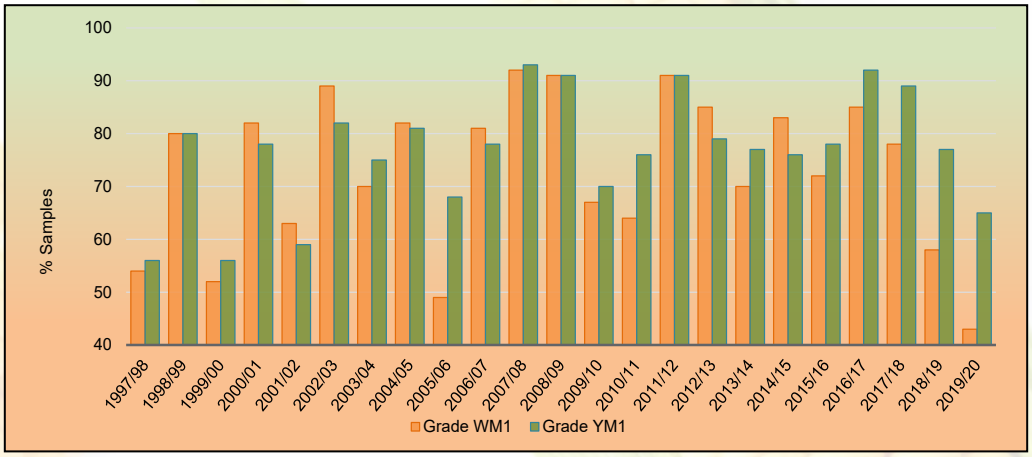
RSA Grading

The maize crop, although the second largest in history, was of below average quality for the second consecutive season. Only 43% of white maize was graded as maize grade one, last season this figure was 58%. 65% of yellow maize was graded as grade one, compared to the 77% of the previous season. Please see Graph 33 for the percentages of samples (white and yellow) per season graded as grade 1, since commencement of the annual maize crop quality survey in 1998.

Graph 33: Percentage samples graded as Grade 1 over seasons



The percentage total defective kernels above and below the 6.35 mm sieve, 10.1% for white and 6.6% for yellow maize, was respectively 1.4% and 1.2% higher than the previous season. Defective white maize kernels above the 6.35 mm sieve made the largest contribution to the increase in the percentage total defective kernels, increasing from 6.8% last season to 8.1% this season. The percentage defective kernels below the 6.35 mm sieve for white maize increased from 1.8% to 2.0% and that of yellow maize from 1.7% to 2.3%. The average percentage Diplodia infected kernels in white maize decreased from 0.4% to 0% this season and in yellow maize from 0.9% to 0%. Fusarium infected kernels increased for both white and yellow maize compared to the previous season, from 0.3% in both white and yellow maize to 0.8% and 0.7% respectively.

The number of white maize samples that were downgraded to class other maize as a result of the percentage foreign matter exceeding 0.75%, increased from 23 samples to 38 samples this season. The number for yellow maize decreased from 18 samples to 14 samples this season. Two white and three yellow maize sample were downgraded as a result of other colour maize that exceeded 10% and 5% (maximum permissable deviation for grade 3) respectively. The average percentage combined deviations of white maize was 10.7% compared to the 9.3% of the 2018/19 season and that of yellow maize 6.9% compared to 5.7% previously.

Please refer to Tables 3 to 7 and Graphs 34 to 36 on pages 34 to 46.

USA Grading

Of the 890 maize samples graded according to USA grading regulations, 30% were graded US1, 25% US2, 16% US3, 11% US4, 7% US5, while sample grade and class mixed corn represented 9% and 2% respectively. The percentage samples graded as US1 varies substantially over seasons, varying from 41% to 51%, 71%, 58% and 64% over the previous five seasons. The percentage samples graded as US2 compared well with the 27% and 29% of the previous two seasons respectively. The main reason for downgrading the samples was (as in previous seasons) the percentage total damaged kernels exceeding the maximum limit per grade, followed by broken corn and foreign material. Please see Tables 8 and 9 on pages 47 to 53.

