

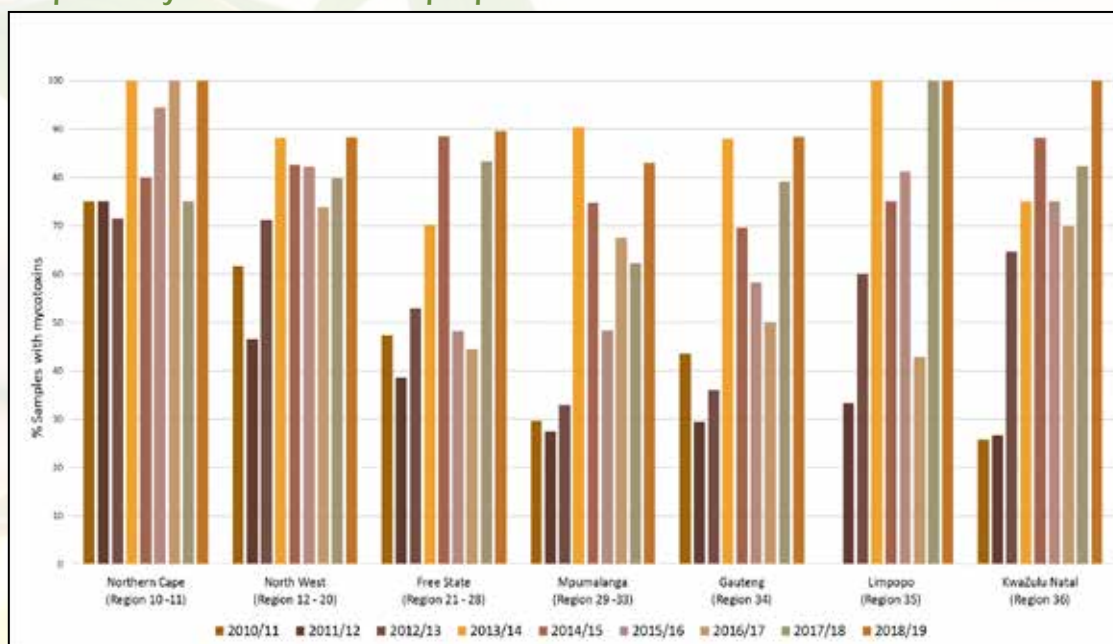
MYCOTOXINS

Approximately 43% (350 samples) of all the 2018/19 maize samples were selected to represent white and yellow maize from all the production regions for the analyses of 13 mycotoxins. The 13 mycotoxins analysed with the LC-MS/MS instrument include Aflatoxin B₁, B₂, G₁ and G₂, Fumonisin (FUM) B₁, B₂ and B₃, Deoxynivalenol (DON), 15-acetyl-deoxynivalenol (15-ADON), Ochratoxin A, T2-toxin, H-T2 toxin and Zearalenone (ZON). The occurrence of these mycotoxins was monitored in the South African maize crop at harvest over the past nine seasons and notable trends are observed.

Three hundred and twelve or 89% of the samples contained one or more mycotoxins, an increase of 14% compared to the previous season (2017/18) and a 27% increase compared to the 62% of the 2016/17 season's maize samples tested. The maize samples contained mainly deoxynivalenol (68%), fumonisins (43%) and zearalenone (10%). The presence of deoxynivalenol and zearalenone increased over the past three seasons, but the fumonisin prevalence stayed constant over the same period, approximately 44% of the samples contained fumonisins.

An increase in the mycotoxin occurrence was observed in all seven major maize production provinces in South Africa this season. The occurrence in the samples selected for mycotoxin analyses over the past nine seasons is illustrated in Graph 42.

Graph 42: Mycotoxin occurrence per province over nine seasons



The percentage samples with one or more mycotoxin present in the different provinces, showed notable differences and the trends in occurrence confirmed that mycotoxin risk varies significantly between production regions, production seasons and maize class. The following results and notable trends were observed this season:

- **Aflatoxins**

This was only the second season that aflatoxins were found. One white maize sample collected in the Free State, in Region 23, was contaminated with 48 µg/kg Aflatoxin B₁ and 95 µg/kg Aflatoxin G₁ (143 µg/kg total aflatoxins). In the 2014/15 season, aflatoxins were found in three white maize samples originating from the North West province.

