

Sorghum Crop Quality 2022/23 – Summary of results

The national Grading Regulations (Government Notice NO. R.15 of 08 January 2016, Regulation 4. Standards for classes) states that a consignment of sorghum shall be classified as Class GM Sorghum if it consists of malt sorghum that does not have a dark testa and complies with the standards for the grades. A consignment of sorghum shall be classified as Class GH Sorghum if it consists of malt sorghum that has a dark testa and complies with the standards for the grades.

Seventy-nine percent (26) of the 33 samples analysed for the purpose of this survey was determined to be class GM. Of these, 18 samples (69%) were graded as Grade GM1. One sample was graded GM2 and two samples GM3, while five samples were graded Class Other Sorghum (CO). Of the 7 samples determined to be class GH, 71% (5 samples) was graded GH1 and the remaining two samples were grade GH2 and Class Other respectively. No white sorghum samples were received this season for inclusion in the survey.

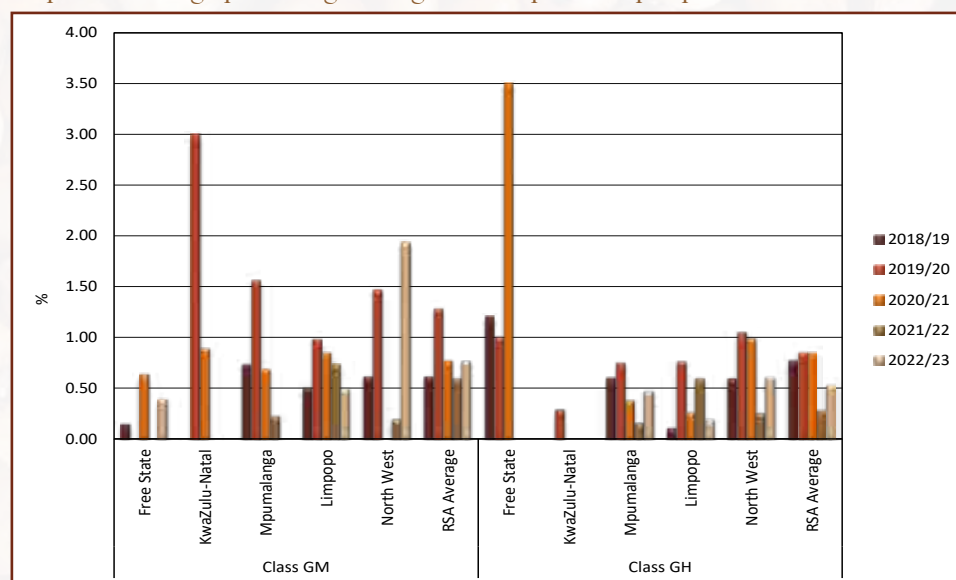
Certain varieties of sorghum contain tannins (specifically condensed tannins) in the seed coat layer beneath the pericarp (commonly referred to as the testa layer) of the grain. These varieties are variously referred to as: tannin, high-tannin, brown, bird-proof, bird-resistant, or bitter sorghums.

Varieties of sorghum not containing tannins are referred to as: non-tannin, low-tannin, condensed tannin-free, or sweet sorghums.

The detection of tannin in sorghum grain for grading purposes is done by SAGL by means of the bleach test. Please refer to the methodology followed under Methods on page 35.

