Trial Results

Barley agronomy trials

Trent Potter, SARDI, Phone: 08 87629132 email: trent.potter@sa.gov.au

Key Outcomes

- Highest grain yields were produced at the earlier sowing date at both sites
- Commander produced the highest grain yields at both sites with the lowest protein content
- Increased N application rates increased grain yield at both sites but significantly increased protein content at Frances
- Increased sowing rates have been shown to slightly increase grain yield but reduce screenings and protein so may assist in attaining the malting grade

Trial Objectives: To assess the yield of a range of agronomic treatments on barley varieties at several sites
Trial Duration: 2009-2010
Location: Various. **Farmer Cooperator:** Martin and Kirsty Flower, Hartley Hocking
Soil Type: Various.
Paddock History: 2008, – Conmurra, wheat, Frances, canola
Monthly Rainfall:

Rain	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Total
Frances, 2009	2	4	25	30	20	51	110	81	68	32	45	21	489
Conmurra, 2009	3	0	31	59	28	98	124	108	112	52	46	30	688

Water Use Efficiency:
Yield Limiting Factors: Hot conditions in November
Plot Size: Plots, 8 m long by 8 rows at 15 cm row spacing.
Replicates: 1.5

Treatments

Barley agronomy trials were sown in a one and a half replicate design. Treatments included sowing time (2), variety (4), plus or minus fungicide spray, varying rates of nitrogen (4) and sowing rate (2). All trials were sown with small plot equipment and managed as per usual agronomic treatment. Grain yield was determined by machine harvest.
Statistically significant results are presented in tables below.

Trial Results

Table 1. Effect of variety on yield and quality at Frances 2009

Variety	kg/ha	Protein	Test weight	Screenings
Buloke	4805	9.99	65.82	4.07
Commander	5145	9.37	66.33	1.88
Gairdner	4821	9.83	67.18	3.15
Hindmarsh	4067	10.90	67.33	5.03

Table 2. Effect of nitrogen on yield and quality at Frances 2009

Nitrogen	kg/ha		Protein	Screenings	1000 grain wt
	TOS 1	TOS 2			
0	4745	3780	9.26	2.68	37.72
25	5284	4085	9.61	3.11	37.81
50	5633	4213	10.01	3.70	36.81
100	5754	4185	11.19	4.64	35.86

Table 3. Effect of sowing rate on yield and quality at Frances 2009

Sowing rate	kg/ha	Protein	Screenings	1000 grain wt	
				TOS 1	TOS 2
150	4625	10.10	3.75	37.98	36.38
200	4794	9.94	3.32	36.67	37.17

Table 4. Effect of variety and sowing date on quality of barley at Frances 2009

	Test weight		Screenings		1000 grain wt	
Variety	TOS 1	TOS 2	TOS 1	TOS 2	TOS 1	TOS 2
Buloke	66.03	65.60	4.13	4.01	36.00	36.83
Commander	67.02	65.63	1.85	1.91	38.63	38.28
Gairdner	68.35	66.01	2.57	3.72	41.36	38.17
Hindmarsh	68.06	66.60	4.00	6.06	33.31	33.82

Table 5. Effect of variety on yield and quality at Conmurra 2009

	kg/ha	Hect	1000 grain wt	Protein	Screenings
Buloke	4480	65.96	44.28	8.98	1.21
Commander	4488	65.65	43.85	8.59	0.89
Gairdner	3976	66.13	42.94	9.47	2.29
Hindmarsh	3972	67.35	40.41	9.6	1.38

Table 6. Effect of nitrogen on yield and quality at Conmurra 2009

Nitrogen	kg/ha	Hect	Protein	Screenings
0	3292	65.81	9.05	1.39
25	3920	66.22	8.94	1.25
50	4461	66.32	8.97	1.34
100	5244	66.74	9.68	1.8

Table 7. Effect of sowing date on yield and quality at Conmurra 2009

	kg/ha	Hect	Screenings
TOS1	4573	66.65	1.17
TOS2	3886	65.89	1.72

Table 8. Effect of variety and sowing date on quality of barley at Conmurra 2009

	1000 grain wt		Protein		Screenings	
	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2
Buloke	43.47	45.08	8.74	9.23	1.22	1.2
Commander	43.31	44.39	8.35	8.84	1.04	0.75
Gairdner	44.51	41.36	8.71	10.23	1.25	3.34
Hindmarsh	40.42	40.4	9.33	9.88	1.16	1.59

Comments

The highest yielding barley variety was Commander at both sites although Buloke produced a similar yield at Conmurra (Tables 1 and 4). There was no significant interaction between variety and sowing date for grain yield at either site. Delayed sowing at Conmurra decreased mean grain yield from 4573 kg/ha down to 3886 kg/ha (Table 6), a decrease of about 31 kg/ha/day. At Frances, delayed sowing decreased mean grain yield from 5354 kg/ha down to 4066 kg/ha, a decrease of 58 kg/ha/day.

Seed size of Gairdner decreased as sowing was delayed at Frances and Conmurra but seed size of other varieties was generally unaffected by delayed sowing (Tables 1 and 4). Similarly, screenings of Gairdner and Hindmarsh increased with delayed sowing date at both sites. Commander had the lowest protein content at both sites (Tables 1 and 4).

Nitrogen increased grain yield at both sites (Tables 2 and 6). At Frances there was an interaction between N rate and sowing date with increased N rate increasing yield by 1 t/ha at the first sowing and only 0.4 t/ha at the second sowing (Table 2). At Conmurra, increased N rate to 100 kgN/ha increased grain yield by nearly 2 t/ha (Table 6). At Conmurra, the first 25 kgN/ha increased grain yield by 25 kg/ha/kgN, the second increased grain yield by 21.6 kg/ha/kgN and the last 50 kgN/ha increased grain yield by 15.7 kg/ha/kgN. At Frances, the first 25 kgN/ha increased grain yield by 21.6 kg/ha/kgN, the second increased grain yield by 14 kg/ha/kgN and the last 50 kgN/ha increased grain yield by only 2.4 kg/ha/kgN.

Increased N rate at Frances increased protein content and screenings and decreased seed size (Table 2). At Conmurra, protein content was similar at N rates of 0-50 kgN/ha but increased at 100 kgN/ha. Also at Conmurra, both screenings and hectolitre weight were slightly increased by higher N levels (Table 6).

Sowing rate affected yield and quality at Frances with the higher sowing rate (200 seeds/m^2) producing higher grain yield, lower screenings and protein and smaller seed size in the first sowing date (Table 3).

Little disease was evident at either site and the fungicide spray had no effect on grain yield or quality.

Conclusion and into the paddock

Highest grain yields were produced at the earlier sowing date at both sites (20 May at Frances and 28 May at Conmurra). Commander produced the highest grain yields at both sites with the lowest protein content. However, little disease was evident in 2009 and Commander has lower levels of resistance to scald, leaf rust and the net form of net blotch than the alternative malting varieties.

Increased N application rates increased grain yield at both sites but significantly increased protein content at Frances. The rate of N to be used would normally have to be reduced as sowing is delayed to maintain protein content low enough to make the malting grade.

Increased sowing rates have been shown to slightly increase grain yield but reduce screenings and protein so may assist in attaining the malting grade.

Acknowledgements

Trials undertaken by the SARDI New Variety Agronomy group.

Funding Body

Funded by GRDC