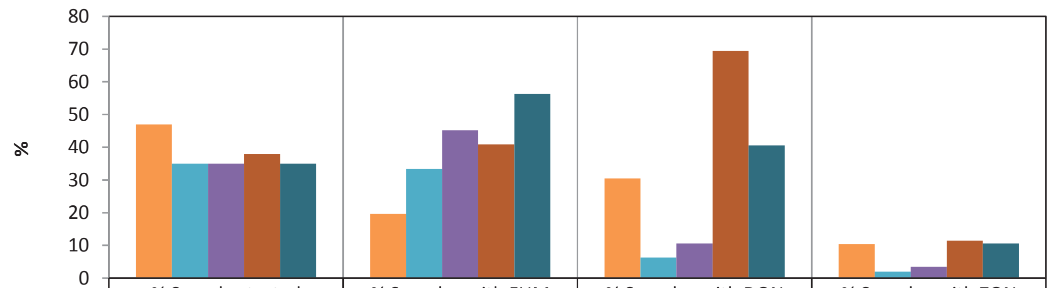
MYCOTOXINS

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 projects to effectively manage the mycotoxin levels in maize.

A total number of 325 samples were analysed for mycotoxin residue levels in the 2010/2011 season. From the 2011/2012 season onwards to this, the 2014/2015 season, 350 samples were analysed annually. The samples were selected to represent all the production regions as well as both white and yellow maize proportionally.

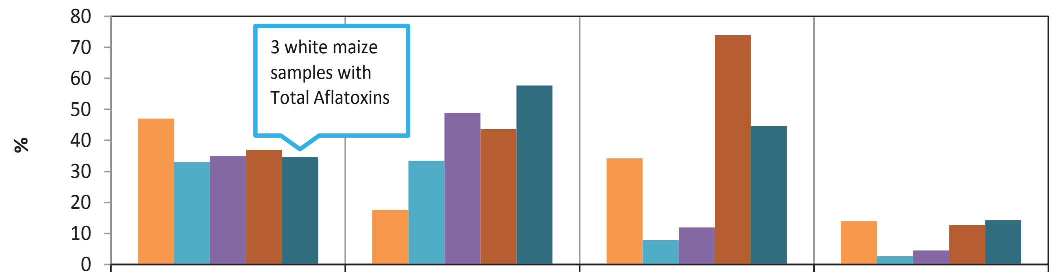
Graphs 45 to 47 provide a summary of the seasonal effect on the percentages total crop, white maize and yellow maize samples that tested positive for Fumonisins (FUM), Deoxinyvalenol (DON) and Zearalenone (ZON).

Graph 45: Percentage white and yellow maize samples that tested positive for mycotoxins over five seasons



	% Samples tested	% Samples with FUM	% Samples with DON	% Samples with ZON
2010 - 2011	47	20	30	10
2011 - 2012	35	33	6	2
2012 - 2013	35	45	11	3
2013 - 2014	38	41	69	11
2014 - 2015	35	56	41	11

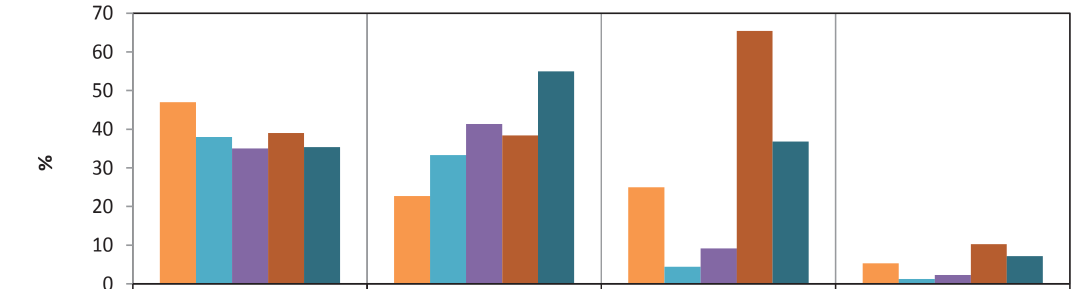
Graph 46: Percentage white maize samples that tested positive for mycotoxins over five seasons



	% Samples tested	% Samples with FUM	% Samples with DON	% Samples with ZON
2010 - 2011	47	18	34	14
2011 - 2012	33	34	8	3
2012 - 2013	35	49	12	5
2013 - 2014	37	44	74	13
2014 - 2015	35	58	45	14

For the first time since the 2010/2011 season, three samples tested positive for Aflatoxin (Afla) residues. All three of these samples were white maize from regions in North West.

