South African Barley Breeding Institute

SABBI

GUIDE TO SABBI SOUTHERN CAPE (DRY LAND) BARLEY VARIETIES 2011

At present four varieties are released for malting barley production, viz. SSG 564, SabbiErica, SabbiNemesia and S5 (new; temporary code). Two varieties are currently in their experimental evaluation phase, viz. S6 and S9. The malting characteristics of these varieties differ especially in terms of their dormancy (period from harvesting up to the stage where the barley meets the germination requirements for malting), and for that reason the mixing of these varieties must be prohibited at all costs. It is thus imperative that the different varieties are transported, handled and stored separately.

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CULTIVARS

At present four varieties are released for malting barley production, viz. SSG 564, SabbiErica, SabbiNemesia and S5 (new; temporary code). Two varieties are currently in their experimental evaluation phase, viz. S6 and S9. The malting characteristics of these varieties differ especially in terms of their dormancy (period from harvesting up to the stage where the barley meets the germination requirements for malting), and for that reason the mixing of these varieties must be prohibited at all costs. It is thus imperative that the different varieties are transported, handled and stored separately.

The retaining of grain as seed for the next year is strongly discouraged. The problems of maintaining variety-pure and insect free seed with good viability safely on the farm is the reason why producers should not keep seed back.

AGRONOMIC CHARACTERISTICS

Economically variety choice is a very important decision for the producer as it is one of the easiest ways to achieve higher and more stable income with the least risk. Factors that determine variety choice are thus fundamental to this decision. Only the most important factors are discussed briefly and for this reason Table 1, which characterises cultivars in terms of agronomic and quality characteristics, is included

Table 1. Average yield (kg/ha) of barley cultivars in the high potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	3825	4889	5213	4609	3968	4515	4503	100.0
SabbiErica	4208	5596	5454	5745	4679	4737	5070	112.6
SabbiNemesia	3940	4872	5792	5189	4786	4743	4887	108.5
S5	3063	5118	5124	5553	4498	4801	4693	104.2
S6	3005	6076	5494	5385	4717	4872	4925	109.4
S9	4084	5873	5317	5574	4110	4800	4960	110.1

Tabl2. Average yield (kg/ha) of barley cultivars in the medium potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	2374	3926	4619	3782	4291	3642	3772	100.0
SabbiErica	2978	4658	5198	3606	4668	4094	4200	111.3
SabbiNemesia	2478	4416	5261	3710	4668	4119	4109	108.9
S5	2268	4385	4665	4005	4424	3914	3944	104.6
S6	2280	4037	4979	3808	4622	3745	3912	103.7
S9	2655	4302	5266	3352	4660	3701	3989	105.8

Table 3. Average yield (kg/ha) of barley cultivars in the low potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	1985	2968	3473	4942	3607	3340	3386	100.0
SabbiErica	2297	3823	4320	4838	3780	4577	3939	116.3
SabbiNemesia	2075	3566	3678	4997	4329	4117	3794	112.0
S5	2056	3228	3427	4505	3903	4127	3541	104.6
S6	1732	3001	3686	3733	3584	3500	3206	94.7
S9	2344	3493	4479	4662	3340	4238	3759	111.0

Table 4. Average plumpness (>2.5 mm) of barley cultivars in the high potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	94.1	92.5	92.5	93.6	83.3	85.1	90.2	100.0
SabbiErica	95.1	89.0	92.4	91.3	81.7	80.6	88.4	98.0
SabbiNemesia	95.9	86.5	91.0	91.0	87.9	82.5	89.1	98.8
S5	98.1	92.2	94.6	93.4	90.6	90.2	93.2	103.3
S6	97.2	95.1	94.7	95.3	83.9	82.9	91.5	101.4
S9	96.2	91.7	92.9	90.7	84.8	82.5	89.8	99.6

Table 5. Average plumpness (>2.5 mm) of barley cultivars in the medium potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	76.0	92.1	92.3	90.1	84.4	88.9	87.3	100.0
SabbiErica	84.9	94.4	93.8	86.7	84.1	89.6	88.9	101.8
SabbiNemesia	88.5	92.4	95.7	91.4	86.4	85.4	90.0	103.1
S5	92.4	94.8	95.8	95.6	87.9	91.1	92.9	106.4
S6	82.8	92.9	95.3	93.1	86	88.9	89.8	102.9
S9	87.6	94.4	93.1	89.8	84.2	88.0	89.5	102.5