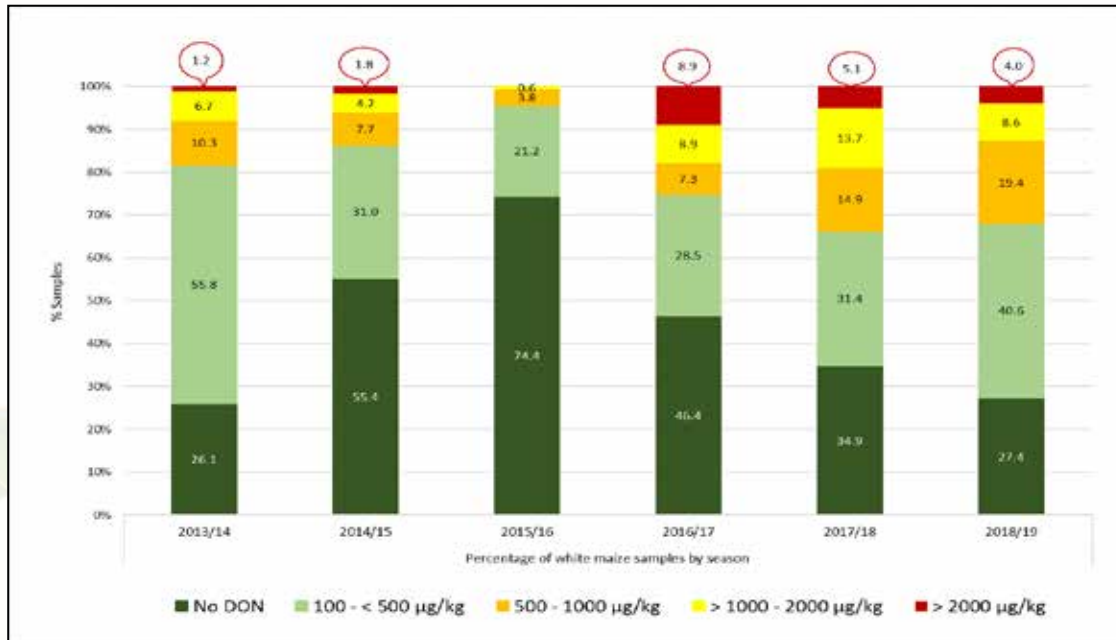
- **Ochratoxin A, T₂-toxin and HT-2 toxin**

None have been reported in South African produced commercial maize since the survey began in 2010/11.

