3. CROP VARIETY TRIALS

3.1 Spring sown wheat & barley - Lake Bolac, Vic

Location: SFS Lake Bolac Research Site

Funding: Southern Farming Systems

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Thanks to Neil Vallance for providing the land for this trials programme.

Summary of findings:

- Adding Imidacloprid to standard seed treatments made a significant (P=.05) improvement in yield to most varieties in the absence of any visible BYDV.
- Increasing sowing rates significantly (P=.05) improved yield for all varieties
- Fungicide timing was not as critical as it is in a longer growing season
- Barley produced the best return on investment when compared to wheat
- None of the varieties of either Barley or Wheat made a quality receival standard

Background/Aim:
After the very wet summer in 2010/11 many paddocks were close to field capacity at sowing and with above average rainfall over the late autumn and early winter many paddocks got too wet to finish the autumn sowing program. Many growers were then forced to sow crops in the spring once the paddocks had dried out.

This trial was set up to look at the potential yield of commonly grown varieties of Barley and Wheat sown in September, whilst comparing some different management strategies that might be adopted when sowing this late in the season:

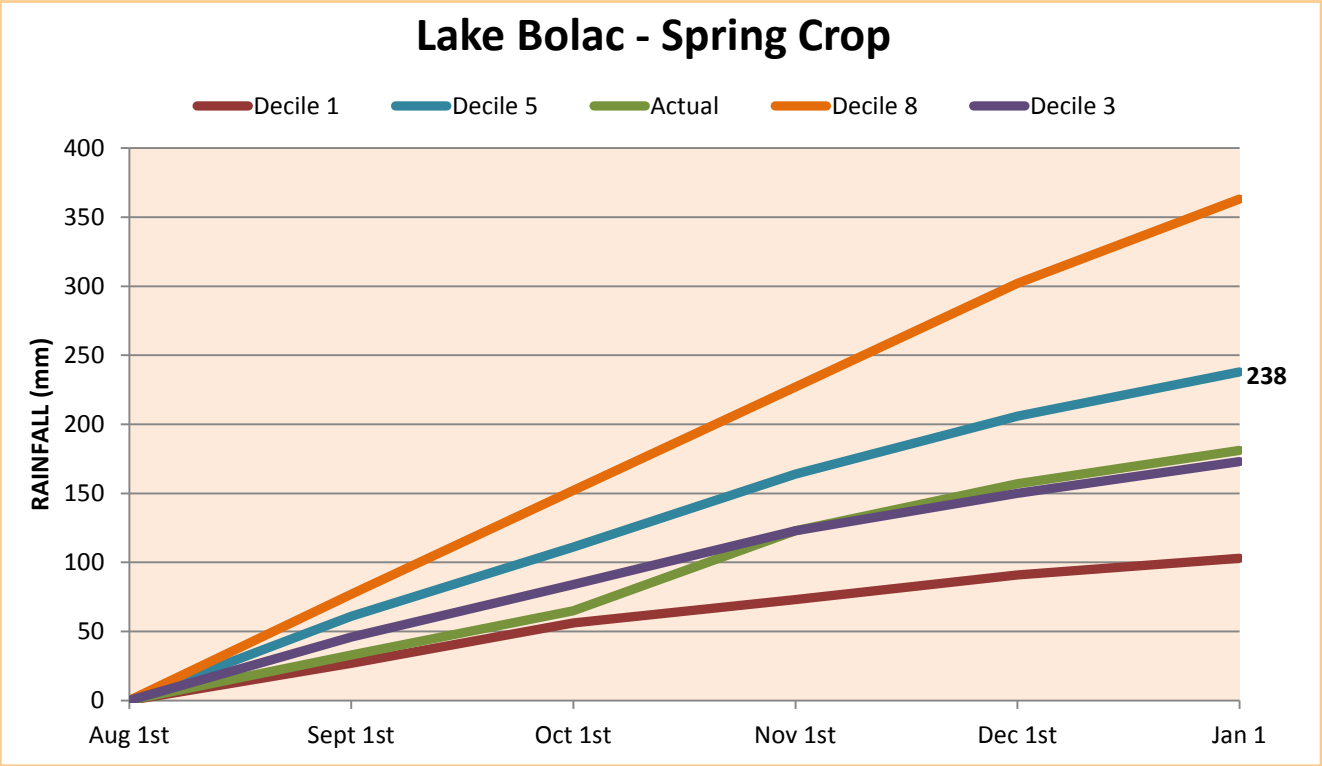
- Look at the influence of adding Imidacloprid to a standard seed treatment for controlling a possible BYDV infection
- To determine if sowing rate should be increased to compensate for less tillering
- Could we optimise the amount spent on fungicides by going on at just one key timing?
  - GS32 or waiting until GS49 in Barley
  - GS32 or waiting until GS39 in Wheat

Trial information:
Trial design consisted of a randomised block design using 4 replicates. Plot lengths were 10m long and 1.45m wide. A factorial design was used which enabled us to statistically compare the three factors mentioned above. By using a factorial analysis of variance the three factors are randomized within the trial and will give more information about the effects of one factor independent of other factors. A factorial analysis can also detect whether two factors interact, and if the interaction is more or less effective. Treatments are randomized throughout each replicate within a factorial trial.

