Mycotoxins

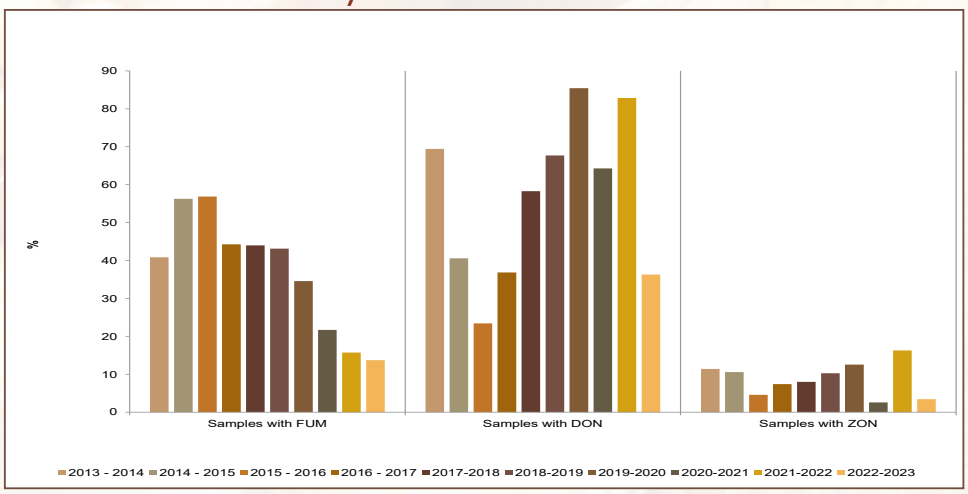
The results of thirteen mycotoxins, including Aflatoxin B_1, B_2, G_1 and G_2, Fumonisin (FUM) B_1, B_2 and B_3, Deoxynivalenol (DON), 15-acetyl-deoxynivalenol (15-ADON), Ochratoxin A, T2-toxin, H-T2 toxin and Zearalenone (ZON), are reported in 350 maize samples selected from the 1000 maize crop samples of the 2022/23 season. Multi-mycotoxin monitoring in locally produced maize has been included in the maize crop quality survey since the 2010/11 maize production season, thus for a total of 13 seasons to date. The samples were representatively selected for white and yellow maize from all the production regions, representing approximately 35 - 40% of the survey samples.

In this season, 46% (161 samples) of the selected samples contained at least one mycotoxin, mainly DON (36%), FUM (14%) and ZON (3%). In the three main production regions occurrence ranged from 38% in North West, 39% in the Free State and 53% in Mpumalanga. In KwaZulu Natal, the Northern Cape, Limpopo and Gauteng mycotoxins were found in 69%, 57%, 55% and 48% of the samples respectively. Two of the three samples collected in Region 6 in the Western Cape were analysed and one was contaminated with FUM B_1, B_2 and B_3. Only DON was found in the three tested samples collected in Region 8 in the Eastern Cape.

The 39% decrease in occurrence this season (when compared to the 2021/22 season), was mainly due to a large decrease in the DON and ZON prevalence that occurred (See Graph 51). The FUM occurrence (14%) reported this season is the smallest in the 13 consecutive seasons in both white and yellow maize. Only the last ten seasons' results were included in the graphs.

No aflatoxins were found this season. In the 13 years of this survey (350 samples/year), aflatoxins were only found in one yellow maize and four white maize samples. No ochratoxin A was reported since the survey began in 2010/11. None of the samples contained T2-toxin and HT-2 toxin this season. These toxins were only reported in two samples in 2021/22.

Graph 51: Percentage white and yellow maize samples that tested positive for mycotoxins over ten seasons



The results of the mycotoxins found, including the concentration ranges and notable trends in the mean concentration levels in white and yellow maize in the different provinces, are summarised as follows:

Deoxynivalenol and 15-ADON

- Approximately 36% white maize and 37% yellow maize samples were contaminated with DON, a notable decrease compared to the previous six seasons. The DON concentration ranges are summarised in Graph 52 (white maize) and Graph 53 (yellow maize).
- Only one white maize sample, collected in North West, contained more than 2 000 µg/kg DON, the South African regulated maximum allowable level in unprocessed maize for human consumption.
- In yellow maize, a DON concentration exceeding 2 000 µg/kg was found in only one sample (2 205 µg/kg) collected in Gauteng.
- The ten-year mean DON concentrations in the seven provinces are illustrated in Graphs 54 and

