ANALYSIS PROCEDURE AND EVALUATION NORMS FOR THE RELEASE OF BREAD WHEAT BREEDER CULTIVARS FOR THE RSA

June 2026 Revision

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INTRODUCTION

South Africa operates in a free market economic system and participation in the process for the release of bread wheat cultivars is **highly recommended**.

The release of bread wheat cultivars is an attempt to provide the wheat industry with new cultivars that perform well agronomically and possess suitable milling, rheological and baking characteristics.

Analytical procedures and release norms are compiled in conjunction with representatives of wheat breeders, producers, millers, bakers and storage companies to ensure market-directed and quality-driven wheat production in the interest of wheat producers and processors.

Release norms use cultivars as biological quality standards to provide a frame of reference against which new breeding lines are evaluated. Only cultivars that are successfully grown commercially and possess acceptable agronomical and quality characteristics may be considered as biological quality standards.

As the breeding of wheat with suitable quality characteristics is a long-term project, release norms and quality standards are provided to breeders to provide them with guidelines that should stand the test of time. Changing the release norms and establishing new quality standards are for this reason thoroughly investigated and carefully considered to ensure that the long-term goals of breeding programs are achieved.

1. WHEAT GRADING SYSTEM

The latest regulation with regards to the Grading, Packing and Marking of Bread Wheat intended for sale in the Republic of South Africa was published in the Government Gazette on the 29th of November 2019 (Government Notice No. R. 1547).

Provision is made for two classes – Bread Wheat and Other Wheat.

The grades for Bread Wheat are Super Grade, Grade 1, Grade 2 and Grade 3.

No grades are determined for Class Other Wheat.

2. CULTIVARS AS BIOLOGICAL STANDARDS

The effect of the climate, rainfall, environmental interaction, cultivation practices and other factors on wheat quality makes the use of fixed criteria or norms for release purposes impractical.

For this reason, cultivars are used as biological quality standards and acceptable deviations from the standard are established as release norms.

It is important that the agronomical performance and yield potential of the chosen quality standard is comparable with those of the breeders' lines, as lower yields in some quality standards are often connected to higher protein content.

Large differences in the protein content of breeders' lines and the quality standard cause deviations, especially in rheological analysis results, which complicates the interpretation and evaluation of breeders' lines.

The following cultivars represent the quality standards against which wheat breeders' lines are evaluated:

Dry land Northern (Summer rainfall) areas:	Elands
Dry land Southern (Winter rainfall) areas:	SST 0117*
Irrigation areas:	SST 806

*SST 0117 was accepted as new biological standard cultivar (with certain conditions, see point 4.1) during the Wheat Forum Cultivar and Technical Committee meeting of 17 October 2022.

2.1 CRITERIA AND PROCESS FOR SELECTION OF A NEW BIOLOGICAL QUALITY STANDARD FOR A SPECIFIC PRODUCTION AREA

When a cultivar selected as biological quality standard for a specific production area is no longer available for commercial planting or when the cultivar's quality is no longer acceptable or suitable, a new quality standard must be selected.

Wheat Breeding companies and/or industry can propose an existing cultivar to be evaluated as quality standard.

The cultivar first and foremost must comply with the criteria already mentioned.

Additional quality data of a minimum of two (2) years from at least five (5) different localities, representative of the intended production area, is required per annum for consideration as quality standard.

The samples are to be submitted to the SAGL for analysis as per the list of tests in the quality guidelines (Section 4).

The proposed biological quality standard is tested and evaluated against the current biological quality standard.

When the need to select a new biological standard cultivar is identified, an applicable project proposal shall be submitted to the SA Winter Cereal Industry Agency (SAWCIA) to cover the costs for the quality analyses. The project proposal shall be submitted by The Southern African Grain Laboratory NPC (SAGL).

3. BACKCROSSES AND HYBRIDS

Backcross parents are not accepted as quality standards. The most important reasons for this are that the backcross parent may not have the desired quality characteristics on the one hand, and on the other the number of backcrosses and selection pressure may result in the original quality not being regained.

The evaluation process in the case of backcrosses and hybrids is the same as for ordinary cultivars.

4. GUIDELINES FOR ACCEPTABLE DEVIATIONS

4.1 GUIDELINES FOR ACCEPTABLE DEVIATIONS FROM THE STANDARD FOR BREAD WHEAT LINES

The quality norms for release are categorized in primary (P) and secondary (S) quality norms. The quality of new lines is judged by the primary criteria which is non-negotiable. In borderline cases a decisive answer is obtained by referring to secondary norms.

TEST	CATEGORY	DEVIATION
Hectolitre mass, kg/hl (clean)[1]	P	-1.8 units
1000 kernel mass, g	S	± 4 g
Falling number, sec.[2]	P	- 15%
Protein (12 % mb)	P	- 1%
Extraction, %[3]	P	- 1.5%
Break flour yield, %	S	± 5%
Kent Jones Colour (C76), KJ[4]	P	+ 1.0 unit
Konica Minolta Colour[5]	P	
L*		± 1.14
a*		± 0.21
b*		± 2.64
MIXOGRAPH		
Peak time, min.[6]	P	
ELANDS		+ 15% to - 25%
SST 806		+ 35% to - 10%
SST 0117		+ 15% to - 25%
FARINOGRAPH		
Absorption (14% mb), %	P	± 2.5%
Development time, min.	S	± 25%
Stability, min.	S	+ 10% to - 30%
ALVEOGRAPH		
Strength, cm^2	P	± 20%
Stability, mm	S	± 20%
Distensibility, mm	S	- 10% to + 20%
P/L value	P	± 25%
BAKING TEST 100g		
Corrected volume, cm^3 [7]	P	- 10%
Dough characteristics	P	None (Normal only)

EXTENSIGRAPH
In cases where supplementary quality information is needed, Extensigraph data can be requested.

Notes:

[1] In the case of Dry land Southern (Winter rainfall) areas, hectolitre mass (HLM) should be a minimum of 1.0 kg/hl higher than that of SST 0117 *(Resolution under point 8. New biological standard cultivar*

for Winter rainfall areas of the minutes of the Wheat Forum Cultivar and Technical Committee meeting held on 17 October 2022).