Rainfall:
After a very wet summer, rainfall for May to July was above average which created delays in completing the sowing of the winter program. This trial was sown on 16 September after a very dry August and September (decile 1 & 2 respectively) and although October was wetter than average we had two further dry months in November and December. With flowering and grainfill of these late sown varieties being around the first week in December yields were likely to be limited, given the lack of rainfall.

Actual Rainfall	Amount (mm)	Long-term Average	Amount (mm)	Difference (+/-)
2011	595 mm	Annual	540 mm	+ 55 mm
GSR (April – Nov)	347 mm	GSR (April – Nov):	401 mm	- 54 mm
GSR (Aug – Dec)	181 mm	GSR (Aug – Dec)	238 mm	- 57 mm

Figure 1. Growing Season Rainfall Deciles



Paddock History:
2009: Canola
2010: Wheat

Soil Characteristics:
Soil Type: Clay loam
Soil Nutrients: N = 46 Kg N/ha (0 – 40cm)
P = 48 mg/kg (Colwell)
K = 420 mg/kg
S = 19.7 mg/kg
pH (CaCl) = 6.6

Tillage type: The trial was sown with the new SFS cone seeder on 20cm row spacing's using 2.5cm knifepoints. Stubble burnt prior to sowing.

Diseases: There was some Stripe rust present on susceptible wheat varieties and Leaf rust in susceptible barley varieties.

Barley Trial

Varieties: Commander, Gairdner, Hindmarsh, Oxford

Sowing rate: Sowing rate was based on seed size, aiming to establish 200 plants/m² and 300 plants/m².

Seed Treatment: Each variety was treated with either
- Baytan @ 150ml/100kg seed = 22.5g Triadimenol/100kg seed
- Zorro @ 400ml/100kg seed = 22.5g Triadimenol/100kg seed + 72g Imidacloprid/100kg seed

Sowing date: 16 September 2011

Harvest date: 16 January 2012

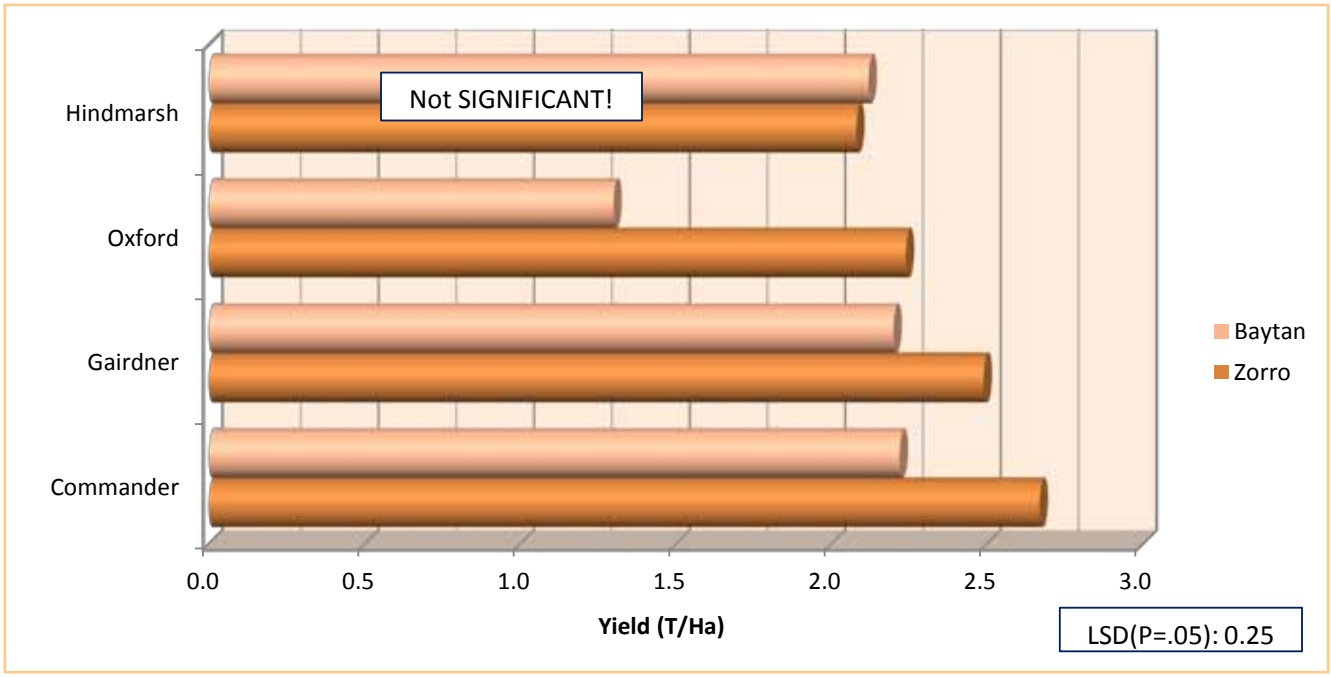
Fertiliser:	16-Sept-11	100 kg/ha MAP
	11-Oct-11	100 kg/ha Urea
Herbicides:	15-Sept-11	Roundup PM @ 1.2L/ha + Trifluralin @ 2L/ha
	10-Nov-11	Logran 750 WG @ 15g/ha + Hasten @ 1%
Fungicides:	10-Nov-11	Prosaro @ 0.15L/ha + Hasten @ 1% (GS32/33 Barley)
	25-Nov-11	Prosaro @ 0.15L/ha + Hasten @ 1% (GS52 Barley)

