BARLEY X FUNGICIDE TRIALS

Amanda Pearce, SARDI, amanda.pearce@sa.gov.au, 0407 400 939

Key Points:

- In the presence of disease, fungicide application increased grain yield (kg/ha).
- Grain quality improved with fungicide application.
- In conjunction with a fungicide management strategy, growers should aim to select resistant barley varieties, using up-to-date disease guides for varietal choice.

Sites:	**Farmer Co-operators:**
Conmurra	L Seears
Frances	M Flower

Trial Sites:
Replicated (3 reps) Plot Trial
8m X 1.6m, 15 cm spacing's

The barley X fungicide trials were established to compare barley yield and quality with no fungicide application (Treatment 1) to barley yield and quality with fungicide application (Treatment 2) (Table 1). Treatment 2, fungicide application, mimics standard practice in the South East.

Table 1: Trial details, treatment application details and additional notes

	Conmurra	Frances
Date Sown	11th June 2013	5th June 2013
Soil Type	Black Clay	Loam/Clay
Rain April-Oct	520.2mm	483.2mm
Treatment 1	No Fungicide Application	No Fungicide Application
Treatment 2	**27/08/2013**: 300 ml/ha Prosaro, 1 L/ha Hasten	**11/09/2013**: 300 ml/ha Prosaro, 1 L/ha Hasten
	8/10/2013: 300 ml/ha Prosaro, 1 L/ha Hasten	**3/10/2013**: 500 ml/ha Opus, 500ml/ha Dimethoate, 30 ml/ha Karate
Additional Notes	Disease observed	Low levels of disease observed Trial site experienced waterlogging

Trial Results

In the presence of disease fungicide application (Treatment 2) significantly increased grain yield (kg/ha) at Conmurra (Table 2). Navigator and Capstan increased by 74% and 69% respectively from Treatment 1 to Treatment 2. Westminster had similar yields with both treatments.

There was a significant difference in varietal yield (kg/ha) across the site. Compass (8930 kg/ha) was significantly the highest yielding variety at Conmurra. The remaining varieties performed similarly, at 81% or greater of the site mean, with Finnis the lowest yielding variety (5649 kg/ha).

Table 2: Conmurra Treatment 1 and Treatment 2 grain yields (kg/ha), % difference between treatments and average site yield (kg/ha) with % site mean

Variety	Treatment 1 No Fungicide Application	Treatment 2 Fungicide Application	% difference in yield (kg/ha) between Treatment 1 & Treatment 2	Average Site Yield (kg/ha)	% site mean
Bass	6954	8102	17	7528	109
Baudin	5920	8534	44	7227	104
Buloke	6027	7233	20	6630	96
Capstan	5130	8685	69	6908	100
Commander	6655	8137	22	7396	107
Compass	8330	9530	14	8930	129
Fairview	6015	6684	11	6350	92
Fathom	5668	6780	20	6224	90
Finnis	4838	6460	34	5649	81
Flagship	6113	7312	20	6713	97
Fleet	5700	6532	15	6116	88
Flinders	6805	8120	19	7463	108
Gairdner	5533	7607	37	6570	95
Grange R	6481	8170	26	7326	106
Henley	7087	8376	18	7732	112
Hindmarsh	6637	7531	13	7084	102
Keel	6543	8465	29	7504	108
La Trobe	6640	8057	21	7349	106
Macquarie	5375	7231	35	6303	91
Maritime	6618	8426	27	7522	108
Navigator	4518	7854	74	6186	89
Oxford	5830	8244	41	7037	102
Schooner	5578	5955	7	5767	83
Scope	5901	6788	15	6345	92
Skipper	6921	8284	20	7603	110
Sloop SA	6325	6652	5	6489	94
SY Rattler	6449	7630	18	7040	102
Westminster	7211	6979	-3	7095	102
Wimmera	6223	7718	24	6971	101
Mean yield (kg/ha)	6227	7658		6933	
LSD (kg/ha)	1024.6			1085.6	

In the absence of disease, fungicide application did not increase site mean yields at Frances (Table 3). Therefore, grain yields were statistically the same unsprayed and sprayed. Despite this, there were significant differences in average site yields (kg/ha) between varieties. Fathom (118% site mean), Gairdner (114% site mean), Capstan (113% site mean), Fleet (111% site mean), Bass (110% site mean), Henley (109% site mean) and Macquarie (108% site mean), were significantly the greatest yielding varieties. Sloop SA was the lowest yielding variety at only 82% of the site mean.

