

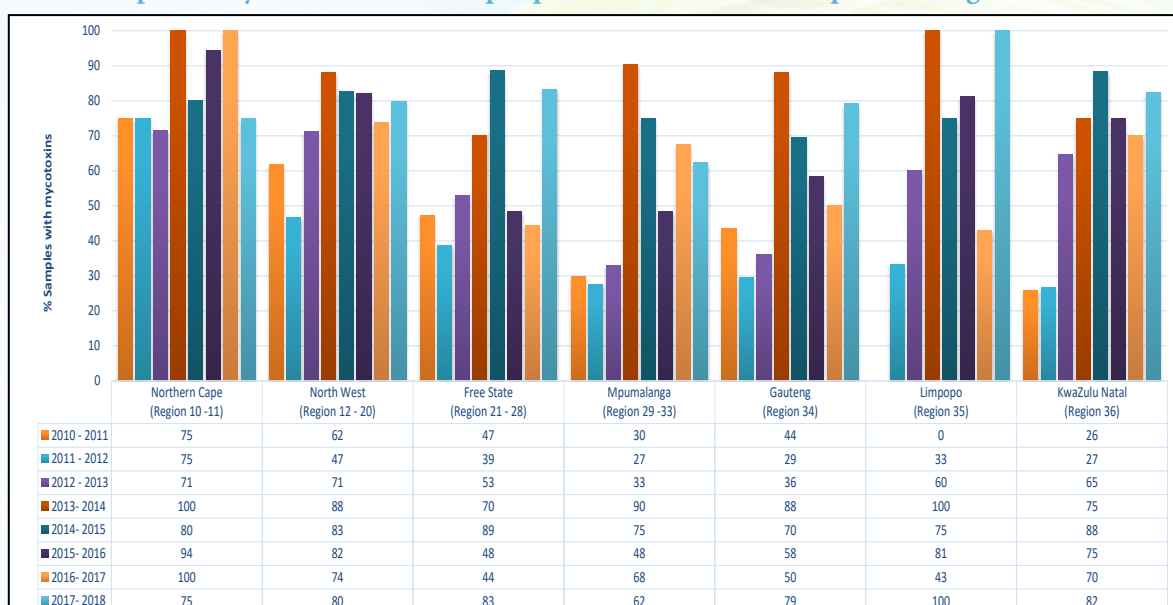
MYCOTOXINS

Annual survey results of mycotoxin contamination in the main staple foods are world-wide critically important for developing sound practices to reduce the mycotoxin contamination along the value chain. The results of the 13 mycotoxins monitored in the SA commercial maize over the past eight seasons, provide insight to producers, traders and processors on the occurrence trends in white and yellow maize over all the production regions. Approximately 35% of the maize crop samples were selected every season for multi-mycotoxin analyses to proportionally represent all the production regions as well as both white and yellow maize.

The 13 mycotoxins (listed in the Methods Section) analysed with the LC-MS/MS instrument include the SA regulated mycotoxins, aflatoxin B₁ (and Aflatoxin total), fumonisin (FUM) B₁ + B₂ and deoxynivalenol (DON) as well as the mycotoxins listed for grains in the Codex General Standard.

In the 2017/2018 season, 75% of the tested samples contained one or more mycotoxin. This is a 13% increase compared to the 62% of the 2016/2017 season's tested maize samples. The percentage samples with mycotoxins in the Free State and Limpopo increased 2-fold when compared with the previous season. The percentage samples containing one or more mycotoxins in the different provinces showed notable differences and the trends in occurrence confirmed that mycotoxin risk varies significantly between production regions, seasons and maize class (white/yellow). A summary of % occurrence per region is provided in graph 41.