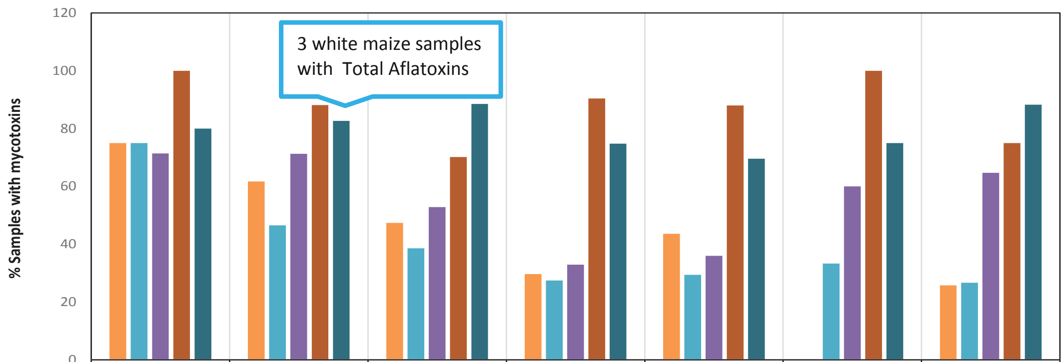
Graph 47: Percentage yellow maize samples that tested positive for mycotoxins over five seasons



	% Samples tested	% Samples with FUM	% Samples with DON	% Samples with ZON
2010 - 2011	47	23	25	5
2011 - 2012	38	33	4	1
2012 - 2013	35	41	9	2
2013 - 2014	39	38	65	10
2014 - 2015	35	55	37	7

The percentage of samples that tested positive for mycotoxins per season in the different provinces are provided in Graph 48.

Graphs 48: Percentage of samples that tested positive for mycotoxins per province over five seasons



	Northern Cape (Region 10 -11)	North West (Region 12 - 20)	Free State (Region 21 - 28)	Mpumalanga (Region 29 -33)	Gauteng (Region 34)	Limpopo (Region 35)	KwaZulu Natal (Region 36)
2010 - 2011	75	62	47	30	44	0	26
2011 - 2012	75	47	39	27	29	33	27
2012 - 2013	71	71	53	33	36	60	65
2013- 2014	100	88	70	90	88	100	75
2014- 2015	80	83	89	75	70	75	88

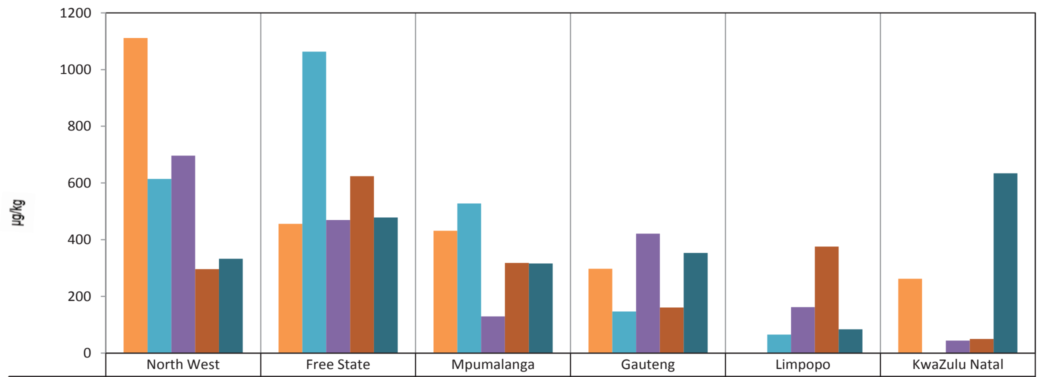
Please note that the percentages referred to in Graphs 44 to 47 were calculated based on the number of samples analysed for mycotoxin residue levels and not the total number of samples received for the crop survey.

Global trends in the occurrence and concentration levels of mycotoxins are summarised in the Annual BIOMIN Mycotoxin Survey report of 2015. A total number of 8 271 agricultural commodity (primary components used for feeds) samples from 75 countries were analysed, these include approximately 1 700 maize samples. Of these, 74% of the samples were contaminated with FUM, 76% with DON, 48% with ZON and 13% with Afla. Samples from South Africa (not only maize), showed 6% Afla, 94% ZON, 86% DON and 76% FUM contamination and none with T-2 or Ochratoxin A.

