

# NEW BARLEY AND WHEAT VARIETIES AND THEIR MANAGEMENT

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## Summary

- A large number of new barley and wheat varieties have been released over the last few years and their adaptation to new farming systems is being evaluated.
- Schooner and Gairdner have been the preferred malting barley varieties in southern NSW. Schooner generally achieves better quality in the lower rainfall parts of the cropping belt.
- Gairdner has proved to be the highest yielding malting variety, but is prone to high screenings under dry conditions, late sowing and excessive nitrogen or seeding rates.
- New varieties with malting potential for the region include Baudin, Buloke, Flagship and Vlamingh, all of which have higher yields and better export malting quality than Schooner.
- Tilga and Tantangara have been the standard feed varieties but are now joined by Capstan, Fleet, Hindmarsh and Yarra.
- Hindmarsh yield and grain quality were excellent in 2006, probably aided by its early flowering.
- Screenings were high in most barley crops in 2006. Hindmarsh, Vlamingh and WI3416 performed best whereas Gairdner, Flagship and Yarra were disappointing.
- Wheat variety by cropping systems interactions were observed at Condobolin, with some varieties better suited to no-till.
- Screenings were generally low in wheat trials. Ellison and Ventura produced the largest grains whereas Young and to a lesser extent Pugsley had high screenings.

## Background

Cereal growing in southern Australia is going through a period of rapid change, presenting growers with both challenges and opportunities. At the industry level, there is an increasing focus on meeting specific markets (eg noodles, pan breads, export malt, domestic feed) as well as deregulation of many markets. In plant breeding, there has been a rationalisation in the number of breeding centres and the introduction of the NVT system. These changes should shorten the development time for new varieties but may reduce the amount of local agronomic information available to farmers at the time of their release. At the farm level, there are major changes in farming systems, with increasing adoption of zero tillage, stubble retention, and satellite guidance

opening the way for innovative practices such as wider rows with inter-row seeding and zone management.

Two GRDC-supported research projects aim to develop variety specific agronomy packages for the major winter crops in southern NSW with emphasis on agronomic practices that are likely to have a genotype by environment interaction. These include adaptation of varieties to different farming systems, particularly no-till and wider row spacings, as well as yield and quality responses to variables such as fertilisers, fungicides, seeding rate, sowing time and weed competition.

## Barley

Interest in barley is increasing with the release of higher-yielding varieties, concerns about leaf diseases in wheat, the requirement for weed competitive crops in managing herbicide resistance, and a desire to reduce risk by crop diversification. Barley can be valuable as a rotation crop with wheat, particularly in no-till and stubble retention systems, as it is not a host for most wheat foliar diseases. Its vigorous early growth allows it to compete well with weeds, needing lower herbicide inputs and restricting weed seed set.

Since 2002, 13 new malting varieties have been or are about to be released. These represent varying improvements in yield, disease resistance and malting quality over the standard varieties but present growers with difficult choices, particularly as there are limits on the number of varieties that can be segregated and successfully marketed. In choosing a barley variety, it is important to consider the available markets.

NSW **malting barley** goes into three markets

1. Export barley grain, principally to China, is a major market for NSW. Schooner has been the major variety into this price sensitive market but there is increasing acceptance of newer varieties.
2. Grain used by Australian maltsters to produce malt for domestic brewing customers. This market is relatively static and in NSW Schooner has been the preferred variety.
3. Grain used by domestic maltsters to supply malt to overseas brewing customers. These markets require varieties with higher enzyme levels, such as Gairdner, Buloke, Baudin and Flagship.

Domestic **feed barley** demand has continued to increase with high numbers of cattle on feed and the continued requirements of the dairy and intensive livestock industries.

## Variety characteristics and performance

- **Gairdner** has performed particularly well across the southern central region, the long term data (Table 1) showing a yield advantage of about 6% over Schooner. It has good malting quality, and although a semi-dwarf variety it can grow quite tall. It is slower to flower than Schooner and so best suited to early and main season planting and to favourable conditions.
- Gairdner will often fail to meet grain size specifications for malting quality, particularly in drier environments and with later sowing.
- Gairdner does have inherently 0.5–1.0% lower grain protein content than Schooner, and this can be magnified by its higher yield potential.
- **Buloke** is a new provisional malting barley variety, with excellent malting quality for the export brewing market. It has semi-erect early growth, is moderately tall, and has average straw strength. Its flowering time is

generally similar to Schooner and it is best suited to low-medium rainfall districts. Buloke has excellent average kernel weight but has a narrow grain shape and so retention and screenings values usually fall between Gairdner and Schooner.

