

Barley variety trials – potential new varieties

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The aim of this trial was to investigate and identify potential new malting varieties for Victorian growers.

Summary

Seasonal conditions favoured early maturing varieties, particularly at the Wimmera sites. The relative performance of Gairdner in the Wimmera was the worst since its first inclusion in trials in 1996. In particular the grain plumpness levels of Gairdner were extremely low. Baudin (“Bow-dan”) is the latest malting variety available to Victorian growers. The variety is best suited to the 375 – 450mm average annual rainfall districts where Gairdner is currently the preferred variety. Yields of the two varieties were similar in the Wimmera during 2003 despite an increased susceptibility of Baudin to leaf rust. In a year where grain size was a major issue, grain plumpness levels of Baudin were substantially superior to Gairdner.

The new CCN resistant Sloop types, SloopSA and SloopVic, were of similar yield to Sloop. The relatively early maturity of SloopSA indicates it should be best suited to the more northern barley growing areas, whilst the slightly later maturity of SloopVic should be suited to the northern Wimmera and southern Mallee.

Four potential new malting varieties (VB0105, VB0021, WI3408 and WI3586-1747) entered commercial evaluation trials on a number of properties during 2003 with potential release in 2006.

The first of a new stream of barley lines with inherently lower grain protein levels was evaluated for the first time in the DPI CVT trials during 2003. The line was on average 0.8% lower in grain protein than any other malting variety and exhibited the highest level of grain plumpness of any variety. Yields of this early maturing, CCN resistant line were equivalent to Schooner and the Sloop types.

Background

Regional evaluation of advanced breeding lines is a critical phase of plant breeding programs. The Department of Primary Industries Crop Evaluation Unit evaluates these advanced barley lines at eight sites within the Victorian Mallee (Merinee, Murrayville, Walpeup, Pira, Woomelang, Hopetoun, Rainbow, Birchip) and seven sites (Brim, Donald, Charlton, Minyip, Crymelon, Kaniva, Horsham) in the Wimmera.

Methods

Trials are sown with three replicates in plots approximately 24m long by 6 – 8 rows in width. Due to issues of seed quarantine associated with Wheat Streak Mosaic Virus, no trials could be sown before the start of June, 2003.

Results

The best performers in the S4 trials during 2003 were early maturing varieties and advanced lines (Table 1, Table 2). Hot conditions during the week starting November 15 caused premature termination of grain filling in the Wimmera amongst later maturing varieties, whilst in the Mallee grain filling was complete for all varieties by this time. In the Mallee, frost at a number of sites caused yield reductions in very early maturing varieties, such as Keel, whilst other varieties were unaffected. Consequently, the maturity effect tended to be greater in the Wimmera than in the Mallee.

Gairdner was severely effected by the hot conditions during November, with the worst relative performance of Gairdner compared to Schooner since Gairdner was first evaluated in 1996 (Table 3). In particular, average grain plumpness levels of Gairdner were at its lowest level in all years of evaluation. In comparison grain plumpness levels of Baudin (pronounced “Bow-dan”), touted as an alternative to Gairdner in the Wimmera, were substantially higher. Yields of Baudin were also slightly higher than Gairdner, despite the high level of leaf rust recorded on this variety.

The new CCN resistant Sloop types, SloopSA and SloopVic, were of similar yield to Sloop. The relatively early maturity of SloopSA indicates it should be best suited to the more northern barley growing areas, whilst the slightly later maturity of SloopVic should be suited to the northern Wimmera and southern Mallee. SloopVic has historically performed relatively well at sites where boron toxicity is known to be prevalent (Rainbow, Woomelang and Murrayville) and this pattern was repeated in 2003. SloopSA has often performed well at Walpeup and sites suffering drought stress (eg Donald in 2003).

The four most advanced breeding lines with malting potential (VB0105, VB0021, WI3408 and WI3586-1747) had mixed seasonal fortunes. Of these lines VB0021, WI3408 and WI3586-1747 have CCN resistance. From a malting and brewing viewpoint, VB0105 and WI3408 have the best quality, with quality profiles exceeding those of Franklin which is still considered the quality benchmark for export malt markets. Only VB0105 exhibited substantial yield improvements over current varieties, but was inferior to Schooner in terms of grain plumpness. A CCN resistant version of VB0105 is currently under development with the first field trials to occur during 2004. Yields and grain plumpness levels of the earliest line, WI3408, were equivalent to Schooner on a state-wide basis, with a slight advantage observed in the northern Wimmera. VB0021 and WI3586-1747 are relatively late maturing and the relative yield performance of these lines was adversely affected as a consequence. Both these lines are targeting the Wimmera environment.

An inherently low protein line, VB0229, was also similar in yield to current malting varieties. However, this early maturing line, which combines CCN resistance with excellent grain plumpness and good malting potential, was an average of 0.8% lower in grain protein concentration than any other malting variety, indicating potential for release in those areas which consistently exceed maximum protein specifications for malting quality.

