5. GRAZING TRIALS

5.1 Evaluation of dual purpose cereals varieties - Bairnsdale, Vic

Location:
Bairnsdale Research Site.

Funding:
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Previous crop:
Peas for Green Manure

Sowing rate:
Trials 1 & 2 80 kg/ha

Sowing dates:
Trial 1 - 15th April 2008
Trial 2 – 16th June 2008

Harvest date:
Trials 1 & 2 – 3rd January 2009

Fertiliser:
- Pre Sowing 1.5t/ha lime
- 80 kg/ha 75% Di Ammonium Phosphate (DAP) + 25% Sulphate of Potash (SOP) @ Sowing
- 50kg/ha Urea 27th August 2008 Top Dressing

Herbicides:
- Pre Sowing (Roundup @ 1 ltr/ha and Trflur at 0.8 ltr/ha)
- Trial 1 – 23rd July (Nugrex @ 750mls/ha)
- Trial 1 & 2 – 5th September (Lontrel @150mls/ha, MCPA @ 1000mls/ha, Axial @300mls/ha and Hasten @ 500mls/ha)

Take home messages:
- For Winter grazing purposes, just prior to rapid stem extension, triticale was able to produce the most DM/ha when compared to wheat and barley, with Crackerjack triticale outperforming the barley and wheats by 300-500kgDM/ha.
- For hay production in trial 1, 5092 barley and CS95102.1 wheat produced 9.3tDM/ha, compared to one wheat that yielded less than 5tDM/ha.
- For grain outcomes, Capstan barley produced the highest yield for both timings of sowing, whilst still able to produce comparable DM for grazing throughout the season.
- New lines to enter the market look very good for both yield and dry matter production with only a percentage of potential achieved in a decile 1 year.

Background/Aim:
To determine:
- Which dual purpose varieties respond to Gippsland's climatic conditions?
- Which new varieties may have commercialization potential?
- Which varieties are best suited to forage and feed grain production?

Trial Design:
23 dual purpose cereal varieties were selected for the following two trials.

Both trial methodologies included:
Plots were 20 m x 2 m (raised beds) with 4 replicates per variety
Plots were harvested and yields recorded. Grain samples were obtained for analysis including Moisture%, Corrected Yield (according to moisture content), Screenings %, Protein % and Test Weight (measured in kg/hl)

Trial 1 (forage and grain) sown 15th April 2008 (early sown)
Single 1m^2 plant quadrant cuts were taken from each variety on the 7th July prior to GS32. The samples were weighed to determine production per hectare, with sub samples taken for DM analysis. The analysis was to provide an indication of the grazing value of the varieties at this stage. The plots were then grazed for 1 hour and 45 minutes by 300 ewes and lambs.

Again, 1m^2 plant quadrant cuts were taken from each variety on the 5th November. The samples were weighed to determine production per hectare, with sub samples taken for DM analysis. The analysis was to provide an indication of the hay production value of the varieties at this stage.

Trial 2 (grain only) sown 16th June 2008 (late sown)
No Grazing and basic methodology as described above.

Rainfall:

Avg. Annual:	655mm
Avg. G.S.R.:	453mm
2008 Total:	505mm
2008 G.S.R.:	Trial 1 (April – November) = 286mm
	Trial 2 (June - November) = 243mm