- **Baudin** is a malting variety from Western Australia. It is seen as a Gairdner alternative with better grain size, lower screenings, quicker maturity (particularly from later sowings) and shorter straw. It is very susceptible to leaf rust and powdery mildew and growers would need to organise a market outlet.
- **Flagship** has excellent export malting quality, is relatively tall and of mid-season maturity. Yields in S NSW have been similar to Gairdner while screenings have been quite variable.
- **Hindmarsh** is a new feed variety which performed very well in 2006. It is very quick to flower, stands well and has attractive large grains.
- **Tilga** and **Tantangara** remain as high yielding feed varieties. Tilga is best suited to the more western areas and Tantangara to the east.
- **Fleet, Capstan** and **Yarra** (moderately late) are feed varieties which may prove to have a place in southern NSW.
- **Tulla** is an acid soils-tolerant, semi-dwarf feed variety with good grain size, straw strength, and disease resistance and yields similar to Tantangara on non-acid soils.
- **Urambie** is a feed variety with a cold requirement for initiation, giving it a wide sowing window.
- **Vlamingh** is a new malting variety from Western Australia for which there is limited NSW data
- **Yambla**, an acid soils tolerant, semi-dwarf feed barley, suited to earlier sowing.

Relative yield across sites and years for the southern region are presented in Table1, taken from the 2007 Winter Cereal Variety Guide. The yield advantage over Schooner of the new malting varieties is evident, but Schooner more consistently meets plump grain standards.

**Table 1. Across sites and years analysis for yield and screenings for main season trials in the Southern Region (sown after 14 May). Yields are for 1999-2005 and expressed as a percentage of Gairdner. Screenings and retention are % by weight.**

Variety	Yield as % Gairdner (no. trials)	Retention (%>2.5 mm)	Screenings (%<2.2 mm)
Baudin	102 (28)	82	3.5
Buloke	104 (38)	71	4.9
Capstan	104 (44)	74	4.9
Flagship	98 (35)	79	3.8
Fleet	105 (4)	-	-
Gairdner	100 (88)	72	8.0
Schooner	95 (88)	82	3.5
Tantangara	102 (88)	72	5.7
Tilga	105 (83)	77	5.5
Tulla	100 (74)	85	2.5
Urambie	101 (18)	52	8.9
Yambla	98 (17)	-	-
Yarra	109 (15)	78	4.5

Dry conditions in 2006 resulted in few successful NVT trials. Some 2006 information is available from trials conducted by NSW DPI and CWFS in the south and central west (Table 2). Of the new varieties, Hindmarsh yielded well as did Buloke and Vlamingh at a number of sites.

**Table 2. Preliminary grain yield data (t/ha) for selected varieties at 7 sites in central NSW in 2006.**

Variety	Tabbita	Gunebang	Quandialla	Gilgandra	Alectown	Curban	Goolgowi
Baudin	1.08	0.57	0.67	2.27			0.83
Buloke	1.25	0.91	0.91	2.32	0.90	2.05	1.09
Capstan	1.12	0.38					
Flagship	1.16	0.66	0.94	2.19			0.83
Fleet	1.41	0.93					
Gairdner	0.84	0.29	0.63	1.97	0.90	1.48	0.63
Hindmarsh	1.34	0.98			1.01	2.22	1.20
Keel	1.37	0.72					
Schooner	1.22	0.70	0.93	2.50	0.86	1.67	0.88
Tantangara	0.88	0.62	0.82	2.12			
Tilga	1.02	0.55	0.66	1.88			
Tulla	0.85	0.53	0.48	1.95			
Urambie	0.96	0.58	0.47	1.65			
Vlamingh	1.14	0.54	1.01	2.44	1.28		0.83
WI3416	1.30	0.66				2.04	0.95
Yarra	1.21	0.49				1.62	

Regional Site

Initial grain quality analyses for 2006 show that grain size was poor at all sites (Table 3). Hindmarsh, Vlamingh and WI3416 performed best whereas Gairdner, Flagship and Yarra were disappointing.

**Table 3. Preliminary retention data (% grain retained on a 2.5 mm screen) for selected varieties at 3 sites in NSW in 2006.**

Variety	Alectown	Curban	Goolgowi
Baudin			35.8
Buloke	45.4	44.5	28.0
Flagship			16.9
Gairdner	28.2	29.1	16.9
Hindmarsh	49.3	65.2	68.9
Schooner	55.9	52.6	31.2
Vlamingh	70.3		47.9
WI3416		58.5	57.4
Yarra		34.6	

A number of management trials using new varieties were conducted in 2006. However, the dry conditions resulted in few significant interactions between varieties and agronomic treatments.