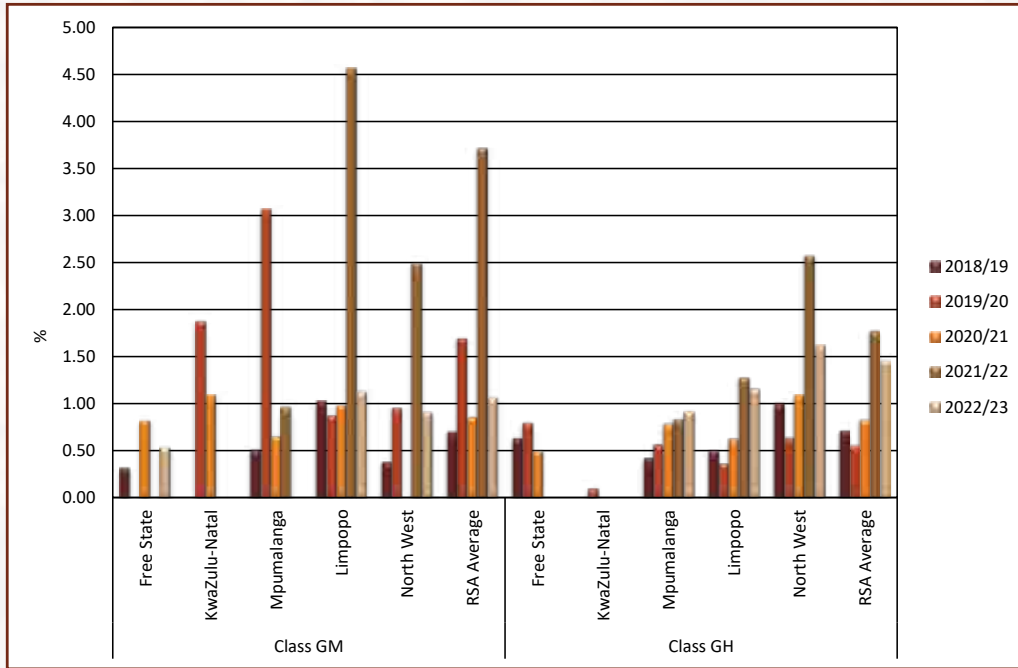
See Graphs 16 to 18 for the weighted average percentages foreign matter, defective sorghum and small kernel sorghum per class per province over five seasons. The five samples received from North West had the highest average percentage foreign matter (1.94%) for GM sorghum. Another five samples from North West also had the highest foreign matter percentage (0.62%) for GH sorghum. The national weighted averages for GM and GH sorghum were 0.77% and 0.54% respectively.

Graph 16: Average percentage foreign matter per class per province over five seasons

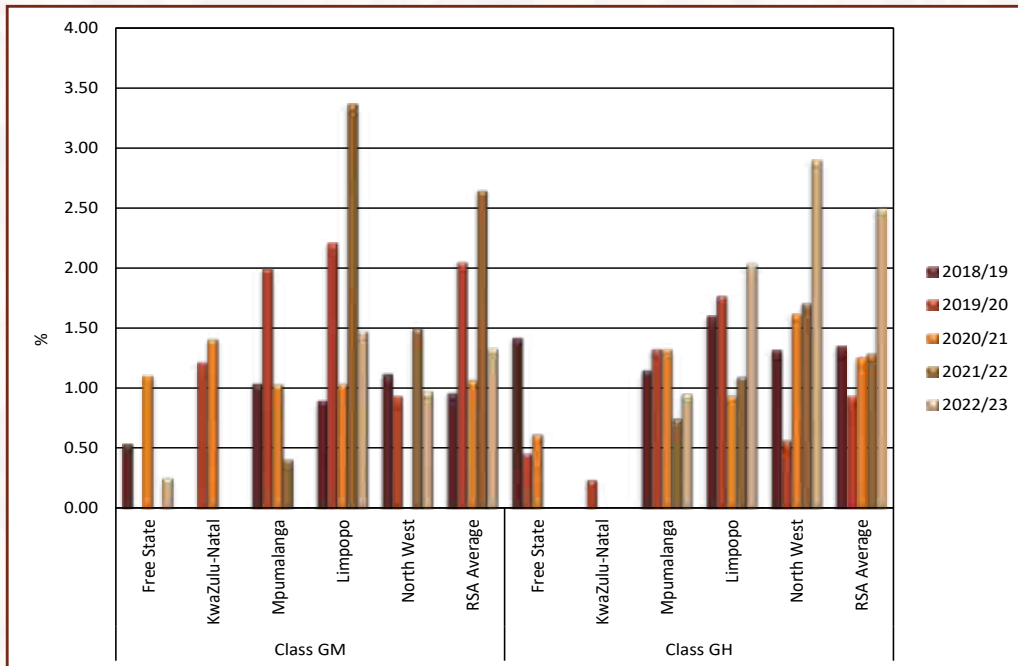


The average percentage defective GM sorghum was the highest (1.13%) in the 20 samples from Limpopo. North West had the highest percentage defective GH sorghum, namely 1.62%. The national averages were 1.07% for GM and 1.46% for GH. GH sorghum showed the highest percentage small kernels (national average 2.50%), with the samples from North West having the highest percentage namely 2.90% and the sample from Mpumalanga the lowest with 0.96%. GM sorghum had the lowest percentages small kernels in the sample from the Free State with 0.26% and the highest in Limpopo (1.48%), the weighted average for the class was 1.34%.