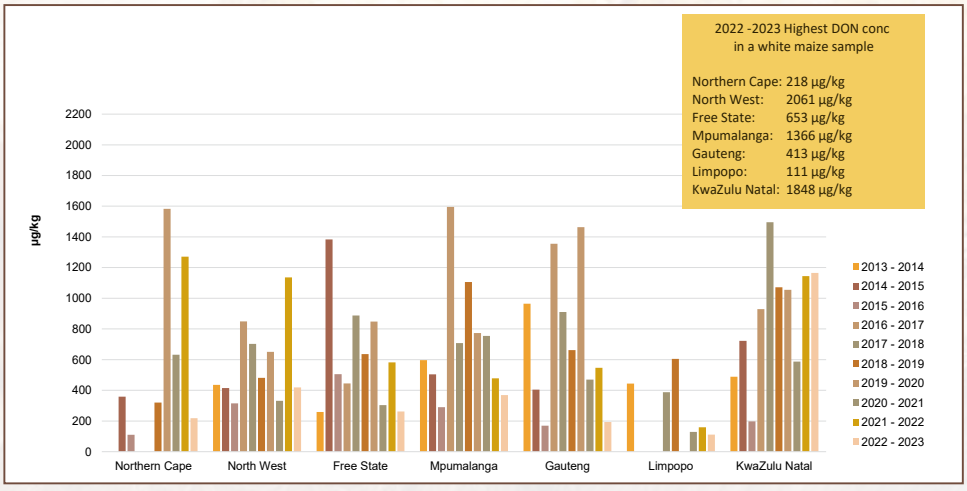
55. The mean DON concentrations in white maize this season decreased in six provinces with the exception KwaZulu Natal.

- In yellow maize, a higher DON mean concentration was reported in Gauteng only when compared to the previous 5 seasons.
- When 15-ADON is found to be contained in a sample, the sample most often also contains DON, mostly when the DON concentration is more than 500 µg/kg. This season, 96% of the samples did not contain 15-ADON. The maximum 15-ADON concentration (379 µg/kg) was reported in a white maize sample from North West that also contained 2 061 µg/kg DON.

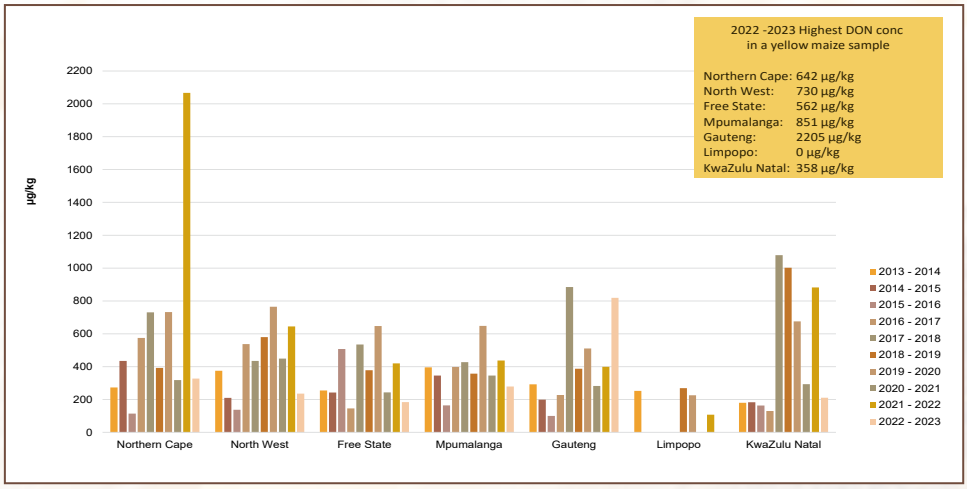
Graph 52: DON concentration range in white maize samples over ten seasons

Graph 53: DON concentration range in yellow maize samples over ten seasons

Graphs 54: White maize DON mean concentration (µg/kg) per province over ten seasons



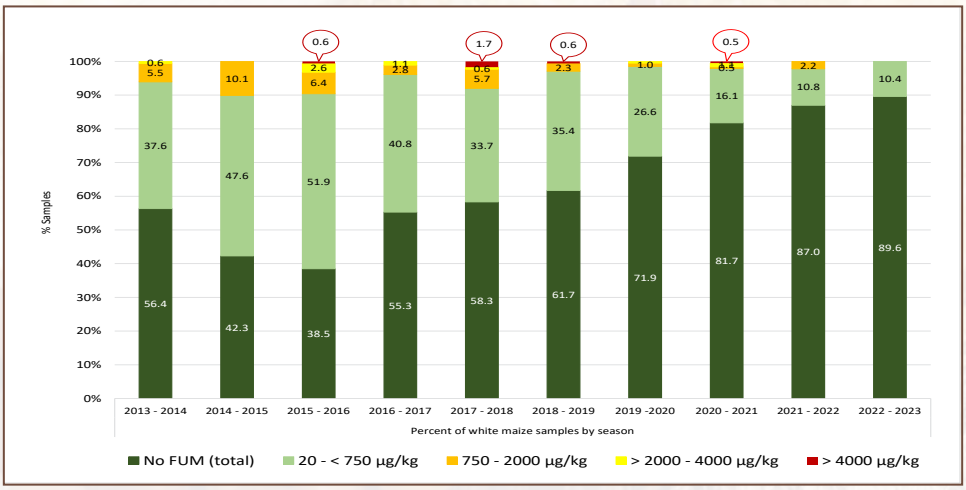
Graph 55: Yellow maize DON mean concentration (µg/kg) per province over ten seasons



