

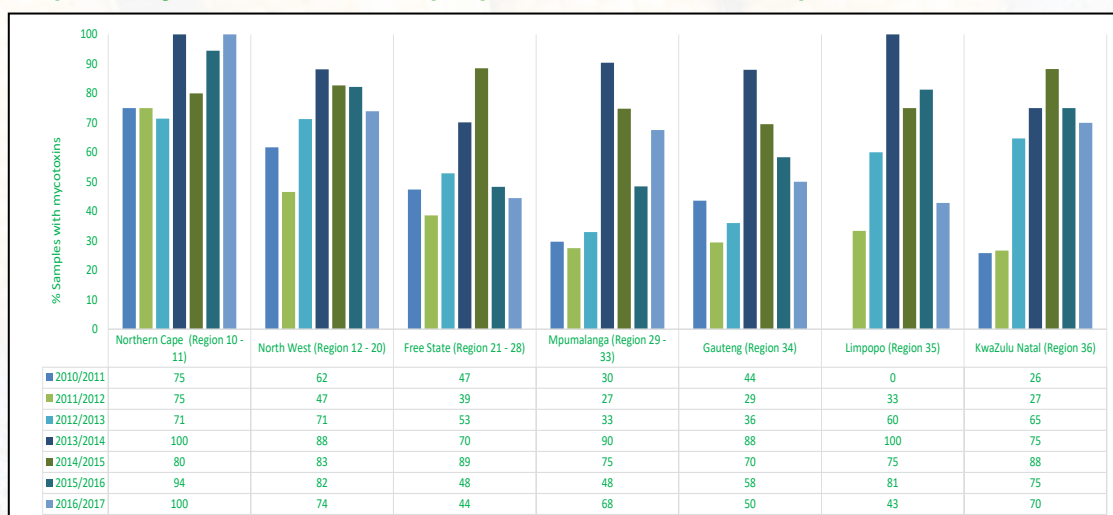
MYCOTOXINS

The multi-mycotoxin assessments included in the annual maize crop quality survey for the past seven seasons provide the most comprehensive overview of the multi-mycotoxin risk in commercial maize produced in South Africa. 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 mycotoxins with maximum allowable levels on maize regulated in SA are Aflatoxin B₁ and Aflatoxin total, Fumonisin (FUM) B₁ + B₂ and Deoxynivalenol (DON). These mycotoxins as well as nine other mycotoxins of most concern globally are included in the LCMSMS analysis, as listed in the Methods Section on page 96.

In total 62% of the 2016/2017 season's tested maize samples contained one or more mycotoxin, similar to the previous season when 63% of the samples tested positive for one or more mycotoxin. However, the trends in occurrence confirmed that mycotoxin risk varies significantly between production regions and years. The percentage of samples that tested positive for mycotoxins from the samples selected per season, differ in the different production regions of South Africa and a summary of percentage occurrence per region is provided in graph 44.

Graph 44: Mycotoxin occurrence per province of selected samples over seven seasons



The absence of Aflatoxin B₁, B₂, G₁, G₂, Ochratoxin A, T2-toxin and HT-2 toxin in the commercial maize samples over the past six seasons were confirmed in the 2016/2017 season. The fact that Aflatoxin B₁ a mycotoxin classified as cancer-causing hazard, does not occur in commercial maize produced in South Africa (except for three white maize samples in the 2014/2015 production season), is a huge food and feed safety advantage for the maize producers in South Africa.

Zearalenone (ZON) was detected in only 13% of the white maize samples and in 1% of the yellow maize samples, with a maximum of 399 ug/kg found in one white maize sample.

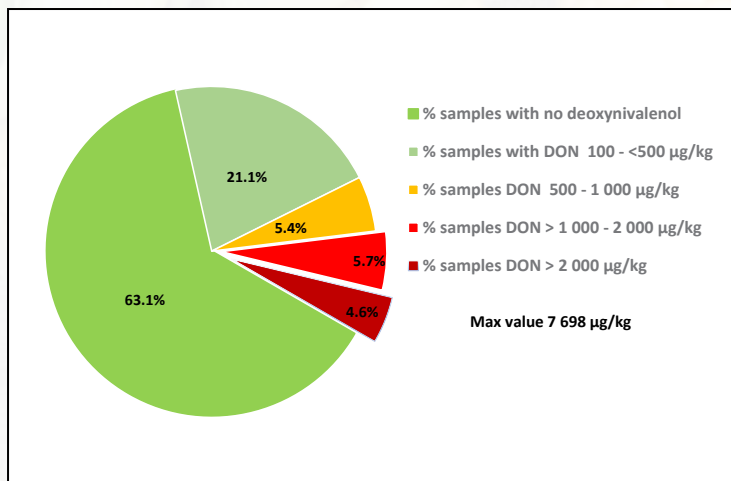
The most predominant mycotoxins observed in all the seasons in most regions on both white and yellow maize are FUM B₁, B₂, B₃ and DON.