Graph 17: Average percentage defective sorghum per class per province over five seasons



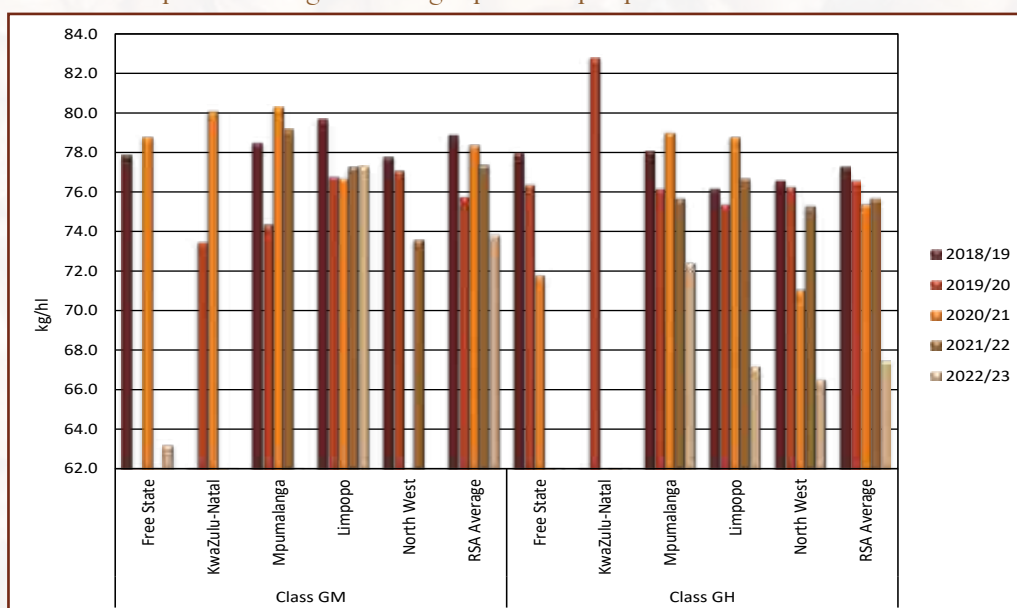
Graph 18: Average percentage small kernel sorghum per class per province over five seasons



As shown in Graph 19, GM sorghum had the highest weighted average test weight, namely 73.8 kg/hl, while GH sorghum averaged 67.5 kg/hl. Test weight values for GM sorghum ranged between 54.0 kg/hl and 80.1 kg/hl, with Limpopo reporting the highest average and North West the lowest. GH values varied from 53.8 kg/hl to 77.1 kg/hl. The sample from Mpumalanga reported the highest value with the lowest GH average reported in North West. Test weight was determined on unscreened samples.

GM sorghum also had the highest 1 000 kernel mass values, ranging between 20.2 g and 27.4 g (14% moisture basis) and averaging 24.3 g. GH sorghum averaged 22.0 g and varied between 18.8 g and 26.6 g. Last season these averages were 23.9 g and 23.3 g respectively.

