Maize Crop Quality 2016/2017 - summary of results

RSA Grading

The maize crop was of very good quality, with 85% of white and 92% of yellow maize, graded as maize grade one, compared to the 72% and 78% of the 2015/2016 season. The percentage total defective kernels above and below the 6.35 mm sieve, 4.7% for white and 4.4% for yellow maize, was 1.5% and 1.3% respectively lower than the previous season. The percentages Diplodia as well as Fusarium infected kernels on both white and yellow maize were between 0.2% and 0.4% lower than in the previous season.

Foreign matter did not pose significant problems, with seven white and three yellow maize samples downgraded to class other maize due to foreign matter exceeding 0.75%. Only one yellow maize sample was downgraded as a result of other colour maize that exceeded 5%. The average percentage combined deviations of white maize was 5.1% compared to the 6.7% of the 2015/2016 season, that of yellow maize was slightly lower, 4.7% compared to 6.0% previously.

Please refer to Tables 3 to 7 on pages 30 to 38.

USA Grading

Of the 1 000 maize samples graded according to USA grading regulations, 70.5% were graded US1, 20.1% US2, 4.5% US3, 1.6% US4, 1.5% US5, while sample grade and class mixed corn represented 1.0% and 0.8% respectively. The percentage samples graded as US1 varies substantially over seasons, comparing 71% to 58%, 64%, 42% and 79% over the previous four seasons. The percentage samples graded as US2 was similar to the 22% and 23% of the previous two seasons respectively. The main reason for downgrading the samples was 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 40 to 44.

Physical Quality factors

Bushel weight/Test weight is applied as a grading factor in the USA grading regulations, but is also routinely done at most intake points locally. White maize had an average test weight of 77.7 kg/hl compared to the 76.9 kg/hl of yellow maize. White maize's average test weight was 0.3 kg/hl lower than the previous season and that of yellow maize 0.2 kg/hl higher. The test weight in total varied from 67.6 kg/hl to 82.4 kg/hl. Only 25 samples reported Bushel weight values below the minimum requirement (56.0 lbs or 72.1 kg/hl) for USA grade 1 maize, 14 of these samples were from Mpumalanga, five from the Free State, three from Gauteng, two from North West and one from KwaZulu-Natal.

The 100 kernel mass ("as is" basis) of white maize (35.0 g) averaged higher than yellow maize (33.5 g) as in previous seasons. The kernel size of white maize was larger and that of yellow maize smaller than the previous season. The percentage yellow maize kernels above the 10 mm sieve were on average 10.7% lower than white kernels and the percentage kernels below the 8 mm sieve 9.3% higher than that of white maize. White maize kernels were larger than in the previous two seasons, while the yellow maize kernels were still some of the smallest the past ten seasons.

Both white and yellow maize were slightly more susceptible to breakage than during the previous season. The percentage stress cracks observed varied overall from 0 to 50%, and averaged 8% for both white and yellow maize, 3% higher than in the previous season.

Please refer to Tables 12 to 16 on pages 46 to 54.

The milling index obtained from the SAGL Milling Index 2017 model, varied from an average of 80.2 for white maize to 76.8 for yellow maize. Grit Yield All (GYA) values averaged 64.8 for white maize and 64.0 for yellow maize. Please see page 95 under the Methods Section for more information on this new parameter which is reported for the first time this season.

Roff milling and whiteness index (WI)

The average % extraction of total meal in white maize obtained with the Roff mill averaged 78.6% (0.2% higher than the previous season) and varied from 69.7% to 81.7%.

The whiteness index averaged 25.4 for unsifted and 17.4 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 26.1 and 17.5 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 sample with the lowest sifted whiteness index value of -17.5 this season, also had the highest percentage other colour maize namely 7.0%. Please see Tables 17 and 18 on pages 56 to 59.

Nutritional Values

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

In general, white maize tends to have a higher fat content than yellow maize, but a lower starch content (except for the two latest seasons). No clear trend can be observed with regards to the protein content.

The average fat content of white maize was 0.1% higher than the 4.1% of both the previous season as well as the average fat content of yellow maize this season. The protein content of yellow maize averaged 8.9%, which was 0.2% higher than that of white maize. The protein content of yellow maize was on average 0.8% lower than in the previous season and that of white maize 1.0% lower than in the 2015/2016 season. The protein contents however compare very well with the 10-year averages.

The average starch content of white maize (74.1%) was 1.5% higher than in the previous season and yellow maize (73.7%) 1.4% higher. Both are also higher than the 10-year averages.

Please refer to Tables 19 to 22 on pages 60 to 65.

Genetic Modification (GM)

The SAGL screened 100 of the crop samples to test for the presence of the Cry1Ab, Cry2Ab and/or CP4 EPSPS traits. Important to remember is that the crop quality samples received by the SAGL are composite samples per class and grade, made up of individual deliveries to grain silos.

SAGL used the EnviroLogix QuickComb kit for bulk grain to quantitatively determine the presence of genetically modified maize.

The detection range for the Cry1Ab trait is 0.4% to 5%. 98% of the samples tested positive for Cry1Ab with values larger than 0.4% (Limit of quantification (LOQ)).

The detection range for the Cry2Ab trait is 0.5% to 5%. 84% of the samples gave values larger than the LOQ of 0.5% (positive results).

The detection range for the CP4 EPSPS trait is 0.25% to 5%. All of the samples (100%) tested positive for CP4 EPSPS with values larger than 0.25% (LOQ).

Values higher than 5%, the highest value of the detection range for all three traits, are reported as > 5%. This methodology has a precision coefficient of variation of 20%.

Please see Table 23 on page 67 for the results obtained as well as page 96 for a summary of the Events and Trade names/Brands represented by these three traits.

Mycotoxins

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

The average Fumonisin level (Sum of B_1, B_2 and B_3) on all 350 samples tested, was 191 µg/kg (ppb) and ranged from not detected (ND) to 6 059 µg/kg. This average is lower than the previous season's 325 µg/kg. Of the 350 samples tested, 155 samples (44%) tested positive for fumonisin levels and the average of these positive results was 431 µg/kg. The previous season, 57% of the samples tested positive, with an average of 569 µg/kg.

The highest Deoxynivalenol (DON) level detected was 7 698 µg/kg, compared to the 1 585 µg/kg of last season. The average level of all samples tested this season was 339 µg/kg, 56 µg/kg the previous season. 21% of the samples tested positive for DON last season compared to 37% this season. The average of the positive results increased from 259 µg/kg in 2015/2016 to 919 µg/kg in 2016/2017.

16% of the samples tested positive for 15-acetyl-deoxynivalenol (15-ADON) residues. The average of the positive results was 254 µg/kg compared to 163 µg/kg in the previous season.

Zearalenone residues were found in 8% of the samples and values ranged from ND to 399 µg/kg. The average of the positive samples was 89 µg/kg compared to the 49 µg/kg of the previous season when 5% of the samples tested positive.

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 79 to 90.