Physical Quality characteristics

Bushel weight/Test weight is applied as a grading factor in the USA grading regulations and is also routinely done at most intake points locally for stock verification purposes. White maize had an average test weight of 75.6 kg/hl compared to the 76.3 kg/hl of yellow maize. White and yellow maize's average test weight was respectively 0.3 kg/hl and 0.6 kg/hl lower than in the previous season. The test weight in total varied from 63.4 kg/hl to 82.4 kg/hl.

64 samples reported Bushel weight values below the minimum requirement (56.0 lbs or 72.1 kg/hl) for USA grade 1 maize, 20 of these samples were from the North West production regions, 36 from the Free State, seven from Mpumalanga and one from KwaZulu-Natal.

The 100 kernel mass ("as is" basis) of white maize was 34.9 g (33.4 g in 2018/19) and averaged higher than yellow maize (30.4 g, last season 30.6 g) as in previous seasons. The percentage white maize kernels above the 10 mm sieve increased by 3.2% compared to the previous season. The percentage yellow maize kernels above the 10 mm sieve was similar to last season, increasing from 8.3% to 8.4%. The percentage yellow maize kernels above the 10 mm sieve was on average 19.4% lower than white kernels and the percentage yellow kernels below the 8 mm sieve 16.3% higher than that of white maize.

White maize was slightly less susceptible to breakage than during the previous season. The percentage yellow maize below the 6.35 mm and 4.75 mm sieves were equal to the previous season. The percentage stress cracks observed varied overall from 2 to 58% and averaged 16% for white and 13% for yellow maize, previously 17 % and 13% respectively. The average stress crack percentages over the last two seasons were the highest of all the seasons since 1999/00 when stress crack analyses were commenced.

Please refer to Tables 12 to 16 on pages 55 to 65 and Graphs 37 to 40 on pages 65 and 66.

The milling index obtained from the SAGL Milling Index 2020 model, varied from an average of 73 (79 in 2018/19) for white maize to 77 (80 previously) for yellow maize. Grit Yield All (GYA) values averaged 63 for white maize and 64 for yellow maize (64 and 65 respectively in 2018/19).

Roff milling and whiteness index (WI)

The average % extraction of total meal in white maize obtained with the Roff mill, averaged 76.2% (0.2% higher than the previous season) and varied from 65.3% to 80.4%. Please see Graphs 41 to 46 on page 72 for a comparison of the different fractions percentages as well as the percentage total meal extraction obtained on the Roff mill since 2012/13.

The whiteness index averaged 31.8 for unsifted and 21.8 for sifted maize meal. Sieving the sample eliminates differences in the readings as a result of particle size. The whiteness index of the previous season averaged 30.2 and 20.3 for unsifted and sifted maize meal respectively.

The higher the WI value obtained, the whiter the meal sample. The main contributing factors causing differences in WI values are the presence of other colour maize like yellow maize, the presence of defective kernels, the type of cultivar as well as the soil composition. The two samples with the lowest sifted whiteness index values this season, namely -19.06 and -17.02, also had the highest percentages other colour maize, namely 18.3% and 13.5% respectively. Please see Tables 17 and 18 on pages 67 to 71.

Nutritional Values

The maize industry requested that crude fibre be added to the scope of analysis performed on the annual maize crop quality survey. With the assistance of Foss, a calibration was developed on the Infratec 1241 Grain Analyser (NIT) during the 2017/18 season. The calibration will be updated annually with the latest season's results.

The average fat content of white maize equaled the 4.0% of the previous season. Yellow maize averaged 3.9%, 0.1% lower than the previous two seasons. The 10-year average fat content of white maize is 4.1% and that of yellow maize 3.9%. The average protein content of yellow maize was 9.0%, while white maize averaged 8.4%, the lowest since the 2010/11 season. The 10-year average for yellow and white maize respectively is 9.0% and 8.8%.

The average starch contents of both white maize (73.2%) and yellow maize (72.3%) was 0.4% lower than in the previous season. Ten-year averages for white and yellow maize are 73.0% and 72.8% respectively. The average crude fibre content of white maize was equal to last season's 1.9% and that of yellow maize was 0.1% lower at 1.9%.

The fat, starch, protein and crude fibre nutritional components are reported as % (g/100 g) on a dry base.

Please refer to Tables 19 to 22 on pages 73 to 79 and Graphs 47 to 49 on page 80.

Genetic Modification (GM)

The SAGL used the EnviroLogix QuickComb kit for bulk grain, to screen 70 of the crop samples in order to quantitatively determine the presence of genetically modified maize (Cry1Ab, Cry2Ab and/or CP4 EPSPS traits). 86% of the samples tested positive for the Cry1Ab trait, 97% for Cry2Ab and 91% for the CP4 EPSPS trait.

The sensitivity of the measurements for Cry1Ab using the above-mentioned kit is 0.8%, i.e. approximately 6 GM kernels in 800 conventional maize kernels. The limit of detection (LOD) for measurements of the Cry1Ab protein is 0.4%.

The sensitivity of the measurements for Cry2Ab using the above-mentioned kit is 0.9%, i.e. approximately 8 GM kernels in 800 conventional maize kernels. The limit of detection (LOD) for measurements of the Cry1Ab protein is 0.5%.

The sensitivity of the measurements for CP EPSPS using the above-mentioned kit is 0.5%, i.e. 4 GM kernels in 800 conventional maize kernels. The limit of detection (LOD) for measurements of the Roundup Ready protein is 0.25%.

Values higher than 5%, the highest value of the detection range for all three traits, are reported as > 5%.

Important to remember is that the crop quality samples received and analysed by the SAGL are composite samples per class and grade, made up of individual deliveries to grain silos.

Please see Table 23 on page 81 for the results obtained as well as page 106 for a summary of the Events and Trade names/Brands represented by these three traits.

Mycotoxins

Aflatoxin (B_1) residues were found on a yellow maize sample from region 12. This is only the third season that Aflatoxin residues are detected by SAGL on maize crop samples since the implementation of the UPLC-MS/MS technique in 2010. Last season, Aflatoxin B_1 and G_1 residues were found on a white maize sample from region 23. During the 2014/15 season, Aflatoxin B_1, B_2, G_1 and G_2 residues were found on one sample and B_1 as well as B_1 and B_2 residues on two more samples respectively.

The average Fumonisin level (Sum of B_1, B_2 and B_3) on all 350 samples tested was 143 µg/kg (ppb), compared to the previous season's average of 298 µg/kg. Levels ranged from not detected (ND) to 5 928 µg/kg. Of the 350 samples tested, 121 samples (35%) tested positive for fumonisin levels and the average of these positive results was 413 µg/kg. The previous season, 43% of the samples tested positive, with an average of 689 µg/kg.

The highest Deoxynivalenol (DON) level detected this season was 7 700 µg/kg, compared to the 11 181 µg/kg of last season. The average level of all samples tested this season was 656 µg/kg, 424 µg/kg the previous season. Both the percentage of positive results as well as the average of the positive results increased this season. 68% of the samples tested positive for DON last season with the average of the positive results 627 µg/kg. This season, 85% of the samples tested positive with an average of 768 µg/kg.

34% of the samples tested positive for 15-acetyl-deoxynivalenol (15-ADON) residues, double that of the previous season. The average of the positive results was 238 µg/kg compared to 218 µg/kg in the previous season.

Zearalenone residues were found in 13% of the samples, 10% during the previous season. Values ranged from ND to 539 µg/kg. The average of the positive samples was 70 µg/kg compared to the 98 µg/kg of the previous season.

None of the 350 samples tested positive for Ochratoxin A, HT-2 or T-2 toxin residues.

Mycotoxin levels lower than the limit of quantitation (< LOQ) as well as limit of detection (< LOD) were seen as having tested negative for calculation purposes. Please see mycotoxin results in Table 24 on pages 89 to 100.