Results and discussion :

This trial was set up to look at the interaction between four varieties of barley sown in the spring and what influence, if any, three separate factors would have on the outcome.

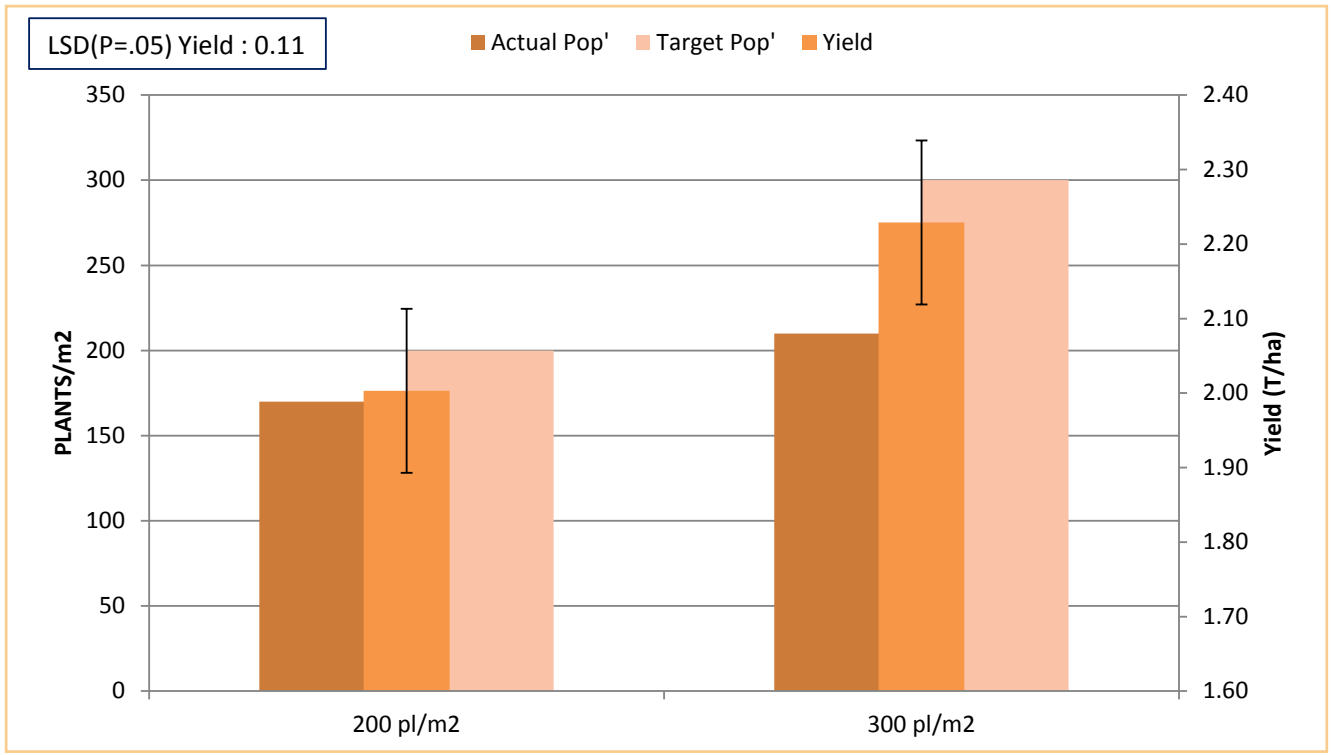
The first factor we looked at was the addition of Imidacloprid insecticide to a standard seed treatment for controlling a possible BYDV infection. The two seed treatments chosen contain the same quantities of Triadimenol but Zorro additionally contains Imidacloprid. As can be seen from figure 2, only Hindmarsh failed to give a statistical yield increase from the addition of Imidacloprid. The variety Oxford gave nearly 1 t/ha yield increase for an average increase in cost of $20/ha for the Zorro seed treatment from both plant populations and both fungicide timings. A tenfold return based on feed barley at $200/t!

