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World Mycotoxin Survey

The Global Threat
January – June 2025

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World Overview

North America
Total Risk 85%

Prevalence:

Afla:	17%
ZEN:	83%
DON:	78%
T2:	15%
FUM:	62%
OTA:	5%

Northern Europe
Total Risk 41%

Prevalence:

Afla:	3%
ZEN:	53%
DON:	77%
T2:	13%
FUM:	36%
OTA:	8%

Eastern Europe
Total Risk 22%

Prevalence:

Afla:	3%
ZEN:	58%
DON:	56%
T2:	53%
FUM:	20%
OTA:	25%

China/Taiwan
Total Risk 90%

Prevalence:

Afla:	15%
ZEN:	61%
DON:	84%
T2:	2%
FUM:	98%
OTA:	6%

Central Europe
Total Risk 72%

Prevalence:

Afla:	19%
ZEN:	71%
DON:	85%
T2:	19%
FUM:	60%
OTA:	16%

Central Asia
Total Risk 20%

Prevalence:

Afla:	0%
ZEN:	100%
DON:	0%
T2:	0%
FUM:	100%
OTA:	20%

East Asia
Total Risk 92%

Prevalence:

Afla:	28%
ZEN:	52%
DON:	78%
T2:	6%
FUM:	100%
OTA:	12%

Southern Europe
Total Risk 76%

Prevalence:

Afla:	54%
ZEN:	74%
DON:	64%
T2:	19%
FUM:	76%
OTA:	24%

Central America
Total Risk 84%

Prevalence:

Afla:	33%
ZEN:	92%
DON:	75%
T2:	8%
FUM:	83%
OTA:	3%

Middle East North Africa
Total Risk 81%

Prevalence:

Afla:	36%
ZEN:	83%
DON:	89%
T2:	4%
FUM:	94%
OTA:	6%

South Asia
Total Risk 94%

Prevalence:

Afla:	85%
ZEN:	46%
DON:	5%
T2:	42%
FUM:	63%
OTA:	68%

South America
Total Risk 75%

Prevalence:

Afla:	29%
ZEN:	74%
DON:	47%
T2:	35%
FUM:	67%
OTA:	21%

Subsaharan Africa
Total Risk 67%

Prevalence:

Afla:	28%
ZEN:	66%
DON:	94%
T2:	0%
FUM:	69%
OTA:	5%

South-East Asia
Total Risk 64%

Prevalence:

Afla:	50%
ZEN:	47%
DON:	53%
T2:	1%
FUM:	82%
OTA:	19%

South Africa
Total Risk 48%

Prevalence:

Afla:	11%
ZEN:	57%
DON:	87%
T2:	2%
FUM:	60%
OTA:	2%

Oceania
Total Risk 12%

Prevalence:

Afla:	4%
ZEN:	19%
DON:	35%
T2:	1%
FUM:	71%
OTA:	2%

10 868	53 382	81
Samples	Analyses	Countries

Percentage of samples above risk threshold

- No samples tested
- 0 – 25%
- 26 – 50%
- 51 – 75%
- 76 – 100%

Moderate risk

Extreme risk

Figure 1. Global map of mycotoxin prevalence and risk in different regions.

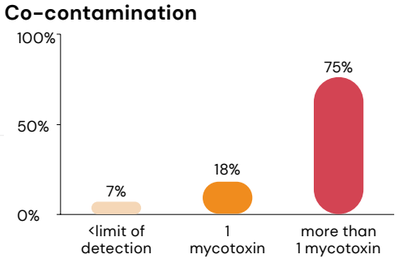
Risk Level

The risk level expresses the percentage of samples testing positive for at least one mycotoxin above the threshold level in parts per billion (ppb).

Recommended risk threshold of major mycotoxins in ppb

Afla	ZEN	DON	T2	FUM	OTA
2	50	150	50	500	10

Co-contamination



Number of mycotoxins per sample based on samples tested for 3 or more mycotoxins.