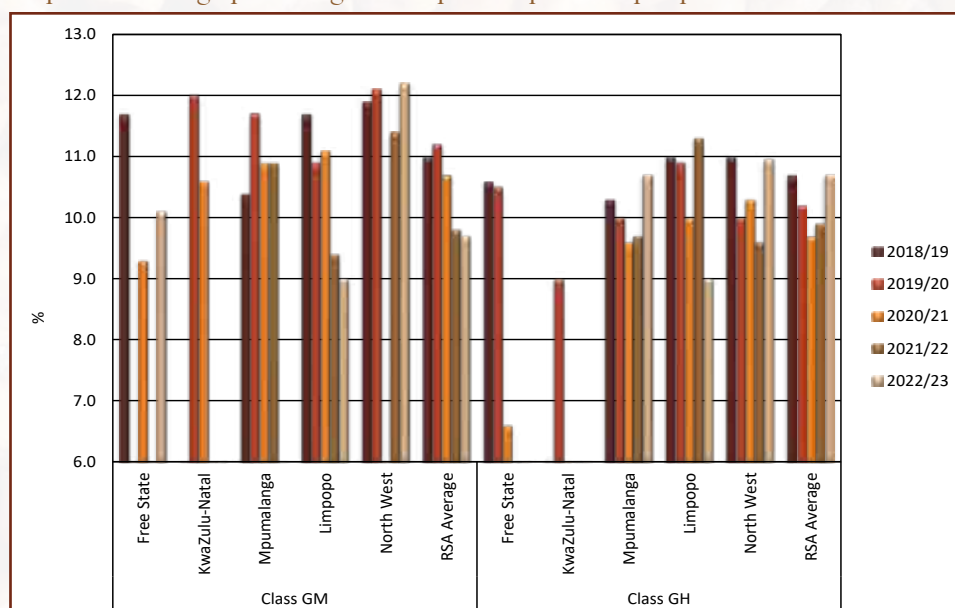
Graph 19: Average test weight per class per province over five seasons



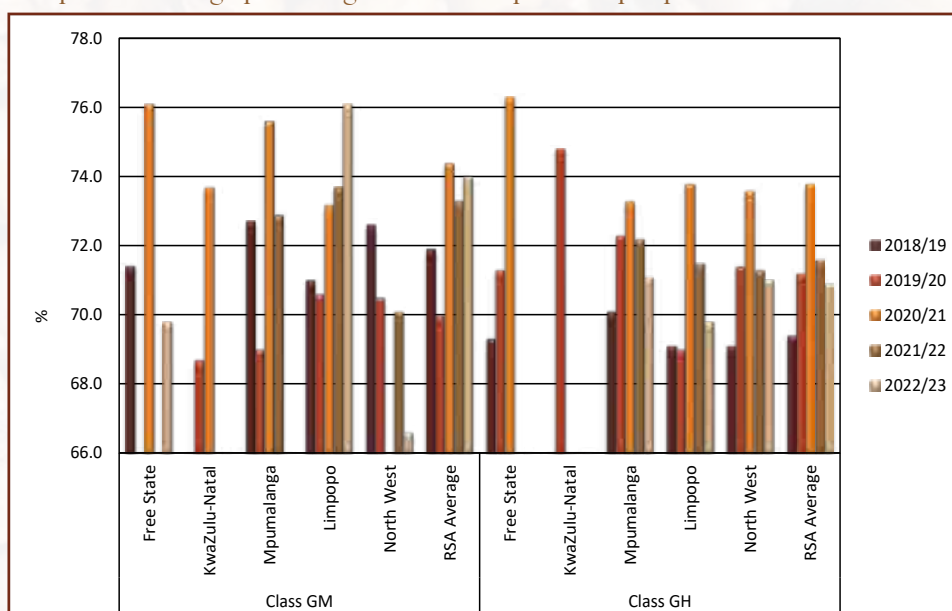
The image analysis results showed that the GM sorghum on average had slightly longer kernels, while the kernel width was similar for GM and GH sorghum. The variation (indicated by the standard deviation) in these parameters is similar for both GM and GH sorghum. Kernel elongation, defined as W/L% (width divided by length, expressed as a percentage) showed a wider variation as the length and width parameters as can be expected, with average standard deviations of 5.3% for GM and 4.6% for GH sorghum. A totally round kernel will have a W/L% of 100. GM sorghum's volume to surface ratio was over the last five seasons on average 3.5% higher than that of GH sorghum.

As shown in Graph 20, North West had the highest protein average of 12.2% for GM sorghum, while Limpopo averaged the lowest with 9.0%. North West also had the highest protein average for GH sorghum namely 11.0%. Limpopo also had the lowest GH average namely 9.0%. Nationally, GM and GH sorghum averaged 9.7% and 10.6% respectively. Graph 21 shows that the highest average total starch content for GM sorghum was reported in Limpopo (76.1%) and the lowest (66.6%) in North West. The highest total starch content for GH sorghum, namely 71.1%, was reported in Mpumalanga and the lowest 69.8% in Limpopo. The weighted total starch content of GM sorghum was 74.0% and that of GH sorghum 70.9%.

