VA

Varietal Accreditation Evaluation 2012
Stage 2 of 2

Henley (trial) and Gairdner (control) Malts

Sugar Adjunct Brew

Contents

1. Variety Trial Outcomes and Overview

Pilot brewing trials were carried out using Henley and compared with a control malt, Gairdner from the 2011 season. The Gairdner control malt represents domestic quality malt.

Trial variety description	A medium-late maturing barley suited to the medium to high rainfall zones of WA, South Australia (Lower EP, mid North and Yorke), SW Victoria and Wimmera and North and SE NSW
Breeding origin	Seedmark (NSL97-5547)
Target malt markets	Export malt
Competing varieties in same growing regions	Targeted as a replacement for Baudin.

Assessment	Comments
Malt	The Henley malt was of good quality. DP was slightly above the specification for sugar brewing.
Milling and mashing	There were no problems encountered during the milling and mashing of Henley and its performance was in line with that of the Gairdner controls.
Lautering	Lautering was relatively easy. Pump speed ratio was gently ramped up and no re-rake required. A similar run-off time was obtained compared to the Gairdner controls.
Wort clarity	Wort clarity was within expectation.
Fermentation	The Henley fermentation was acceptable, although it took slightly longer to reach its Present Gravity.
Beer quality	The quality of the Henley beer was satisfactory. The expert sensory panel judged the beer as being fruity, having a slightly solventy aroma, crisp, and dry and having a short & thin palate. Initial haze and forced haze was better than the Gairdner controls.

2. Results and Discussion

2.1 Malt Analysis

Barley samples were commercially malted and analysis results are outlined in Table 1. Refer to Appendix A for the malting schedule.

TABLE 1 - Malt Analysis

Parameter	Gairdner control malt (2012)	Henley trial malt	Specification Starch
Moisture %	4.0	4.7	5.0 max
Fine Extract d.b.%	80.7	82.6	80.0 min
Fine-coarse	0.9	1.1	
Colour EBC	4.3	3.0	3.0 – 4.5
Total Nitrogen %	1.57	1.75	1.44 – 1.89
Total Protein d.b.%	9.8	10.9	9.0 – 11.8
Soluble Nitrogen d.b.%	0.68	0.71	
Soluble Protein d.b.%	4.23	4.48	
Kolbach Index %	42.9	40.8	37 - 46
Diastase WK	240	**318**	175 - 300
Viscosity mPa.sec	1.49	1.45	1.60 max
Wort Beta Glucan mg/L	72	66	180 max
AAL %	82.1	81.8	82 max
FAN mg/L	160	166	150 min
Carlsberg modification %	94.0	93.8	
Carlsberg homogeneity %	87.2	76.2	
Alpha Amylase D.U.	49	60	
Friability %	92.3	87.5	80 min
DMS (total) ppm	10.2	8.9	
DMS precursor ppm	1.7	3.3	4.5 max
Malt screenings – Sortimat (>2.8,>2.5,>2.2,<2.2mm) %	82.5/15.9/2.5/0.7	94.5/4.8/0.8/0.2	

Out of specification parameters are marked in **red bold type**.
Malt analyses represent a mean of 3 malting labs

2.2 Brewing Performance Analysis

Beers were produced using the PBA sugar program. Refer to the PBA handbook for details of brewing and analysis. Brewing performance data is presented in Table 2.

TABLE 2. Brewing Performance of Henley Malt

Parameter	Performance rating
Milling	Good
Mashing	Good
Lautering	Good
Wort Clarity	Good
Fermentation	Good

Definitions:
Excellent = Performance significantly improved over the control
Good = Performance comparable with the control
Fair = Performance worse than the control but within plant capability
Unsatisfactory = Performance outside production capability and/or acceptability

Lautering Performance	Lauter time (all in lauter tun to all in kettle)	Wort run-off time
Control	64 ± 3min	51 ± 4min
Henley	63min	52min

Comments:

- The run-off performance was good. The Gairdner control brew had a run-off time of 51 minutes. The trial brew had a run-off time of 52 minutes.

2.3 Wort Analysis

TABLE 3. Data for Wort Samples

Sample	Original Gravity °P	Limit Gravity °P	% AAL	pH	EBC Colour	FAN mg/L	ß-glucan mg/L
Control	14.04	1.3	90.8	5.49	10.1	163	30
Henley	13.83	1.2	91.3	5.48	6.5	154	32

Comments:

- Compared to the control, the Henley trial had a similar Limit Gravity and Apparent Attenuation value.
- The Henley wort was lighter in colour compared to the control.

2.4 Fermentation Analysis

The time to reach constant gravities was between 160 and 180 hours.

TABLE 4. Fermentation Data

Sample	Present Gravity °P	Alcohol % v/v	pH
Gairdner control	1.55	6.88	4.28
Henley	1.59	6.77	4.22

Figures 1 and 2 show the fermentation curves of the Gairdner brew and the Henley sugar brew.

