Maize Crop Quality 2014/2015 - summary of results

RSA Grading

The maize crop was of good quality, with 83% of white and 76% yellow maize, graded as maize grade one. The percentage total defective kernels above and below the 6.35 mm sieve, 5.3% for white and 5.8% for yellow maize was respectively 1.0% and 0.3% lower than the previous season. The percentage defective kernels above the sieve decreased compared to 2013/2014, but the percentage defective kernels below the sieve increased. The percentages Diplodia as well as Fusarium infected kernels were 0.3% and 0.6% lower than the previous season's 1.0% and 1.5% respectively.

Foreign matter (0.1%) and other colour maize (0.3%) did not pose significant problems, with only two white and one yellow maize sample downgraded to class other due to foreign matter and eight yellow maize samples downgraded as a result of other colour maize exceeding 5%. The average percentage combined deviations of white maize was 5.8% compared to the 6.8% of the 2013/2014 season, that of yellow maize was also slightly lower, 6.2% compared to 6.4%.

Please refer to Table 5 on page 33.

USA Grading

Of the 1 000 maize samples graded according to USA grading regulations, 64% were graded US1, 23% US2, 6% US3, 2% for both US4 and US5, while sample and mixed grades represented 1% and 2% respectively. The percentage samples graded as US1 was significantly higher than the 42% of the previous season but lower than the 79% of the 2012/2013 season. The percentage samples graded as US2 was also lower than the 31% of the previous season. The main reason for downgrading the samples were the percentage total damaged kernels exceeding the maximum limit per grade followed by broken corn and foreign material.

Physical Quality factors

Bushel weight/Test weight is applied as a grading factor in the USA grading regulations, but also routinely done at most intake points locally. White maize had an average test weight of 78.3 kg/hl compared to the 76.3 kg/hl of yellow maize. The test weight in total varied from 67.3 kg/hl to 83.1 kg/hl and averaged 77.3 kg/hl, slightly higher than the ten year average. Only 29 samples reported values below the minimum requirement (56.0 lbs or 72.1 kg/hl) for USA grade 1 maize, 22 of these samples were from Mpumalanga, four from North West, two from Gauteng and one from the Free State.

The 100 kernel mass averaged 29.8 g which is 3.1 g lower than the previous season and also 2.0 g lower than the ten year average. As in previous seasons, white maize (31.1 g) averaged higher than yellow maize (28.6 g). The kernel sizes of both white and yellow maize were smaller than the previous season. The percentage yellow maize kernels above the 10 mm sieve were on average 6.6% lower than white kernels and the percentage kernels below the 8 mm sieve 9.4% higher than that of white maize. The kernel sizes observed this season were some of the smallest the past ten seasons.

Both white and yellow maize were less susceptible to breakage than during the previous season, the largest difference (< 6.35 mm) of 0.6% between the two seasons were observed on yellow maize. The percentage stress cracks observed varied from 0 – 61%, averaged 6% and was a percent lower than in the previous season. White maize averaged 6% and yellow maize 5%.

Please refer to Table 15 on page 51.

The milling index varied from 50.2 to 123.5 and averaged 97.6, 6.7 higher than the previous season. The average milling index for white maize is higher (100.4) than that of yellow maize (95.0).

Roff milling and whiteness index (WI)

The average % extraction of total meal in white maize obtained with the Roff mill averaged 78.7% (0.3% lower than the previous season) and varied from 69.0% to 84.3%.

The whiteness index averaged 22.9 for unsifted and 14.9 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 25.3 for unsifted maize meal. Sifted maize meal averaged 15.6.

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 of -27.9 this season also had the second highest percentage of other colour maize namely 9.6%. The sample with the highest occurrence of other colour maize was a yellow maize sample.

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. No clear trend can be observed with regards to the protein content.

The average fat content of the 2014/2015 crop samples was 4.1%, 0.2% higher than in the previous season as well as the weighted ten year average. The average protein content of 9.4% was the highest since the 2006/2007 season and 0.8% higher than last season. The ten year weighted average is 8.7%. The starch content this season decreased on average with 0.2% compared to the previous season and is 0.2% higher than the ten year weighted average of 72.6%.

The fat content of white maize was 0.2% higher than both the previous season and the average of yellow maize (4.0%). The protein content of yellow maize was 0.1% higher than that of white maize (9.4%) and almost a percent higher than in 2013/2014, white maize's protein content increased 0.8% year on year. The ten year weighted average of both white and yellow maize is 8.7%. The starch contents of white and yellow maize are 0.3% and 0.2% respectively lower than the previous season.

Please refer to Table 20 on page 64.

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%. 94% 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%. 81% 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%. 98% of the samples 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 21 on page 66 for the results obtained as well as page 91 for a summary of the Events and Trade names/Brands represented by these three traits.

Mycotoxins

Aflatoxin (G_1, B_1, G_2, B_2) residues were found on one sample and B_1 residues on two more samples. This is the first season that Aflatoxin residues were detected on maize crop samples analysed by SAGL since the implementation of the UPLC-MS/MS technique in 2010.

The average Fumonisin level (Sum of B_1, B_2 and B_3) on all 350 samples tested was 224 µg/kg (ppb) and ranged from 0 (not detected (ND)) to 3 382 µg/kg. This average is higher than the previous season's 186 µg/kg. Of the 350 samples tested, 197 samples (56%) tested positive for fumonisin levels and the average of these positive results was 397 µg/kg. The previous season, 41% of the samples tested positive, with an average of 456 µg/kg.

The highest Deoxynivalenol (DON) level detected was 9 736 µg/kg compared to the 6 134 µg/kg of last season. The average level of all samples tested this season was 183 µg/kg, 289 µg/kg the previous season. Sixty nine percent of the samples tested positive for DON last season compared to 41% this season. The average of the positive results increased from 417 µg/kg in 2013/2014 to 447 µg/kg in 2014/2015.

Eleven percent of the samples tested positive for 15-acetyl-deoxynivalenol (15-ADON) residues. The average of the positive results was 251 µg/kg compared to 182 µg/kg in the previous season.

Zearalenone residues were found in 11% of the samples and values ranged from 0 (ND) to 337 µg/kg. The average of the positive samples was 60 µg/kg compared to the 78 µg/kg of the previous season when 12% of the samples tested positive.

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 22 on pages 74 to 85.