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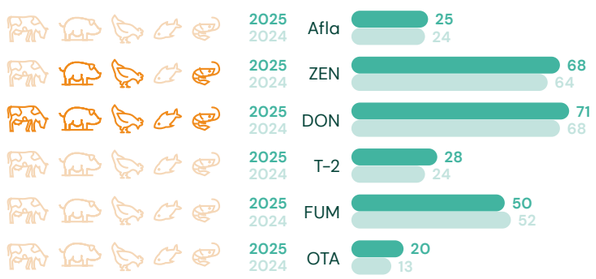
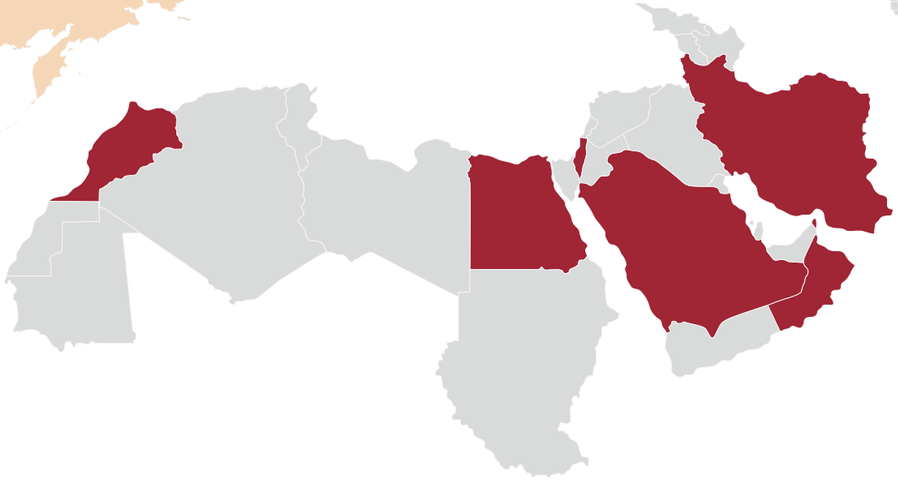
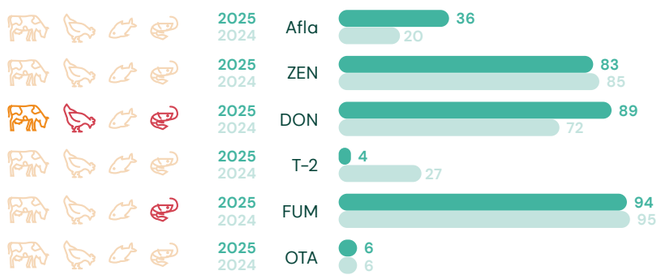
Europe



Total samples: 4 589	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	3 563	4 395	4 389	3 262	3 305	3263
% Contaminated samples	25%	68%	71%	28%	50%	20%
Average of positive (ppb)	14	185	819	26	720	24
Median of positive (ppb)	8	36	267	14	120	4
Maximum (ppb)	909	8 843	27 336	1 313	84 985	1 380

