

Buloke - Malting Barley



Fact Sheet

A high yielding export malting quality barley, with extensive adaptation across southern New South Wales, Victoria and South Australia.

Buloke is a potential exporting malting quality variety with early to midseason maturity, high yielding, and excellent foliar leaf disease resistance. Buloke is best suited to the low to medium rainfall districts of south eastern Australia.

Features

- Extremely high grain yields in low – medium rainfall districts
- Excellent malting quality for export brewing markets, similar to Franklin and superior to Gairdner
- Grain plumpness similar to Baudin, being superior to Gairdner but slightly inferior to Schooner
- Early to mid-season maturing variety, similar flowering time to Schooner in southern Australian
- Moderately resistant to resistant to most leaf diseases
- Semi erect growth habit, similar to Barque
- Buloke lacks CCN resistance compared to SloopSA, SloopVic and Flagship

Pedigree

Buloke (pronounced, “Bull-oak”) has been bred by the Department of Primary Industries – Victoria from the cross Franklin/VB9104//VB9104 through the Malting Barley Quality Improvement Program (MBQIP). Buloke is named after the shire of Buloke, which spans an area of the southern Mallee and northern Wimmera of Victoria.

Target End Use Markets

Specific quality characteristics for which Buloke represents an improvement compared to the current malting varieties, are higher malt extract, diastase and fermentability levels. Varieties with high diastase and high fermentability are not suited to the domestic brewing industry due primarily to the high percentage production of low alcohol beer in Australia.

Plant Characteristics

Buloke is an early to midseason maturing, potential malting variety with good grain size, with best adaptation in those regions on southern Australia with 325mm – 450mm annual rainfall. Buloke has semi erect growth habits similar to Barque, slower growth habits compared to Sloop varieties and a tall variety similar to Barque. In Victoria, Buloke flowers at approximately the same time as Schooner, and about 3-4 days later than SloopSA. Limited data suggests Buloke is a few days later flowering than Schooner in central NSW. Buloke has reasonable straw strength, moderately good head retention and is tolerant to pre harvest sprouting similar to Gairdner.

Grain Yield

Longterm (2002-2004) yield data indicates Buloke is the highest yielding malt barley variety in the Murray Mallee and Victorian Mallee. Buloke yields are equivalent to the yield of the feed barley variety Barque, and 11% higher than Schooner and 6-8% higher yielding than all the Sloop varieties in low rainfall zones, and similar to 5% higher than other malting variety competitors in medium rainfall zones. Buloke yields 11% and 5% greater than Schooner in the Wimmera and central regions of Victoria respectively (Table 1).

Table 1. Longterm (2002-2004) barley yields (t/ha) for Victoria, South Australia and New South Wales, expressed as a % of Schooner.

Variety	Victoria				VIC & SA Mallee		South Australia								NSW					
	Central Victoria	No. Sites	Wimmera	No. Sites	% overall mean yield	No. Sites	Yorke Peninsula	No. Sites	Mid North	No. Sites	South East	No. Sites	Lower Eyre P.	No. Sites	Upper Eyre P.	No. Sites	Central NSW	No. Sites	Southern NSW	No. Sites
Schooner (t/ha)	2.54		2.24		1.92		2.96		3.34		3.54		3.41		1.78		2.97		3.11	
MALTING																				
Baudin	95	5	103	11	97	40	105	20	106	12	103	8	102	8	103	20	107	22	108	28
Buloke	105	5	111	11	112	33	111	10	108	6	107	4	106	4	107	10	109	24	109	34
Cowabbbie	-	-	73	1	-	-	-	-	-	-	-	-	-	-	-	-	106	55	105	75
Dhow	96	5	96	11	94	43	103	35	102	21	101	14	97	14	99	35	-	-	-	-
Flagship	101	5	107	11	106	32	109	20	104	12	107	8	104	8	106	20	105	21	104	31
Gairdner	104	5	101	11	98	49	109	35	107	21	107	14	101	14	102	35	107	81	108	100
Gairdner Plus	105	3	104	11	100	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Schooner	100	5	100	11	100	51	100	35	100	21	100	14	100	14	100	35	100	81	100	81
Sloop	102	5	103	11	104	51	102	35	102	21	103	14	99	14	99	35	-	-	-	-
SloopSA	100	5	107	11	106	45	103	30	103	18	103	12	100	12	101	30	-	-	-	-
SloopVic	113	5	104	11	104	45	103	25	101	15	101	10	98	10	98	25	10	36	102	43
FEED																				
Barque	100	5	113	11	110	51	110	35	106	21	105	14	105	14	110	35	-	-	-	-
Capstan	82	5	113	11	106	40	114	25	113	15	107	10	108	10	110	25	108	33	108	44
Keel	105	5	130	11	109	49	113	35	113	21	102	4	102	4	100	10	-	-	-	-
Maritime	102	2	112	5	108	17	112	17	109	9	108	6	108	6	108	17	107	18	108	25
Yarra	87	5	105	11	-	-	117	15	109	9	109	6	108	6	112	15	-	-	-	-

Grain Quality and Plumpness

Physical grain quality analysis indicates the average grain plumpness of Buloke is similar or slightly inferior to Schooner but superior to Gairdner (Table 2).