Figure 2. The influence on yield of Baytan v Zorro seed treatments



The second factor we studied was determining if increasing the sowing rate, to compensate for less tillering, was going to be cost effective. We had originally aimed to compare 200 plants/m^2 with 300 plants/m^2 but final plant counts were 170 and 210 plants/m^2 respectively (Figure 3)

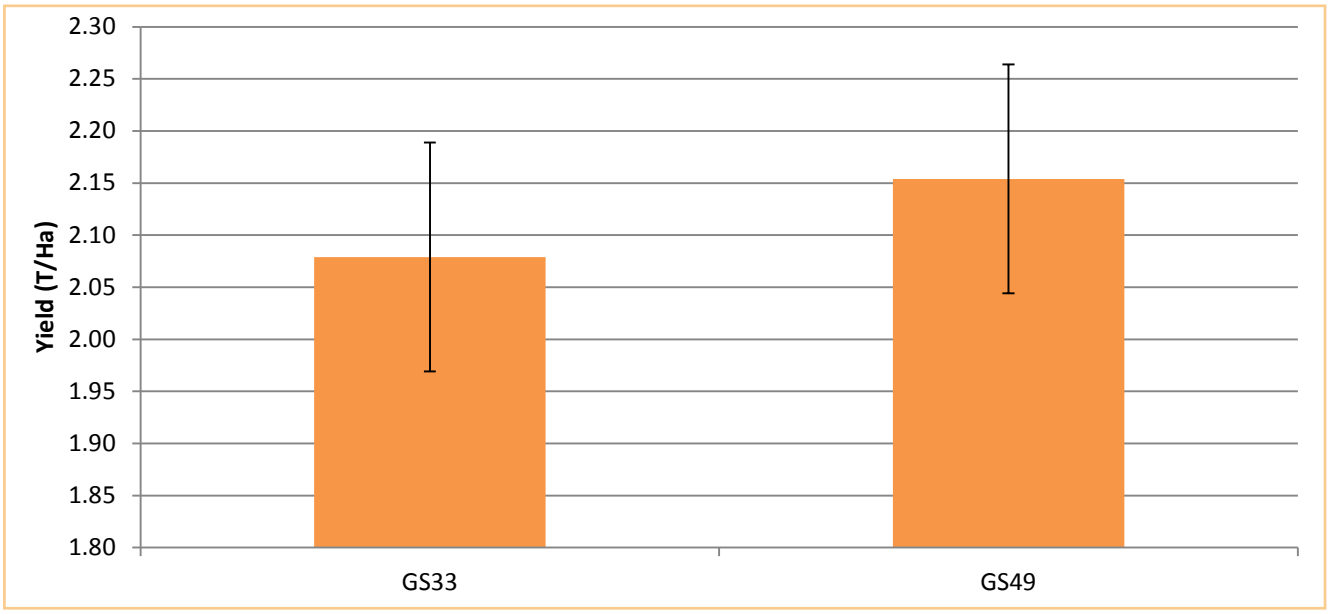
Figure 3. The influence on yield of two different plant populations



Although the final plant populations were only 40 plants/m² difference, compared to the planned 100 plants/m² we still had a significant (P= .05) yield difference of 0.23t/ha across all varieties + both seed treatments + both fungicide timings.