[2] Falling number values should exceed 220 seconds and may not be more than 15% lower than that of the quality standard.

[3] In the case of Dry land Southern (Winter rainfall) areas, extraction % (EX) should be a minimum of 1.3% higher than that of SST 0117 *(Resolution under point 8. New biological standard cultivar for Winter rainfall areas of the minutes of the Wheat Forum Cultivar and Technical Committee meeting held on 17 October 2022)*.

[4] Kent Jones Colour is corrected to 76% extraction on the basis of 0.4 KJ units per 1% extraction. E.g. If a sample has an extraction to the value of 77%, 0.4 KJ will be subtracted from the line's colour value. Should the sample's extraction be 75%, 0.4 KJ will be added to the sample's colour value.

As part of a project "Development of new colour evaluation norms using the Konica Minolta CM-5 L*a*b* measurements for the release of bread wheat breeders' varieties in South Africa", a regression model was developed for calculation of the Kent-Jones values by using L*a*b* values. The historic dataset of the breeders' samples of the 2013/2014 season was used.

KJ results reported from 2026, are predicted KJ values calculated according to this model.

[5] The Konica Minolta Spectrophotometer CM-5 (instrument settings for 10° observer and D65 illuminant) colour analysis has been included in the quality analyses since the 2013/2014 season.

Colour coordinates reported:
L* measures lightness and varies from 100 for perfect white to zero for black
a* represents green to red variation
b* represents blue to yellow variation

The correction factors for the Konica Minolta colour values to 76% extraction formed part of the findings of a project funded by the South African Winter Cereal Industry Trust (SAWCIT) 'Development of new colour evaluation norms using the Konica Minolta CM-5 L*a*b* measurements for the release of bread wheat breeders' lines in South Africa'.

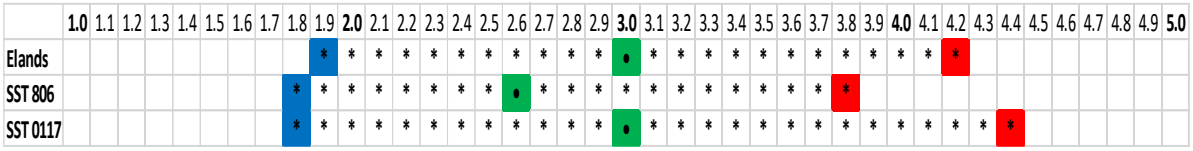
The factors are as follows:

- L* - *Increase* L* by 0.13 for every 1% of total extraction *above* 76% and *decrease* L* by 0.13 for every 1% of total extraction *below* 76%
- a* - *Decrease* a* by 0.02 for every 1% of total extraction *above* 76% and *increase* a* by 0.02 for every 1% of total extraction *below* 76%
- b* - *Decrease* b* by 0.08 for every 1% of total extraction *above* 76% and *increase* b* by 0.08 for every 1% of total extraction *below* 76%

The tolerance values for the L* a* and b* measurements were determined by multiplying the standard deviation of the "deviation" values obtained from the result summaries (first year, provisional and final release) evaluated during the 2022/2023 season, by 3. The Empirical Rule states that 99.7% of data observed following a normal distribution lies within 3 standard deviations of the mean.

6 If the Mixograph peak time spectrum of the biological standard cultivars is represented graphically, the relative differences in peak time are noticeable.

The diagram on the next page shows that the mixing characteristics of standards vary and that the acceptable deviations should be adjusted accordingly. Elands and SST 0117 display strong rheological and relatively long mixing characteristics, whilst SST 806 display shorter peak times.

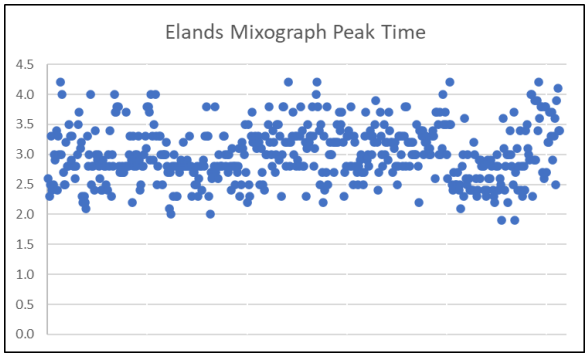


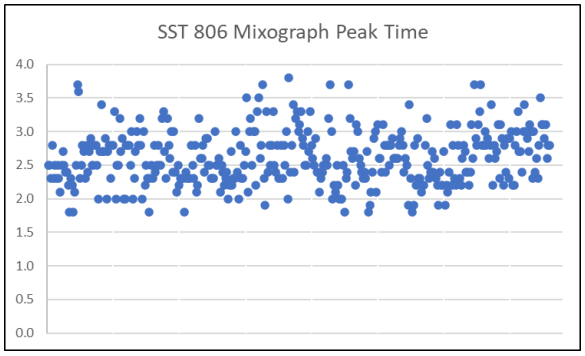
	Average	*Minimum*	*Maximum*	
Elands	3.0	1.9	4.2	(n = 513)
SST 806	2.6	1.8	3.8	(n = 380)
SST 0117	3.0	1.8	4.4	(n = 82)

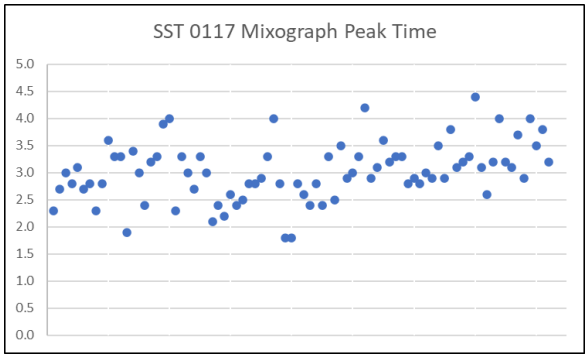
Cultivar tolerances in respect of the Mixograph peak time are therefore set as follows:

ELANDS	+ 15% to - 25%
SST 806	+ 35% to - 10%
SST 0117	+ 15% to - 25%

Please also see below the scatterplot graphs showing the spread of the peak time results for the three biological standard cultivars.