Graph 20: Average percentage crude protein per class per province over five seasons



Graph 21: Average percentage total starch per class per province over five seasons



The crude fat content of the crop samples was determined for the second time this season. The national average for GM sorghum was 3.4% and that for GH sorghum 2.8%. The previous season's averages were 3.5% for GM sorghum and 3.0% for GH sorghum.

The crude protein, total starch and crude fat contents of the samples were calculated and reported on a dry basis.

Hunterlab colour determinations were done on a milled fraction of dehulled sample above the 1.8 mm slotted sieve. The Hunterlab spectrophotometer separates the components of reflected color into a three-dimensional colour scale, namely the Hunter L, a, b scale where L represents lightness (100 being white and 0 being black), a represents green to red variation and b represents variation from blue to yellow.

Please see Graphs 22 to 27 for a comparison of the ranges in the L, a, b values obtained on GM and GH sorghum over five seasons. The minimum and maximum values are based on a single composite grading sample's result in a specific season.

Although there are currently no acceptable ranges for these parameters defined, the colour must be within the consumer-acceptable range, which traditionally are products with a slightly pink hue. Not only the dehulling process, but also other traits such as pigmentation differences determine the end product colour.

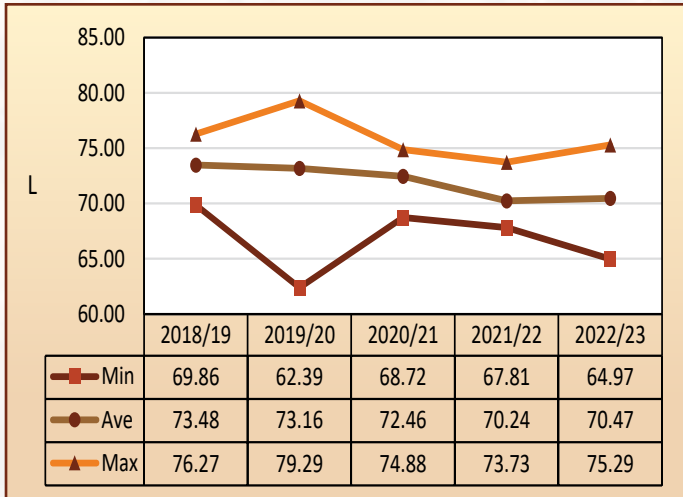
Mycotoxin analyses were performed on all 33 sorghum crop samples. The samples were tested by means of a SANAS ISO/IEC 17025 accredited multi-mycotoxin method using UPLC-MS/MS. With this technique simultaneous quantification and confirmation of Aflatoxin B₁; B₂; G₁; G₂, Fumonisin B₁; B₂; B₃, Deoxynivalenol, 15-ADON, HT-2 Toxin, T-2 Toxin, Zearalenone and Ochratoxin A is possible in one run.

None of the samples tested positive for any of these mycotoxins this season or in the 2017/18, 2019/20 and 2020/21 seasons. One sample from Limpopo tested positive for Fumonisin B₁ residues in the previous season. Fumonisin, Deoxynivalenol (DON) and Zearalenone residues were found on some of the samples of the 2018/19 season. None of the levels however raised any concerns.

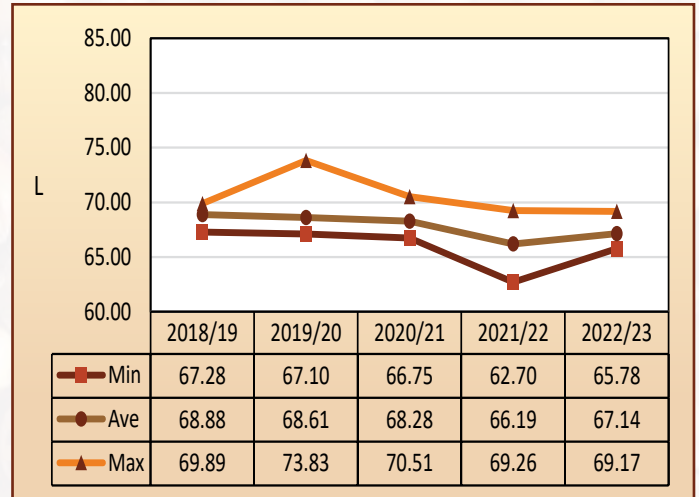
Please see mycotoxin results in Table 10 on pages 32 and 33.