Graph 41: Mycotoxin occurrence per province of selected samples over eight seasons

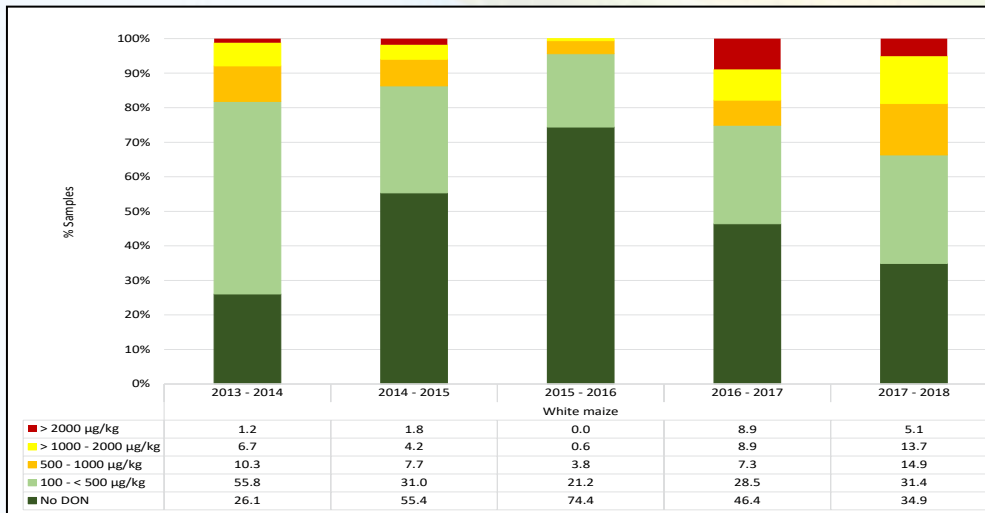


The survey confirmed the absence of aflatoxin B₁ (classified as a cancer-causing hazard), B₂, G₁ and G₂, T₂-toxin, HT-2 toxin and ochratoxin A in commercial maize produced in all the regions over the past eight seasons. Zearalenone (ZON) was detected in only 9% of the white maize samples and 7% of the yellow maize samples. The highest ZON concentration, (361 µg/kg) was found in a white maize sample. The most predominant mycotoxins observed in all the seasons in most regions on both white and yellow maize are FUM B₁, B₂, B₃ (in 44% of the samples) and DON (in 58% of the samples).

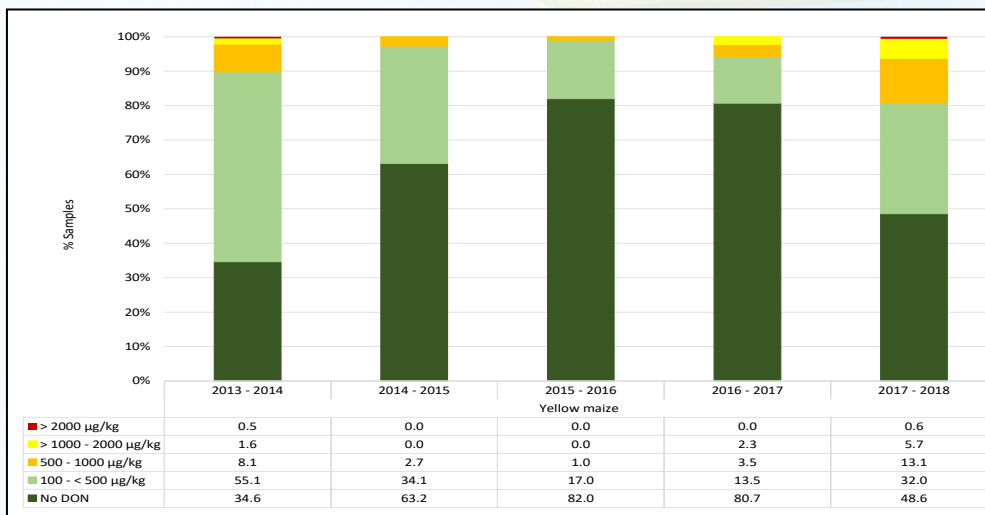
The number of samples containing DON this season increased with 21%; from 37% in 2016/2017 to 58% in the 2017/2018 season. In contrast to the previous season, the highest increase in % samples with DON was observed in yellow maize; from 19% in the previous season to 51% of the samples this season. With the amendment of the SA Regulation in 2016 to include maximum allowable levels for human consumption, it is important to focus on the % samples with FUM and DON concentrations just below and above the maximum allowable levels; namely 4 000 µg/kg FUM B₁+ B₂ and 2 000 µg/kg DON in unprocessed maize.