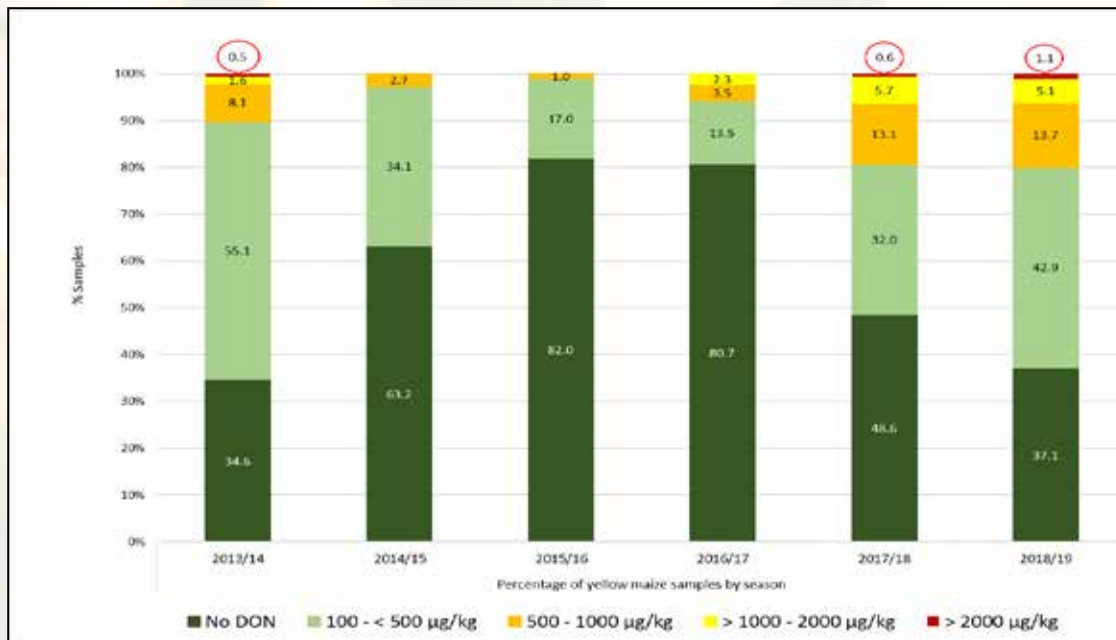
- **DON and 15-ADON**

The number of white and yellow maize samples containing DON increased, compared to the previous three seasons. However, only 4% white maize samples and 1% yellow maize samples contained more than 2 000 µg/kg DON (2 000 µg/kg is the SA regulated maximum allowable level in unprocessed maize for human consumption). The concentration ranges of the 68% samples containing DON, are summarised in Graph 43 (white maize) and Graph 44 (yellow maize).

Graph 43: DON concentration range in white maize samples over six seasons



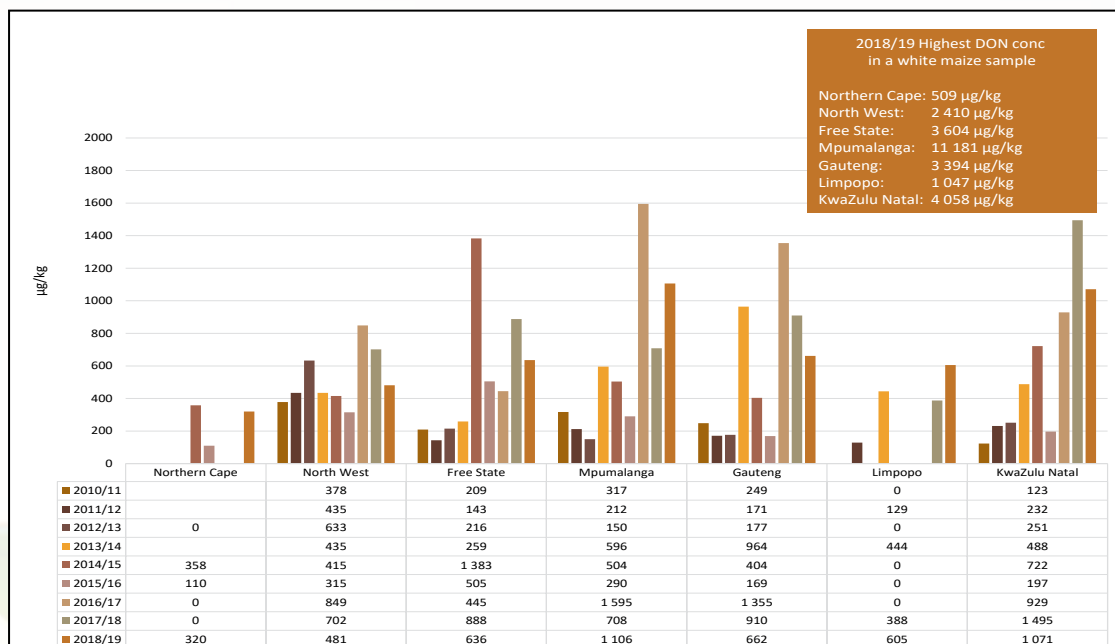
Graph 44: DON concentration range in yellow maize samples over six seasons