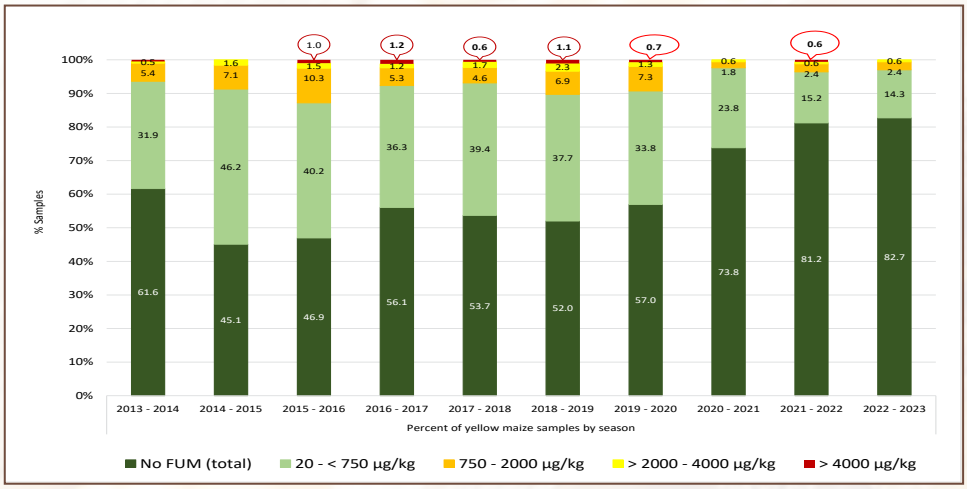
Fumonisins (FUM Total = FB_1 + FB_2 + FB_3)

- A continual decrease in FUM contamination is reported in both white and yellow maize. FUM in white maize decreased from 62% in 2015/16 to only 10% this season. The yellow maize samples that contained fumonisins decreased from approximately 53% in 2015/16 to 17% this season.
- The highest FUM level in individual maize samples decreased also when compared to the previous seasons. None of the samples contained more than 4 000 µg/kg, the South African regulated maximum allowable level in unprocessed maize for human consumption. The concentration ranges of the samples with FUM over the past ten seasons are summarised in Graph 56 (white maize) and Graph 57 (yellow maize).
- The white maize mean FUM concentrations in the provinces decreased except in the Free State. The ten-year FUM mean concentration variations in white maize in the seven provinces are illustrated in Graph 58.
- The mean FUM concentration in yellow maize increased only in North West and the Free State. These trends are illustrated in Graph 59.
- The highest FUM in white maize was 557 µg/kg, found in a sample from the Free State.
- The maximum concentration in yellow maize samples was 3 127 µg/kg in a sample from the Northern Cape.

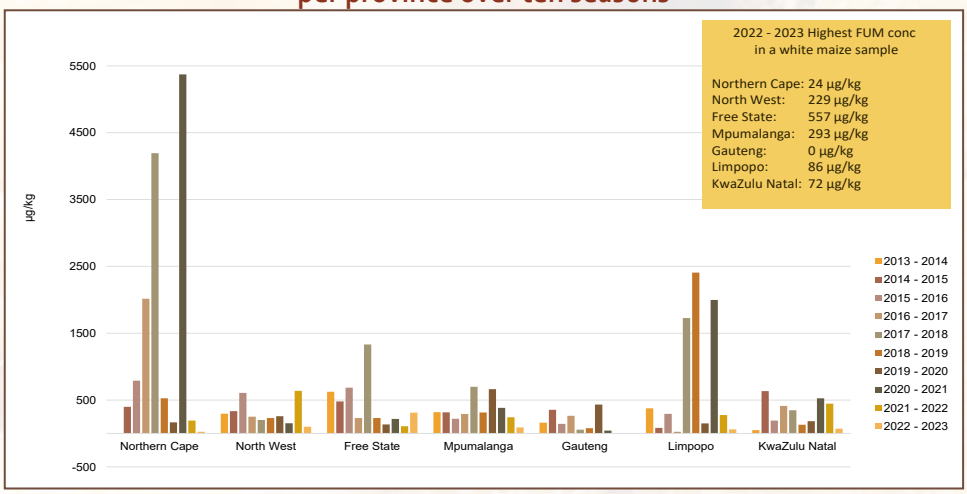
Graph 56: FUM concentration range in white maize samples over ten seasons



