2) does results in better crop competition with weeds.

It is very clear that delayed sowing (from May into June) does decrease yield – especially for longer season varieties such as Gairdner barley. These longer season varieties cannot adjust to the later sowing date and suffer a severe yield penalty. Mid season varieties such as Yitpi wheat are also affected by the loss in yield, however the loss is much less (around 10% decrease in yield for the 2004 trial at Laen).