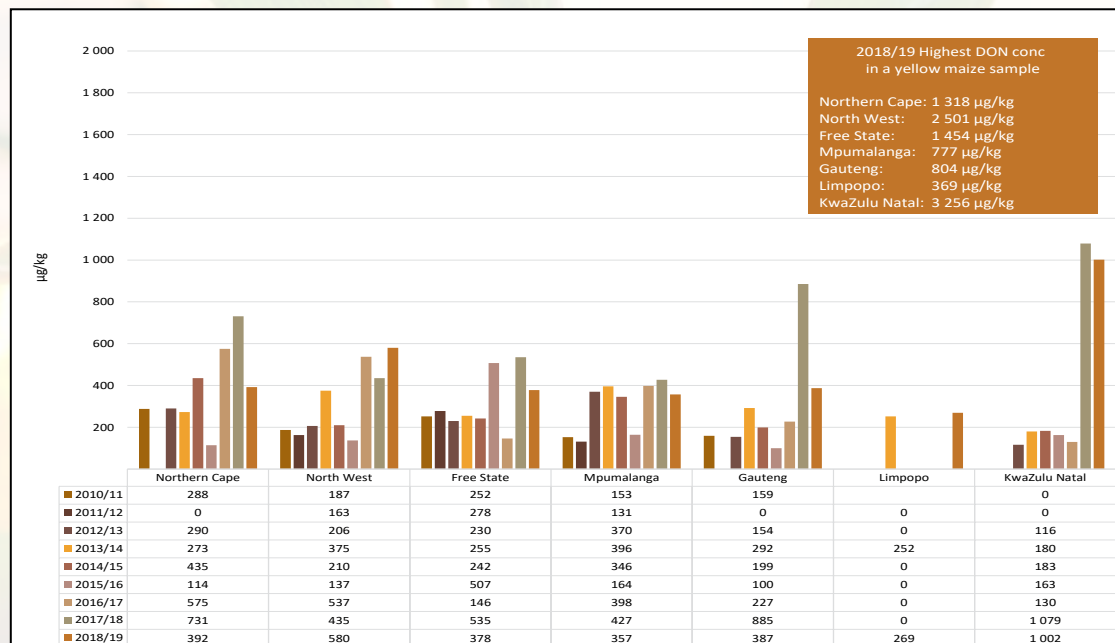
- The highest DON concentrations ever reported on the maize crop over the past nine seasons, were found in a white as well as a yellow maize sample this season. The white maize sample, collected in Mpumalanga, contained 11 181 µg/kg DON and the yellow maize sample from KwaZulu Natal was contaminated with 3 256 µg/kg DON.

- The annual mean DON concentrations in the seven provinces ranged from 320 µg/kg to 1 106 µg/kg in white maize and from 269 µg/kg to 1 002 µg/kg in yellow maize. The nine-year variations in the seven provinces are illustrated in Graphs 45 (white maize) and 46 (yellow maize).

Graphs 45: White maize DON mean concentration (µg/kg) per province over nine seasons



Graph 46: Yellow maize DON mean concentration (µg/kg) per province over nine seasons