7 Bread volume is evaluated against the protein level of the line. A factor of 40 cm^3 per 1% protein difference is used to adjust the bread volume of the line against the standard. E.g. If a line has a protein content of 11.0% and the standard has a protein content of 12.0%, 40 cm^3 will be added to

the line's bread volume and vice versa. The current salt (NaCl) level used in the standard 100 g bread recipe is 0.96%.

As part of a project funded by the Winter Cereal Trust, the 100 g baking test evaluation score determination was updated during the 2021/2022 season.

The evaluation scores range from 0 – Poor to 09 – Excellent.

This 100 g baking test evaluation does not provide an indication of the baking quality of the flour per se but refers to the relationship between the protein content and the bread volume.

4.2 GUIDELINES FOR ACCEPTABLE DEVIATIONS FROM THE STANDARD FOR *HIGH-YIELDING* BREAD WHEAT LINES

During a special meeting of the Research Technical Committee for Wheat of the Winter Cereal Trust held on 15 January 2016, a set of proposed amendments that need be made to the criteria currently set for the release of bread wheat lines was discussed. There was consensus among all the role players present at the meeting that if the minimum and maximum values of the criteria used to release bread wheat lines are widened to accommodate higher-yielding lines, the yield gain of such lines must be significant. The committee decided that all such lines must yield **at least 5% more** than current commercial bread wheat cultivars.

The relaxed wheat cultivar release criteria for high-yielding lines were thus adopted into this document *(Resolution under point 9.1 Relaxed Wheat Cultivar Release Criteria of the minutes of the Wheat Forum Cultivar and Technical Committee meeting held on 19 April 2018)*.

Please refer to ***ANNEXURE A –*** Yield determination protocol for high yielding lines.

TEST	CATEGORY	DEVIATION
Yield, t/ha	P	+ 5%
HLM, kg/hl (clean)	P	-2.0 units
HLM, kg/hl (clean) (SST 0117)[1]	P	-2.0 units
1000 kernel mass, g	S	± 4 g
Falling number, sec.[2]	P	- 15%
Protein (12% mb)	P	- 2.5%
Extraction, %	P	- 2.0%
Extraction, % (SST 0117)[3]	P	- 2.0%
Break flour yield, %	S	± 5%
Kent Jones Colour (C76), KJ[4]	P	+ 1.5 units
Konica Minolta Colour[5]	P	
L*		± 1.14
a*		± 0.21
b*		± 2.64
MIXOGRAPH		
Peak time, min.[6]	P	
ELANDS		+ 15% to - 25%
SST 806		+ 35% to - 10%
SST 0117		+ 15% to - 25%

FARINOGRAPH		
Absorption (14% mb), %	P	± 3.0%
Development time, min.	S	± 25%
Stability, min.	S	+ 10% to - 30%
ALVEOGRAPH		
Strength, cm^2	P	± 20%
Stability, mm	S	± 20%
Distensibility, mm	S	± 20%
P/L value	P	+ 40% to -25% (Southern areas) + 30% to -25% (Other areas)
BAKING TEST 100g		
Corrected volume, cm^3 [7]	P	- 20%
Dough characteristics	P	None (Normal only)

See notes under Section 4.1

5. ANALYSIS REQUIREMENTS FOR FIRST YEAR, PROVISIONAL AND FINAL RELEASE

The analyses required for first year, provisional and final release are conducted by The Southern African Grain Laboratory (SAGL).

Provisional and final release analyses consist of hectolitre mass (HLM), thousand kernel mass (TKM), vitreous kernels (VK), falling number (FN) on whole wheat flour (WW), milling on a Bühler laboratory wheat mill reporting break flour yield (BFY) and extraction (EX) values, colour (Kent Jones (KJ) and Konica Minolta (L*a*b*)), protein on WW and flour (FL) as well as mixograph, farinograph, alveograph, consistograph and 100g baking test analyses.

Milling Worth (MW) and Baking Worth (BW) values are also calculated as part of provisional and final release analysis. The following six parameters contribute to the MW – HLM, TKM, BFY, EX, KJ and FN. The six parameters contributing to the BW are flour protein, farinograph absorption, alveograph strength and P/L, mixograph peak time and 100 g baking volume. Each of these parameters contribute a specific weight to the MW and BW values.

First year release analysis (Northern and Southern dry land) consists of all the above except TKM and consistograph analyses.

Cultivars that passed the evaluation process as described in the most recent version of '*Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Cultivars for the RSA'*, will be listed on the Wheat Forum Cultivar List as published on the SAGL website. Please refer to Annexures B and C.

5.1 DRY LAND NORTHERN AND SOUTHERN PRODUCTION REGIONS

A minimum of two (2) years' analysed data from at least five (5) localities per annum is required for provisional release. If there is any doubt about any of the quality aspects, provisional release is postponed.

For final release, three (3) years' data from a minimum of five (5) localities per annum is required.

If doubt or concerns exist with regard to any of the quality aspects of a line, a fourth year's data can be requested by the Committee.

5.2 IRRIGATION PRODUCTION REGIONS

One (1) year's analysed data from at least five (5) localities is required for provisional release. These samples will be indicated as 'First year Provisional' for unique identification purposes.

If doubt exists regarding any of the quality aspects, provisional release is postponed.

For final release, two (2) years' data from a minimum of five (5) localities per annum is required. These samples will be indicated as 'Second year Final' for unique identification purposes.

The analysis conducted on the First year Provisional - and Second year Final samples, will be the same as for Provisional and Final release, mentioned under point 5.

If doubt or concerns exist regarding any of the quality aspects of a line, a third year's data can be requested by the Committee.

Implementation of the analysis requirements for irrigation wheat commenced in the 2018/2019 production season *(Refer to Resolutions under point 9.2 Classification of Cultivars for Irrigation Areas of the minutes of the Wheat Forum Cultivar and Technical Committee meeting held on 19 April 2018)*.

