



Alternaria Toxins

Cereals, Fruits, Vegetables and Oil Seeds in the Spotlight

Fungi of the genus *Alternaria* (black fungi) are common representatives of field fungi. They make part of the natural microbiological growth on pre- and post-harvest crops. The genus *Alternaria* consists of about 50 species, which may produce toxins and secondary metabolites in a varying scope.

High relative humidity in summer may lead to proliferation of *Alternaria* and thus a potential contamination with *Alternaria* toxins.

There are about 70 known different mycotoxins and phytotoxins of the genus *Alternaria*.

Only a small portion of these mycotoxins occur in food, the most important being:

- Alternariol (AOH)
- Alternariol monomethylether (AME)
- Altenuene (ALT)
- Tenuazonic acid (TEA)
- Tentoxin (TEN)

Occurrence and Spreading

Due to their ubiquitous spreading, *Alternaria* toxins occur in many different types of food. They are present in cereals, vegetables (tomatoes, carrots, potatoes) and in fruits such as apples and grapes. Even oil seeds like sunflower seeds, rapeseeds and olives may get infected.

Toxicology and Regulatory Provisions

The various *Alternaria* toxins are differentiated by their toxic impact. Depending on the substance, cytotoxic, teratogenic, fetotoxic, mutagenic, antiviral and antibacterial characteristics have been found.

Moreover, *Alternaria* spores are amongst the most frequent in- and outdoor allergens and thus the main cause for children's asthma.

In 2011, the European Food Safety Authority (EFSA) published a Scientific Opinion on Alternaria toxins. Six of these substances are of major importance in the food chain. EFSA's CONTAM Panel considered it appropriate to use the threshold of toxicological concern (TTC) approach. For the genotoxic Alternaria toxins, AOH and AME the TTC value is 2.5 ng/kg b.w. per day, the TTC value for the non-genotoxic substance TEA is 1.5 µg/kg b.w. per day.

Grain, vegetables, fruit, alcoholic beverages, oilseeds and vegetable oils mainly contribute to the dietary exposure to Alternaria toxins. For a final evaluation additional data have to be collected.

In the commission recommendation (EU) 2022/553 on monitoring the presence of Alternaria toxins in food are new indicative levels (listed in the table) based on the available data in the EFSA database. The indicative levels are not food safety levels.

Analysis

Our experts from the Competence Centre for Mycotoxins & Biotoxins have long-term experience in the analysis of the entire mycotoxin spectrum occurring in food. A method for the quantitative determination of the Alternaria toxins AOH, AME, TEA, TEN and ALT is offered by the Competence Centre for Mycotoxin Analysis. This applied LC-MS/MS method allows the clear identification and quantification of relevant Alternaria toxins in the lowest concentration ranges. It is applicable for juices (apple, pear, grape, tomato, carrot), tomato and carrot products, grapes and wine, and additionally for cereals, cereal products as well as oilseeds and plant oils.

The limits of determination based on the recommendation are complied with our analysis.

Extract from the european recommendation *

Food	Indicative level [µg/kg]		
	AOH	AME	TEA
Processed tomato products	10	5	500
Paprika powder	-	-	10000
Sesame seeds	30	30	100
Sunflower seeds	30	30	1000
Sunflower oil	10	10	100
Tree nuts	-	-	100
Dried figs	-	-	1000
Cereal based food for infants and young children	2	2	500

* More details are in commission recommendation (EU) 2022/553