## Wheat

The adaptation of new wheat varieties to a range of management factors was examined in 2006. Low rainfall caused the loss of some trials but there were some interesting results. In a trial at Condobolin, fourteen wheat varieties were grown under three cropping systems, namely:

1. Cultivation pre-sowing, seeded in 18 cm rows with a conventional combine giving complete disturbance, levelled with harrows.
2. Direct drill, stubble burnt, seeded in 18 cm rows with narrow points and presswheels
3. No-till, stubble retained, seeded in 30 cm rows with narrow points and presswheels.

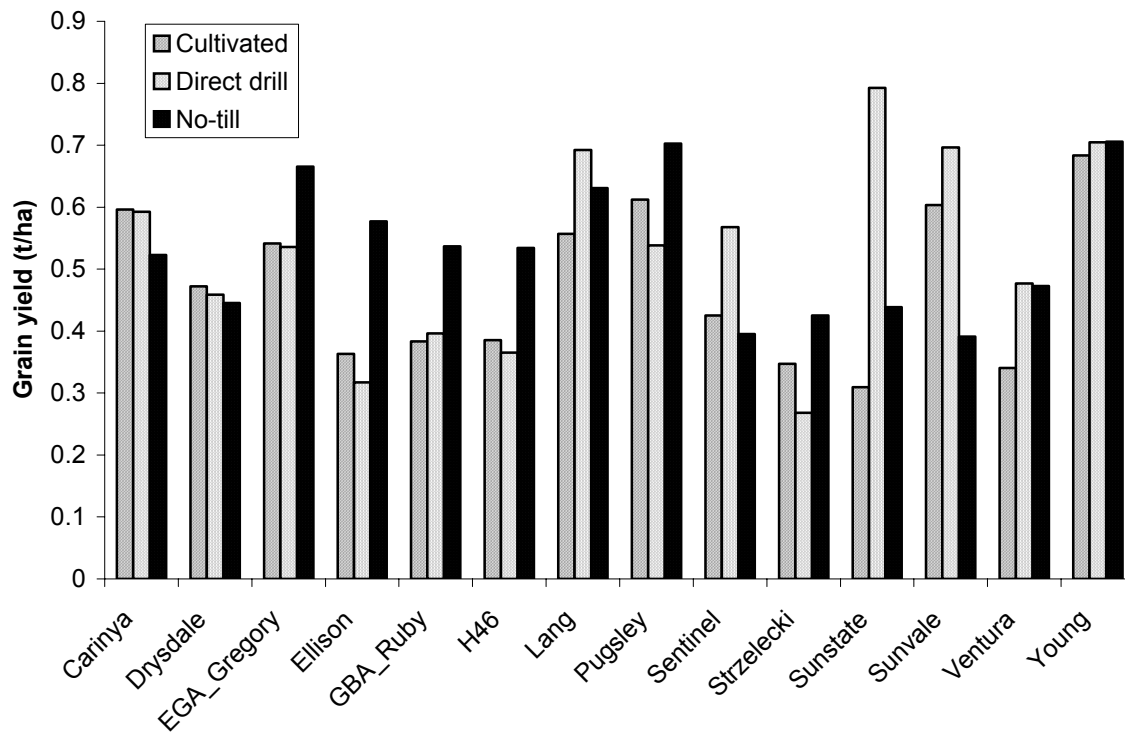
Average yields were lowest in the cultivated plots and equal in the direct drill and no-till treatments. Overall, Young, Lang and Pugsley had the highest average yields but there were significant cropping system by variety interactions. Sunstate, Sentinel and Sunvale performing best where direct drilled whereas EGA\_Gregory, Ellison, GBA\_Ruby and H46 were better under no-till.

Where varieties did better under no-till, they did so by producing similar vegetative dry matter and ears per m<sup>2</sup> than under the other systems, but having more grains per ear and a higher harvest index. This suggests that these varieties suffered less water stress at flowering when grown under no-till than under the other systems.

In contrast, some varieties performed worse under no-till, and this resulted from poorer vegetative growth and fewer fertile ears. These varieties showed no advantage in ear fertility under no-till, with grains per ear and harvest index similar across all systems. Differences in row spacing between the systems may have played a role in these results and trials in 2007 will explore these issues and determine if these results are repeatable.

Other trials investigated the yield and grain quality response of a range of varieties to row spacing, seeding rate, nitrogen application, row direction (north-south compared to east-west) and sowing time. Grain size was generally good and screenings low in trials where pre-anthesis stress reduced grain set and crops were able to fill the remaining grains. Ellison and Ventura tended to have the largest grains whereas the highest screenings were in Young and to a lesser extent Pugsley. These trials will be repeated in 2007.

**Figure 2. Grain yield of fourteen wheat varieties grown under three cropping systems, 2006**



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Regional Site