5.3 RELEASE OF CULTIVARS in more than one production area

A single cultivar can be released concurrently in more than one production area in the same season, provided that region-specific testing protocols have been followed and no concerns regarding the quality of the results in any of the proposed production areas are raised. The decision by committee members should be unanimous.

For release in an area other than originally released, a minimum of two (2) years' data from at least five (5) localities is required. The first year's data is valid for provisional release and the second year's data for final release.

If doubt or concerns exist regarding any of the quality aspects of a line, a third year's data can be requested by the Committee.

6. GENERAL GUIDELINES FOR SUBMISSION OF BREEDERS' SAMPLES FOR ANALYSIS TO SAGL

6.1 DISPATCH OF SAMPLES

6.1.1 Samples may be forwarded by courier or hand delivered to the SAGL's premises.

6.1.2 The cover letter accompanying the samples should contain the following information:

- Breeder company/institution name
- Name and contact information (telephone number and e-mail address) of the person(s) submitting the samples

- Name and contact information (E-mail -, postal - and physical address) of the person(s) to receive the quality analysis report
- Production region / type e.g. winter rainfall, winter dryland, irrigation, etc.
- Samples submitted for first year, provisional or final release
- Clearly indicate lines that should be evaluated against the relaxed release criteria for high-yielding lines
- The name of the biological standard cultivar included
- A list of the names of the breeder lines to be analysed
- A list of the names of the localities where the trials were planted

6.1.3 A copy of the appropriate cover letter should be placed in each bag of the consignment.

6.1.4 The samples should be packaged in bags made from material that will not tear. The sample bags should be marked clearly with the line and locality names.

6.1.5 The samples should be sorted and placed in bags according to the information on the cover letter (e.g., production area, biological standard / line name, year of release and locality).

6.1.6 Breeder line names should be kept the same from the first year to the final year of analysis to ensure traceability.

6.2 SAMPLE CRITERIA

6.2.1 Minimum sample size required for analysis is 3.0 kg.

6.2.2 Samples should be treated against insects before dispatch.

6.2.3 Samples should be free from soil and grit.

6.2.4 The whole wheat samples should have a moisture content not exceeding a maximum of 13.0%.

6.2.5 The hectolitre mass should not be less than 75 kg/hl (cleaned).

6.2.6 When the protein content is less than 10.0% or more than 15.0% (12% mb) evaluation becomes unreliable.

7. REPORTING FORMAT OF QUALITY RESULTS

7.1 All samples are uniquely identified by allocation of SAGL laboratory numbers and sample codes (linked to the company submitting the samples).

7.2 All quality results generated by the SAGL, are captured in a SAGL Wheat Breeders database.

7.3 The quality results (according to the analyses listed in Section 4.1) per specific breeder line are reported in an Excel file format. A computer program was custom designed for this purpose with the assistance of SAGL.

7.4 Each season's results are summarized on a separate worksheet in the file.

7.5 On each worksheet, the breeder line's quality results are compared to that of the biological standard cultivar.

7.6 The average, standard deviation and Coefficient of Variance (CV) of both the biological standard cultivar and breeder line's results over localities are calculated for each quality parameter.

7.7 The deviation of the breeder line's average value per parameter, compared to that of the biological standard cultivar, is calculated and reported.

7.8 Deviations exceeding the values indicated under Section 4, Guidelines for acceptable deviations, are flagged (cells coloured red).

7.9 CV values exceeding the generally accepted maximum value of 15%, are also flagged (cells coloured blue).

7.10 A summary sheet, where the average values of the biological standard cultivar and breeder line over seasons are compared, is also included.

7.11 The result summaries as well as the rheological graphs (mixogram, farinogram and alveogram) are forwarded to the applicable breeder company.

7.12 An added advantage of the data being summarized in a user-friendly format is that the results of all wheat breeder companies are reported in the same format which facilitates the interpretation and evaluation of the data.

7.13 A summary of yield increase calculations for high yielding lines is to be presented during the pre-meetings (see point 9) as well as the Cultivar Release and Technical Committee meeting by the applicable breeder company.

8. PROTOCOL FOR EXTENDED CONDITIONING TIME OF BREEDER SAMPLES PRIOR TO MILLING ON THE BüHLER MCKA AUTOMATIC LABORATORY WHEAT MILLS

Protocol to be finalised after conclusion of discussion with the processing industry.

9. PRE-MEETINGS FOR DISCUSSION OF RESULTS

Pre-meetings to discuss the results of the quality analyses are held annually when provisional and final release results for each of the companies/institutions are available (middle April to middle June). These pre-meetings afford wheat seed breeders the opportunity to discuss their results with representatives of the Milling and Baking industries, the producers as well as the storage companies prior to the Cultivar Release and Technical Committee meeting (to be scheduled when the pre-meeting dates have been finalised).

The pre-meetings may be attended by any of the members of the Cultivar Release and Technical Committee and are chaired by an independent and objective expert. The current appointed Chair is Prof. Marena Manley from the University of Stellenbosch, while Prof. Maryke Labuschagne from the University of the Free State, was appointed as her second. Travel expenses (when applicable) for the Chair to attend the pre-meetings as well as the Cultivar Release and Technical Committee meeting are to be submitted to the Administrators of the Wheat Forum and SAWCIA.

Separate meetings, to ensure confidentiality of Intellectual Property, are scheduled with each of the breeding companies/institutions. Currently meetings are held with the ARC Small Grain, SA SEED, Syngenta, Agricol/Donmario, Limagrain South Africa and Advanta Seeds. The meetings are scheduled by SAGL.

These pre-meetings do not have any decision-making power.

A table summarizing the recommendations made during these meetings is communicated to the Cultivar Release and Technical Committee by the Chair of the pre-meetings.

10. CULTIVAR DESCRIPTION

Important grain characteristics that should be noted for the release of a new cultivar are:

10.1 VISUAL KERNEL CHARACTERISTICS

Visual general kernel characteristics such as colour, size, shoulder, back, base, cheeks, skin, groove, germ and beard characteristics are described. Deviating kernels (kernels that look different from the normal shapes of the cultivar) are picked out by hand from a 25 g sample and the percentage is determined.