Table 3: Frances Treatment 1 and Treatment 2 grain yields (kg/ha) and average site yield (kg/ha) with % site mean

Variety	Treatment 1 No Fungicide Application	Treatment 2 Fungicide Application	Average Site Yield (kg/ha)	% site mean
Bass	3396	3160	3278	110
Baudin	2847	3398	3123	105
Buloke	2455	2782	2619	88
Capstan	3049	3715	3382	113
Commander	2319	3038	2679	90
Fathom	3495	3538	3517	118
Flagship	2864	2773	2819	95
Fleet	3442	3148	3295	111
Flinders	2967	3198	3083	103
Gairdner	3352	3457	3405	114
Granger R	2639	3390	3015	101
Henley	3344	3142	3243	109
Hindmarsh	2970	2995	2983	100
Macquarie	3323	3126	3225	108
Maritime	2968	2842	2905	97
Navigator	2460	2677	2569	86
Oxford	2818	2897	2858	96
Schooner	2456	2567	2512	84
Scope	2985	2785	2885	97
Skipper	2965	3055	3010	101
Sloop SA	2405	2456	2431	82
SY Rattler	2880	2957	2919	98
Westminster	2901	2971	2936	99
Wimmera	2756	2942	2849	96
Mean Yield (kg/ha)	2919	3042	2981	
LSD (kg/ha)			312	

Protein % increased with fungicide application at both sites (mean of Conmurra and Frances, Treatment 1 13.1% and Treatment 2 (13.6%) (Table 4). At Conmurra protein only increased slightly from 13.3% (Treatment 1) to 13.4% (Treatment 2). In comparison, at Frances protein increased from 12.9% (Treatment 1) to 13.8% (Treatment 2). At Frances all varieties, except Baudin, increased in protein (%) from Treatment 1 to Treatment 2.

Table 4: Variety protein % for Treatment 1 and Treatment 2 at Conmurra and Frances

	Treatment 1		Treatment 2	
Variety	**Conmurra**	**Frances**	**Conmurra**	**Frances**
Bass	13.5	13.4	14.1	14.1
Baudin	12.8	12.9	13.3	12.4
Buloke	12.8	13.2	12.8	13.4
Capstan	14.1	12.4	14.0	13.7
Commander	12.5	11.6	14.1	12.8
Compass	12.9		13.9	
Fairview	13.1		13.9	
Fathom	13.3	13.2	13.7	14.1
Finnis	13.9		13.7	
Flagship	13.5	13.1	14.0	14.0
Fleet	13.4	12.9	14.7	13.8
Flinders	13.4	13.2	13.3	14.0
Gairdner	13.6	12.5	12.1	13.4
Grange R	13.4	12.1	14.2	13.5
Henley	12.4	12.0	13.3	13.8
Hindmarsh	13.7	14.6	13.8	15.4
Keel	13.4		12.2	
La Trobe	13.1		13.8	
Macquarie	13.2	12.8		13.9
Maritime	13.4	13.1	12.9	14.2
Navigator	13.4	12.5	12.9	13.9
Oxford	12.8	11.7	11.8	13.0
Schooner	13.7	13.4	13.6	14.2
Scope	12.7	12.7	14.5	13.9
Skipper	13.4	13.4	13.2	14.4
Sloop SA	13.6	13.3	13.1	14.7
SY Rattler	12.5	12.5	12.4	13.5
Westminster	13.0	13.2	12.5	13.9
Wimmera	13.9	13.9		14.3
Mean	**13.3**	**12.9**	**13.4**	**13.8**

A thousand grain weight increased with fungicide application at both sites (Table 5). At Conmurra 1000 grain weight increased from 39.9g/1000 seed with Treatment 1 to 44.4g/1000 seed with Treatment 2. At Frances 1000 grain weight increased from 41.7g/1000 seed with Treatment 1 to 43.1g/1000 seed with Treatment 2. Most varieties increased in 1000 grain weight from Treatment 1 to Treatment 2 at both sites.