Table 1: Average relative yields of barley varieties and advanced breeding lines in Victorian S4 trials in Victoria during 2003 as a percentage of region mean yields.

NAME	Maturity	Yield as % of region mean yield			
		Northern Mallee	Southern Mallee	Northern Wimmera	Wimmera
BARQUE	Early	103.9	105.5	105.7	100.8
BAUDIN	Mid season	89.6	91.5	94.5	98.4
DHOW	Mid season	96.1	86.5	96.2	91.9
FRANKLIN	Very late	74.1	65.5	74.6	88.2
GAIRDNER	Moderately late	91.0	89.9	88.2	95.6
KEEL	Very early	100.1	108.8	120.7	117.0
SCHOONER	Mid season	98.7	99.1	97.2	93.8
SLOOP	Early-mid season	99.5	98.2	95.7	93.4
SLOOPSA	Early	99.7	97.6	99.8	96.3
SLOOPVIC	Mid season	99.7	105.5	96.3	93.9
VB0021	Moderately late	102.9	97.1	89.9	90.6
VB0105	Mid season	105.3	108.7	104.0	107.8
VB0229	Early	100.6	99.6	102.2	97.6
WI3408	Early	96.4	101.0	105.4	98.9
WI3586-1747	Moderately late	91.9	96.0	93.9	98.7

Table 2: Grain plumpness (% > 2.5mm screen), as an average of 3 sites in each of 4 barley growing regions, and grain protein concentrations as an average of 13 Victorian S4 trials, for current barley varieties and advanced breeding lines.

NAME	Average grain plumpness (% > 2.5mm screen)				Mean protein %
	Northern Mallee	Southern Mallee	Northern Wimmera	Wimmera	
BARQUE	84.8	77.6	77.5	85.8	
BAUDIN	78.9	60.2	68.0	63.5	11.7
DHOW	82.0	67.7	72.5	55.5	12.5
FRANKLIN	25.1	10.6	7.0	30.3	12.2
GAIRDNER	49.3	36.3	56.3	52.3	11.6
KEEL	82.6	88.1	87.0	84.9	
SCHOONER	63.6	59.0	84.1	64.6	11.7
SLOOP	86.9	76.1	66.4	66.0	11.7
SLOOPSA	87.0	77.4	72.4	72.3	11.7
SLOOPVIC	84.9	78.7	72.5	67.6	11.9
VB0021	84.5	75.1	64.1	52.1	11.7
VB0105	77.8	63.5	57.1	52.5	11.2
VB0229	86.0	80.7	81.9	79.7	10.9
WI3408	74.7	62.3	56.4	56.2	11.9
WI3586-1747	75.4	39.1	43.7	24.7	

Interpretation

Growers in the central and northern Mallee should consider growing the early maturing, CCN resistant SloopSA as a replacement for Schooner. Growers in the southern Mallee and northern Wimmera should consider growing the midseason, maturing, and more boron tolerant, SloopVic as an alternative to Schooner (and Arapiles).

Growers in the Wimmera receiving above 375mm average annual rainfall, and where CCN is controlled by other crop rotations, should consider or continue growing Gairdner, despite the relatively poor performance of this variety during 2003. Growers in these districts may consider growing Baudin, but must expect a lower level of resistance to leaf rust and barley scald than is the case with Gairdner. It is expected the relative performance of Gairdner will improve compared to Baudin in seasons with more favourable spring conditions than those experienced in 2003.

The new malting varieties will not complete commercial evaluation until 2005 and growers should not expect significant quantities of seed to be available until 2006.

Table 3: Relative performance of Gairdner and Schooner in the Victorian Mallee and Wimmera during the period 1996 – 2003.

Year	Variety	Mallee		Wimmera	
		Yield** (% Schooner)	Av. Grain (% > 2.5mm)	Yield (% Schooner)	Av. Grain (% > 2.5mm)
1996	Schooner	100	64	100	89
	Gairdner	99	43	135	82
1997	Schooner	100	57	100	70
	Gairdner	101	63	111	66
1998	Schooner	100	73	100	76
	Gairdner	92	72	123	70
1999	Schooner	100	87	100	89
	Gairdner	94	67	118	84
2000	Schooner	100	89	100	77
	Gairdner	103	68	120	77
2001	Schooner	100	95	100	90
	Gairdner	102	94	123	93
2002	Schooner	100	72	100	83
	Gairdner	108	65	124	84
2003	Schooner	100	77	100	57
	Gairdner	92	53	98	41

* Average grain plumpness levels are the mean percentage retention on a 2.5mm screen for the trial sites assessed in a particular season. In the Mallee, 7-8 sites were assessed in most years. In the Wimmera 5-7 sites were assessed in most years except in 2002 when grain was only available from 3 sites.

* Average yields are the mean percentage yields of Schooner screen for the trial sites assessed in a particular season. In the Mallee, 7-8 sites were assessed in most years. In the Wimmera 7 sites are assessed in most years except in 2002 when grain was only harvested from 3 sites.