FIGURE 1. Fermentation Curve of the Gairdner Control Brew

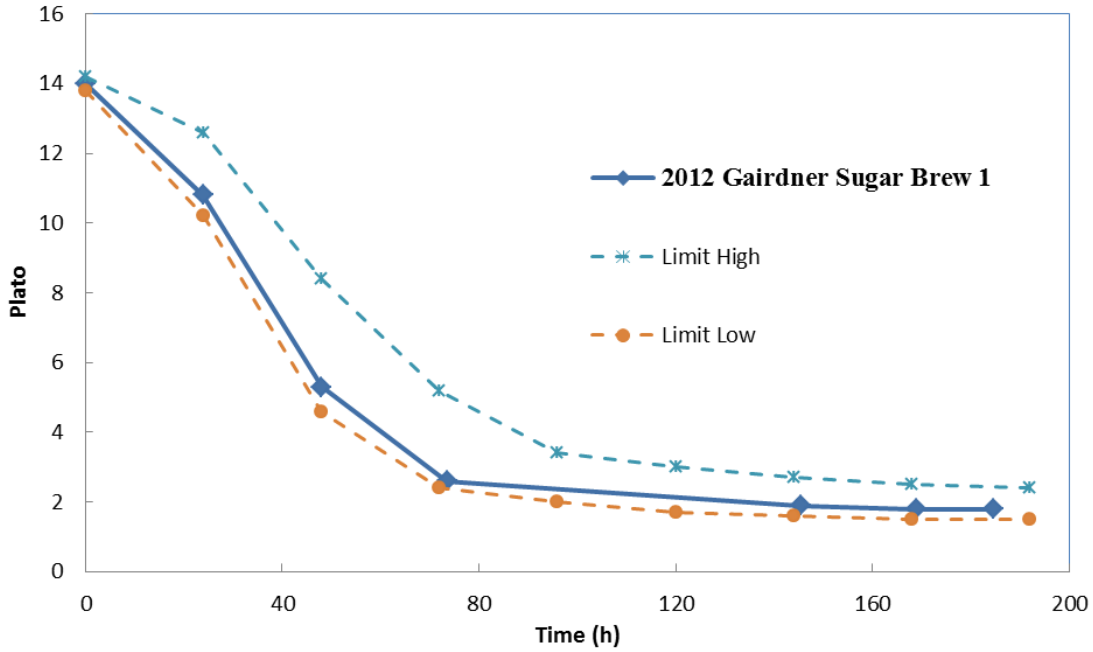
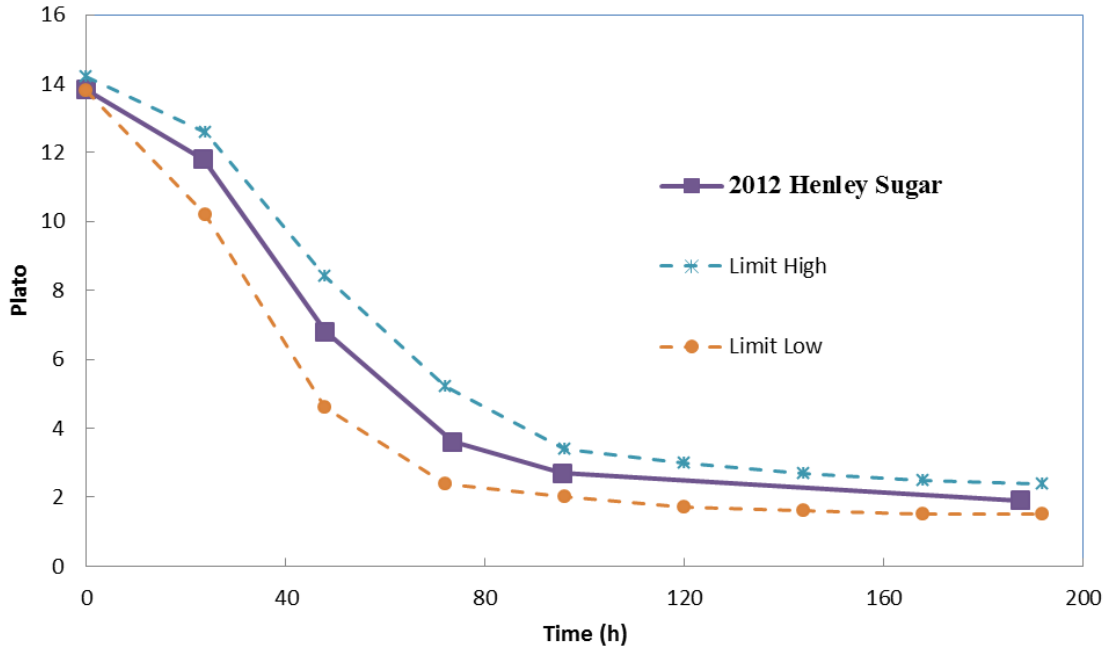


FIGURE 2. Fermentation Curve of Henley sugar Trial Brew



Comments:

- The fermentation curve for the Henley trial was within expected limits and comparable with the two Gairdner control brews.
- Although the present gravity of the Henley sugar trial was lower than the Gairdner controls, less alcohol was produced during the trial. This is probably due to the slightly lower initial wort gravity in the trial brew compared to the controls.