Dr. Sierk Ybema, an independent industry consultant, is contracted to perform the description of the kernel characteristics as well as identification of deviating kernels.

10.2 ELECTROPHORETIC BAND PATTERNS

Electrophoretic band patterns are determined by means of SDS-PAGE electrophorese analysis. High molecular weight - glutenin subunits (HMW-GS) are encoded by genes at loci, Glu-A1, Glu-B1 and Glu-D1, and are not reliable for variety identification as many cultivars have the exact same HMW band pattern; however, it is reliable to use to determine seed purity and can be an indication of the homozygous state of a line. The determination is done on 20 kernels.

The Department of Plant Sciences (Plant Breeding) (Faculty: Natural and Agricultural Sciences) of the University of the Free State is contracted to perform SDS-PAGE analyses.

10.3 REPORTING OF GRAIN CHARACTERISTIC RESULTS

Results, as reported by the above-mentioned (points 9.1 and 9.2), are provided to the members of the Cultivar Release and Technical Committee meeting by the SAGL. Individual results are forwarded to breeding companies. Result reports are also forwarded to the administrator of the Wheat Forum for minuting purposes.

10.4 CULTIVAR PURITY

All cultivars approved for final release by the Cultivar Release and Technical Committee, are still subjected to strict norms for cultivar purity (maximum 1% impurity) in terms of the provisions for seed standards and certification under the Plant Improvement Act. Cultivar purity under these norms is however only determined after final release.

11. GENERAL RULES

Any cultivar that is released should in the first instance be of such quality that it could satisfy the local market if it is grown as the dominant cultivar.

Its relative commercial value should be comparable to grain that is available on the world market.

Previously, only red cultivars with medium hard to hard morphological characteristics were allowed in the bread wheat class.

White wheat lines/cultivars are now also included in the annual determination of the milling and baking quality of wheat breeder lines.

During a meeting of the SAWCIA Cultivar Release and Technical committee held in 29 June 2026 it was resolved that the current arrangement for the evaluation of white wheat cultivars be maintained, namely that white wheat cultivars continue to be evaluated against the existing biological standards and release criteria until sufficient local data and commercial experience justify reconsideration.
(Resolution 14/2026 of the minutes of the meeting of the SAWCIA Cultivar Release and Technical Committee held on 29 June 2026).

No Genetically Modified (GM) wheat shall be submitted for release prior to notification and consent of the whole industry.

12. FUNDING FOR WHEAT BREEDER QUALITY ANALYSES AND SUBMISSION OF SAMPLES TO SAGL

Only breeding companies/institutions that have released and made commercially available at least one cultivar is eligible to apply for SAWCIA research funding *(Resolution 11/2025 of the minutes of the meeting of the SAWCIA Cultivar Release and Technical committees held on 23 June 2025)*.

The Cultivar Release and Technical Committee has requested SAGL to submit an annual funding proposal on behalf of the wheat breeding companies for conducting milling and baking quality analyses on wheat breeder samples.

Breeding companies/institutions submit their funding requirements to SAGL by 15 June annually.

Funding for quality analysis of first year, provisional and final year release analyses to be performed by the SAGL, is done as per the agreed funding model.

Samples of lines to be submitted for provisional or final release of which the results are to be evaluated during the Cultivar Release and Technical Committee meeting held during the first half of each year, are to be submitted to the SAGL by the 15th of February each year.

Samples for first year analyses are to be submitted annually by the latest 31st of May.

Adherence to this sample submission timeline is crucial to ensure sufficient time for completion of quality analysis, preparation of result reports and evaluation of the data by representatives of the Milling and Baking industry, producers as well as grain handling and storage companies prior to the pre-meetings during which the results are discussed (referred to under point 8).

13. DISCONTINUATION OF CULTIVAR LINES

The discontinuation of any cultivar line previously submitted for analysis, must be recorded at the Cultivar Release and Technical Committee meeting by the respective breeders and noted in the minutes of the meeting to ensure full traceability.
(Resolution 12/2025 of the minutes of the meeting of the SAWCIA Cultivar Release and Technical Committees held on 23 June 2025).

14. BREEDER COMPANY/INSTITUTION CONTACT LIST

To improve accessibility and communication across the value chain, a standardized contact list of key personnel from each breeding company/institution is included in this document.
(Resolution 7/2025 of the minutes of the meeting of the SAWCIA Cultivar Release and Technical Committees held on 23 June 2025).

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15. PUBLICATION, MAINTENANCE AND REVISION OF DOCUMENTATION

The Wheat Forum Steering Committee requested the SAGL to –

- Publish on its website the agreed Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Cultivars for the RSA, as well as the Wheat Forum Cultivar List.
- Maintain and update the agreed Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Cultivars for the RSA and Wheat Forum Cultivar List in future.

SAGL was appointed as responsible party for the maintenance of the Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Cultivars for the RSA document as well as the Wheat Forum Cultivar List during the Wheat Forum Cultivar and Technical Committee meeting held in April 2018.

The Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Cultivars for the RSA document as well as the Wheat Forum Cultivar List are to be revised annually during the Cultivar Release and Technical Committee meeting to be scheduled as soon as the pre-meetings have been held and an updated version of the document and/or list published on the SAGL website (if applicable) directly thereafter.

Please refer to:
ANNEXURE B - Protocol for updating the Wheat Forum Cultivar List
ANNEXURE C – Wheat Forum Cultivar list

This document was revised under Point 6.2 Review of Cultivar Release Criteria of the SAWCIA Cultivar Release and Technical Committee meeting held on 29 June 2026, with minuted resolutions referred to in the document.

Annexure A – Yield determination protocol for high-yielding lines

Background:

During a special meeting of the Research Technical Committee for Wheat, held on 15 January 2016, a set of proposed amendments to the criteria currently set for release of bread wheat lines, was discussed.