The number of samples that contained DON increased with 14% this season; from 23% in 2015/2016 to 37% in the 2016/2017 season. The highest increase in % samples containing DON was observed in the white maize samples; from 26% in the previous season to 54% of the samples this season.

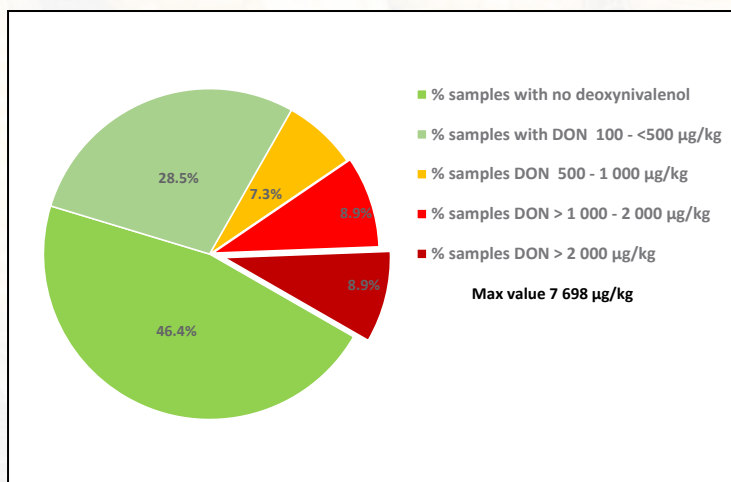
With the amendment of South African Regulations in 2016 with maximum allowable levels for human consumption, it is important to focus on the % samples with FUM and DON concentrations just below and above the maximum allowable levels; 4 000 µg/kg FUM B₁ + B₂ and 2 000 µg/kg DON in unprocessed maize.

The % samples with DON at different concentration levels in the 2016/2017 season, are summarised for all maize (white and yellow maize), white maize only and yellow maize only in graphs 45 to 47. Although DON was not detected in 63% of the maize samples, only 46.4% white maize samples contained no DON. It should also be noted that in 8.9% of white maize samples and 2.3% of yellow maize samples, DON concentrations above the regulated maximum allowable level of 2 000 µg/kg were measured, with 7 698 µg/kg the highest concentration observed on one white maize sample.

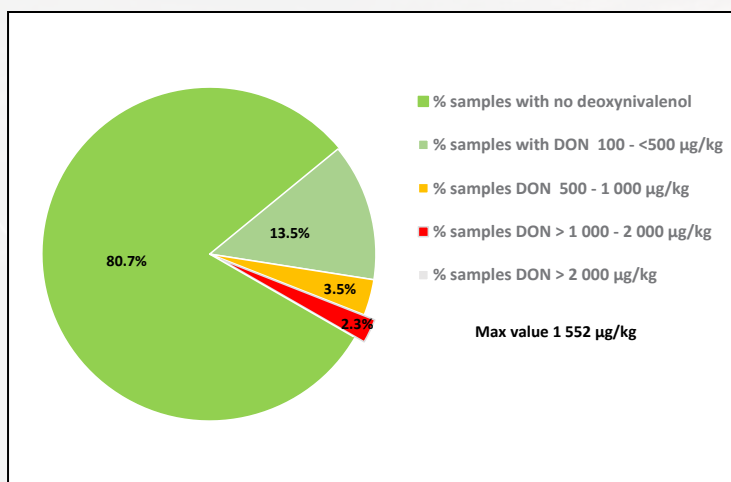
Graph 45: 2016/2017 SA Maize crop - DON occurrence



