

ESSENTIAL FOOD SAFETY:

PREVENTING MYCOTOXIN
POISONING IN EUROPE - A
TOOLKIT FOR POLICY MAKERS

POLICY NOTE

WRITTEN BY

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Introduction

Mycotoxins are toxic chemicals naturally produced by fungi, or mould, that are estimated to contaminate some 25% of the world's crops. Damp climates, insect damage, and poor food storage that facilitate the growth of mould increase the likelihood and levels of mycotoxin contamination.

These contaminations represent a real threat to consumer health. We have seen efforts (notably by France) to increase allowable thresholds for mycotoxin contamination, which could pose additional risk to consumers. Advocating for higher mycotoxin thresholds comes together with an increased public scepticism towards crop protection (i.e. fungicides), which is used to mitigate the risk of these toxins. The Consumer Choice Center points out that any regulatory changes in the legality of fungicide levels need to be backed up by scientific evidence and require the availability of sound alternatives to traditional crop protection methods such as genome-editing.

Since its creation in 2017, the Consumer Choice Center has had the ambition of fostering more free, responsible, and vocal consumers. We also regard it as our mission to bring attention to those issues that don't find as much coverage. For example, we have delivered more focus on the locust plague that hit Africa earlier this year, and have advocated for innovation-focused biotech solutions. We also believe that favouring modern technology such as gene-editing is key to an agricultural and medical revolution that will prolong and better the lives of patients and consumers. In this spirit, we want to attract more attention to the issue of mycotoxin poisoning in Europe, which we see as an underreported food safety problem. Tens of thousands of liver cancer deaths and billions of dollars in market losses can be attributed to mycotoxin contamination annually. However, the decisions and positions of some regulators and policy-makers has put this threat to the forefront of our concerns in the realm of agriculture. We believe that a move away from modern agricultural technology will have mycotoxins poisoning re-emerge as one of the most severe concerns for food safety in Europe.

THIS POLICY NOTE WILL EXPLAIN WHAT MYCOTOXINS ARE, AND WHAT WE BELIEVE NEEDS TO BE DONE TO PREVENT THEIR SPREAD.

AN UNDERESTIMATED DANGER: THE PREVALENCE AND EFFECTS OF MYCOTOXINS

In short, mycotoxins are naturally occurring toxic chemicals produced by moulds (fungi) that grow on crops. Wet weather, insect damage, and inadequate storage all promote the growth of mould on crops and increase the likelihood of mycotoxin contamination. s.. Among the most common mycotoxins are aflatoxins, ochratoxin A (OTA), fumonisins (FUM), zearalenone (ZEN), and deoxynivalenol (DON – also known as [vomitoxin](#)), which can all be ingested through eating contaminated food, including dairy products (as infected animals can carry it into milk), eggs, or meat. One of the most dangerous are aflatoxins, which can affect corn, wheat, rice, soybeans, peanuts, and tree nuts, [and can cause cancer](#). Most disconcertingly, [up to 28%](#) of all liver cancers worldwide can be attributed to aflatoxins, and its [immunosuppressant features](#) leave humans weakened against other diseases. The features have been known to modern science since the turn of the century.

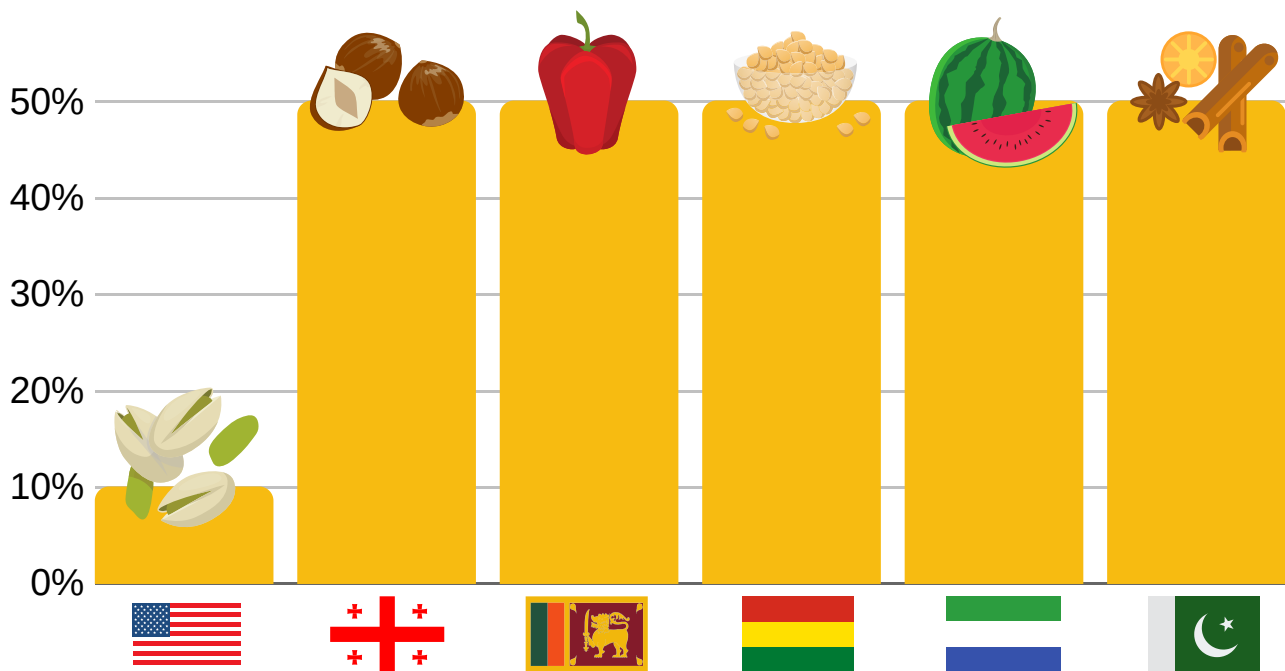
In Africa, this is a [deadly epidemic](#). Aflatoxin exposure is more deadly than exposure to malaria or tuberculosis, [with 40% of all liver cancers](#) in Africa being related to it. Mycotoxin contamination can occur through inadequate food storage, but more importantly, it occurs in the absence of the correct crop protection measures, including chemicals.