In North America, the DON concentration increased with approximately 10% and the prevalence of DON doubled in South America since the previous year, with 32% of the samples testing positive. Seventy percent of all the samples from South America was contaminated with FUM at an average level of 2 235 µg/kg. The highest FUM value worldwide was detected in a Brazilian maize sample (36 489 µg/kg). Aflatoxins were present in 18% of the samples at 40 µg/kg on average and 11% of all the samples exceeded the risk threshold. The second highest average values of Afla were detected in the African samples. Overall, DON constitutes the most frequent threat to feed commodities followed by ZON and FUM.[1]

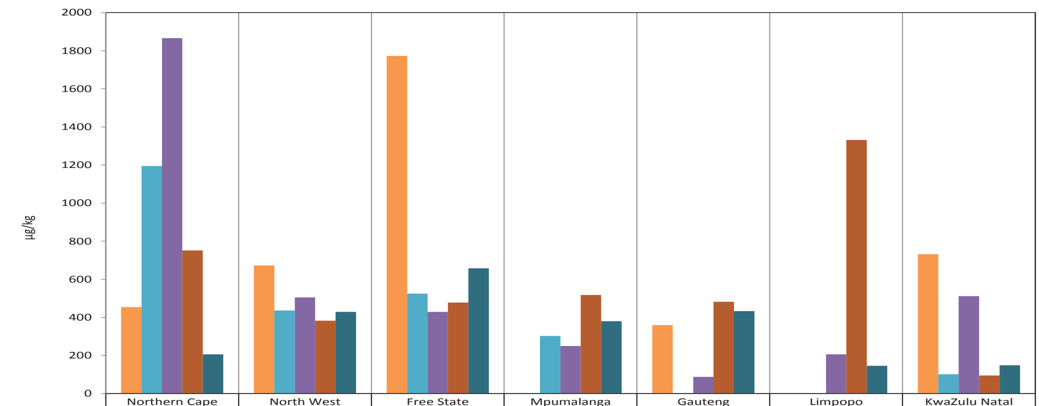
Locally, FUM and DON were found in samples from all the maize producing regions, except for Limpopo where no DON was found. Different patterns of occurrence are observed in different seasons. Mean concentration levels also differ over seasons. FUM tend to show higher mean concentrations on yellow maize compared to white maize from the same region. Please see Graphs 49 and 50.

Graph 49: Total Fumonisin mean concentration in white maize per province over five seasons



	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	1112	456	431	298	0	262
2011 - 2012	614	1064	528	147	65	0
2012 - 2013	696	470	129	422	162	44
2013 - 2014	296	624	318	161	376	50
2014 - 2015	333	478	316	353	84	634

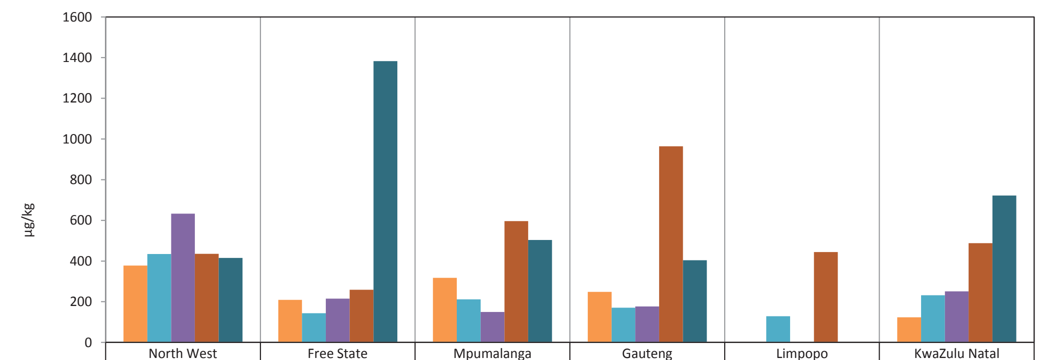
Graph 50: Total Fumonisin mean concentration in yellow maize per province over five seasons



	Northern Cape	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	454	672	1773	0	360	0	732
2011 - 2012	1195	436	525	303	0	0	102
2012 - 2013	1866	505	429	250	88	207	512
2013 - 2014	752	383	478	518	482	1332	95
2014 - 2015	206	429	658	380	433	146	149

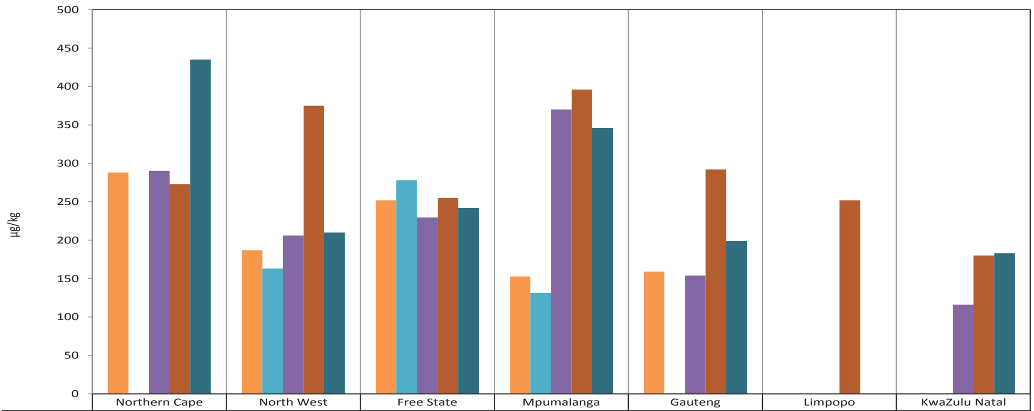
DON shows higher mean concentrations on white maize than yellow maize from the same region. Please see Graphs 51 and 52.