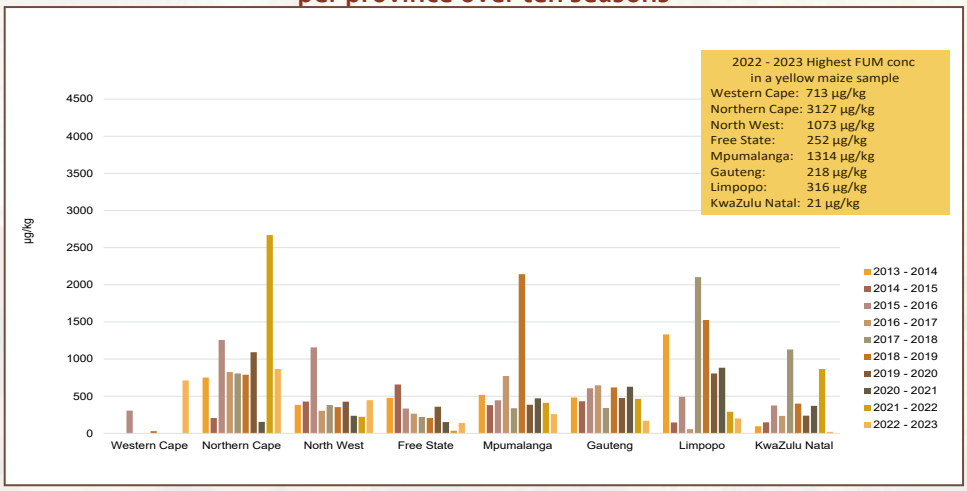
Graph 57: FUM concentration range in yellow maize samples over ten seasons



Graph 58: White maize FUM (total) mean concentration (µg/kg) per province over ten seasons



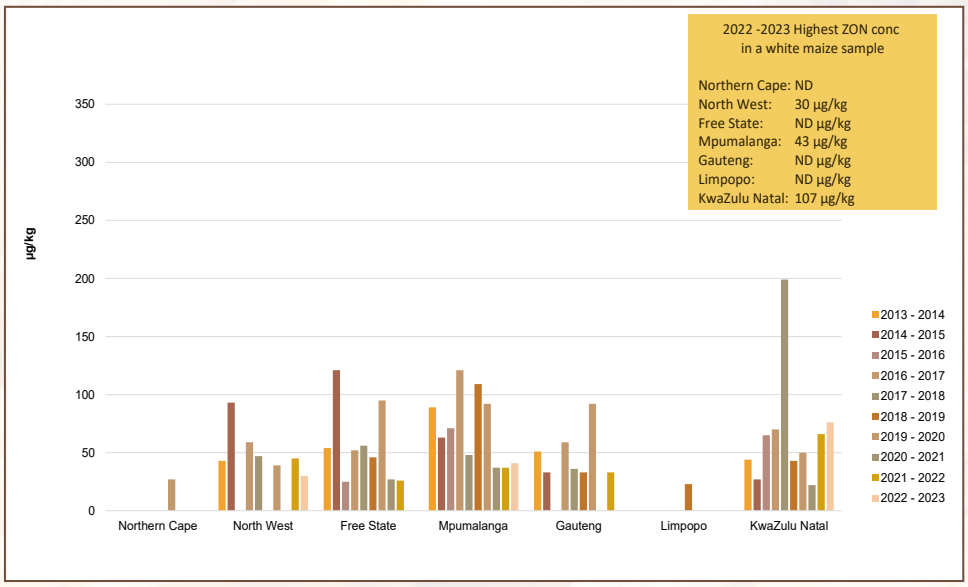
Graph 59: Yellow maize FUM (total) mean concentration (µg/kg) per province over ten seasons



Zearalenone

- ZON was found in white maize in only three provinces, namely North West, Mpumalanga and KwaZulu Natal. Yellow maize samples from the Free State, Mpumalanga, Gauteng and KwaZulu Natal contained low ZON concentrations. The ZON occurrences in the seven provinces are illustrated in Graphs 60 and 61.
- The highest ZON concentrations in individual samples were in yellow maize from Gauteng (328 µg/kg) and KwaZulu Natal (111 µg/kg).

Graph 60: White maize ZON mean concentration (µg/kg) per province over ten seasons



Graph 61: Yellow maize ZON mean concentration (µg/kg) per province over ten seasons