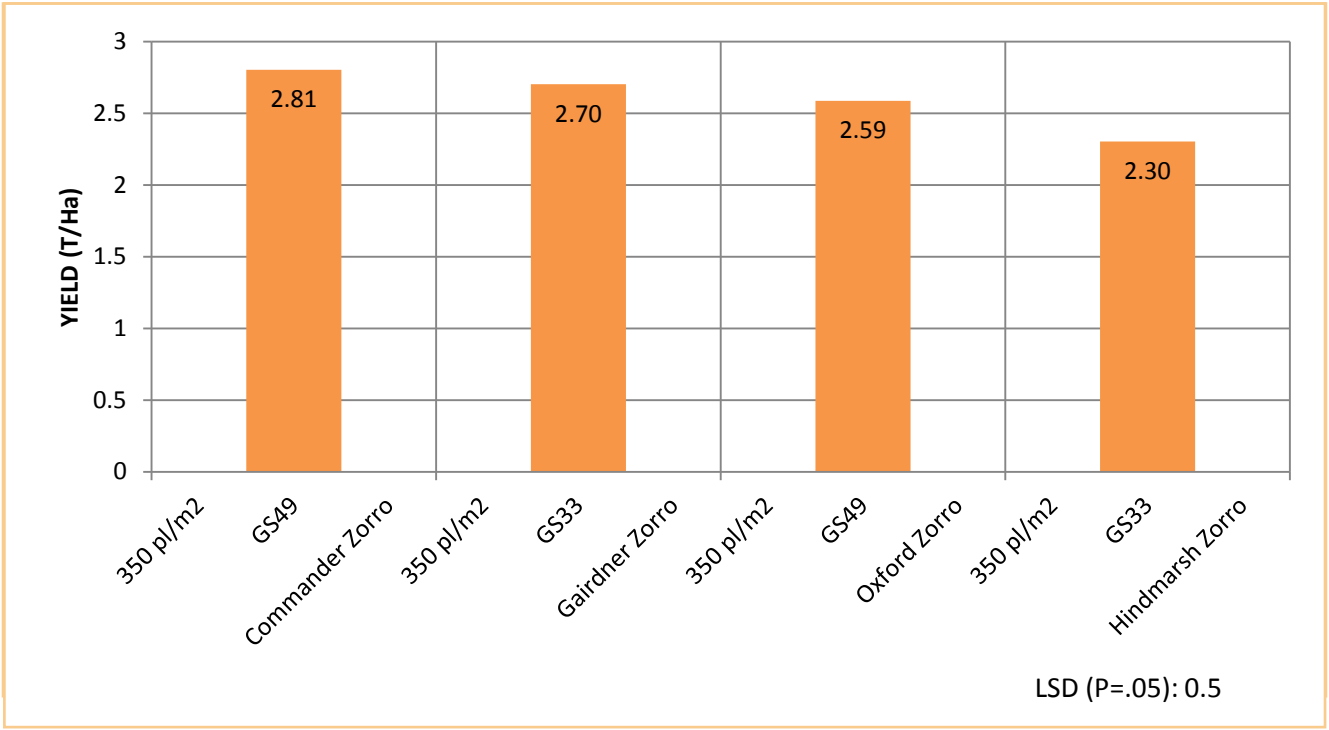
The final factor we looked at was fungicide timing and whether we could optimise the amount spent on fungicides by going on at just one, key timing, rather than the more typical practice of applying two fungicides? So we applied a fungicide at GS32/33 or waited until GS49. Even though there was a yield increase from an application at ear emergence compared to at GS32/33 it was not statistically significant when comparing all varieties, plus both seed treatments and both plant populations.

Figure 4. The influence on yield of two different fungicide application timings



Having looked at the influence of each of the three factors individually we can bring everything together and look at the highest yielding combination of all the factors (figure 5). Commander barley sown at the high plant population, with Zorro seed treatment and a fungicide application at GS49 gave the highest yield in the trial of 2.81t/ha which was only significantly (P=.05) higher yielding than Hindmarsh barley's best combination of the high plant population, with Zorro seed treatment and a fungicide application at GS33. Both Gairdner and Oxford's best combination were not statistically lower yielding than Commander.

Figure 5. The best combinations of factors by Variety



Wheat Trial

Varieties: Chara, Derrimut, Gladius, Scout, Lincoln

Sowing rate: Sowing rate was based on seed size, aiming to establish 200 plants/m² and 300 plants/m².

Seed Treatment: Each variety was treated with either
- Raxil @ 100ml/100kg seed= 2.5g Tebuconazole/100kg seed
- Hombre @ 400ml/100kg seed= 2.5g Tebuconazole/100kg seed + 72g Imidacloprid/100kg seed