Table 1: Trial 1 fodder and hay dry matter production

Variety	[1]Fodder kg DM/ha	Fodder DM %	[2]Hay kg DM/ha	Hay DM %	Total kg DM/ha
GS5092 Barley	219	14.6	9319	43.4	9538
Yerong Barley	272	16.1	7795	39.6	8067
Capstan Barley	319	14.8	7621	43.4	7940
Urambie Barley	257	17.1	7557	49.6	7814
Gairdner Barley	173	14.2	7369	42.1	7542
Monstress Triticale	553	19.1	8285	41.6	8837
Crackerjack Triticale	745	18.3	7144	40.9	7888
Endeavour Triticale	282	17.5	7562	39.6	7844
Tobruk Triticale	439	20.2	6812	43.8	7251
Jackie Triticale	440	16.8	5634	41.2	6074
Wedgetail	217	18.9	9299	47.6	9516
CS95102.1	174	23.2	9315	37.1	9489
Amarok	176	22.0	9123	40.9	9299
Freelon	99	21.0	7957	39.9	8056
CS170	259	23.1	7745	38.7	8003
HRZ03.1010.3	220	23.9	7689	37.5	7909
GS1078	224	19.3	7638	43.1	7862
CS97942.29	186	23.2	7020	39.2	7206
Mackellar	195	22.1	6562	38.9	6756
AH10	262	17.9	6246	44.0	6508
Brennan	133	20.4	6176	38.7	6309
CS98048.72	120	21.8	5181	36.7	5301
CS98408.75	114	21.5	4698	37.9	4812

[1] Fodder samples taken prior to GS32
[2] Hay samples taken between GS65 and GS85

Results and discussion:
Results (Table 1) show that Triticale produced the most DM/ha for grazing out of all the cereals with the Crackerjack variety out performing all others. Of the Barley varieties Capstan produced the most DM/ha for grazing followed by Yerong. Of the Wheat varieties, AH10 and CS170 produced the most DM/ha. The varieties had moderate DM% levels ranging between 14.2% and 23.9%

For hay production GS5092 barley and CS95102.1 wheat produced the most DM/ha. Monstress triticale produced the most DM/ha of the triticale varieties. The majority of DM % levels more than doubled for hay production compared to the fodder production stage.

For Total DM/ha (fodder and Hay combined) GS5092 barley, Monstress triticale and Wedgetail were the best for each of the cereal types. Three of the four highest producers were wheat but GS5092 Barley out performed them all.

Table 2: Trial 2 hay dry matter production

Variety	kgDM/ha	DM %
Urambie Barley	7994	47.0
Capstan Barley	6697	40.9
5092 Barley	6282	39.4
Yerong Barley	6188	39.1
Gairdner Barley	5493	39.1
Crackerjack Triticale	7460	40.7
Monstress Triticale	5865	40.3
Endeavour Triticale	5808	37.9
Tobruk Triticale	5508	40.9
Jackie Triticale	4652	38.7
GS1078	5595	37.7
Wedgetail	5511	39.1
AH10	5362	38.9
Amarok	5050	38.8
CS98408.75	4943	33.2
CS170	4722	37.0
CS95102.1	4638	34.8
Freelon	4617	35.2
CS98048.72	4097	34.6
Brennan	4082	35.0
Mackellar	3805	36.3
HRZ03.1010.3	3516	33.6
CS97942.29	3509	34.2

Hay samples taken between GS65 and GS85

Results in Table 2 for trial 2 show that Urambie barley produced the most hay DM/ha for all cereal types with Crackerjack triticale being second. On average the Barley varieties produced the most DM/ha hay followed by the triticale varieties. The DM% varied considerably across all cereal types ranging from 47% down to 33.2%.

Table 3: Trial 1 Yield and quality for grazed trial, early sown.