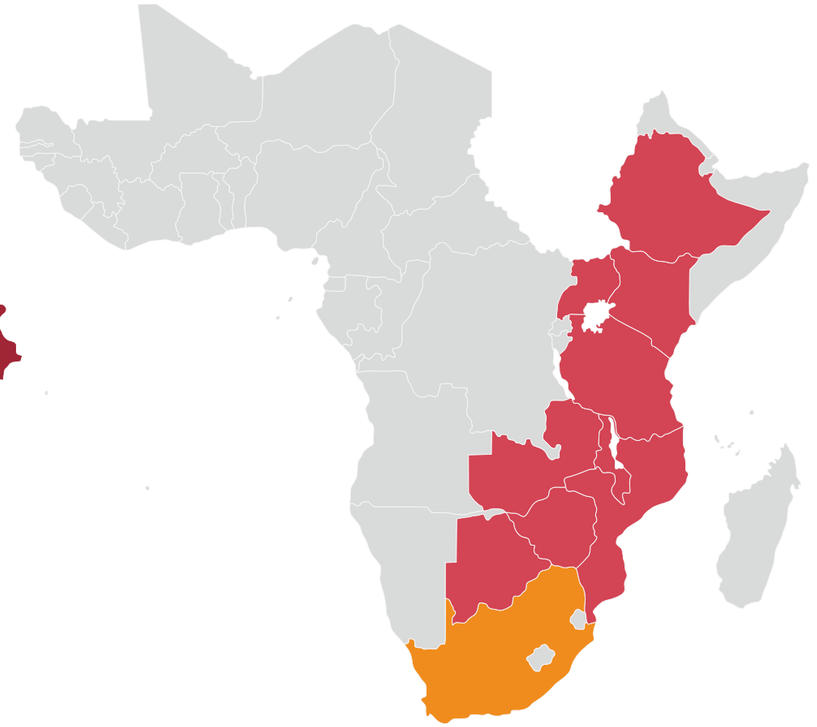
Middle East & North Africa





Total samples: 171	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	171	171	171	171	171	171
% Contaminated samples	36%	83%	89%	4%	94%	6%
Average of positive (ppb)	5	20	262	12	814	2
Median of positive (ppb)	1	14	231	12	567	1
Maximum (ppb)	47	193	1 045	13	11 027	12

Sub-saharan Africa



Total samples: 540	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	540	540	540	540	540	540
% Contaminated samples	15%	59%	89%	1%	62%	3%
Average of positive (ppb)	52	101	355	30	396	7
Median of positive (ppb)	3	13	151	26	77	3
Maximum (ppb)	629	7 151	13 772	73	6 525	56

Animal colours indicate the risk posed to this species by the prevalence and concentration of each mycotoxin in all samples from this region (light orange=moderate to red=extreme see color code page 2). % Contaminated samples January–June 2025 ■ and January–June 2024 ■

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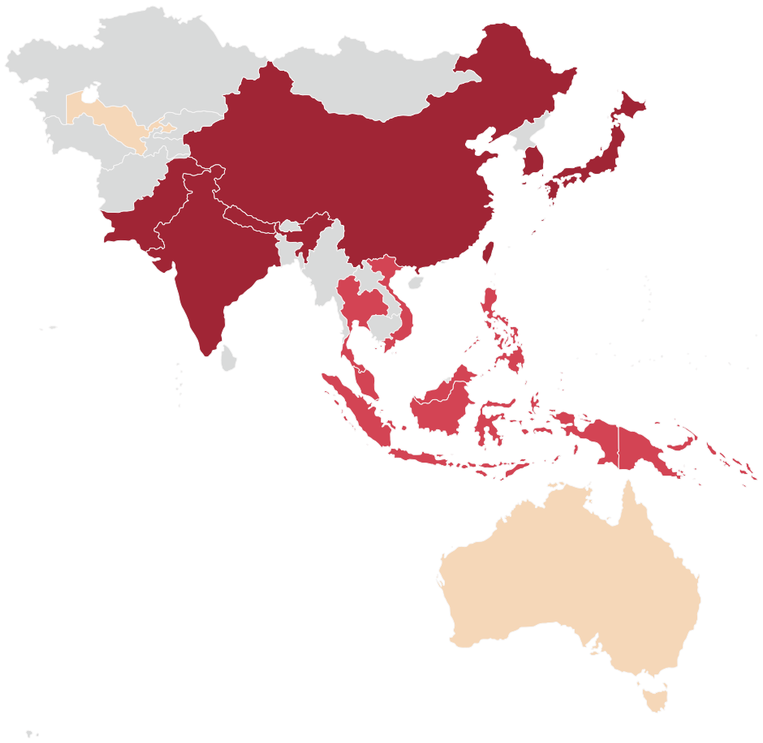
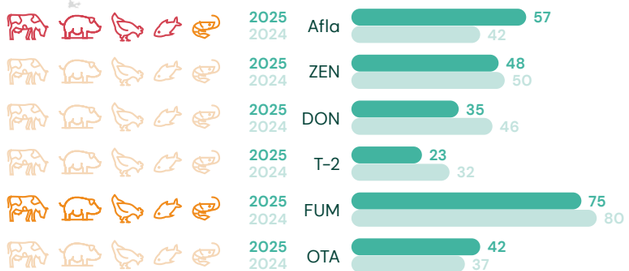
World Mycotoxin Survey