Table 5: A thousand grain weight (g/1000 seed) Treatment 1 and Treatment 2 at Conmurra and Frances

	Treatment 1		Treatment 2	
Variety	**Conmurra**	**Frances**	**Conmurra**	**Frances**
Bass	39.9	48.5	46.8	46.2
Baudin	40.4	37.0	43.8	41.3
Buloke	41.6	43.1	46.4	42.0
Capstan	35.7	38.8	44.6	45.2
Commander	39.1	38.5	43.3	42.6
Compass	45.2		40.6	
Fairview	39.3		50.4	
Fathom	47.0	48.7	40.0	50.3
Finnis	37.4		44.7	
Flagship	42.0	43.0	47.4	43.9
Fleet	46.7	51.1	41.2	51.5
Flinders	37.1	37.4	48.0	40.3
Gairdner	40.7	42.1	39.6	47.1
Grange R	38.6	41.1	45.6	46.4
Henley	42.8	42.5	45.1	41.4
Hindmarsh	37.9	36.8	41.2	37.6
Keel	37.5		47.9	
La Trobe	39.1		40.9	
Macquarie	39.4	43.8		41.9
Maritime	37.4	44.0	45.4	45.9
Navigator	32.4	36.9	43.3	38.8
Oxford	32.3	36.5	40.5	36.3
Schooner	40.7	39.6	42.6	40.6
Scope	41.1	42.8	43.3	44.1
Skipper	40.0	39.7	44.8	42.6
Sloop SA	41.4	43.7	41.9	48.1
SY Rattler	38.6	39.7	47.9	40.3
Westminster	44.8	45.8	51.0	42.8
Wimmera	41.6	38.8		37.1
Mean	**39.9**	**41.7**	**44.4**	**43.1**

Test weight (kg/hl) increased with fungicide application (Table 6). At Conmurra test weight increased from 65.6 kg/hl with Treatment 1 to 68.2 kg/hl seed with Treatment 2. At Frances test weight increased from 68.1 kg/hl with Treatment 1 to 69.2 kg/hl with Treatment 2. At Conmurra all but four varieties (Baudin, Fairview, Flagship and La Trobe) test weights increased between 0.03% (Westminster) to 34.5% (Granger R) from Treatment 1 to Treatment 2. At Frances all but six varieties (Fleet, Henley, Macquaire, Oxford, Westminster and Wimmera) test weights increased between 0.01% (Buloke) to 6.7% (Gairdner) from Treatment 1 to Treatment 2.

Table 6: Test weight (kg/hl) Treatment 1 and Treatment 2 at Conmurra and Frances

	Treatment 1		Treatment 2	
Variety	**Conmurra**	**Frances**	**Conmurra**	**Frances**
Bass	66.3	69.8	69.4	72.2
Baudin	66.9	66.6	66.5	69.3
Buloke	64.0	68.1	67.5	68.1
Capstan	63.6	65.9	66.6	69.5
Commander	66.3	69.0	68.0	69.8
Compass	64.9		68.9	
Fairview	67.7		66.9	
Fathom	65.4	68.5	69.4	69.1
Finnis	70.5		74.5	
Flagship	67.7	69.0	67.6	69.8
Fleet	65.9	67.1	67.6	65.9
Flinders	66.7	68.0	68.7	70.0
Gairdner	65.6	68.2	68.4	72.4
Grange R	51.4	68.0	69.1	70.9
Henley	65.6	66.2	68.2	65.6
Hindmarsh	68.4	67.8	69.5	68.7
Keel	63.8		68.5	
La Trobe	69.0		65.1	
Macquarie	66.7	71.0		70.4
Maritime	64.1	68.1	69.2	69.6
Navigator	60.3	64.8	65.7	67.7
Oxford	63.3	68.6	68.9	66.5
Schooner	67.9	68.9	69.5	68.9
Scope	65.7	66.9	68.4	69.4
Skipper	65.9	68.0	67.6	70.5
Sloop SA	67.2	68.2	67.6	70.3
SY Rattler	66.4	68.7	67.0	68.8
Westminster	68.1	71.0	68.2	69.2
Wimmera	67.5	68.0		67.6
Mean	**65.6**	**68.1**	**68.2**	**69.2**