During the discussion, the following points were noted, namely:

- The protein content of wheat is a critical quality factor as it would have an impact on all other quality characteristics;
- Breeders had different opinions as to which of the quality characteristics could hamper yield;
- It was necessary to investigate what the effect of relaxing the criteria would be on bringing about an increase in the yield;
- It would be necessary to look at biological standards for high yielding cultivars;
- Trials to identify high-yielding cultivars had to be planted and evaluated independently;
- The environment determined the level of "actual" yield in comparison with "potential" yield;
- Relaxing the quality criteria without an increase in yield would not address producers' needs; and
- The grading regulations for bread wheat only refer to "red" wheat cultivars.

There was consensus among all the role players present at the meeting that if the minimum and maximum values of the criteria used to release bread wheat lines are widened to accommodate higher-yielding cultivars, then the yield of such cultivars must be significant. The committee decided that all lines proposed as high-yielding cultivars must yield at least 5% more than current commercial bread wheat cultivars.

In order to quantify and standardize the yield determination of high-yield lines a decision was taken that the breeders of the then current (i.e. 2016) active breeding companies in South Africa (Sensako, Pannar and ARC Small Grain Institute) need to jointly develop a protocol for determining the yield levels of high-yielding lines.

This protocol was developed at a workshop held on the 11th of February 2016, after the National Cultivar Evaluation Programme (NCEP) meeting.

The protocol considers the following key elements:

- Annually, the top three high-yielding commercial cultivars are identified for each wheat-producing area based on data from the past three years.
- Yield data for higher-yielding lines must come from independent, replicated trials to ensure reliability. Only trials with a coefficient of variance (CV) of less than 10% for irrigation areas and 15% for dryland areas are considered.
- Furthermore, the yield performance of lines considered for release must be at least 5% higher than the average of the three predetermined commercial cultivars (quality standards). This requirement ensures that new cultivars offer a tangible improvement in yield.

A protocol for yield determination regarding higher-yielding lines

In order to set a benchmark for newly identified higher-yielding lines, it is important to determine the top three (3) high-yielding commercial cultivars in each of the wheat producing areas in South Africa over the last three years. These top three (3) cultivars will be determined on an annual basis. Once acceptable higher-yielding lines have been identified, released and commercialised, the protocol needs to be reviewed again to determine if these cultivars will be then used as standards and what the significant percentage yield increase of new lines must be in order to be considered for release.

Yield data for higher-yielding lines must originate from replicated trials. A minimum Coefficient of Variance (CV) percentage must be used as a benchmark to determine if a trial can be included in the combined yield analysis. Only trials with a CV lower than 10% can be included for the irrigation areas. For the dry land areas, only trials with a CV lower than 15% can be used. The samples from the five (5) trial sites that are submitted to the SAGL for quality evaluation must be used in the statistical analysis to determine the yield level of the lines. The biological standard must also be part of the statistical analysis. The yield performance of the lines considered for release, must be 5% significantly higher than the average of the three (3) pre-determined commercial cultivars.

The statistical trial layout should preferably be a lattice design. When analysing the data, the Least Significant Difference level must be set at 95%.

Cultivars used as standards:

Yield standard cultivars will *exclude* any *cultivars not commercially available* and will be reviewed annually for relevance and availability based on recommendations from the National Cultivar Evaluation Program (NCEP) after the meeting held in February every year at the ARC-SG in Bethlehem (*(Resolution 6/2025 of the minutes of the meeting of the SAWCIA Cultivar Release and Technical committees held on 23 June 2025)*.

The selection process being a collaborative effort involving inputs from various stakeholders in the National Cultivar Evaluation Workgroup. This group includes representatives from breeders of the cultivars and other renowned industry experts who bring valuable insights to the NCEP.

Following careful considerations of all the above-mentioned points, recommendations are made based on statistical analysis of four-year data. This data reflects cultivars' performance (yield + stability) across multiple locations representing each production region.

The current standards to be used for each production area are summarized in the following table:

Production area	**Current Quality Standard**	**Yield Standard Cultivars**
Winter Rainfall Area	SST0117	SST056, SST0127, SST0187, SST0166
Dryland Free State Area	Elands	PAN3111, Matlabas, PAN3161
Irrigation areas	SST806*	SST884, SST8135, SST8154

*Not included in the NCEP from 2021 - 2024

No changes are proposed to the 5% higher yield requirement on the performance of lines considered for release.

Annexure B – Protocol for updating the Wheat Forum Cultivar list

- The cultivar list to be hosted on the SAGL website is to be named the **Wheat Forum Cultivar List**, to distinguish this list from any other lists already in existence.
- The criteria for listing a cultivar on the Wheat Forum Cultivar List is the *minuted* approval of the cultivar by the SAWCIA Cultivar Release and Technical Committee. Approval will indicate that the cultivar has passed the evaluation process as described in the 'Analysis Procedure and Evaluation Norms for the Release of Bread Wheat Breeder Varieties for the RSA' document.
- Any addition or elimination of a cultivar to/from the Wheat Forum Cultivar List, shall be based on a resolution documented in Minutes of meetings of the Cultivar Release and Technical Committee.
- The Wheat Forum Cultivar List shall be updated annually upon receival of the Minutes of the Cultivar Release and Technical Committee meeting.