The % samples with DON at different concentration levels in the past five seasons for both white and yellow maize, are summarised in graphs 42 and 43. This season, only 34.9% of white maize samples contained no DON and a notable increase was observed in the % samples with DON concentrations larger than (>) 1 000 µg/kg over the last three consecutive seasons. Five percent of the white maize samples (9 samples) were contaminated with DON concentrations above the regulated maximum allowable level of 2 000 µg/kg, as illustrated in graph 42. The highest DON concentration of 3 510 µg/kg was also observed on a white maize sample. In contrast to the 81% yellow maize samples containing no DON in 2016/2017, only 49% yellow maize samples this season contained no DON and the percentage yellow maize with DON > 1 000 µg/kg increased from 2% in 2016/2017 to 6% in 2017/2018, see graph 43.

Graph 42: 2017/2018 White maize crop - DON occurrence

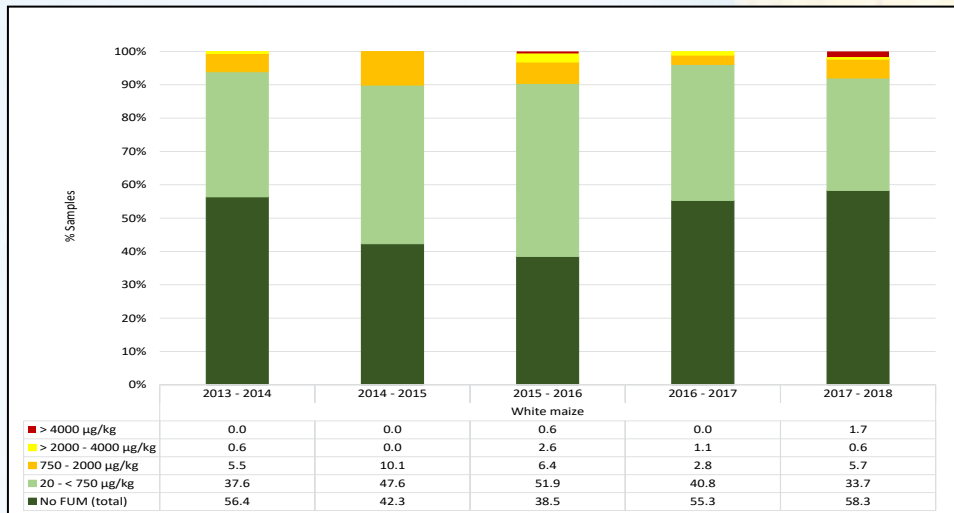


Graph 43: 2017/2018 Yellow maize crop - DON occurrence

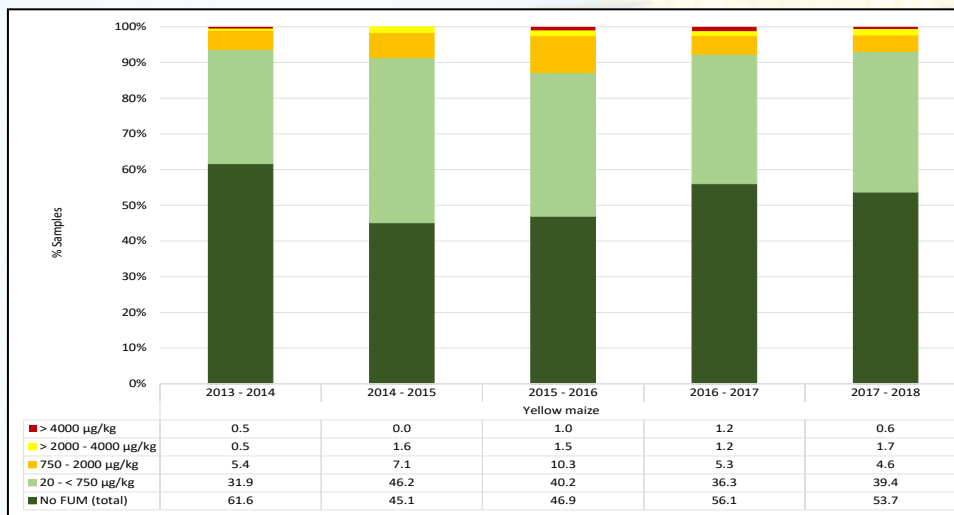


Fumonisin were found in 44% of the samples, similar to the eight-year average, while white and yellow maize also had almost the same incidence rates every season. However, in contrast to the 2016/2017 season, white maize samples containing FUM above 4 000 µg/kg were found this season, concentrations as high as 8 356, 7 328 and 4 505 µg/kg were reported in three different provinces. The following two graphs are summaries of the % white and yellow maize with different FUM concentration levels over the past five seasons.