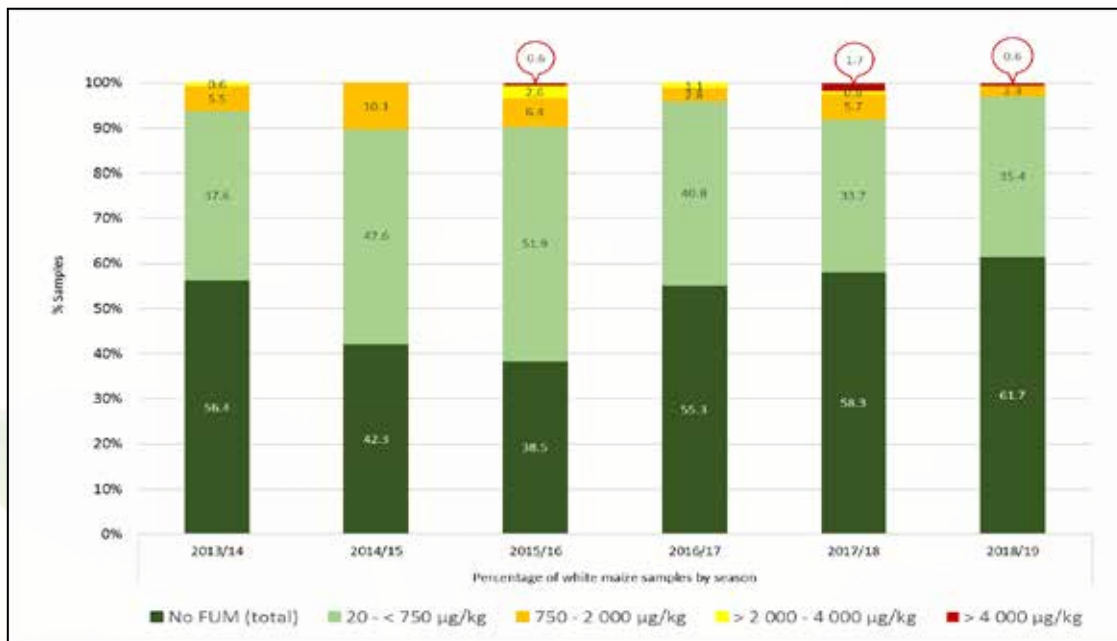


- 15-ADON is always only present in samples that contain DON, mostly when the DON concentration is more than 500 µg/kg. In this season, only 17.7% of the 350 samples tested contained 15-ADON, with a mean concentration of 218 µg/kg.

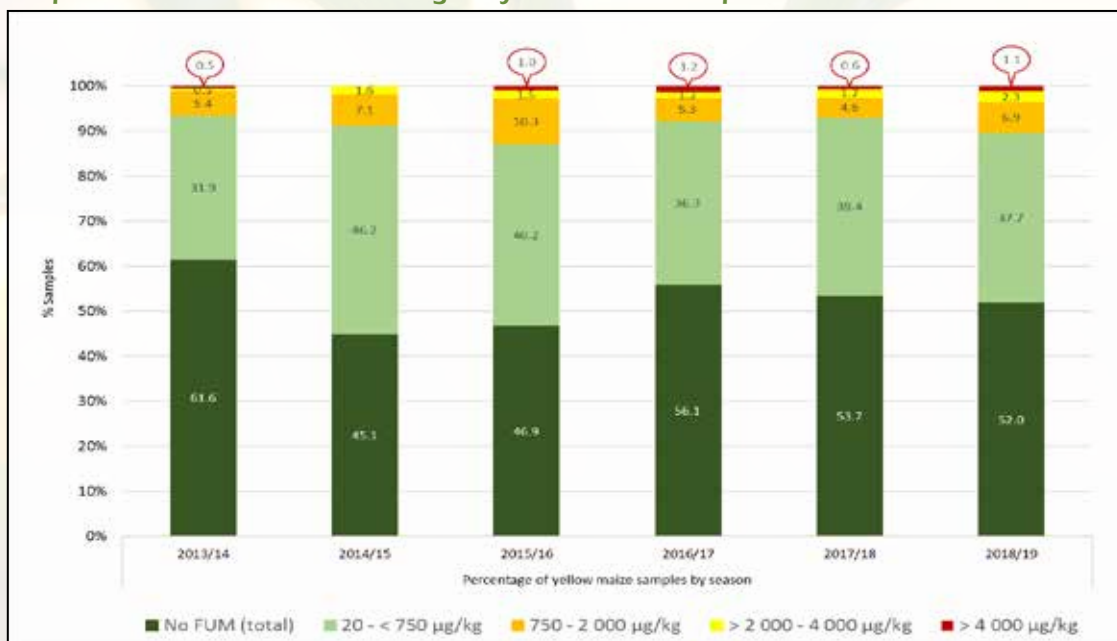
Fumonisin ($FUM\ Total = FB_1 + FB_2 + FB_3$)

- Slightly more yellow maize (48%) than white maize samples (38%) contained fumonisins this season, similar to the previous two seasons. Only 0.6% white and 1.1% yellow maize samples were contaminated with more than 4 000 µg/kg FUM (4 000 µg/kg is the SA regulated maximum allowable level in unprocessed maize for human consumption). The concentration ranges of the samples with fumonisins over the past six seasons are summarised in Graph 47 (white maize) and Graph 48 (yellow maize).