Annexure C – Wheat Forum Cultivar list

Wheat Forum Cultivar List *(Updated October 2026)*

Northern dryland area			Southern production area			Irrigation		
Cultivar	**Line name**	**Year of approval**	**Cultivar**	**Line name**	**Year of approval**	**Cultivar**	**Line name**	**Year of approval**
SST 3266	B-WPT23-03	2026	SAS 3850	2023PANCE6	2026	SAS 3459	2024SASLE1	2026
			SST 0267	KPT23-15	2026	SAS 3553	2024SASLE32	2026
			DM 7127	21SUD01	2026	SST 8253	BPT23-09	2026
			DM 5127	23SUD04	2026	SST 8266	BPT24-05	2026
						DM 7027	24SUD02	2026
						Bivane	BSP22/04	2026
						Xhora	BSP22/05	2026
						Bell	BSP22/06	2026
						Levubu	BSP24/06	2026
SST 3256	WPT22-01	2025	SAS 3840	2022PANCE4	2025	SAS 3444	2022PANLE6	2025
			SST 0256	KPT22-22	2025	SST 8256	BPT23-07	2025
						SST 8254	BPT23-12	2025
						DM 7026	22SUD05	2025
						DM 5026	23SUD03	2025
						DM1817T	DM1817T	2025
			PAN 3838	2021PANCE1	2024	SST 8247	BPT21-03	2024
			PAN 3939	2021PANCE14	2024	SST 8237	BPT21-10	2024
			LG Albatros	LG Vencedor	2024	SST 8245	BPT22-13	2024
			LG Fisant	LG Garcilaso	2024	SST 8246	BPT22-15	2024
			IS Tordo	IS Tordo	2024	LG Gemsbok	LG Vencedor	2024
PAN 3223	PAN2019-4	2023	SST 0235	KPT20-31	2023	PAN 3525	2021PANLE19	2023
			SST 0236	KPT20-35	2023	SST 8235	BPT21-01	2023
			LG Aficion	LG Aficion	2023	SST 8236	BPT21-16	2023
			LG Ancia	LG Ancia	2023	LG Ancia	LG Ancia	2023
			LG Aroba	LG Aroba	2023	IS Tordo	DM 1815T	2023
Mkuze	T18-04	2022	PAN 3855	PAN 3555 (Irr)	2022	PAN 3611	2019PANLE15	2022
			PAN 3774	PAN 3474 (Irr)	2022	PAN 3616	2019PANLE16	2022
			PAN 3753	PAN 3453 (Irr)	2022	SST 8227	BPT20-12	2022
			PAN 3783	PAN 3583 (Irr)	2022	LG Aficion	LG Aficion	2022
			PAN 3976	PAN 3676 (Irr)	2022			
						SST 8217	BPT19-03	2021
						SST 8215	BPT19-06	2021
SST 3207	WPT16-06	2020	SST 0208	KPT15-25	2020	Umgeni	BSP18/04	2020
						Selons	BSP16/02	2020
						SST 8205	BPT18-04	2020
PAN 3282	PAN2016-4	2019	Tredou	W16/01	2019	PAN 3681	2016PANLE12	2019
PAN 3380	PAN2016-16	2019				PAN 3582	2017PANLE4	2019
SST 3197	WPT16-13	2019				PAN 3583	2017PANLE25	2019
						PAN 3584	2017PANLE26	2019
						SST 8196	B-BPT16-21	2019
Mokolo	T08/21	2018	SST 0187	KPT15-28	2018	Usutu	BSP15/02	2018
PAN 3373	PAN2015-23	2018				PAN 3676	2015PANLE35	2018
SST 3186	WPT15-03	2018				PAN 3474	2015PANLE45	2018
SST 3176	CWPT13-15	2017				SST 8175	B-BPT14-20	2017
						SST 8177	B-BPT14-18	2017
PAN 3252	PAN2013-5	2016	SST0166	KPT13-21	2016	PAN 3555	2013PANLE8	2016
Kubetu	T13/04	2016	Steenbok	W12/12	2016	PAN 3453	2013PANLE20	2016
						Umzumbe	BSP13/05	2016
SST 3156	WPT12-01	2015				PAN 3541	20129ANLE1	2015
						PAN 3644	2012PANLE20	2015
						SST 8154	B-BPT12-03	2015
						SST 8156	B-BPT12-06	2015
						SST 8155	C-BPT12-03	2015
SST 3149	A-WPT11-09	2014	SST 0147	KBPT11-21	2014	SST 8145	B-BPT10-16	2014
Wedzi	T10-02	2014				Renoster	BSP10-14	2014
PAN 3133	PAN2011-11	2014				Koedoes	BSP10-15	2014
SST 3137	IPT10-08	2013	SST 0137	KPT10-24	2013	PAN 3623	2010PANLE24	2013
SST 3127	WPT10-06	2013				SST 8134	B-BPT09-11	2013
Kougas	T09/16	2013				SST 8135	B-BPT09-01	2013
						SST 8136	B-BPT10-02	2013
PAN 3111	PAN2009-3	2012	SST 0127	09-016	2012	PAN 3515	2009BSPPANLE17	2012
						SST 8126	B-BPT09-07	2012
						SST 8125	B-BPT09-09	2012
SST 316	PT07/4	2011	Ratel	W08-14	2011	Timbavati	BSP07/11	2011
SST 317	PT08/6	2011	PAN 3471	PAN 3471 (Irr)	2011	Tamboti	BSP07/12	2011
			SST 0117	08-012	2011	PAN 3400	2008BSPPANLE17	2011
						SST 815	B-BPT08-12	2011
						SST 816	C-BPT08-13	2011
PAN 3198	PAN2006-3	2010	PAN 3434	PAN 3434 (Irr)	2010	PAN 3497	2007BSPPANLE17	2010
PAN 3195	PAN2007-15	2010	Kwartel	W05/22	2010	SST 805	C-BPT07-14	2010
Senqu	KGIV07/06	2010	SST 008	07-017	2010	Umlazi	BSP06/08	2010
Selati	KGIV07/05	2010				SST 807	C-BPT07-20	2010
Koonap	KGIV07/09	2010						
Hartbees	KGIV07/07	2010						