The Global Threat –
January to June 2025

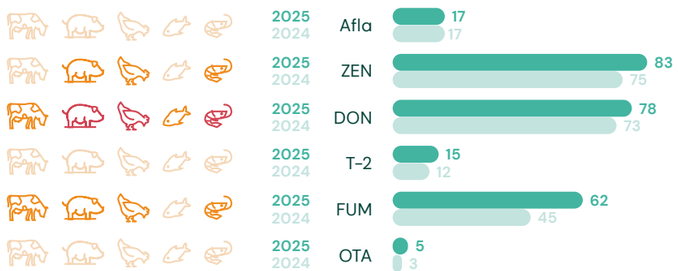
Asia





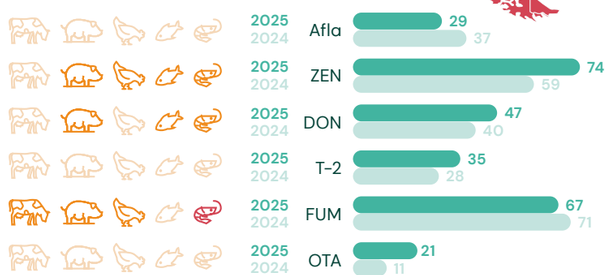
Total samples: 1 762	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	1 734	1 747	1 761	1 678	1 727	1 653
% Contaminated samples	57%	48%	35%	23%	75%	42%
Average of positive (ppb)	33	135	528	34	1 464	18
Median of positive (ppb)	14	44	263	31	723	10
Maximum (ppb)	1 031	20 153	7 236	114	676 340	360

North America



Total samples: 773	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	773	773	773	773	773	773
% Contaminated samples	17%	83%	78%	15%	62%	5%
Average of positive (ppb)	10	156	836	46	4 068	54
Median of positive (ppb)	1	32	383	10	1 118	2
Maximum (ppb)	287	2 029	13 360	1137	265 841	45 778

Central & South America



Total samples: 3 033	Afla	ZEN	DON	T-2	FUM	OTA
Number of samples tested	2 644	2 649	1 937	1 753	2 337	681
% Contaminated samples	29%	74%	47%	35%	67%	21%
Average of positive (ppb)	7	100	435	50	1 987	6
Median of positive (ppb)	3	51	210	36	1 100	2
Maximum (ppb)	206	2 168	8 991	334	208 079	540

Animal colours indicate the risk posed to this species by the prevalence and concentration of each mycotoxin in all samples from this region (light orange=moderate to red=extreme see color code page 2). % Contaminated samples January–June 2025 ■ and January–June 2024 ■

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World Mycotoxin Survey

Spectrum 380®
January – June 2025

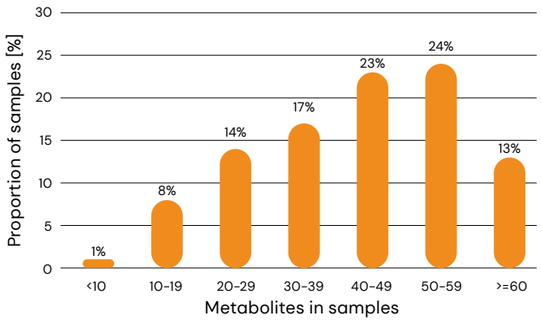
Multiple mycotoxin occurrence

Spectrum 380® results January to June 2025: the most comprehensive mycotoxin analysis available

445
Samples

356 000
Analysis points

27
Countries



43
average number
of Mycotoxins
and Metabolites
per sample

10
out of
10
samples contaminated
with *Fusarium* toxins

99 %
Contained
10
or more mycotoxins and
metabolites

Spectrum 380®:

The most advanced and comprehensive mycotoxin analysis available. It detects > 800 different mycotoxins (including masked and modified forms and emerging mycotoxins), fungal metabolites as well as plant and bacterial toxins and metabolites. This is not a routine analysis but it is done in special cases and/or also of course as part of research of future objectives. Spectrum 380® is developed and conducted by the world's leading independent mycotoxin research lab at the Department of Agrobiotechnology (IFA-Tulln) at the University of Natural Resources and Life Sciences Vienna and offered through cooperation with Performance Solutions plus Biomin Holding GmbH.

Advantages Spectrum 380® & Spectrum Top®50

- Low detection limits
- Qualitative and quantitative results
- Generate structural information
- Minimal sample treatment required
- Can cover a wide range of analytes
- Applicable to complex matrices

Liquid Chromatography – Mass Spectrometry (LC/MS)

Spectrum 380® is a technique that combines the physical separation proprieties of the HPLC with the mass analysis capabilities of the mass spectrometer (MS). The two analytical methods work synergistically. Chromatography separates mixtures with multiple components (e.g. mycotoxins), before the mass spectrometer then provides the structural features of individual components with high sensitivity and specificity.

The most common variations of the method are either liquid chromatography coupled to mass spectrometry (LC-MS) or tandem mass spectrometry (LC-MS/MS). In LC-MS/MS, the mass to charge ratio of the ions belonging to individual mycotoxins are measured before then being fragmented. Each fragment is re-measured in the second mass spectrometry step for extra specificity. Due to the extreme sensitivity, this method is the reference method of choice in many laboratories and it currently represents state-of-the-art of analytical chemistry. The advantages are listed on the right side.

Mycotoxins & metabolites

Metabolite	Prevalence	Average ppb	Maximum ppb
Tryptophol	93%	234	9 084
Flavoglaucin	79%	644	59 904
Aurofusarin	79%	859	13 600
Abscisic acid	78%	196	1 565
Deoxynivalenol	76%	751	15 648
Brevianamid F	73%	57	623
Equisetin	73%	116	4 761
Asperphenamate	69%	112	5 299
15-Hydroxyculmorin	69%	558	8 623
Zearalenone	69%	106	3 569
Asperglaucide	69%	127	6 211
Genistin	69%	52 967	246 500
Moniliformin	67%	191	1 747
Daidzin	65%	36 849	174 600
Siccanol	65%	196	13 400
Neoechinulin A	65%	232	17 966
Culmorin	64%	149	3 943
Genistein	64%	4 038	37 970
Enniatin B	64%	82	2 006
Daidzein	62%	5 581	39 830
3-Nitropropionic acid	61%	48	1 734
Fellutanine A	60%	52	1 465
Enniatin B1	59%	40	743
Emodin	58%	36	1 251
Glycitein	56%	1 981	12 550
Bikaverin	56%	64	746
Glycitin	55%	22 105	96 920
Beauvericin	54%	19	596
Alternariolmethylether	53%	24	1 940

Positive Samples [%] for metabolites present in >50% of samples (orange bars indicate regulated or guideline mycotoxins; red bar indicates a masked mycotoxin). Cut off for all metabolites 1 ppb (except for aflatoxins 0.5 ppb).

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World Mycotoxin Survey

Spectrum Top®50
January to June 2025

Overview of the most frequently found mycotoxins, their masked and modified forms as well as emerging mycotoxins in all samples and finished feed