Graph 47: FUM concentration range in white maize samples over six seasons

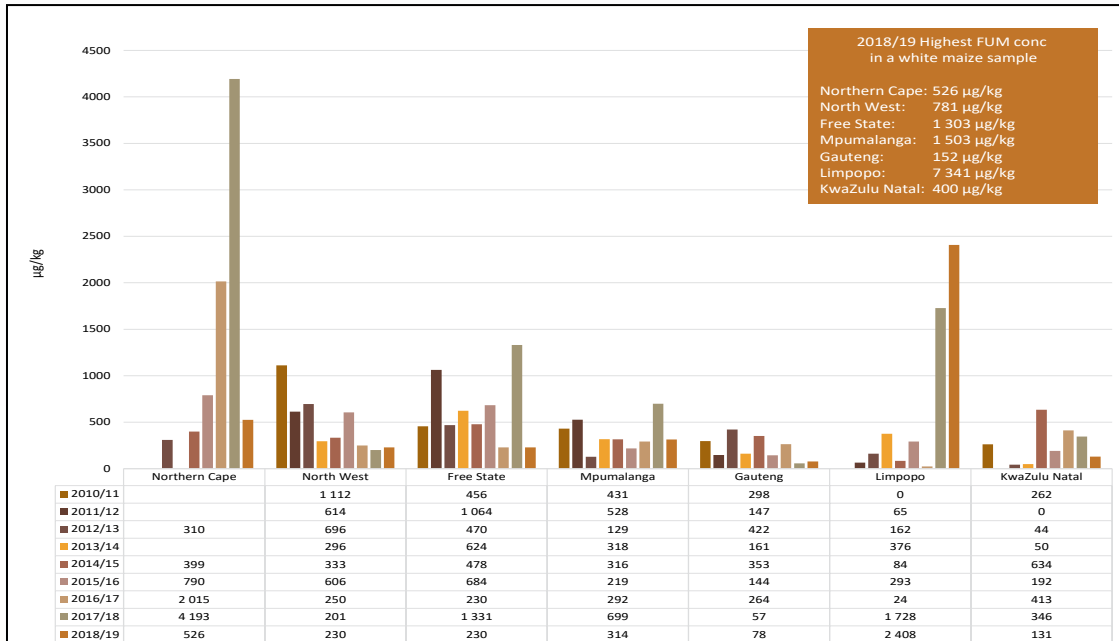


Graph 48: FUM concentration range in yellow maize samples over six seasons



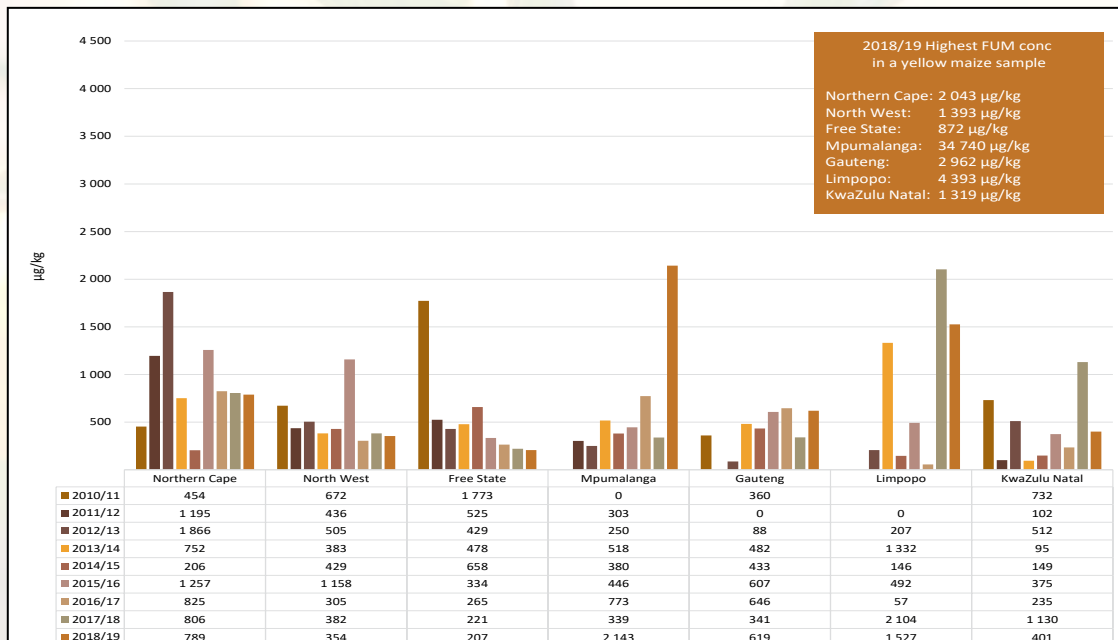
- A decrease was observed in the white maize mean FUM concentration in four of the seven production provinces compared to the previous production season. This season’s mean FUM concentration in white maize in the Limpopo province increased to 2 408 µg/kg (39% increase) because of the high FUM concentration found in one of the samples (7 341 µg/kg). The nine-year FUM mean concentration variations in white maize in the seven provinces are illustrated in Graph 49.

Graph 49: White maize FUM (total) mean concentration (µg/kg) per province over nine seasons



- The highest concentration fumonisin ever reported in this survey was found this season in yellow maize collected in Mpumalanga (34 740 µg/kg FUM total). This concentration is eight times more than the second highest FUM concentration reported in an individual yellow maize sample this season.
- The mean FUM concentration in yellow maize ranged from 207 µg/kg in the Free State to 2 143 µg/kg in Mpumalanga and only increased in two provinces, namely Mpumalanga and Gauteng. These trends are illustrated in Graph 50.

Graph 50: Yellow maize FUM (total) mean concentration (µg/kg) per province over nine seasons