Graph 51: DON mean concentration in white maize per province over five seasons



	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	378	209	317	249	0	123
2011 - 2012	435	143	212	171	129	232
2012 - 2013	633	216	150	177	0	251
2013 - 2014	435	259	596	964	444	488
2014 - 2015	415	1383	504	404	0	722

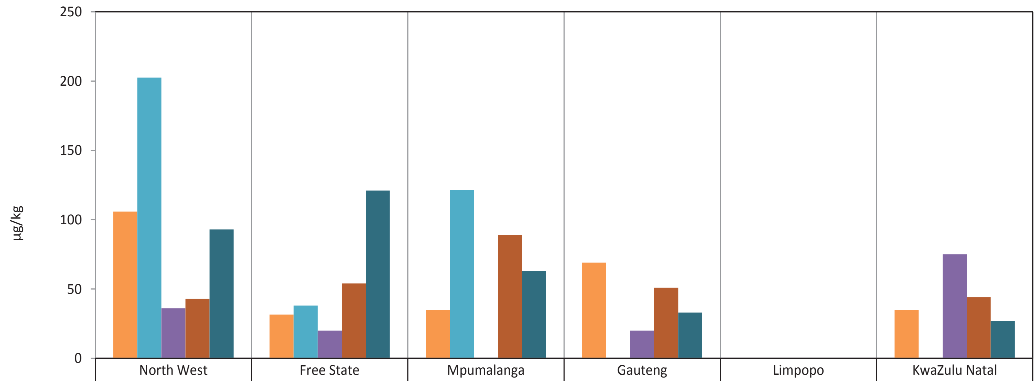
Graph 52: DON mean concentration in yellow maize per province over five seasons



	Northern Cape	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	288	187	252	153	159	0	0
2011 - 2012	0	163	278	131	0	0	0
2012 - 2013	290	206	230	370	154	0	116
2013 - 2014	273	375	255	396	292	252	180
2014 - 2015	435	210	242	346	199	0	183

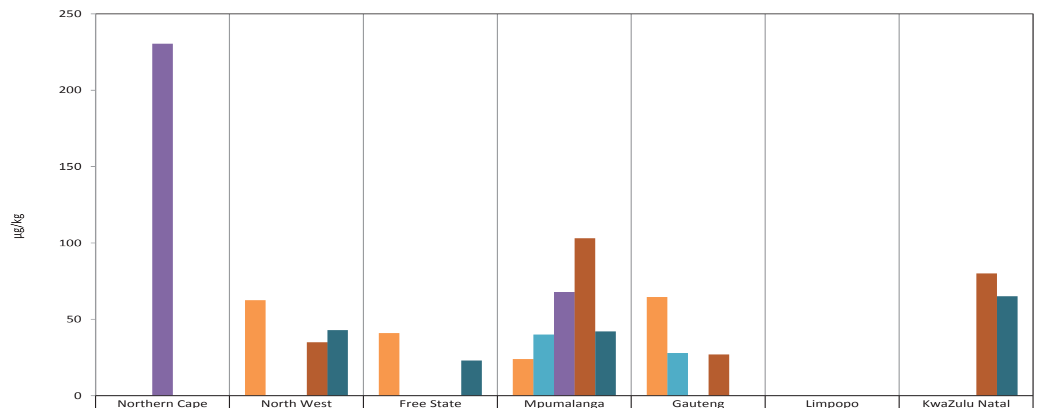
ZON mean concentrations tend to show better correlation between white and yellow maize from the same region, than FUM and DON. Please see Graphs 53 and 54.

Graph 53: ZON mean concentration in white maize per province over five seasons



	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	106	32	35	69	0	35
2011 - 2012	203	38	122	0	0	0
2012 - 2013	36	20	0	20	0	75
2013 - 2014	43	54	89	51	0	44
2014 - 2015	93	121	63	33	0	27

Graph 54: ZON mean concentration in yellow maize per province over five seasons



	Northern Cape	North West	Free State	Mpumalanga	Gauteng	Limpopo	KwaZulu Natal
2010 - 2011	0	63	41	24	65	0	0
2011 - 2012	0	0	0	40	28	0	0
2012 - 2013	231	0	0	68	0	0	0
2013 - 2014	0	35	0	103	27	0	80
2014 - 2015	0	43	23	42	0	0	65

Table 22 on pages 74 to 85 provides the mycotoxin results of all 350 samples analysed for the 2014/2015 season. Table 23 on page 86 provides an overview of the mycotoxin results obtained from the 2003/2004 to 2014/2015 seasons.