Graphs 44: 2017/2018 White Maize crop - Fumonisin occurrence

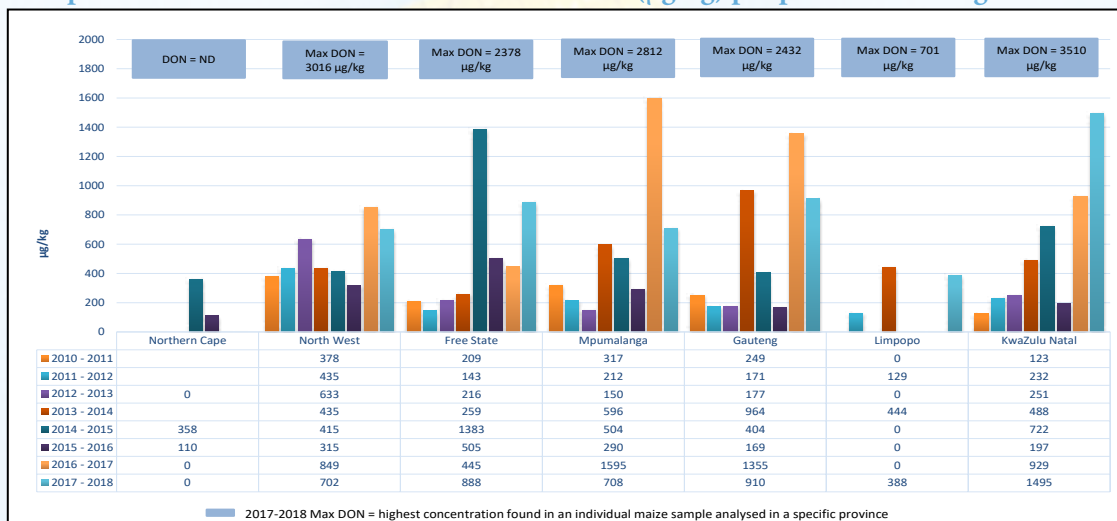


Graph 45: 2017/2017 Yellow Maize crop - Fumonisin occurrence

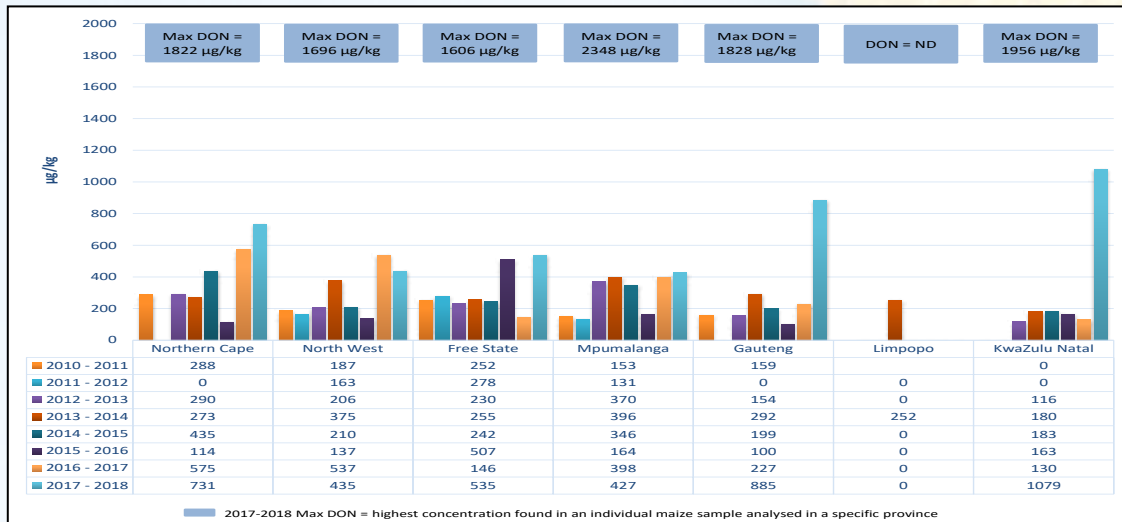


The different patterns of the mean concentrations FUM, DON and ZON over the eight seasons in the different regions, confirmed again the well-known fact that the mycotoxin risk in maize produced, differ from season to season in the same region and also from region to region, because the occurrence and concentration levels of mycotoxins are influenced by climatic factors during the pre-harvest production period.

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

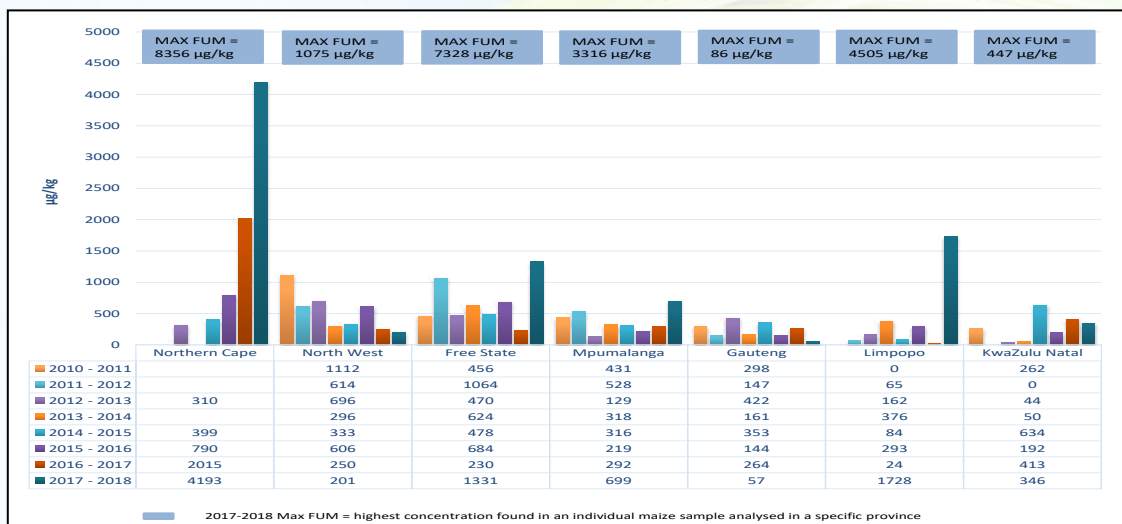


Graph 47: Yellow maize DON mean concentration (µg/kg) per province over eight seasons