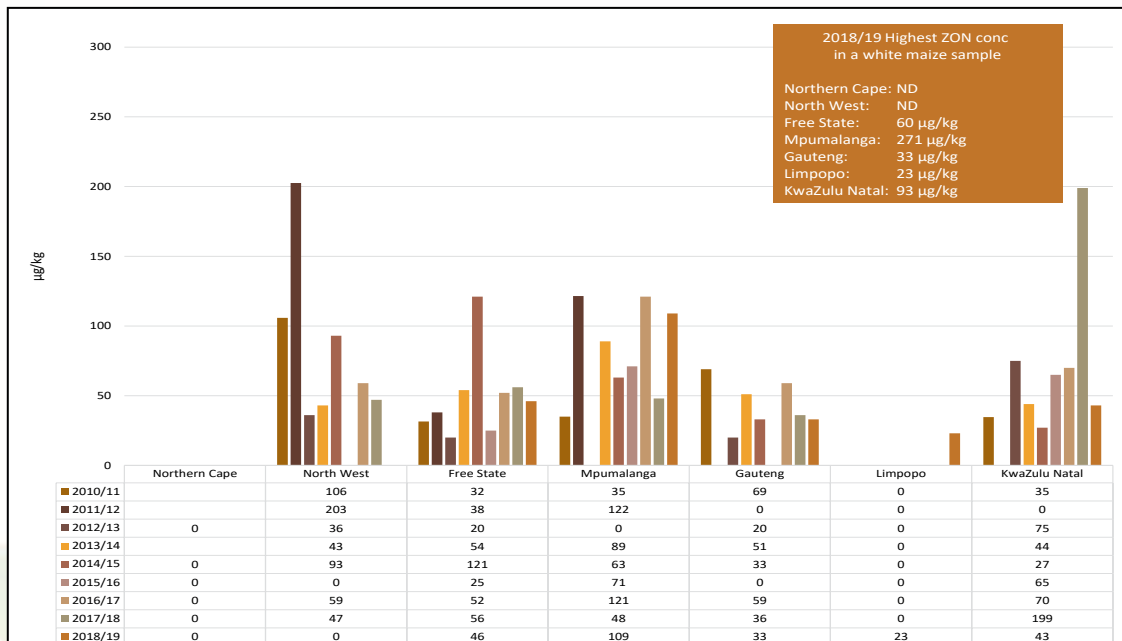


Zearalenone

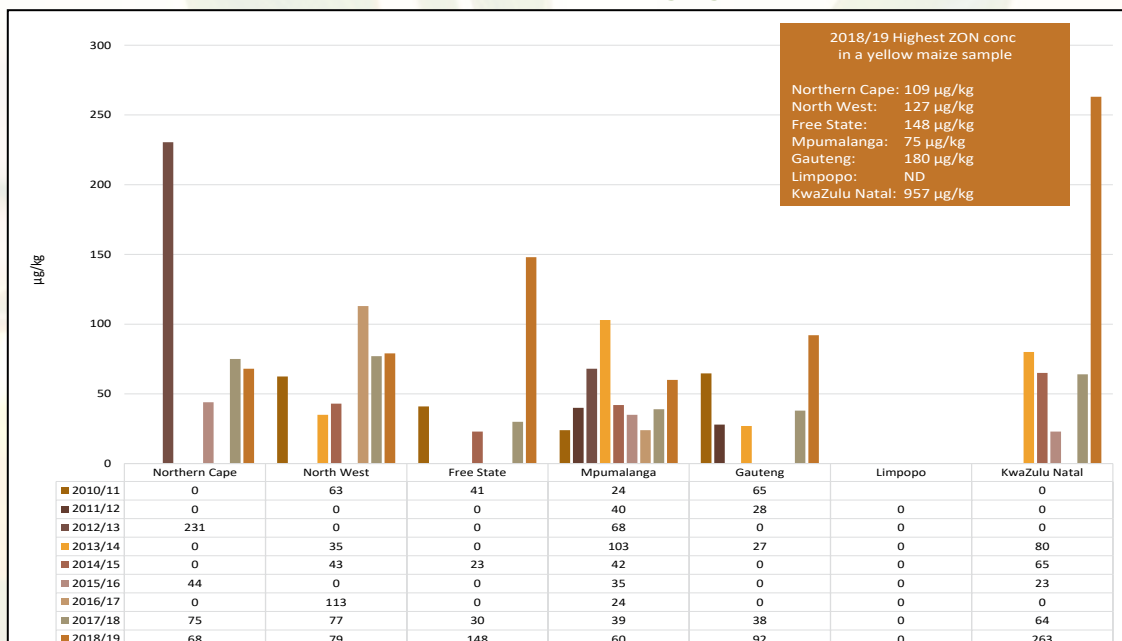
- Zearalenone was for the first time since this survey started nine years ago, found in the Limpopo province, 33 µg/kg in one white maize sample. The ZON occurrences in the seven provinces are illustrated in Graphs 51 (white maize) and 52 (yellow maize) by reporting the mean ZON concentrations found in white and yellow maize.

- The highest concentration ZON in an individual sample (957 µg/kg), since the survey commenced in 2010/11, was reported this season in yellow maize from KwaZulu Natal.

Graph 51: White maize ZON mean concentration (µg/kg) per province over nine seasons



Graph 52: Yellow maize ZON mean concentration (µg/kg) per province over nine seasons



INTERNATIONAL MYCOTOXIN REGULATIONS

Information with regards to mycotoxin regulations per region and country, can be obtained from the Mycotoxins.info webpage supported by Biomin (<http://www.mycotoxins.info/regulations>).