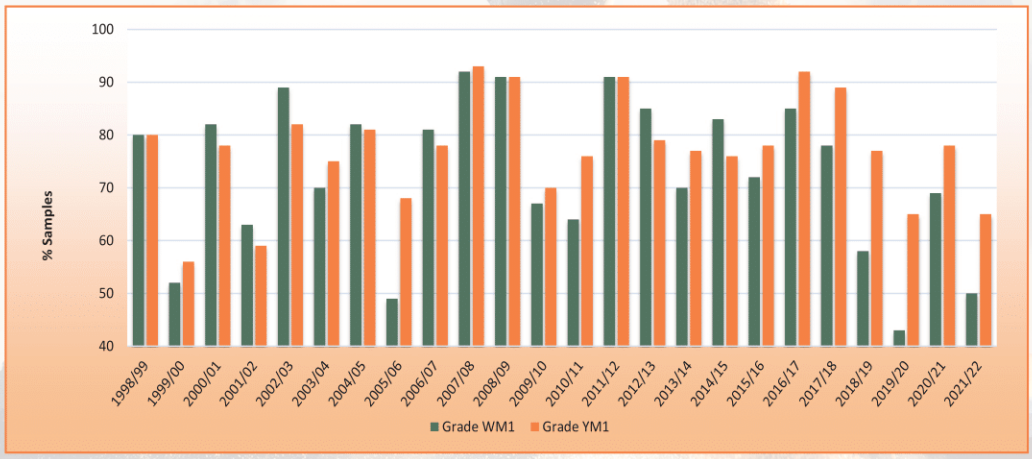
Maize Crop Quality 2021/22 - summary of results

RSA Grading

Based on the results reported on the 2021/22 season's crop samples, the maize crop was of below average quality. 50% of white maize samples received for the purpose of the crop quality survey was graded as maize grade one, last season this figure was 69%. 65% of yellow maize samples received and graded was graded as grade one, compared to the 78% 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, 7.6% for white and 6.7% for yellow maize, was respectively 1.5% and 2.5% higher than the previous season. Defective white maize kernels above the 6.35 mm sieve increased by 2.7% to 5.7% and yellow maize increased by 2.2% to 4.3%. The percentage defective kernels below the 6.35 mm sieve for white maize decreased slightly from 2.1% to 1.9% and that of yellow maize increased slightly from 2.1% to 2.3%. The average percentage Diplodia infected kernels in white and yellow maize was 1.2% and 1.5% respectively this season, the previous season the average for both was 0%. Fusarium infected kernels of white maize were 1.7% compared to the 0.8% of 2020/21 and that of yellow maize 1.6% compared to 0.6% previously.

The percentage of white maize samples that were downgraded to class other maize as a result of the percentage foreign matter exceeding 0.75%, increased from 5% (29 samples) to 6% (34 samples) this season. The percentage for yellow maize equaled last season's 5% (23 and 21 samples respectively). No samples were downgraded as a result of other colour maize exceeding the 10% and 5% maximum permissable deviation for grade 3 white and yellow maize respectively. The average percentage combined deviations of white maize was 8.0% compared to the 5.6% of the 2020/21 season and that of yellow maize 6.9% compared to 4.5% previously.

Please refer to Tables 3 to 7 and Graphs 34 to 36 on pages 35 to 48.

USA Grading

Of the 1 000 maize samples graded according to USA grading regulations, 27% were graded US1, 31% US2, 15% US3, 12% US4, 8% US5, while sample grade and class mixed corn represented 6% and 1% respectively. The percentage samples graded as US1 varies substantially over seasons, varying from 62% to 30%, 41%, 51% and 71% over the previous five seasons. The percentage samples graded as US2 was higher than the 21% and 25% of the previous two seasons. Grades 3, 4 and 5 as well as sample grade also reported increases in the percentage samples compared to a number of previous seasons. 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 49 to 56.

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 75.5 kg/hl compared to the 75.4 kg/hl of yellow maize. The average test weights of white and yellow maize were respectively 0.4 kg/hl and 1.1 kg/hl lower than in the previous season. The test weight in total varied from 56.6 kg/hl to 83.9 kg/hl.

68 samples (6.8%) reported Bushel weight values below the minimum requirement (56.0 lbs or 72.1 kg/hl) for USA grade 1 maize. One sample each originated in the Eastern Cape and Vaalharts regions, 37 were from the North West production regions, 17 from the Free State, eight from Mpumalanga and two each from Gauteng and KwaZulu Natal. In the previous season 2.1% of the samples were below the minimum requirement.