Table 6. Average plumpness (>2.5 mm) of barley cultivars in the low potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	83.9	88.1	97.2	89.0	84.6	84.4	87.9	100.0
SabbiErica	91.3	89.9	96.0	87.3	86.2	85.0	89.3	101.6
SabbiNemesia	90.6	87.9	95.2	91.9	86.9	89.0	90.3	102.7
S5	95.8	90.0	94.3	93.8	87.0	91.9	92.1	104.8
S6	88.0	86.3	93.0	82.1	81.5	83.4	85.7	97.5
S9	95.2	90.1	97.8	86.0	84.7	85.6	89.9	102.3

Table 7. Average kernel nitrogen of barley cultivars in the high potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	1.77	1.91	1.83	1.77	1.83	1.74	1.81	100.0
SabbiErica	1.67	1.84	1.83	1.66	1.87	1.69	1.76	97.2
SabbiNemesia	1.77	1.78	1.87	1.71	1.91	1.65	1.78	98.3
S5	1.70	1.78	1.82	1.66	1.87	1.64	1.75	96.7
S6	1.69	1.72	1.75	1.66	1.76	1.53	1.69	93.4
S9	1.84	1.75	1.78	1.73	1.97	1.66	1.79	98.9

Table 8. Average kernel nitrogen of barley cultivars in the medium potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	1.94	1.64	1.81	1.67	1.59	1.74	1.73	100.0
SabbiErica	1.94	1.59	1.83	1.66	1.62	1.73	1.73	100.0
SabbiNemesia	1.88	1.56	1.70	1.56	1.62	1.72	1.67	96.5
S5	1.95	1.58	1.75	1.53	1.6	1.73	1.69	97.7
S6	1.94	1.50	1.59	1.58	1.53	1.56	1.62	93.6
S9	1.94	1.57	1.71	1.58	1.64	1.73	1.70	98.3

Table 9. Average kernel nitrogen of barley cultivars in the low potential region for the period 2005 – 2010

Cultivar	2010	2009	2008	2007	2006	2005	Average	% Dev
SSG 564	2.11	1.85	1.76	1.59	1.88	2.38	1.93	100.0
SabbiErica	2.11	1.59	1.93	1.59	1.99	2.23	1.91	99.0
SabbiNemesia	2.15	1.76	1.91	1.62	1.91	2.3	1.94	100.5
S5	2.20	1.71	1.91	1.65	1.9	2.28	1.94	100.5
S6	1.99	1.74	1.58	1.71	1.76	2.30	1.85	95.9
S9	2.16	1.79	1.79	1.75	1.99	2.39	1.98	102.6

Table 10. Agronomic and quality characteristics of barley cultivars

Cultivars	Growth period	Straw length	Straw strength	Peduncle strength
SSG 564	MF	ML	Medium	MW
SabbiErica	M	M	Good	MG
SabbiNemesia	M	MS	Good	MG
S5	M	MS	Good	G
S6	M	M	Good	MG
S9	M	MS	Good	MG

F = Fast *MF = Medium fast* *M = Medium* *S = Short*
MS = Medium short *ML = Medium long* *L = Long* *MG = Medium good*
G = Good *MH = Medium high* *H = High* *MW = Medium weak*

Growth period
Growth period refers to the average number of days that it takes from emergence to physiological maturity. For this reason cultivars must be planted that are adapted to the climatic conditions, such as growing season, rainfall pattern and temperature, of the area.

Straw strength
Straw strength is the ability of a cultivar to remain standing (resistance to lodging) under extreme conditions and is largely determined by straw length and thickness. The lodging of barley often results in considerable yield and grain quality losses, which can largely be attributed to the resulting increased infestation of fungal plant diseases. It is largely a problem where critical yield potential conditions have been exceeded, but rain with a strong wind and excessive nitrogen fertilisation can also play a role.

Peduncle strength
This characteristic refers to the strength of the culm between the flag leaf and the head/ear, and thus to the susceptibility of the cultivar to wind damage. The greatest risk of the latter is just prior to harvesting. It is advisable to rather cut the crops into windrows prior to harvesting if the cultivar is susceptible to this phenomenon.

Disease characteristic

In the Southern Cape, barley cultivars often are infected by various fungal diseases. Depending on environmental conditions, the levels of infestation differs from year to year. Although different levels of resistance against these fungal diseases exist, a complete spraying program should still be followed. A high level of infestation has an influence on the yield and quality of the harvest.

