

2.1.5 Winter wheat variety trial - Dunkeld, Vic

Location:

Dunkeld Research Site.

Funding:

This was an SFS Hamilton Branch funded trial.

Researchers:

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Background/Aim:

This trial compares a number of varieties that are either commercially available or close to commercial release that may be suitable for southwest Victoria. This trial differs from other comparative crop variety testing in that it evaluates the varieties with a fungicide programme, to determine the yield response of the varieties by comparing controlled leaf disease against an untreated control. Additionally, the management of inputs in the trial are based on the objective to gain the best margin per hectare.

Paddock history:

2005: Pasture,
2006: Pasture,
2007: Canola.

Soil type:

Sandy clay

Soil nutrients:

N = 45mg/kg (0-10cm) + 10.1mg/kg (10-60cm),
P = 45mg/kg (Colwell),
K = 0.55 Meq/100g,
S = 21mg/kg,
pH (CaCl₂) = 4.7.

Take home messages:

- The average foliar fungicide treated wheat yields for the Dunkeld winter wheat trial were 5.24t/ha. Disease pressure was high at the site resulting in an average yield increase of 0.75t/ha across all varieties from the two spray fungicide programme, with 5 of the 8 varieties achieving a 20% or more yield increase.
- The highest yielding variety was Mackellar at 126% of the site mean, also the most profitable variety returning a gross margin of \$1,136.40/ha.
- BYDV management must be considered when growing susceptible varieties of wheat, employing techniques that also minimise the impacts on the predatory environment.

Trial information:

Trial design consisted of a replicated randomised block design using 3 repetitions treated with foliar fungicide and leaving 1 repetition untreated, to demonstrate local disease pressure and varietal susceptibility. Plot lengths were 13m long and 1.45m wide. Rainfall was highly variable throughout the season, with a wet winter, then very dry Spring. Late rainfall in mid December did not contribute to the yield result of this trial.

Rainfall:

Avg. Annual: 612.2mm Hamilton Airport 1991-2008
Avg. G.S.R.: 474.0mm Hamilton Airport 1991-2008
2008 Total: 453.2mm Dunkeld Research Site
2008 G.S.R.: April – November = 298.1mm Dunkeld Research Site¹

¹ Yield Potential: 1/3 of Dec (72mm), Jan (45.2mm) & Feb (11.4mm) with monthly totals above 20mm + 1/2 March (15.6mm) rainfall when total above 20mm + ((April – November rainfall) – 90mm*) x 20kg/mm/ha. In total December-March adjusted rainfall to stored soil water = 39.1mm, plus April-November = 298.1mm, minus evaporation factor* =>247.2. Therefore, for Dunkeld, the water limited yield should be 4.94t/ha, or 247.2mm x 20kg/mm/ha.

Treatment list:

8 winter wheat varieties.
Measurements included yield and grain quality components, including protein, test weight, screenings and resulting classification.

Seeding equipment and row

spacing: SFS cone seeder using 2.5cm knifepoints and Janke high V press wheel on 17.12cm (6 ¾ inches) row spacing.

Sowing rate:

Seeding rate based on 1000 grain weight with a desire to establish 180 plants/m²

Sowing date: 23rd May 2008

Fertiliser:

- 23/5/08 MAP @ 100kg/ha
- 26/9/08 Urea @ 50kgN/ha
- 15/10/08 Coptrel @ 0.4L/ha

Herbicides:

- 23/5/08 RoundUp PowerMax @ 1.50L/ha + Triflur 480 @ 1.50L/ha + Striker @ 0.10L/ha
- 24/5/08 Dual Gold @ 0.25L/ha + Diuron @ 0.50L/ha
- 28/7/08 Axial @ 0.30L/ha + Precept @ 1.00L/ha + Adigor @ 0.5%

Fungicides:

- 15/10/08 Opus @ 0.25L/ha
- 5/11/08 Opus @ 0.25L/ha

Diseases:

Leaf rust was active on susceptible varieties within the untreated section, particularly in Mackellar and Brennan. Also, BYDV was highly active across all varieties within the trial, except Mackellar which is a known BYDV resistant line.

Harvest date: 21st January 2009

Results and discussion:

Of note, Mackellar achieved the highest yield of 6.61t/ha, or 126% of the site mean; close to a tonne better than the next best variety, being Frelon. Mackellar also yielded significantly ($P<0.05$) higher than 5 of the 8 varieties, with the presence of BYDV at visually high levels, helping explain the success of Mackellar, enabling it to perform to potential when confronted with aphids during growth conditions.