Variety	Yield (t/ha)	Significant Difference	Protein (%)	Moisture (%)	Test Weight (kg/hl)
Capstan	3.39	a	12.00	12.05	59.68
CS95102.1	2.62	b	10.10	11.00	67.90
GS5092	2.57	b	11.78	12.20	62.68
Endevour	2.55	b	11.53	11.30	63.53
Freelon	2.52	b	10.13	10.63	62.50
Tobruk	2.45	bc	10.25	11.08	70.68
10.10.3	2.44	bcd	10.68	11.40	65.25
GS1078	2.43	bcd	11.08	11.75	66.10
Ranger	2.38	b-e	12.60	12.30	54.30
CS170	2.37	b-e	10.53	11.11	70.70
Amarok	2.34	b-e	11.03	11.70	68.58
Gairdner	2.27	b-e	11.78	12.13	60.50
Crackerjack	2.21	b-e	9.98	10.70	67.28
Yerong	2.20	b-f	10.73	10.63	43.15
Monstress	2.12	b-f	11.15	11.20	63.18
CS97942.29	2.10	b-g	10.13	11.05	70.15
Jackie	1.99	c-h	11.18	10.93	66.78
Urambie	1.95	c-i	11.60	11.75	57.68
CS98048.72	1.92	d-i	10.30	10.95	68.80
Brennan	1.90	e-i	11.90	11.98	62.35
AH10	1.86	e-i	10.93	11.38	66.00
Wedgetail	1.68	f-i	9.38	10.43	63.03
CS98408.75	1.58	ghi	11.08	11.73	68.28
Mackellar	1.51	Hi	10.88	11.05	68.00
LSD P=0.05	**0.526**		**2.176**	**1.303**	**11.586**
CV	**17.03**		**14.27**	**8.16**	**12.91**
Grand Mean	**2.18**		**10.79**	**11.3**	**63.44**
Treatment Prob(F)	**0.0001**		**0.0053**	**0.0283**	**0.0054**

Results in Table 3 (Trial 1) indicate that Capstan produced the greatest quantity of grain (3.39 t/ha) of the barley varieties, but with test weight of just below 60kg/hl, relegating this variety to Feed 2. Urambie for this trial produced the lowest barley grain yield and similarly, the yield for Yerong was moderate compared to other varieties (as expected for these dual purpose line), with protein and the test weight particularly low for Yerong when compared to Urambie. However, unlike other barley varieties, Gairdner tested adequately for protein & moisture, but poor for weight.

Tobruk Triticale produced the most grain (2.45 t/ha) of the triticale varieties, with protein 10.25%. While Tobruk, Jackie and Crackerjack achieved adequate tests weights above 65 kg/hl, Monstress and Jackie yielded well down for grain when compared to the other triticale varieties.

Of the wheat varieties CS95102.1 produced the highest grain yield of 2.62 t/ha. Protein was low to moderate across all the varieties, with test weights all well below the required 62kg/hl for feed wheats.

Table 4: Trial 2 Yield and quality for non-grazed trial

Variety	Yield (t/ha)	Significant Difference	Protein (%)	Moisture (%)	Test Weight (kg/hl)
Capstan	2.61	a	11.48	11.93	64.65
CS170	2.55	ab	10.00	10.70	65.25
Jackie	2.54	ab	9.55	10.53	61.50
5092	2.51	ab	11.48	11.60	62.08
CS95102.1	2.48	abc	8.98	10.90	68.38
GS1078	2.45	abc	8.85	11.05	67.10
Yerong	2.40	a-d	8.93	9.95	52.73
Urambie	2.35	a-d	12.73	12.48	56.68
Frelon	2.30	a-d	10.53	10.58	64.88
Tobruk	2.21	a-e	10.58	11.35	61.05
Crackerjack	2.19	a-e	8.93	10.38	63.60
Amarok	2.18	a-e	10.35	11.38	68.18
Endevour	2.08	b-e	9.98	10.60	62.73
CS97942.29	2.05	b-f	9.43	10.85	70.18
10.10.3	2.01	c-f	10.80	11.55	63.40
AH10	2.00	c-f	10.48	11.60	64.88
Wedgetail	1.98	c-f	10.40	10.88	62.48
Gairdner	1.93	d-g	11.40	11.75	61.95
Brennan	1.92	d-h	10.38	11.68	65.15
Monstress	1.79	e-h	10.15	10.83	66.98
CS98048.72	1.58	fgh	9.23	11.00	66.68
CS98408.75	1.46	gh	9.80	10.95	67.53
Mackellar	1.42	h	9.30	11.28	62.83
LSD P=0.05	**0.504**		**1.629**	**0.864**	**9.472**
CV	**16.66**		**11.32**	**5.49**	**10.43**
Grand Mean	**2.14**		**10.18**	**11.12**	**64.23**
Treatment Prob(F)	**0.0001**		**0.0005**	**0.0001**	**0.1252**