Barley plump grain (>2.5mm sieve) % increased at both sites from Treatment 1 to Treatment 2. On average Conmurra increased from 52.5% to 67.6% with fungicide application and from 41.1% to 48.3% at Frances with fungicide application. At Conmurra Oxford (182.6%), Gairdner (14.7%), Capstan (108.1%) and Buloke (104.4%) had the greatest increase in plump grain from Treatment 1 to Treatment 2. At Frances, again the varieties Capstan (116.7%) and Gairdner (102.9%) had the greatest increase in plump grain from Treatment 1 to Treatment 2

Table 7: Barley Plump Grain (>2.5mm sieve) % Treatment 1 and Treatment 2 at Conmurra and Frances

	Treatment 1		Treatment 2	
Variety	**Conmurra**	**Frances**	**Conmurra**	**Frances**
Bass	48.4	64.9	73.5	66.2
Baudin	57.3	37.5	68.2	52.4
Buloke	38.3	25.9	78.2	29.6
Capstan	35.5	23.1	73.8	50.0
Commander	60.7	37.0	44.6	54.8
Compass	71.9		59.5	
Fairview	43.2		80.1	
Fathom	69.8	67.4	63.4	66.9
Finnis	21.0		40.4	
Flagship	60.4	38.7	84.5	45.8
Fleet	61.4	56.2	58.7	56.2
Flinders	55.7	34.7	82.7	55.5
Gairdner	29.7	21.1	72.1	42.9
Grange R	64.5	38.4	65.8	63.0
Henley	70.8	57.8	73.9	53.5
Hindmarsh	60.0	29.5	67.5	32.6
Keel	48.1		82.7	
La Trobe	58.2		64.6	
Macqauire	38.4	32.4		27.2
Maritime	51.4	56.8	70.0	58.9
Navigator	32.1	43.5	48.2	52.5
Oxford	21.6	34.0	61.1	31.4
Schooner	65.1	31.0	63.3	37.0
Scope	40.7	27.9	66.2	39.4
Skipper	57.7	35.9	64.1	52.3
Sloop SA	67.5	49.6	69.2	66.9
SY Rattler	60.4	47.8	64.0	44.9
Westminster	69.4	53.6	86.2	44.0
Wimmera	63.4	41.4		36.6
Mean	**52.5**	**41.1**	**67.6**	**48.3**

Conclusion

In the presence of disease (Net form of net blotch, Spot form of net blotch, scald and leaf rust were observed in susceptible varieties), fungicide application increased grain yields at Conmurra. In the absence of disease at Frances grain yields were the same between the two treatments. Despite this, it is important to note that all fungicides work best as a preventative spray, rather than a cure.

Net form net blotch remains a significant disease threat to barley production across South Australia and growers should refrain from growing barley on barley, or planting highly susceptible varieties, unless a vigilant fungicide strategy is planned. Cereal cyst nematode levels should be carefully monitored when susceptible varieties such as Scope, Buloke, Oxford and Gairdner are grown. Growers should aim for varieties which meet minimum disease standards, and compliment these varieties with fungicide application. Recent disease guides should be consulted when selecting varieties.

Grain quality (protein (%), 1000 grain weight (g/1000seed), test weight (kg/hl) and screenings) all improved with fungicide application. This suggests fungicide application has the added benefit of improving grain quality.

Varietal differences were observed across and within the sites, highlighting the importance of selecting suitable varieties for the target environment to maximise yield and grain quality potential.

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