The 100 kernel mass ("as is" basis) of white maize was 35.1 g (33.3 g in 2020/21) and averaged higher than yellow maize's 31.1 g (last season 31.2 g). This trend is also observed in previous seasons. The percentage white maize kernels above the 10 mm sieve (28.2%) increased by 6.6% compared to the previous season. The percentage yellow maize kernels above the 10 mm sieve (9.4%) was 2% higher than last season. The percentage yellow maize kernels above the 10 mm sieve was on average 18.8% lower than white kernels and the percentage yellow kernels below the 8 mm sieve 14.9% higher than that of white maize.

The percentages maize below the 6.35 mm and 4.75 mm sieves provides an indication of the breakage susceptibility. White maize was slightly more susceptible to breakage than during the previous season and the same can also be said for yellow maize. The percentage stress cracks observed varied overall from 0 to 50% and averaged 11%. White and yellow maize both also averaged 11%, the previous season both averaged 12%.

Please refer to Tables 12 to 16 on pages 58 to 68 and Graphs 37 to 40 on pages 68 and 69.

The milling index obtained from the SAGL Milling Index 2022 model, varied from an average of 68 (73 in 2020/21) for white maize to an average of 72 (76 previously) for yellow maize. Grit Yield All (GYA) values averaged 62 for white maize and 63 for yellow maize, 63 and 64 respectively in the previous season.

Roff milling and whiteness index (WI)

The average % extraction of total meal in white maize obtained with the Roff mill, averaged 76.2% (1.4% lower than the previous season) and varied from 63.5% to 81.4%. Please see Graphs 41 to 46 on page 75 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 season when the development of the new model for Milling Index was commenced.

The whiteness index averaged 38.9 for unsifted and 35.7 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 36.3 and 27.0 for unsifted and sifted maize meal respectively.

The higher the WI value, 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 spread of the results this season, both sifted and unsifted, were less than in previous seasons. Please see Tables 17 and 18 on pages 70 to 74.

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 is updated annually with the latest season's results.

The average fat content of white maize equaled the 4.0% of the previous three seasons. Yellow maize averaged 3.9%, 0.1% lower than the previous season. The 10-year average fat content of white maize is 4.1% and that of yellow maize 4.0%. The average protein content of yellow maize was 8.4%, while white maize averaged 8.0%, both the lowest levels 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 (76.0%) and yellow maize (75.1%) were 0.5% and 0.4% respectively higher than in the previous season. Ten-year averages for white and yellow maize are 73.6% and 73.1% respectively. The average crude fibre content of white maize was 2.2% and that of yellow maize 2.3%, similar to the previous season.

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 76 to 82 and Graphs 47 to 49 on page 83.

Genetic Modification (GM)

The SAGL used the EnviroLogix QuickComb kit for bulk grain, to screen 60 of the crop samples in order to quantitatively determine the presence of genetically modified maize (Cry1Ab, Cry2Ab and/or CP4 EPSPS traits). 88% of the samples tested positive for the Cry1Ab trait, 92% for Cry2Ab and 98% 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 84 for the results obtained as well as page 109 for a summary of the Events and Trade names/Brands represented by these three traits.

Mycotoxins

None of the 350 samples analysed this season, tested positive for Aflatoxin or Ochratoxin A residues.

This season T2- toxin and HT-2 toxin residues were found for the first time since the 2012/13 season. Two samples, a yellow maize sample collected in Mpumalanga and a white maize sample from KwaZulu Natal reported 28 µg/kg T2-toxin and 93 µg/kg HT-2 toxin and 30 µg/kg T2-toxin and 47 µg/kg HT-2 toxin respectively.

The average Fumonisin level (Sum of B_1, B_2 and B_3) on all 350 samples tested was 111 µg/kg (ppb), compared to the previous season's average of 100 µg/kg. Levels ranged from not detected (ND) to 18 301 µg/kg. The second highest value detected was 2 286 µg/kg. Of the 350 samples tested, 55 samples (16%) tested positive for fumonisin levels and the average of these positive results was 709 µg/kg. The previous season, 22% of the samples tested positive, with an average of 459 µg/kg.

The highest Deoxynivalenol (DON) level detected this season was 6 879 µg/kg, compared to the 3 256 µg/kg of last season. The average level of all samples tested this season was 621 µg/kg, 279 µg/kg the previous season. Both the percentage of positive results as well as the average of the positive results increased this season and compared with the results of the 2019/20 season. 64% of the samples tested positive for DON last season with the average of the positive results 434 µg/kg. This season, 83% of the samples tested positive with an average of 749 µg/kg.

31% of the samples tested positive for 15-acetyl-deoxynivalenol (15-ADON) residues, compared to 18% the previous season. The average of the positive results was 211 µg/kg compared to 176 µg/kg in the previous season.

Zearalenone residues were found in 16% of the samples, 3% during the previous season. Values ranged from ND to 428 µg/kg. The average of the positive samples was 58 µg/kg compared to the 38 µg/kg of the previous season.

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 92 to 103.