Sowing date: 16 September 2011

Harvest date: 16 January 2012

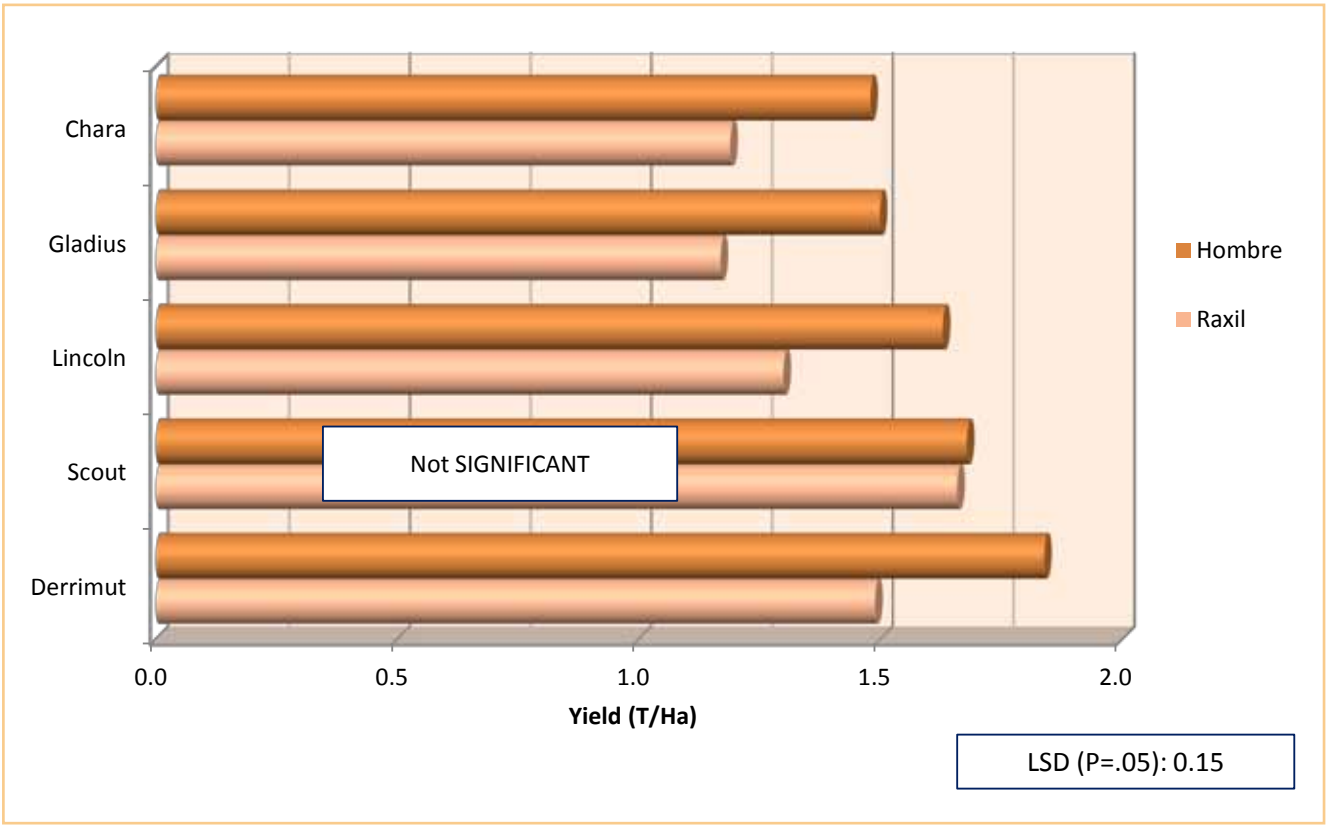
Fertiliser:	16-Sept-11	100 kg/ha MAP
	11-Oct-11	100 kg/ha Urea
Herbicides:	15-Sept-11	Roundup PM @ 1.2L/ha + Trifluralin @ 2L/ha
	10-Nov-11	Logran 750 WG @ 15g/ha + Hasten @ 1%
Fungicides:	10-Nov-11	Prosaro @ 0.15L/ha + Hasten @ 1% (GS32 Wheat)
	25-Nov-11	Prosaro @ 0.15L/ha + Hasten @ 1% (GS39 Wheat)

Results and discussion:

This trial was set up to look at the interaction between five varieties of wheat sown in the spring and what influence, if any, three separate factors would have on the outcome.

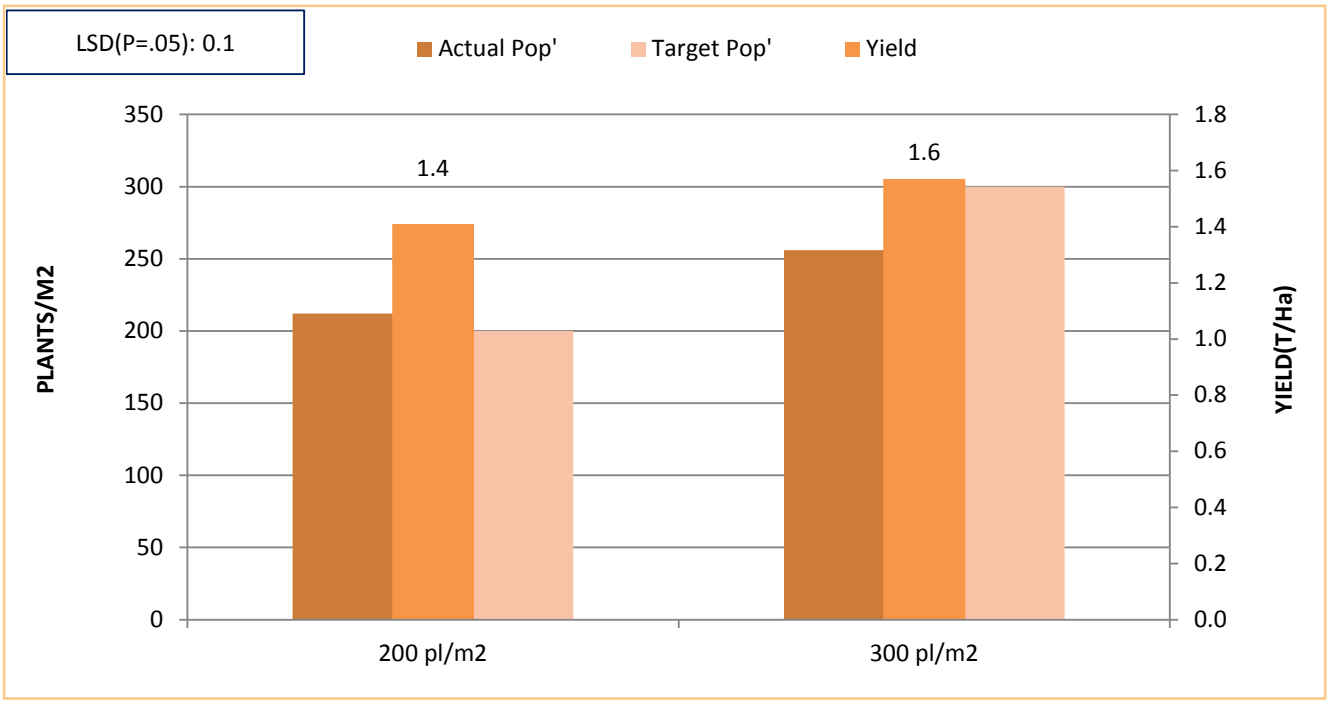
The first factor we looked at was the addition of Imidacloprid insecticide to a standard seed treatment for controlling a possible BYDV infection. The two seed treatments chosen contain the same quantities of Tebuconazole but Hombre additionally contains Imidacloprid. As can be seen from figure 6, only Scout failed to give a statistical yield increase from the addition of Imidacloprid.