Table 11 gives an indication of the status of the cultivars with regard to the most important fungal diseases in the area. The nomenclature used to indicate status could be explained as follows:

- Susceptible: The cultivar has no resistance against the pathogen and the disease spreads fast when conditions are favourable.
- Moderately susceptible: The cultivar has no resistance against the pathogen but the spreading of the disease is slightly slower under favourable conditions and under less favourable conditions, it can be less harmful.
- Moderately resistant: The cultivar has quite good but not complete resistance against the pathogen. Although symptoms can be observed, the development of the disease is slow and it normally has little effect.
- Resistant: No scars or evidence of the disease is visible.

Table 11. Disease resistance of cultivars in the Southern Cape

Cultivars	Leaf blotch	Net form Net blotch	Spot form Net blotch	Leaf rust
SSG 564	MR	MS	MS	S
SabbiErica	S	MS	S	S
SabbiNemesia	S	MS	S	R
S5	S	S	S	MR
S6	R	MS	MS	MS
S9	S	MS	MS	S

S = Susceptible MS = Moderately Susceptible MR = Moderately resistant
R = Resistant

Leaf blotch
Also known as, scald and caused by the pathogen *Rhynchosporium secalis*. First signs are water soaked areas on the leaves, which turn grey-green. Lesions become bleached and develop dark brown margins. All the above-ground parts of the plant except the upper stem can be infected. Common in wet conditions and when crops are sown early.

Net blotch – net form
The net form of net blotch (*Pyrenophora teres f. teres*) develops first as small circular to elliptical dark brown spots, which elongate and produce fine, dark brown streaks along and across the leaf blades, creating a distinctive net-like pattern. Severely affected leaves wither rapidly. The disease infects heads and is both seed- and stubble- borne.

Net blotch – spot form
The spot form of net blotch (*Pyrenophora teres f. maculata*) develops as small dark brown spots to larger dark brown blotches up to 10 mm. Blotches are round to oval when small becoming more straight-sided as they enlarge. Larger lesions are often surrounded by a chlorotic margin particularly towards the tip of the leaf.

Leaf rust
Leaf rust (*Puccinia hordei*) develops as small circular to oval pustules with light brown spores on the upper surfaces of leaves and leaf sheaths. Black spores are produced on maturing leaves. Leaf rust survives between crops on volunteer barley or can carry over on the weed Star of Bethlehem (*Ornithogalum umbellatum*).

Malt characteristics

Table 12. Malt analyses of cultivars in the Southern Cape

Cultivar	EXTRACT	KI	DP	FAN	VISC	AAL	β-Glucan
SSG 564	79.5	43	450	186	1.48	83.0	152
SabbiErica	80.8	44	390	192	1.49	82.6	138
SabbiNemesia	80.1	44	450	201	1.49	84.2	156
S5	80.4	45	439	212	1.47	85.0	90
S6	80.0	39	432	139	1.51	82.3	131
S9	81.1	43	514	196	1.46	83.5	100

Extract
Extract (% DBFG). This acronym stands for extract yield, dry basis, fine grind. The fine-grind extract percentage indicates the maximum soluble yield possible for the malt. The higher the extract, the more soluble the material and the less husk and protein.

KI
Kolbach Index. This ratio (also expressed as S/T [soluble/total], SN/TN, or Soluble Nitrogen Ratio) is calculated by dividing the soluble nitrogen (or protein) value by the percent total nitrogen (or protein). The KI is an important indicator of malt modification. The higher the number, the more highly modified the malt.

DP
Diastatic power (DP) expresses the strength of starch-reducing enzymes in the malt. Diastatic power, considered together with mealiness/vitreosity, indicates how well a malt will respond to mashing.

FAN
Free Amino Nitrogen (FAN) Free amino nitrogen is determined on the fine extract and is an essential component of yeast nutrition in brewing as it promotes proper yeast growth and fermentation efficiency. It also plays a role in the maintenance of foam stability.

VISC
Viscosity (cP): Viscosity is a measure of the breakdown of ß-glucans (endosperm cell walls) during malting, expressed in cP (centipoise units). High viscosity causes adverse effect of these components on the recovery of malt extract, makes wort filtration difficult, and may also lead to haze formation in beer

AAL
Fermentability is measured using Apparent Attenuation Limit (AAL) where an excess amount of yeast is allowed to ferment under controlled conditions. In this procedure, specific gravity is measured before and after fermentation and used as the basis for calculating AAL. Attenuation refers to the percentage of original extract that has been converted by the fermentation process.

B-glucans
Beta-glucans are a component found in under modified barley malt that cause stuck sparges and thick mouthfeel. Besides its negative effects on brewing quality, a high β-glucan content in cell walls of the endosperm makes the access of hydrolases to their substrates in the endosperm cells difficult and so retards the transfer of carbohydrate to the embryo, resulting in slower germination.