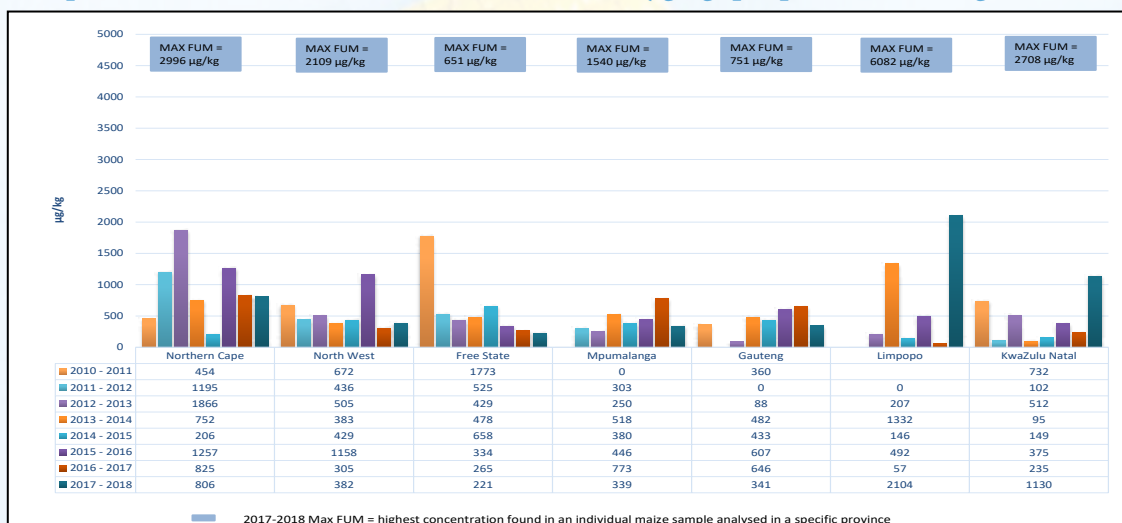


This season, the white maize FUM mean concentrations increased notably in four provinces as illustrated in Graph 48. Yellow maize mean concentrations increased notably in two provinces, see Graph 49.

Graph 48: White maize FUM mean concentration (µg/kg) per province over eight seasons

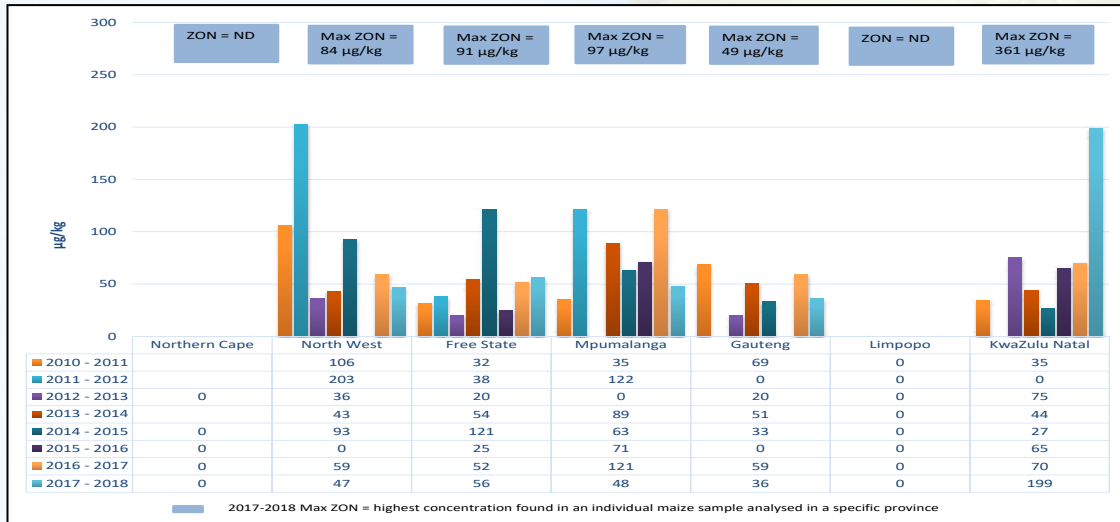


Graph 49: Yellow maize FUM mean concentration (µg/kg) per province over eight seasons



ZON in white maize, was found in the same five provinces as in the previous seasons. In contrast to the previous season when ZON in yellow maize was only found in two provinces, this season ZON was reported in all the provinces except Limpopo. It must be noted that ZON was not found in any maize samples from the Limpopo region over the past eight seasons.

Graph 50: White maize ZON mean concentration (µg/kg) per province over eight seasons



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