As a result of mycotoxins, [food products are prevented from entering Europe](#), and Africa loses millions in unusable food every year. Most recently, Kenya had to destroy 4 million bags of maize. [Agriculture Cabinet Secretary Peter Munya told](#) the Senate Committee for Agriculture that maize in the country's Strategic Grain Reserves is unfit for human consumption as aflatoxins have contaminated it.

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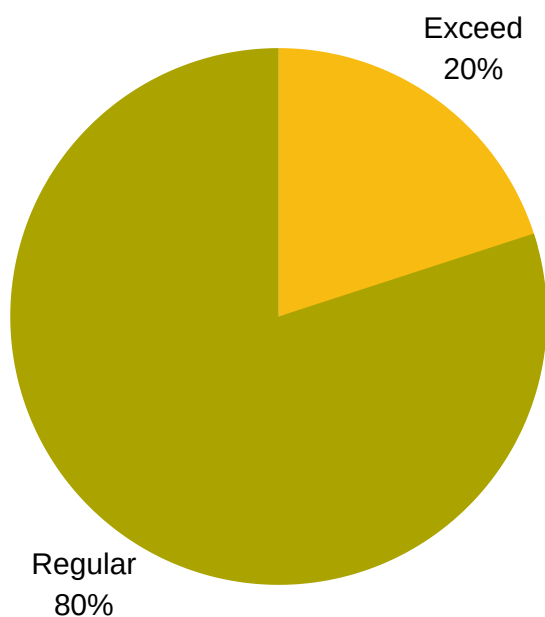
THE SITUATION OF MYCOTOXINS IN EUROPE

The European Union has made necessary adjustments as late as this year. On May 6 2020, the European Commission published the [Implementing Regulation \(EU\) 2020/625](#), which implements stricter food safety controls on several regions, notably due to the risk of aflatoxin contamination. 10% of U.S pistachio import samples were found to have aflatoxin exposure, 50% of hazelnut samples from Georgia, 50% of Sri Lankan pepper samples, 50% of Bolivian nut product imports, 50% of watermelon samples from Sierra Leone, as well as half of Pakistani spice mix samples.



As much as these import safety checks are valuable, they also display one particular point: exposure to mycotoxins is just as likely in Europe as it is all across the world. These are not environmental preconditions that would make this continent less exposed to be prone to be affected by this phenomenon.

On May 13 2020, [EFSA published a scientific opinion](#) on public health risks related to the presence of ochratoxin A (OTA) in food. EFSA states that OTA exposure can be genotoxic by directly damaging the DNA, and also reaffirmed that it also confirmed that it can be carcinogenic to the kidney. Ochratoxin causes nephropathy in humans; it is also suspected to be the cause of Tunisian nephropathy and human Balkan endemic nephropathy (BEN). This mycotoxin is known for its teratogenic effect; it can harm the fetus in the womb owing its ability to cross the placenta and cause the malformation of the central nervous system and damage to the brain. The agency says that there is a health concern for most consumer groups, and that EFSA's scientific advice will inform the European Commission in the ongoing discussion on maximum levels of OTA in foodstuffs.



Source: BIOMIN

APPROXIMATELY 20% OF CENTRAL EUROPEAN GRAIN FEED EXCEEDED EU REGULATORY LIMITS.

[According to 2017 data](#), Europe is also at severe risk of mycotoxin contamination. [A 10-year survey](#) conducted by the BIOMIN research centre in Austria found that approximately 20% of Central European grain feed and almost 12% of Southern Europe's grain feed exceeded EU regulatory limits.