Above: Trial 1 cereal variety trial being sown

Results in Table 4 indicate that Capstan Barley produced highest yield in Trial 2, with Gairdner yielding significantly less than many other barley treatments. Protein was high for all of the Barley varieties other than Yerong which had a protein level of 9%. Only Capstan achieved the test weight requirements for Feed 1 Barley classification.

Jackie was the highest yielding Triticale variety followed by Tobruk. Both tested adequately for protein, with test weights below standards. The test weight for Monstress was acceptable for feed wheat standards, most likely a response to the reduced yield. Endevour also yielded considerably less than the other Triticale varieties.

All the Wheat varieties tested well for weight, moisture and protein. CS170 yielded the most grain producing 2.55 t/ha followed closely by CS95102.1 producing 2.48 t/ha.

The yield from Trial 1 was only marginally higher than Trial 2 results when comparing grand means.

Discussion:

The results from Trial 1 suggest that Crackerjack triticale was the most favourable variety for grazing or Dry Matter production up until the early extension phase of the crop. Following Crackerjack and the majority of the Triticale varieties, Capstan barley produced the most Dry Matter for grazing at this earlier crop phase. Of the wheat varieties AH10 and CS170 produced the most Dry Matter for grazing. The overall low levels of dry matter production can be attributed to the poor growing conditions experienced during the growing season. Rainfall was minimal for the vast majority of the growing season, with 137mm falling in late November. As the cereals were water stressed, weed control was compromised, also affecting some productivity of these cereals.

Hay production results from Trial 1 indicate that 5092 Barley and CS95102.1 wheat appear to be the most favourable varieties with Wedgetail wheat being a close third. For total Dry Matter production, 5092 Barley was the best performer followed by three wheats (Wedgetail, CS95102.1 and Amarok). The overall low Dry Matter production levels are reflective of the ongoing dry season.

The Results from Trial 2 suggest that Urambie Barley and Crackerjack Triticale were the favourable varieties for hay Dry Matter Production. The level of hay Dry Matter production for these two varieties was greater than those achieved in Trial 1. But this was not a trend across the majority of the varieties.

Grain yield for Trial 1 was only marginally more than Trial 2, mainly attributed to poor weed control and crash grazing in trial 1. Capstan barley produced the greatest yield of all the cereal types with a high protein level, but a low test weight. CS95102.1 wheat produced the next best yield with an excellent test weight but an especially low protein level in the late sowing evaluation. Endevour was the highest yielding Triticale variety in the early sowing, while Jackie was the lowest due to leaf rust. This is surprising being a dry low rust pressure season.

Grain Yield for Trial 2 was clearly topped by the Capstan Barley. Jackie was leading Triticale variety while CS170 was the leading wheat variety for grain yield.

Grain quality in general would have been effected by the drought conditions, late season rain and delayed harvest.

Across both trials Capstan barley appears to have performed the best on average in a dry & challenging season.

Trial observations:

- The sowing equipment used in the Trial 1 was found to be faulty, affecting the consistency of establishment. As a result Trial 2 was sown with alternative equipment. The results have been amended to account for this problem, but would have impacted on the results consistency.
- Drought across the district resulted in wildlife pressures on the trials and interfered with weed control measures in Trial 1.
- Future trials should consider Trial 2 having the same sowing date. Alternatively, three trials could be used, with Trials 1 and 2 being sown on the same date with only one trial being grazed. Therefore, the effect of grazing will be clearer.
- Weather conditions delaying harvest by a month that would may have reduced grain quality, particularly for the early maturing varieties.
- Fodder cuts were intended for observation, so were not taken to provide statistically significant results.

Above: Trial 2 October 2008