For this trial, the two spray foliar fungicide program resulted in a 0.75t/ha yield response, when averaged across all varieties, with 5 of the 8 varieties achieving a 20% or more yield increase. This yield response highlights the value of a fungicide program, both for the potential benefits in relation to disease control and green leaf retention, or in terms of an insurance policy to aid efficient conversion of rainfall to grain.

Regarding rainfall, the water use efficiency (WUE) figures achieved in this trial were rather high as a result of the dryer than average spring and early sowing, which forced the crop to make the most of every millimeter of rainfall. As result Mackellar was able to achieve a 26.8kg/mm WUE, which is unusually high, however this was the function of the season. Any calculations less than 80% would suggest agronomic factors needing improved management.

Grain quality was not an issue for any of the varieties, as all of the varieties achieve Feed 1 (F1) specifications, with the exception of the harvest process cracking grain from two varieties. Test weights were well above the F1 specification, as all varieties achieved a test weight of 10% or more above the required 62.0kg/hl. Protein was not an issue, as F1 had no requirement for protein, however, protein levels were generally 10% in concentration or below, suggesting that there was potential for significant yield increases, had extra nitrogen been applied.

Summary:

Therefore, across this trial, grain quality had no effect on the profitability of the varieties. Mackellar achieved the highest yield (6.61t/ha) and gross margin per ha (\$1,136.40/ha), as the grain quality classification did not differ between varieties. Noteworthy, is the gross margin per ha, which highlights the impact of variety selection on profit which can be significantly increased via one simple decision.

In hindsight, the trial should have been sprayed with Fastac in early tilling to minimise the effect of BYDV. Naparoo was the lowest yielding variety at 81% of the site mean. However, Naparoo did suffer significant grain shaking, which is something that growers will have to consider when planting Naparoo, if this year is anything to go by.

Table 1: Grain yield, corrected to 12.5% moisture, sprayed with fungicide and compared to unsprayed check. A percent of the site mean calculation and WUE calculation also included.

Variety	Yield (t/ha)	¹ Sig. Diff.	% of Site Mean	² WUE % of 4.94t/ha	Untreated Check (t/ha)
Mackellar	6.61	a	126	134	5.21
Frelon	5.62	ab	107	114	4.54
Einstein	5.51	ab	105	112	5.05
Amarok	5.32	bc	102	108	4.40
Beaufort	5.28	bc	101	107	4.99
SQP 95102.1	4.73	bc	90	96	3.93
Brennan	4.59	bc	88	93	3.61
Naparoo	4.26	c	81	86	4.23
Mean	5.24				4.50
LSD P=0.05	1.158				
CV	12.61				

¹ Means followed by the same letter do not significantly differ ($P=0.05$, LSD).

² Water Use Efficiency percentages are calculated based on the water limited potential yield of wheat at Dunkeld for the 2008 growing season; being 247.2mm x 20kg/mm/ha, or 4.94t/ha.

Table 2: Grain quality analysis, including protein, test weight & screenings that contributes to final economic analysis of variety performance on a GM/Ha basis (using standard inputs across all treatments of \$450/ha).

Variety	Protein % ¹	Test Weight kg/hl ¹	Screenings below 2.0mm ¹	Resultant Quality Classification	² GM\$/Ha
F1 Specs.		62.0	15.0		
Mackellar	8.6	74.5	15.0	F1	\$1,136.40
Frelon	10.0	76.0	13.0	F1	\$898.80
Einstein	9.5	71.8	10.3	F1	\$872.40
Amarok	9.6	73.4	12.7	F1	\$826.80
Beaufort	9.1	69.0	17.3	F1*	\$817.20
SQP 95102.1	9.1	69.6	17.3	F1*	\$685.20
Brennan	11.1	73.7	15.0	F1	\$651.60
Naparoo	10.2	74.6	12.3	F1	\$572.40
Mean	9.66	72.81	14.13		
LSD P=0.05	1.529	2.999	7.59		
CV	9.04	2.35	14.13		

¹ Quality parameterisation is based on 2008-2009 NACMA Wheat Standards and should be used as a guide only. Cells with gray covers suggest units outside specifications. Shading indicates reading outside preferred test range for the individual variety's potential.

² Prices for grain were taken as a spot price on the day of harvest and supplied by Riordan Grains; F1 = \$240/t.

*Quality classification not changed due to the harvesting process cracking these grains.

This winter wheat variety trial programme will continue annually with the support of both industry and researchers to constantly evaluate new varieties, as well as the disease susceptibility of current varieties on the market.