Table 2. Average grain plumpness (%>2.5mm) of Buloke and comparative varieties in Victoria (2003-2004) and South Australia (2004).

Variety	Grian Plumpness (%>2.5mm) Victoria 2003-2004					Grian Plumpness (%>2.5mm) South Australian 2004						
	Wimmera Victoria	Central Victoria	3th Vic	Eas Vic	Mallee Vic	Sth West Vic	Yorke Peninsul	Mid North	Murray Mallee	South East	Lower Eyre P.	Upper Eyre P.
(No. Sites)	10	3	3	12		2	10	6	6	8	4	4
MALTING												
Baudin	48	65	90	43	68		37	26	50	38	73	30
Buloke	43	64		45	70		40	18	49	51	62	30
Flagship	39	57		44	68		47	29	43	46	68	31
Franklin	18	49	49	24	36							
Gairdner	34	64	80	40			37	25	49	38	61	25
Gairdner Plus	23	49		36			35	16	46	25	57	22
Schooner	46	73		53	70		44	31	56	58	83	34
Sloop	50	75		55	72		45	38	52	74	82	36
SloopSA	57	80		58	69		48	35	56	79	87	36
SloopVIC	53	72		55	72		52	33	58	63	86	35
FEED												
Barque	59	70		56	69		50	34	43	50	78	35
Keel	69	74		59	80		56	38	52	77	79	45
Yarra	46	77		55	83		68	32	50	53	78	37

On average, the grain protein concentration of Buloke is 0.6% lower than Schooner (45 trials; Table 3). The grain protein comparison is heavily biased toward data from the 2003 season and it is advised that additional data be used before any strong conclusions can be drawn. Grain protein is subject to yield dilution effects, and the substantial yield advantage of Buloke compared to Schooner is likely to result in lower grain protein unless additional nitrogen is available.

Table 3. Mean grain protein % of Buloke compared to competitor varieties in trials over the period 2001 - 2003. A weighted average has been calculated for Buloke and Schooner, which were common entries in all analyses.

Variety	2001 VIC_S3 (5 trials)	2002 VIC_S4 (5 trials)	2003 VIC_S4 (14 trials)	Weighted SA_S4 (21 trials)	Average
Barque	11.5	12.6		11.8	
Buloke	11.4	12.3	11.2	11.0	11.3
Baudin		12.6	11.7	11.2	
Dhow		13.5	12.5	11.8	
Gairdner		12.1	11.6	11.6	
Flagship			11.9	11.5	
Schooner	11.9	12.6	11.7	11.8	11.9
Sloop		12.8	11.8	11.7	
SloopSA		12.5	11.7	11.6	
SloopVIC		12.4	11.9	11.9	
Keel				11.4	

Malting Quality

Buloke produces malt with very high malt extract, diastase and fermentability levels. Malt product from a typical 10.5% protein sample of Buloke would be expected to have typical malt analyses of: malt extract level of 81.5%, diastase levels of 380 WK units and Apparent Attenuation Levels (fermentability) of 82.7. This quality is superior to all existing varieties in the low-medium rainfall districts and at least equal to Franklin.

Herbicide Tolerance

Herbicide tolerance testing conducted by the Wagga Wagga Agricultural Research Institute during 2003 indicates Buloke is at least as tolerant to the range of herbicides tested as other varieties (Table 4).

Table 4: Herbicide tolerance reactions of Buloke based on evaluation conducted by NSW Agriculture at the Wagga Wagga Agricultural Research Institute during the 2003 season for a 19th June sowing date.

Pre emergent applied herbicides:	Reaction*
Trifluralin 480 (Triflur 480®)	Tolerant
Post emergent applied herbicides:	Reaction*
Diclofop-methyl (Hoegrass®)	Tolerant
Diclofop-methyl+fenoxaprp-p-ethyl (Tristar® Advance)	Tolerant
Tralkoxydim (Achieve® WG)	Tolerant
Chlorosulfuron (Glean®)	Tolerant
Metsulfuron methyl (Ally®)	Tolerant
Bromoxynil (Buctril200®)	Tolerant
Diflufenican + MCPA (Tigrex®)	Tolerant
2,4 D Amine 500g/kg	Tolerant
Dicamba + MCPA	Moderately tolerant
Picloram + MCPA	Tolerant

- Tolerant indicates no significant yield reduction was recorded at twice the recommended application rate
- Moderately tolerant indicates a significant yield reduction of less than 10% was recorded at twice the recommended application rate
- Moderately intolerant indicates a significant yield reduction of less than 20% was recorded at twice the recommended application rate

Disease Resistance

Disease reactions for Buloke are shown in Table 5. Buloke appears moderately tolerant of high levels of soil boron, being similar to SloopVic. In terms of leaf disease resistance Buloke is resistant to the Net form of Net Blotch, moderately resistant to leaf scald and powdery mildew, and moderately susceptible to the Spot form of Net Blotch and leaf rust. Buloke is susceptible to *Heterodera avenae*, the causal agent of the disease known as Cereal Cyst Nematode (CCN).