The Methods section of this report on pages 35 to 37 provide a description of the procedures and methodologies followed.

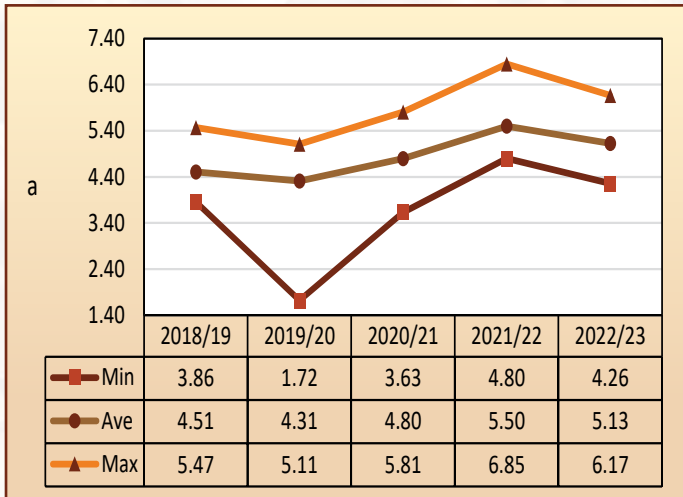
Graph 22: Range of Hunterlab L values on GM sorghum over five seasons



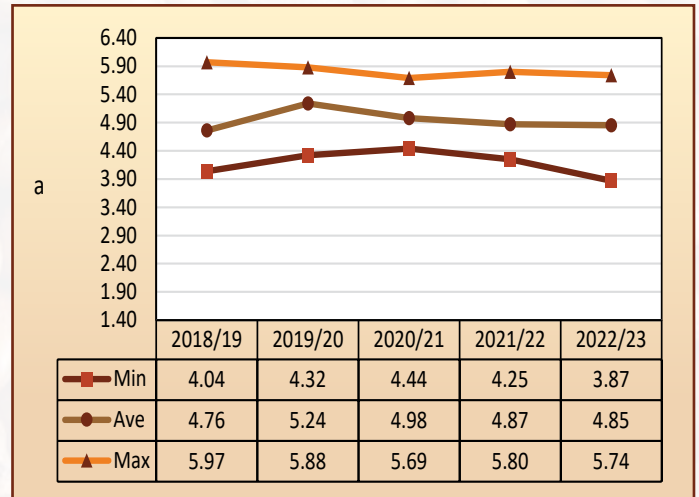
Graph 23: Range of Hunterlab L values on GH sorghum over five seasons



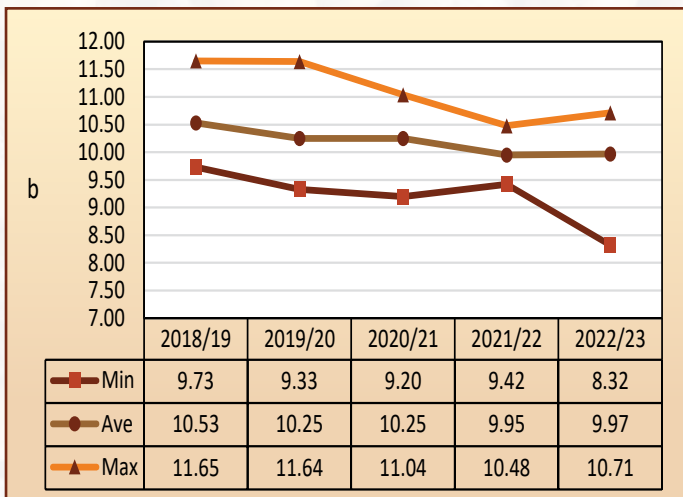
Graph 24: Range of Hunterlab a values on GM sorghum over five seasons



Graph 25: Range of Hunterlab a values on GH sorghum over five seasons



Graph 26: Range of Hunterlab b values on GM sorghum over five seasons



Graph 27: Range of Hunterlab b values on GH sorghum over five seasons