ALL samples

Metabolite	Prevalence	Average	Maximum
Deoxynivalenol	80%	460	17 982
Fumonisin B1	73%	879	536 932
Enniatin B	72%	71	5 682
Beauvericin	71%	66	6 179
Enniatin B1	67%	22	4 215
Fumonisin B2	66%	257	97 105
Zearalenone	61%	96	7 150
Alternariol	60%	39	2 851
Moniliformin	58%	104	6 137
Fumonisin B3	50%	131	42 303
Enniatin A1	44%	11	1 659
Enniatin A	31%	5	507
Deoxynivalenol-3-Glucoside	29%	96	3 066
Aflatoxin B1	23%	16	931
Nivalenol	22%	170	4 374
Ochratoxin A	20%	6	338
Sterigmatocystin	18%	11	1 274
HT-2 Toxin	17%	56	1 536
15-Acetyl-Deoxynivalenol	14%	165	2 214
T-2 Toxin	7%	22	372
Ergocristine	7%	37	456
Ergocristinine	6%	32	422
Mycophenolic Acid	6%	486	18 327
Ergotamine	6%	22	169

3 053	161 809	70
Samples	Analysis points	Countries

Regulated or guideline mycotoxins

Masked and modified mycotoxins

15-Acetyl-DON: fungal metabolite of DON; shown to be converted to DON in intestinal tract of pigs and chickens

DON-3-glucoside: plant metabolite of DON (masked DON); less toxic than DON, but it converted back to DON in the gastrointestinal tract of mammals.

Nivalenol: Type B trichothecene, more cytotoxic than DON in intestinal cells of pigs and ruminants (*in vitro*)

Ergot alkaloids

Spectrum Top®50:

The most comprehensive mycotoxin analysis commercially available. It detects > 50 different mycotoxins (including masked and modified forms), emerging mycotoxins and fungal metabolites. The Spectrum Top® 50 method was developed by scientists of Romer Labs, a leading global supplier of diagnostic solutions for food and feed safety.

Top25 metabolites are presented according to their prevalence. Cut off for all metabolites 1 ppb (except for aflatoxins 0.5 ppb). Average of positive samples and maximum levels found are reported in ppb.

1 264	66 992	54
Samples	Analysis points	Countries

Emerging mycotoxins (non regulated)

Emerging mycotoxins: frequently found on agricultural commodities, not regulated; toxicity is under investigation, but toxic effects suggested in some scientific literature; EFSA started to publish reports to do a risk assessment for these toxins.

Moniliformin: broiler very susceptible, genotoxic, immunosuppressive; causes heart damage, muscular weakness, respiratory distress

Alternariol: no acute toxicity, cytotoxic and mutagenic *in vitro*, effects on reproductive & immune system *in vitro*.

Beauvericin and Enniatins: effects on immune system: accumulation in fat-rich tissue.

Sterigmatocystin: precursor of aflatoxins; causes similar effects as aflatoxin B_1 in animals, but lower acute toxicity; negative effects incl. bloody diarrhea, less milk production, less feed intake, hepatotoxicity, nephrotoxicity

Mycophenolic acid: shows a low acute toxicity in animals but may cause immunosuppression.

Finished Feed

Metabolite	Prevalence	Average	Maximum
Fumonisin B1	86%	307	8 065
Deoxynivalenol	84%	260	4 409
Fumonisin B2	79%	109	2 699
Enniatin B	75%	61	5 682
Beauvericin	72%	19	214
Moniliformin	72%	78	1 257
Enniatin B1	71%	21	4 215
Alternariol	70%	20	1 033
Zearalenone	69%	35	1 066
Fumonisin B3	65%	59	1 075
Enniatin A1	48%	10	1 659
Enniatin A	43%	3	230
Aflatoxin B1	38%	11	642
Deoxynivalenol-3-Glucoside	31%	53	369
Ochratoxin A	29%	4	262
Nivalenol	18%	55	1 055
15-Acetyl-Deoxynivalenol	12%	81	698
HT-2 Toxin	10%	33	127
Sterigmatocystin	10%	7	226
Ergocristinine	9%	25	167
Ergotamine	9%	19	169
Ergocristine	8%	28	169
T-2 Toxin	8%	17	60

Top25 metabolites are presented according to their prevalence. Cut off for all metabolites 1 ppb (except for aflatoxins 0.5 ppb). Average of positive samples and maximum levels found are reported in ppb.

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