Figure 6. The influence on yield of Raxil v Hombre seed treatments



The second factor we studied was determining if increasing the sowing rate, to compensate for less tillering, was going to be cost effective. We had originally aimed to compare 200 plants/m^2 with 300 plants/m^2 but final plant counts were 212 and 256 plants/m^2 respectively (Figure 7)

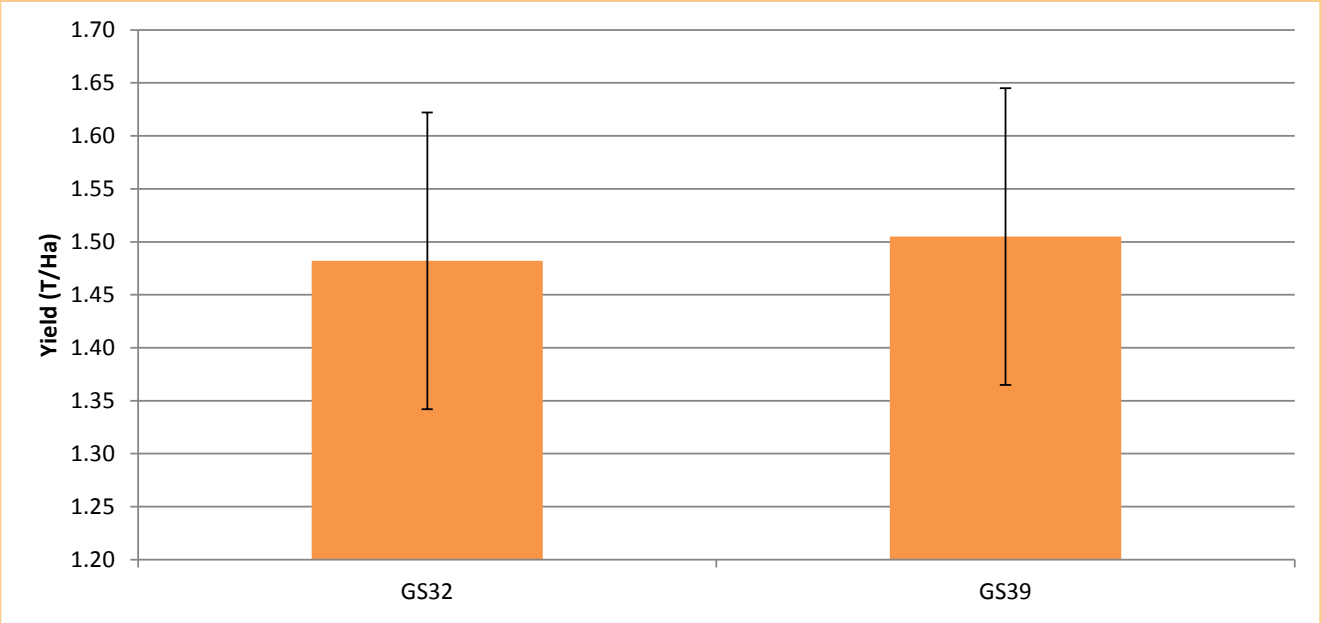
Figure 7. The influence on yield of two different plant populations



Although the final plant populations were only 44 plants/m² difference, compared to the planned 100 plants/m² we still had a significant (P= .05) yield difference of 0.2t/ha across all varieties + both seed treatments + both fungicide timings.

