

**THE SOUTHERN AFRICAN GRAIN LABORATORY NPC
DIE SUIDER AFRIKAANSE GRAANLABORATORIUM NPC**

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Enquiries: Wiana Louw

20 February 2024

FOR ATTENTION: Ms. Beatrix de Witt

Trust Administrators

THE CHAIRMAN

THE MAIZE TRUST

C/o L&L Agricultural Services

477 Whiterite Road

The Willows

0040

Dear Madam

FINAL PROGRESS REPORT CONCERNING A PROJECT FUNDED BY THE TRUST

Herewith the final progress report for the project titled: *SOUTH AFRICAN MAIZE CROP QUALITY SURVEY FOR THE 2021/2022 SEASON.*

No imported maize samples were received for analysis during the 2022/2023 marketing season.

The SAGL would like to thank the Maize Trust for their approval and allocation of funds for the annual South African Maize Crop Quality Survey since 1997/1998. All these projects have been completed successfully and within the set timeframe.

Please do not hesitate to contact us should you require additional information.

Yours sincerely

Wiana Louw
GENERAL MANAGER

DIRECTORS: B. Mokgatle (Chairman), E. Briedenhann (Vice Chairman), D.B. Strydom (Executive Committee Member), G.L. Roos, E.H. Potgieter, C. Binnion, W.J. Lemmer, W.J. Groothof, A. v d Vyver, L. Breytenbach

GENERAL MANAGER: Wiana Louw

FINAL PROGRESS REPORT CONCERNING A PROJECT FUNDED BY THE TRUST

It is with pleasure that SAGL report as follows:

(a) PROJECT NAMES:

SOUTH AFRICAN COMMERCIAL MAIZE CROP QUALITY SURVEY FOR THE 2021/2022 SEASON

Project leader:

W. Louw (On behalf of the SAGL)

(b) ACTIONS TAKEN:

Procedures were e-mailed to all Agbiz Grain members detailing the process for the taking of representative samples for this Quality Survey on the 16th of May 2022. Sample submission was telephonically followed up on a continuous basis.

(c) PROGRESS:

Communication received from the Maize Trust in a letter dated 1 July 2022 indicated that only 72% of the funding applied for has been approved for this project, the number of samples to be analysed had to be reduced.

As a result, the total number of samples for analysis was reduced to 690 (1 000 in the application). The number of white maize samples included in the survey was reduced from 520 to 360, the number of samples for multi-mycotoxin analysis was reduced from 350 to 275 and that for GMO analysis from 100 to 60 samples.

A letter from the Maize Trust dated 20 December 2022, stated that the initial approval by the Trustees of the Maize Trust at the June 2022 meeting had been revised. At a meeting on the 29th of November 2022, the Board of Trustees decided to approve the total amount according to the project application.

Following this decision, an additional number of samples were selected and registered to a total of 1 000 samples, during December 2022. This included 524 white maize samples and 350 samples for mycotoxin analyses.

All crop quality analyses were completed and the results made available on the SAGL's website. The first results were available on the SAGL website on the 8th of July 2022. All the results (excluding the mycotoxin results) were available on the SAGL's website by the 31st of March 2023. The final mycotoxin result update was done on the 19th of May 2023. Individual results were e-mailed to the respective grain storage companies on a weekly basis.

The report has been finalised and was available on the SAGL website from the 29th of September 2023.

(d) RESULTS:

A total of 1 000 composite samples, representing white and yellow maize of each production region, were registered and analysed for quality. The samples comprised of 524 white and 476 yellow maize samples.

The average, minimum and maximum values of all samples per class and grade of both white and yellow maize from each production region are calculated and reported in respect of every quality parameter measured. Averages are compared to averages of previous seasons and graphs that show tendencies over seasons are also included in the report.

RSA GRADING

The maize crop, the third largest on record, 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.

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 was 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 permissible 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.

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.

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. White and yellow maize's average test weight was 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%.

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%.

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 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 spread of the results this season, both sifted and unsifted, were less than in previous seasons.

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 level 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 (75.5%) and yellow maize (74.7%) 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 than in the previous season.

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

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.

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. 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 B₁, B₂ and B₃) 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 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 well 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.

(e) PROBLEMS ENCOUNTERED:

The timelines for the availability of results and completion of the crop quality report had to be postponed by approximately five months.

(f) MILESTONES NOT BEEN ACHIEVED:

None.

(g) ADEQUACY OF FUNDING:

The project was successfully completed within the allocated budget.

The statement of funds granted by the Trust is attached to this report.

(h) UTILISATION OF RESULTS:

- ✓ Data highlights possible differences in the quality of commercial maize produced in different regions for the purpose of local marketing.
- ✓ Data provides important information on the quality of commercial maize intended for export.
- ✓ Data serves as basis for comparison between quality of local maize and imported maize.
- ✓ Data can reveal general tendencies over seasons.

- ✓ Data adds value to research projects and can be used as basis to direct future research projects.
- ✓ Data can be used when grading regulations needs to be revised or when new quality norms are investigated.
- ✓ The annual maize crop quality surveys provide an ideal opportunity to evaluate the occurrence status of mycotoxins throughout all production regions in South Africa.
- ✓ Reliable analytical data is accumulated to establish a database to enable industry to comment on proposed legislative levels and to supply reliable data for targeted research project to effectively manage the mycotoxin levels in maize.

(i) DISTRIBUTION OF REPORTS:

The report is available on the SAGL website (www.sagl.co.za) in an easy-to-page format. It can also be downloaded as a PDF document. Notifications with regards to the availability of the reports were sent out via Mailchimp to Directly Affected Groups and interested parties in the grain industry on the 9th of October 2023. Hard copy reports were available from the 12th of October 2023. Eight hard copies of the report as well as a copy on CD-ROM will be submitted to the Trust.



SAGL

The Southern African Grain Laboratory NPC

Registered Number: 1997/018518/08

SAGL		STATEMENT		2023/12/14	
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VAT Reg No: 444 016 9821 The Maize Trust P.O.Box 74626 Lynnwood Ridge Pretoria 0040		Account number MAI001		REFERENCE : Beatrix De Witt Enquiries: Janet Stolp / Natasja Lamprecht	
	Date	Amount Approved (Excl. VAT)	Amount Paid (Excl. VAT)	Amount to be paid (Excl. VAT)	
Maize crop quality survey 2021/2022					
Applied		R 4,803,705			
Approved 1 June 2022		R 3,478,261			
Approved 29 Nov 2022		R 1,325,444			
Payment received - July 2022			R 2,086,957		
Payment received - Nov 2022			R 1,756,008		
Payment 20%				R 960,741	
Maize Crop Quality 2021/2022					
Money was spent as indicated:					
1000 Samples(grading,nutrient,physical tests)	R 3,097,124				
524 White samples(roff-milling,whiteness index)	R 450,904				
109 Crude fibre	R 64,320				
350 Mycotoxin	R 904,594				
GMO	R 37,393				
Print & distribution of report	R 29,738				
Courier costs	R 69,367				
Web maintenance / Compiling / processing / administration of report	R 150,266				
TOTAL SPENT	R 4,803,706				
Total(VAT exclusive) approved	R 4,803,705				
Difference	R -0				
TOTAL DUE		R 4,803,705	R 3,842,964	R 960,741	
Banking details: The Southern African Grain Laboratory		SAGL	Standard Bank Branch code 051001 Account No 012184454	BANK: Payments Ref No MAI001	

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2023/12/14