

6. FROM FIELD TO FORK: PREVENTION, STORAGE AND PROCESSING

Mycotoxins are an issue throughout the food supply chain. Some form while the crop is still in the field; others may be produced after harvest if drying and storage conditions favour toxigenic fungi. Prevention therefore does not depend on a single decisive treatment, but on a sequence of agronomic decisions, controls and management procedures.

PREVENTION STARTS IN THE FIELD

The susceptibility of wheat, maize and other cereals to fungal infection depends on interactions between crop species, variety, weather and agricultural practice. Rain and humidity at certain growth stages can favour some *Fusarium* infections; hot periods and drought stress may contribute to aflatoxin risk in maize, depending on climatic and crop conditions. No single weather pattern predicts all mycotoxins equally.

Appropriate crop rotation, management of crop residues, reduction of insect damage, variety selection and harvest planning can help reduce risk. Irrigation and nutrient management also affect plant physiology, but individual measures do not guarantee freedom from contamination. Any plant-protection treatments used must be authorised and part of a relevant agronomic strategy: on their own they cannot guarantee protection against mycotoxins.

HARVEST: WHEN THE NATURE OF THE RISK CHANGES

Harvesting under suitable conditions limits grain exposure to further adverse weather. However, early harvesting of very moist grain requires prompt, well-managed drying. After threshing, prolonged storage in damp heaps must be avoided; equipment and vehicles should be cleaned, grain breakage reduced and batches kept identifiable.

Appearance alone cannot establish safety: an apparently normal batch may contain mycotoxins, while visibly damaged grain indicates a problem requiring investigation without quantifying its scale. Representative sampling and analytical plans are needed, where appropriate, to determine whether a product is suitable for food use.

DRYING AND STORAGE: MANAGING WATER, TEMPERATURE AND TIME

Mould growth during storage is chiefly influenced by water availability, more accurately described by water activity (a_w) than moisture percentage alone, and by temperature. Rapid drying after harvest and maintaining dry conditions are central preventive

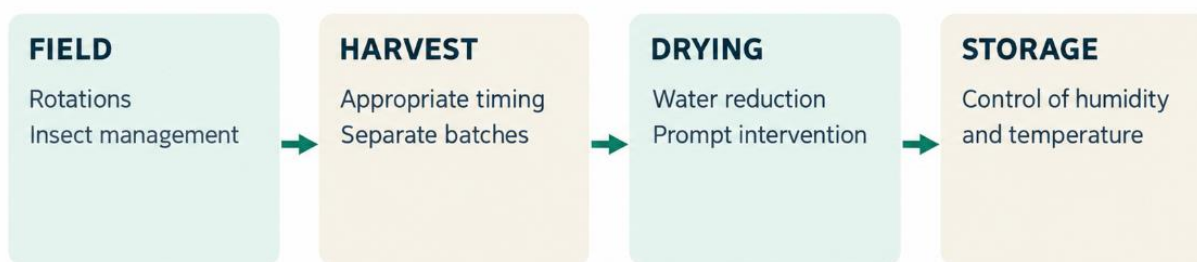
measures. No single moisture percentage can be considered safe for every cereal: product, temperature, storage duration and installation characteristics all matter.

Silos and warehouses need cleaning, protection from leaks, control of condensation and hot spots, ventilation management and regular monitoring. Insects and mechanical damage also facilitate deterioration and infection. Monitoring must address the whole stored mass, since localised problems can escape a superficial inspection.

An often overlooked point is that drying contaminated grain can prevent further toxin production without necessarily removing what is already present. Preventing new fungal growth and removing existing contamination are different objectives.

PREVENTING MYCOTOXINS ALONG THE SUPPLY CHAIN

These measures reduce the risk of formation: they do not guarantee removal of toxins already present



Cooking is not a reliable decontamination treatment.

OVERORGANIC | SCIENTIFIC LIBRARY

CLEANING, SORTING AND MILLING: POSSIBLE REDUCTION, NOT ERADICATION

Screening, aspiration and optical or density sorting can remove dust, fragments and damaged grains that may be more contaminated than average. Effectiveness varies greatly with the mycotoxin, cereal and contamination pattern. Good sorting can reduce the mean level but does not replace analytical testing of the product continuing along the supply chain.

During milling, some mycotoxins become unevenly distributed between refined flour, bran and other fractions. Separation may reduce concentration in one fraction while increasing it in another. The possible use of by-products as food or feed therefore requires separate assessment: a contaminant does not disappear merely because it has been moved elsewhere.

COOKING, FERMENTATION AND EXTRUSION: WHAT REALLY CHANGES?

Mycotoxins do not all behave identically during food processing. Temperature, time, moisture, pH and food composition influence the transformation of each substance. Some concentrations may fall while others remain relatively stable; transformation products may also arise whose toxicological significance requires specific evaluation.

Ordinary home cooking should not be regarded as a reliable way to make contaminated food safe. Nor should fermentation or industrial processing be assumed to achieve complete detoxification. The correct approach is to establish the effect of the process on the particular mycotoxin and food matrix rather than generalising across substances.

SAMPLING, TRACEABILITY AND CRITICAL SUPPLY-CHAIN POINTS

Mycotoxin contamination can be highly heterogeneous: a few high-concentration hot spots can influence the result for a large batch. A qualified laboratory can perform an excellent analysis on an unrepresentative sample and still produce information unsuitable for describing the whole lot. Sampling, sample preparation, analysis and interpretation are therefore inseparable. Chapter 7 examines analytical techniques and sampling plans in detail.

Traceability links findings to cultivation, harvesting and subsequent stages, and enables problematic batches to be isolated rather than losing information through indiscriminate mixing. Regulation (EU) 2023/915 sets maximum levels for various combinations of mycotoxin and food and prohibits mixing compliant food with food exceeding those limits to dilute contamination. Compliance does not make good preventive practice unnecessary.

WHAT, THEN, IS THE MOST EFFECTIVE STRATEGY?

Prevention works when measures reinforce one another: appropriate agronomy, timely harvesting, proper drying, controlled storage, technological sorting and risk-proportionate analytical checks. No stage automatically compensates for failures at an earlier one. Even environmentally unspoilt regions can produce cereals containing mycotoxins, because these result from biological processes influenced by climate and the supply chain, not solely from human-made pollution.

The central message is simple: reducing the likelihood of mycotoxin formation is generally more reliable than counting on their removal once present. This principle supports both food safety and more rational management of losses throughout the supply chain.

SCIENTIFIC AND REGULATORY REFERENCES

- [1. Codex Alimentarius \(2017\). Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals \(CXC 51-2003\).](#)
- [2. FAO. Mycotoxins in Grain – Prevention and control of mycotoxins in stored grains and seeds.](#)
- [3. European Commission. Regulation \(EU\) 2023/915 on maximum levels for certain contaminants in food \(as amended\).](#)
- [4. Codex Alimentarius. Official collection of codes of practice, including those for specific supply chains.](#)