Graph 46: 2016/2017 White Maize crop - DON occurrence

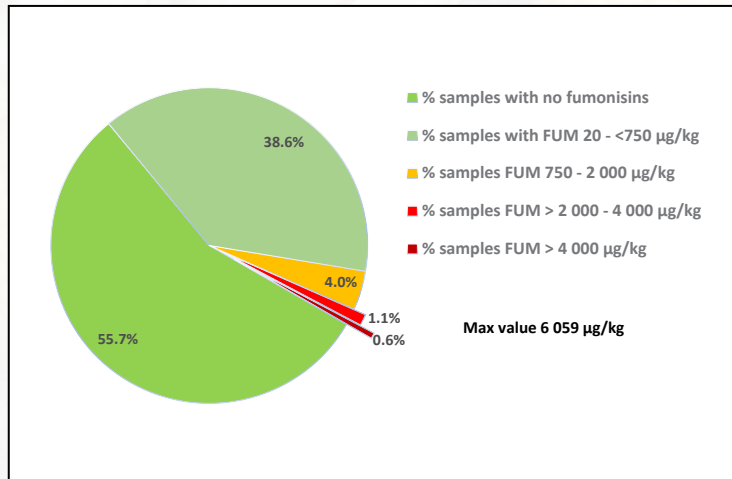


Graphs 47: 2016/2017 Yellow Maize crop - DON occurrence

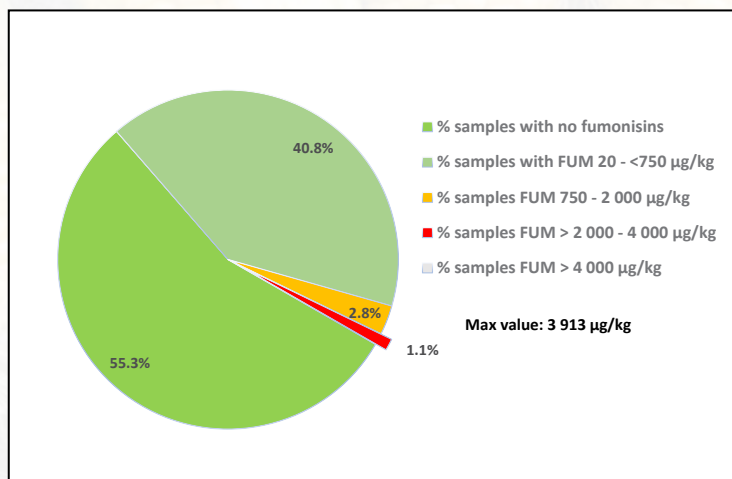


Less samples contained FUM this past season, with occurrences decreasing from 57% to 44% of the samples. Graphs 48 to 50 are summaries of the % samples with different FUM concentration levels in the 2016/2017 season for all maize, white maize and yellow maize. None of the white maize samples contained FUM above 4 000 µg/kg, however more than 4 000 µg/kg were measured in 1.2% of the yellow maize samples; one yellow maize sample had 6 059 µg/kg FUM.

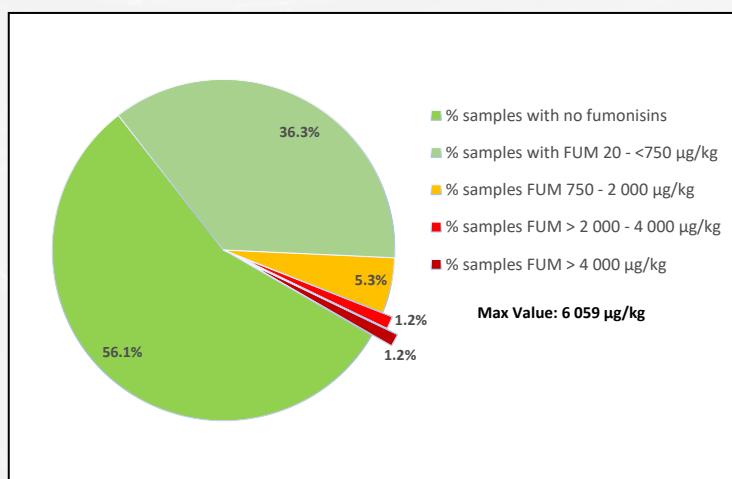
Graph 48: 2016/2017 SA Maize crop - Fumonisin occurrence



Graph 49: 2016/2017 SA White maize crop - Fumonisin occurrence



Graph 50: 2016/2017 SA Yellow maize crop - Fumonisin occurrence



The different patterns of the mean concentrations FUM, DON and ZON over the seven 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 differ from region to region because the occurrence and concentration levels are related to certain climatic factors during the pre-harvest production period. These concentration patterns are summarised in graph 51 for white maize and graph 52 for yellow maize for DON mean concentrations per province over seven seasons, as well as graphs 53 and 54 for FUM and graphs 55 and 6 for ZON.

In five of the provinces, the mean DON values of the white maize were higher than the yellow maize mean values.