In 2013, [France requested](#) to have its maize samples exempted from EU regulation on mycotoxins, because its harvest would have mainly been unusable. [The 2018 data](#) showed that 6% of the field and 15% of French silo maize samples were contaminated with aflatoxins. Long-term storage of grain contributes to the prevalence of mycotoxin poisoning.

NECESSARY MEANS OF CROP PROTECTION FOR CONSUMER SAFETY

Fungicides are biocidal chemical compounds or biological organisms used to kill parasitic fungi or their spores. They are used to (1):

- To control a disease during the establishment and development of a crop.
- To increase productivity of a crop and to reduce blemishes. Diseased food crops may produce less because their leaves, which are needed for photosynthesis, are affected by the disease. Blemishes can affect the edible part of the crop or, in the case of ornamentals, their attractiveness, which both can affect the market value of the crop.
- To improve the storage life and quality of harvested plants and produce. Some of the greatest disease losses occur post-harvest. Fungi often spoil (render unusable) stored fruits, vegetables, tubers, and seeds.

Through Integrated Pest Management Systems (IPMS), farmers are able to use fungicides such as Succinate dehydrogenase inhibitors (SDHI).

SDHIs have faced increased scrutiny in past years, particularly in France. [According](#) to the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), "the information and hypotheses put forward did not provide any evidence to support a health alert for humans and the environment related to the agricultural use of these fungicides that justified amending or withdrawing the marketing authorisations. Nevertheless, ANSES does not regard the issue as closed and is continuing its investigations." The agency also adds that the level of total dietary exposure is low in relation to the current toxicological thresholds, and the maximum residue limits for these active substances are only exceeded in exceptional cases.

It stands to reason that crop protection tools face rigorous scrutiny, both on the national and EU-level. That said, determinations towards restricting use in agriculture should be risk-, not hazard-based.

(1) McGrath, M.T. 2004. What are Fungicides. The Plant Health Instructor. DOI: 10.1094/PHI-I-2004-0825-01. Updated 2016.

hazard vs. risk

Risk-based regulation manages exposure to hazards. For instance, the sun is a hazard when going to the beach, yet beach-goers limit their exposure by applying sunscreen. A hazard-based regulatory approach would be to ban all beach excursions, in order to cut out the hazard completely. The same logic of hazard-based regulation is all too often applied in crop protection regulation, paired with a misunderstanding of the precautionary principle. In essence, hazard-based regulation advocates would endorse outlawing all crop protection methods that are not completely safe, regardless of the dosage. By ignoring the importance of the equation $\text{Risk} = \text{Hazard} \times \text{Exposure}$, hazard-based regulation does not follow a scientifically sound policy-making approach.

The agri-technological use of genome-editing has also been successful at identifying applicable use of CRISPR-Cas-9 to prevent mycotoxin poisoning in asparagus (2). Given the immense benefits provided through technologies such as CRISPR-Cas9 and other gene-editing procedures, it becomes a necessity to reform Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms.

The said legislation led to European Court of Justice ruling Case C-528/16, *Confédération paysanne and Others v Premier ministre and Ministre de l'agriculture, de l'agroalimentaire et de la forêt*, which found "techniques/methods of genetic modification conventionally used and deemed to be safe" and the "concept of 'genetically modified organism'" to necessitate banning the use of new breeding technologies in European agriculture.

The ECJ ruling is based on outdated legislation, which indiscriminately rules on the basis of a technology, as opposed to advocating for a case-by-case safety assessment, which would be more in line with a reasoned application of the precautionary principle. The use of gene-editing in agriculture would allow for an innovation-based approach to agriculture, allow for a solution between the use of fungicides and understandable environmental concerns.

(2) Ferrara, M., Haidukowski, M., Logrieco, A.F. et al. A CRISPR-Cas9 System for Genome Editing of *Fusarium proliferatum*. *Sci Rep* 9, 19836 (2019). <https://doi.org/10.1038/s41598-019-56270-9>



CONCLUSION

Mycotoxins represent a palpable threat to the health of consumers, and cannot be ignored. If the European Union pursues reducing the use of fungicides, it should, in the interests of consumers, only do so if the means for alternative crop protection technology has been guaranteed. Phasing-out proven technology without the ability to use substitutes would entrench a deep mistrust between consumers and farmers, as essential food safety could not be ensured. It is in the interest of regulators and consumers alike to prevent that from happening, and to guarantee a reduction of preventable death and long-lasting health effects due to mycotoxin poisoning in Europe.



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**MYCOTOXINS REPRESENT A PALPABLE
THREAT TO THE HEALTH OF CONSUMERS**



2

**REDUCING THE USE OF FUNGICIDES
SHOULD ONLY BE PERSUED IF
ALTERNATIVE CROP PROTECTION
TECHNOLOGY HAS BEEN GUARANTEED**

3

**PHASING-OUT PROVEN TECHNOLOGY
WITHOUT SUBSTITUTES WOULD
ENDANGER FOOD SAFETY**



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