Table 5. Resistance of Buloke to commonly occurring diseases in the proposed growing regions compared to competitor varieties.

Variety	Boron		Scald	BYDV	Powdery Mildew	Leaf Rust	Net Blotch Net Form	Net Blotch Spot Form
	Toxicity	CCN						
MALTING								
Baudin	MIT	S	S	MR	S	VS	MS	S
Buloke	MT	S	MR-MS	S	MR	MS-S	R	MS-S
Dhow	MIT	R	MS	S*	MS	S	MR-MS	S
Flagship	IT	R	MR-MS	S	MR	S	R	MS
Gairdner	IT	S	MR-S	MR	MR	MS-S	MR-MS	S-VS
Gairdner Plus	IT	R	MR-S	MR	R	S	R	MS
Schooner	MIT	S	MS	S	VS	S-VS	MR-MS	MS-S
Sloop	MIT	S	S	S	VS	S	MR-MS	S
SloopSA	MIT	R	S	S	VS	S	MR	S
SloopVic	MT	R	S	S	MR	MS	MR	MS-S
FEED								
Barque	MIT	R	VS	S	MR-MS	S	MS	MR
Capstan	MIT	R	MR-R	S	R	S	R	S
Keel	MT	R	MR-MS	S	MR	VS	MR	MR
Maritime	MIT	R	S	S	MR	S	R	MS
Yarra	MIT	R	S	S	S	R	MS	MS-S

* These ratings are less reliable and should be treated with caution. R= Resistant MR = moderately resistant MS = Moderately susceptible S = Susceptible VS = Very susceptible T = Tolerant MT = Moderately tolerant MI = Moderately intolerant I = Intolerant

Target End Use Markets

Buloke is ideally suited for export malting barley grain markets in China or as export malt to Japan, South Korea, the Philippines, Vietnam, Thailand and other countries in the South East Asian region. Buloke encompasses very high malt extract, diastase and fermentability levels. Varieties with high diastase and high fermentability are not suited to the domestic brewing industry, due to the use of liquid sugar, as opposed to starch, adjunct in the brewing process. Also, due to the relatively high production in Australia of low alcohol beer which is difficult to produce with highly fermentable malt.

Area of Adaptation

Buloke is broadly adapted to the low – medium rainfall districts of southeastern Australia. Buloke would be an alternative to Schooner, Sloop, SloopVic, SloopSA and Flagship in these areas.

The low – medium rainfall districts of southeastern Australia include the following regions in which the yield performance of Buloke has equalled or exceeded existing malting varieties in one or more years:

The South Australian statistical divisions of the

- Lower Eyre Peninsula,
- Yorke Peninsula,
- Mid North,
- Murray Mallee,

The Victorian statistical divisions of the

- Mallee
- Wimmera
- Loddon

The NSW statistical divisions of the

- Murray
- Murrumbidgee
- Central West

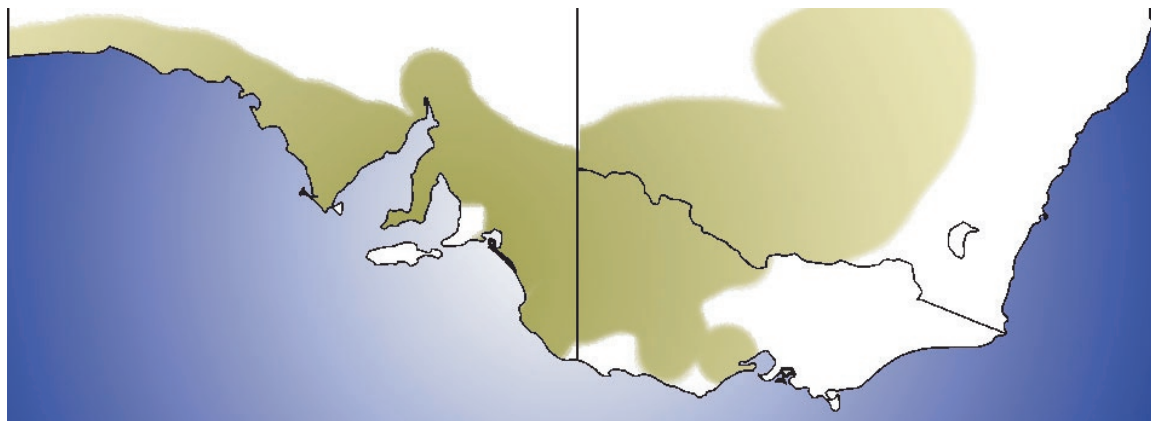


Figure 1. Regions of adaptation of Buloke in southern Australia based on yield comparisons with competitor varieties.

Plant Breeders Rights (PBR) and End Point Royalty (EPR)

Buloke will be protected by Plant Breeder's Rights (PBR). Proposed EPR for Buloke is \$2.00/tn exclusive GST.

Seed Availability

AWB Seed are marketing Buloke through all major seed retailers.

For more information call:

Mary Raynes, Barley Industry Development Officer, or
David Moody, Senior Barley Breeder. Department of Primary Industries, Horsham, Victoria on (03) 53 62211