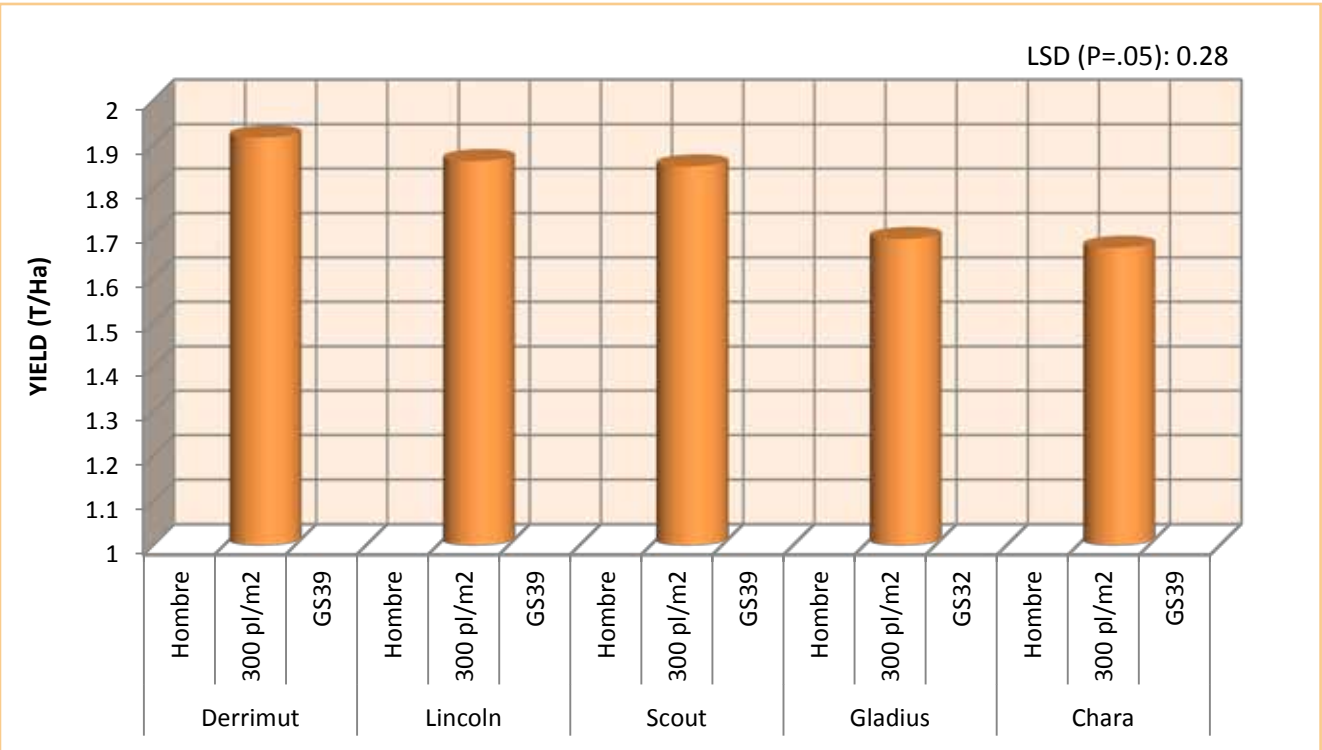
The final factor we looked at was fungicide timing and whether we could we optimise the amount spent on fungicides by going on at just one, key timing, rather than the more typical practice of applying two fungicides? So we applied a fungicide at GS32 or waited until GS39. Even though there was a yield increase from an application at GS39 compared to at GS32 it was not statistically significant when comparing all varieties, plus both seed treatments and both plant populations.

Figure 8. The influence on yield of two different fungicide application timings



Having looked at the influence of each of the three factors individually we can bring everything together and look at the highest yielding combination of all the factors (figure 9). Derrimut wheat sown at the high plant population, with Hombre seed treatment and a fungicide application at GS39 gave the highest yield in the trial of 1.92t/ha which was only significantly (P=.05) higher yielding than Chara's best combination of the high plant population, with Hombre seed treatment and a fungicide application at GS39. The best combinations of the other three varieties were again the high plant population, with Hombre seed treatment and a fungicide application at GS39 except for Gladius that yielded highest with the fungicide applied at GS32.

Figure 9. The best combinations of factors by Variety



Summary:
It is easy to say with the benefit of hindsight that the rainfall was insufficient in 2011, at a decile 4, for a short season crop of wheat and barley that would have had a shallow and poorly developed root system to exploit the limited soil moisture. The other critical element in growing a low yielding crop is to make the best of any quality premiums that are available and on this count none of the varieties would have received this premium as they all had a combination of low test weights, high screenings and high protein.

What we can learn from this trial is that a seed treatment which includes Imidacloprid gave us a statistical yield advantage in the absence of any visible BYDV and that plant populations should be higher than for autumn sown crops to compensate for the lower tiller numbers. For susceptible varieties a fungicide is still likely to be appropriate but the timing seems less critical compared to a longer season crop.

Based on the results of this trial, barley would be the preferred cereal of choice for a spring sown cereal with potentially limited growing season moisture or possibly the decision should be made to do something else completely!