2.5 Packaged Beer Analysis

Packaged beer analysis is given in Table 5. The analysis was completed by an ISO accredited laboratory.

TABLE 5. Packaged Beer Analysis

Analysis #	Gairdner Control	Henley trial
Chemical		
Original extract °P	10.4	10.2
Apparent extract °P	1.06	1.06
Alcohol %v/v	4.88	4.80
pH	4.30	4.25
Colour EBC	4.3	3.3
Bitterness B.U.	23.9	22.6
VDK mg/L	0.018	0.042
DMS µg/L	14	20
Total Esters mg/L	25.1	24.9
Total Alcohols mg/L	100.8	104.0
Physical		
Initial Stability FTU ASBC	22	17
Forced Stability FTU ASBC	86	54
8 week hot room Stability FTU ASBC	34	25
Foam stability by NIBEM seconds	270	255
Vmax L	0.28	0.48
12 week hot room Stability FTU ASBC	41	38

Refer to the PBA handbook for analysis details.
In 2012, hot room stability samples were stored at 25ºC. 8 weeks at 25ºC is ~ to 4 weeks at 30ºC.

Comments:

- The Henley beer had a lighter colour and lower alcohol level compared to the Gairdner controls.
- It also produced higher levels of both VDK and DMS. Total esters and higher alcohol levels of the Henley beer were similar to the controls.
- The Henley had slightly better haze stability than the Gairdner controls. Long term stability was also good.
- The Henley beer had a very good filterability.

2.6 Sensory Evaluation

The expert tasting panel judged the Henley beer as being fruity, slightly solventy aroma, crisp, bland, dry and short & thin palate.

The Gairdner control beer was assessed as pale in colour, clean, sweet, slightly fruity, slightly sulphury aroma, solventy and a dry sharp palate.

Both beers were satisfactory with no malt related defects**.**

2.7 Conclusion

Overall, the performance of the Henley malt throughout the PBA evaluation process was comparable to the Gairdner controls.

The lautering performance was good and wort clarity was acceptable.

The Henley beer was also lower in colour and had higher VDK and DMS than the Gairdner controls.

The sensory evaluation showed there were no malt related flavour defects.

The filterability of the Henley beer was slightly better than the control beer.

This completes the pilot brewing evaluation for Henley barley in 2012 and the report will now be forwarded to the MBIBTC for assessment as part of the BA accreditation process.

Dr David Duan
Facilitator – Pilot Projects
Date: 24/05/2013

CUB is a quality endorsed company and as such all brews conducted by, and beer analysed by Pilot Brewing Australia which are discussed in this document are carried out within the CUB pilot brewery, which Pilot Brewing Australia contracts to carry out this evaluation work.

33. Appendix A

Barley Quality - Gairdner

Parameter	Results
Barley Growing Location	-
Crop year	2010
Total Protein (dry basis) – NIR %	9.9
Total Protein %(dry basis) – DUMAS if new variety	-
Moisture %	10.6
Screenings (< 2.2 mm) %	0.9
Retention (>2.5 mm) %	92.0

Malting protocol – Gairdner

Comments: Moisture profiles were normal and germination counts were good during malting.

Date Malted	June, 2011				
Malt Supplier	BBM - Geelong				
Steeping	**First soak hrs**	**Air rest hrs**	**Second soak hrs**	**Steep temp. °C**	**Other**
	8	10	8	16	
Germination	**Days**	**Air on temp °C**	**Other**		
	4	15			
Kilning	**Temp range °C**	**Total time hrs**			
	58 - 84	17			
Gibberellic acid use (GA3)	**GA3 applied ppm**				
	0.6				

Barley Quality - Henley

Parameter	Results
Barley Growing Location	SW Vic
Crop year	2011
Total Protein (dry basis) – NIR %	11.1
Total Protein %(dry basis) – DUMAS if new variety	-
Moisture %	9.5
Screenings (< 2.2 mm) %	0.6
Plump Grain (>2.5 mm) %	-

Malting Protocol - Henley

Date Malted	May 2012				
Malt Supplier	BBM Burnley Plant				
Steeping	**First soak Hrs**	**Air rest Hrs**	**Second soak Hrs**	**Steep temp. °C**	**Other**
	9	9	9	16	
Germination	**Days**	**Air on temp °C**	**Other**		
	4	15	Air off 18 C		
Kilning	**Temp range °C**	**Total time hrs**			
	60 - 86	17 hrs			
Gibberellic acid use (GA3)	**GA3 applied ppm**				
	0.2				