Northern dryland area			Southern production area			Irrigation		
Cultivar	**Line name**	**Year of approval**	**Cultivar**	**Line name**	**Year of approval**	**Cultivar**	**Line name**	**Year of approval**
SST 398	PT06-08	2009	SST 096	06-00011	2009	PAN 3489	2006PANLE35	2009
						SST 895	B-BPT06-03	2009
						SST 896	C-BPT06-02	2009
						Sabie	BSP06/17	2009
SST 374	E3A04/24	2008	SST 087	05-0006	2008	SST 884	B-BPT05/19	2008
SST 387	PT05/04	2008				PAN 3471	2005BSPPANLE31	2008
PAN 3172	PAN2005-2	2008				PAN 3478	2005BSPPANLE28	2008
PAN 3379	PAN2005-23	2008						
PAN 3161	PAN2004-4	2007	Tankwa	W03/21	2007	SST 877	BPT04-07	2007
PAN 3368	PAN2004-25	2007	SST 077	04-0021	2007	SST 875	BPT04-05	2007
						Buffels	BSP03/12	2007
SST 963	02WE3B-10	2006	SST 064	03-0107	2006	SST 867	BPT03-3	2006
SST 366	PT04/3	2006	SST 067	03-0110	2006	SST 866	BPT03-7	2006
SST 308	PT04/4	2006						
SST 319	PT04/5	2006						
PAN 3355	PAN2003-2	2006						
SST 946	01PT9	2005	SST 047	02-0031	2005			
SST 356	02WE3B-9	2005	SST 056	03-0101	2005			
SST 954	02WE3B-12	2005	SST 026	03-0103	2005			
PAN 3144	PAN2002-27	2005						
SST 935	01PT11	2004	Kariega	Kariega (Irr)	2004	PAN 3434	2001LE2	2004
SST 347	01PT23	2004	SST 035	03-0102 (SST 835)	2004	Duzi	KGIB01/01	2004
Matlabas	KGIV01/02	2004				Krokodil	KGIB01/02	2004
Nossob	KGIV01/03	2004						
PAN 3120	EWPAN9902	2003				SST 835	BPT00-6	2003
PAN 3122	EWPAN2000-20	2003						
SST 322	09WP52	2003						
SST 334	00WP17	2003						
PAN 3118	PAN9911	2002	Baviaans	BSP97/1	2002	CRN 826	BPT002/E3	2002
Tarka	T98/5	2002	SST 027	00-0005	2002			
Komati	T98/8	2002						
			PAN 3404	98PANLE15	2001	Olifants	BSP98/8	2001
			PAN 3408	98PANLE29	2001			
			Steenbras	KBSP95/26	2001			
			SST 015	99-0001	2001			
			Biedou	W98/22	2001			
SST 399	07WPT-40	2000	PAN 3492	96LE1	2000	Baviaans	BSP97/1	2000
PAN 3191	9622	2000	PAN 3490	95LE14	2000	SST 806	97E3-3-6	2000
			SST 94	S97/3138	1999	Steenbras	KSBP95/26	1999
Elands	T95/14	1998	SST 88	S96-239	1998	SST 885	35F5x6-57	1998
PAN 3377	9504	1998				SST 886	35F4x6-44	1998
SST 983	IPT14	1998						
PAN 3364		1997				SST 876		1997
SST 972		1997						
Caledon		1996						
SST 964		1996						
SST 367		1996						
SST 363		1996						
SST 966		1996						
Gariep		1995	SST 57		1995	Inia		Not available
Limpopo		1995	SST 65		1996	Kariega		1993
PAN 3349		1995				SST 822		1993
SST 936		1994				SST 825		1993
SST 333		1993				Marico		1992
Betta DN		1992						
Carina		1989						
Hugenoot		1989						
Carol		1987						
SST 124		1987						
SST 107		1984						
Belinda		1971						

16. AMENDMENTS AND REVIEW

Revision:	Amendments
June 2026	• Replaced the word “Varieties” with the word “Cultivars” in the title of the document as well as in the document text. • **2.1 CRITERIA AND PROCESS FOR SELETION OF A NEW BIOLOGICAL QUALITY STANDARD FOR A SPECIFIC PRODUCTION AREA** Added the sentence: The project proposal shall be submitted by The Southern African Grain Laboratory NPC (SAGL). • **Note 4 under 4.1 GUIDELINES FOR ACCEPTABLE DEVIATIONS FROM THE STANDARD FOR BREAD WHEAT LINES** Add information with regards to the calculation of predicted KJ values from Konica Minolta CM-5 L*a*b* measurements. • **5. ANALYSIS REQUIREMENTS FOR FIRST YEAR, PROVISIONAL AND FINAL RELEASE** Specify that the analyses listed relating to first year release analysis pertain to lines from the Northern and Southern dry land areas. Include Milling Worth and Baking Worth values. • **6.2 SAMPLE CIRTERIA** 6.2.1 Change the minimum sample mass required for all years of analysis to 3.0 kg. • **8. PROTOCOL FOR EXTENDED CONDITIONING TIME OF BREEDER SAMPLES PRIOR TO MILLING ON THE BüHLER LAB MILLS.** Change the name of the mills from MLU 202 to MCKA Automatic Laboratory Wheat mills. • **9. PRE-MEETINGS ANALYSIS REQUIREMENTS FOR FIRST YEAR, PROVISIONAL AND FINAL RELEASE** Changes the dates for pre-meetings from “middle March to middle May” to “middle April to middle June”. Add Advanta Seeds to list of breeding companies. • **11. GENERAL RULES** Add reference to white wheat as well as resolution 14/2026 of minutes of meeting dated 29 June 2026. • **12. FUNDING FOR WHEAT BREEDER QUALITY ANALYSES AND SUBMISSION OF SAMPLES TO THE SAGL** Add “Only breeding companies that have released and made commercially available at least one cultivar may be eligible to apply for SAWCIA research funding”. Add “The Wheat Forum Cultivar and Technical Committee has requested SAGL to submit an annual funding proposal on behalf of the wheat breeding companies for conducting milling and baking wheat breeder samples”. Add “Breeding companies submit their funding requirements to SAGL by 15 June annually”. • **Add 13. DISCONTINUATION OF BREEDER LINES** • **Add 14. BREEDER COMPANY/INSTITUTION CONTACT LIST** • **Annexure A – Yield determination protocol for high-yielding lines**

	Add "Yield standard cultivars will *exclude* any *cultivars not commercially available* and will be reviewed annually for relevance and availability based on recommendations from the National Cultivar Evaluation Program" Remove reference to changes from the previous yield standard list • **Annexure C – Wheat Forum Cultivar list** Updated with cultivars approved for final release during the meeting of 29 June 2026

*Enquiries with regard to previous revisions of this document can be addressed to SAGL.