Graph 51: White maize DON mean concentration ($\mu\text{g}/\text{kg}$) per province over seven seasons

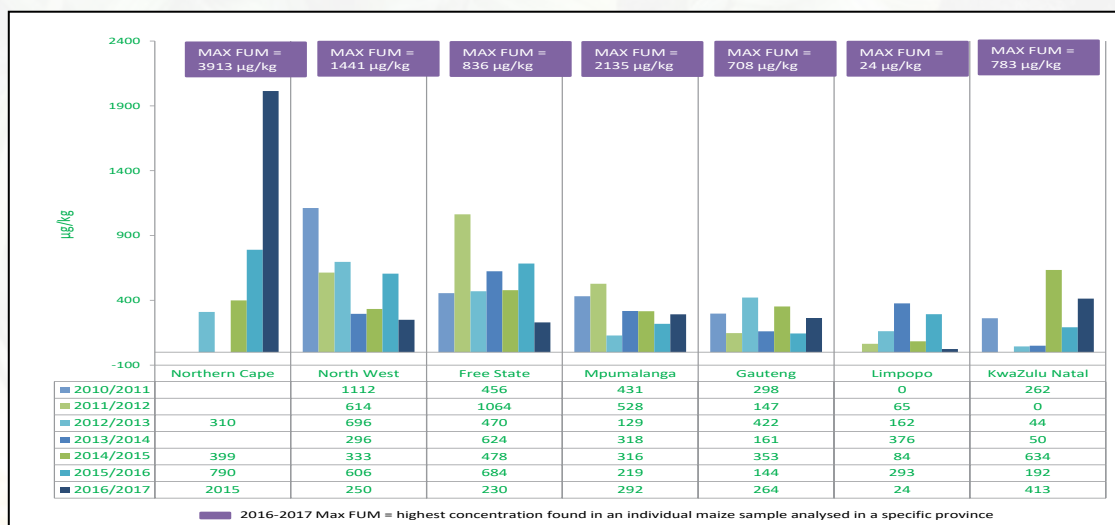


Graph 52: Yellow maize DON mean concentration ($\mu\text{g}/\text{kg}$) per province over seven seasons



The white maize and yellow maize FUM mean concentrations are similar in most provinces, as illustrated in graphs 53 and 54.

Graph 53: White maize FUM (total) mean concentration (µg/kg) per province over seven seasons

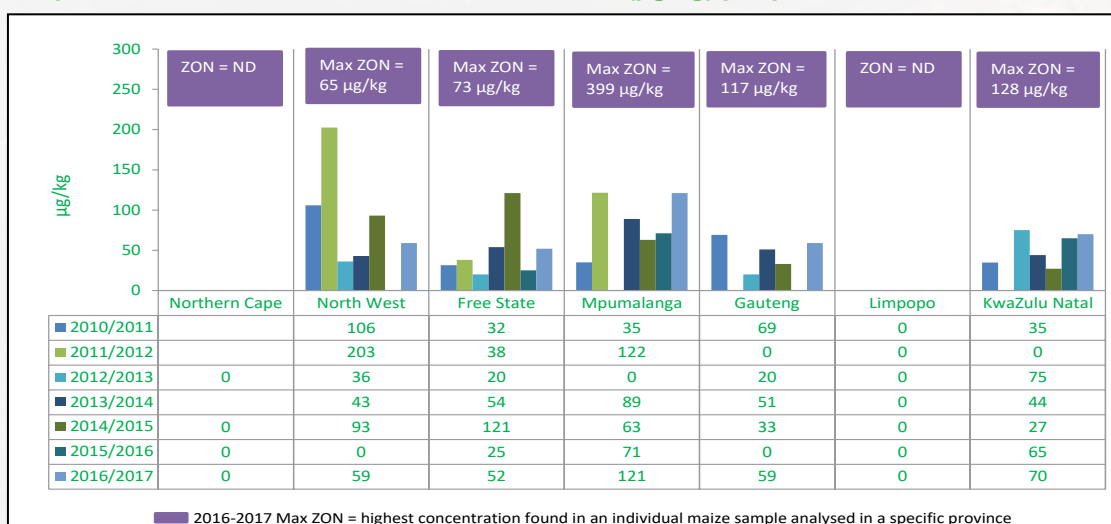


Graph 54: Yellow maize FUM (total) mean concentration (µg/kg) per province over seven seasons



ZON in white maize was found in five of the seven provinces, but in yellow maize only in two provinces, namely North West and Mpumalanga. It must be noted that ZON was not found in any of the maize samples from the Limpopo regions the past seven seasons.

Graph 55: White maize ZON mean concentration (µg/kg) per province over seasons



Graph 56: Yellow maize FUM (total) mean concentration (µg/kg) per province over seven seasons



When comparing these trends with the mycotoxin overview of the USA Corn 2017 published by Olmix, the % maize samples containing DON with levels less than 500 µg/kg, was similar, but the maximum DON value in South African maize was higher in the 2016/2017 season than reported in USA corn. 95% of the South African maize samples contained FUM < 750 ug/kg, in comparison with 78% of the USA maize, while the maximum FUM concentrations reported in the two countries were similar. The South African maize contained far less ZON than that of the USA 2017 harvest. (Reference: www.olmix.com/myco-news).