# Mycotoxins

Global trends in the occurrence and concentration levels of mycotoxins are summarised in the Annual BIOMIN Mycotoxin Survey report of 2016. A total number of 16 511 agricultural commodity samples from 81 countries were analysed, which represented more than 63 000 analyses. These samples included maize, wheat, barley, rice, soybean meal, corn gluten meal, dried distiller's grains and silage amongst others. Summaries of the regulated mycotoxins, aflatoxin (Afla), fumonisins (FUM), deoxynivalenol (DON), ochratoxin A (OTA), zearalenone (ZON) and T-2 toxin for Europe, Asia, Middle East, North America, South & Central America and Africa are included in this report. Multiple mycotoxin occurrence was re-confirmed.

The sixth monthly mycotoxin trends from January to December 2016 confirmed the influence of climatic change patterns on the mycotoxin occurrence and levels. Early 2016 results compared to the second half of 2016 results, showed risk levels (percentage of samples at a level above the risk threshold) increasing worldwide (South Africa from 45% to 73%). A total of 263 samples from Africa that included finished feed, maize and cereal (wheat and sorghum) were tested. Of the 24 cereal samples tested, 17% was contaminated with Afla (2 ppb / 2 ppb), 67% with ZON (47 ppb / 195 ppb), 79% with DON (589 ppb / 2 724 ppb), 12% with T-2 (26 ppb / 68 ppb), 21% with FUM (306 ppb / 1 340 ppb) and 50% with OTA (7 ppb / 27 ppb). The average of the positives and the maximum value in ppb are provided in the brackets.[1]

Constant monitoring and continued research on the prevention and mitigation of mycotoxin contamination are necessary. Application of good agricultural practices and storage conditions as well as effective mycotoxin risk management programs are essential elements in preventing the negative effects of mycotoxins.

## National Mycotoxin Regulations

According to the Foodstuffs, Cosmetics and Disinfectants Act (Act 54 of 1972) and regulations published under Government Notice No. R. 1145, dated 8 October 2004, all foodstuffs, ready for human consumption, may not contain more than 10 µg/kg of aflatoxin, of which aflatoxin $B_1$ may not exceed 5 µg/kg.

Amendments to Government Notice No. R. 1145, dated 8 October 2004, recently published under Government Notice No. 987 of 05 September 2016, specify that

- Cereal grains (wheat, maize and barley) intended for further processing, may not contain more than 2 000 µg/kg of Deoxinyvalenol.
- Flour, meal, semolina and flakes derived from wheat, maize or barley, ready for human consumption, may not contain more than 1 000 µg/kg of Deoxinyvalenol.

Further processing means any other treatment or processing method that has been proven to reduce levels of fungus produced toxins in foodstuffs intended for human consumption.

## International Mycotoxin Regulations

The Maximum, advisory and guidance levels for mycotoxins on maize, maize products and cereals from the European Union, USA, China and Codex are provided below for comparison purposes.

The European Union specifies the following maximum levels for mycotoxins on cereals and specifically wheat:

### Aflatoxins

- All cereals and all products derived from cereals, including processed cereal products, with the exception of maize, rice, processed cereal-based foods for infants and young children and dietary foods for special medical purposes intended specifically for infants, $B_1 \leq 2.0$ µg/kg.
- All cereals and all products derived from cereals, including processed cereal products, with the exception of maize, rice, processed cereal-based foods for infants and young children and dietary foods for special medical purposes intended specifically for infants, sum of $B_1 + B_2 + G_1 + G_2 \leq 40$ µg/kg.

### Ochratoxin A

- Unprocessed cereals, ≤ 5.0 µg/kg.
- All products derived from unprocessed cereals, including processed cereal products and cereals intended for direct human consumption with certain exceptions (see full regulation), ≤ 3.0 µg/kg.

### Deoxynivalenol

- Unprocessed cereals other than durum wheat, oats and maize, ≤ 1 250 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, with the certain exceptions (see full regulation) ≤ 750 µg/kg.
- Bread (including small bakery wares), pastries, biscuits, cereal snacks and breakfast cereals, ≤ 500 µg/kg.

### Zearalenone

- Unprocessed cereals other than maize ≤ 100 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption and the germ with certain exceptions (see full regulation) ≤ 75 µg/kg.
- Bread (including small bakery wares), pastries, biscuits, cereal snacks and breakfast cereals, excluding maize-snacks and maize-based breakfast cereals, ≤ 50 µg/kg.[2]

### T-2 and HT-2 toxin

- Unprocessed cereal – wheat, rye and other cereal, indicative level 100 µg/kg.
- Cereal grains for direct human consumption – cereals other than oats and maize, indicative level 50 µg/kg.
- Cereal products for human consumption – cereal milling products other than oat and maize, indicative level 50 µg/kg.
- Cereal products for human consumption – breakfast cereals including formed cereal flakes, indicative level 75 µg/kg.
- Cereal products for human consumption – bread (including small bakery wares), pastries, biscuits, cereal snacks, pasta, indicative level 25 µg/kg.
- Cereal products for human consumption – cereal-based foods for infants and young children, indicative level 15 µg/kg.[3]

In the USA, the Food and Drug Administration (FDA) actions levels for Aflatoxin for all commodities intended for human consumption is 20 µg/kg (excluding Aflatoxin $M_1$ in milk where the maximum level is 0.5 µg/kg). Advisory maximum levels for DON in finished wheat products intended for human consumption is 1 000 µg/kg.[4]

In China the maximum level for Aflatoxin $B_1$ in wheat is 5.0 µg/kg. The maximum level for DON in cereals and their products including wheat and wheatmeal is 1 000 µg/kg. Ochratoxin A in cereals and processed products of milled grains may not exceed 5.0 µg/kg and Zearalenone in wheat flour may not exceed 60 µg/kg.[5]

According to Codex, Ochratoxin A in raw wheat may not exceed 5 µg/kg and the proposed maximum level for DON is 2 mg/kg in raw wheat and 1 mg/kg in flour, semolina, meal and flakes derived from wheat.[6]

### References:


1. BIOMIN World Mycotoxin Survey 2016, Annual Report No. 13, www.biomin.net.
2. COMMISSION REGULATION (EC) No 1881/226 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs.
3. COMMISSION RECOMMENDATION of 27 March 2013 on the presence of T-2 and HT-2 toxin in cereals and cereal products.
4. FDA Mycotoxin Regulatory Guidance, A Guide for Grain Elevators, Feed Manufacturers, Grain Processors and Exporters, August 2011.
5. National Food Safety Standard, Maximum Levels of Mycotoxins in Foods, GB 2761-2011.
6. CODEX General Standard for contaminants and toxins in food and feed, CODEX STAN 193-1995, Revised in 1997, 2006, 2008, 2009, Amended 2009.