
# COCERAL MYCOTOXINS SURVEY: SYNTHESIS REPORT 2021

**Results of the Mycotoxins management survey carried out among COCERAL members**

**Published in May 2022**



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## EXECUTIVE SUMMARY

COCERAL has first carried out a survey among its members regarding mycotoxin management in 2007. The survey was repeated in 2009, 2011, 2013, 2015, 2017, 2019 and latest in 2021. Over the time, some questions have been adapted or added to the survey but essentially with the continuing objective to gain an overview on of mycotoxins management carried out by COCERAL members.

COCERAL members are on the one hand grain collectors and international traders of cereals, oilseeds, pulses, olive oil, oils and fats, animal feed, but also agrosupply distributors, who often advise farmers all along the production cycle - on the choice of seed varieties and the of use of fertilisers and plant protection products.

The first part of the survey focuses specifically on agrosupply distributors' contribution to prevention of mycotoxins risk in the field. Almost all agrosupply distributors participating in the 2021 survey that advise farmers inform about practices aimed at minimising mycotoxin development in the field, for example by recommending fusarium resistant seeds or adapted fungicides treatments or generally advising on agricultural practices. Further to the advice provided, mycotoxin risk management of farmers normally improves.

The second section of the survey aims at sampling and testing practices pursued by grain collectors and international traders. They intervene mostly after the grain is harvested. Collectors mainly test at harvest, in store but also at loading before transport or at delivery to first processing industry (testing before harvest is done only to a minor extent). When importing and trading within the EU, testing tends to take place at delivery to first processing industry but also (to a minor extent) in store.

With about 90% of survey participants indicating that they sample their lots to monitor mycotoxins, this highlights an continuous awareness of mycotoxin issues. Survey participants were also asked which crops they sample on which mycotoxins. From the 2021 results, Maize, wheat and barley appears to be the most tested crops. Some change in the testing patterns could be observed when comparing the replies with the 2019 survey.

Regarding the sampling methods used by operators for mycotoxins analyses, the 2021 survey confirms the same trend outlined in the report 2019 (predominance of the use of EU official control regulation sampling plans and, to a minor extent, contractual methods (such as GAFTA 124 and FOSFA)), excepts for a two-fold increase in the use of the CEN method EN/ISO 24333:2009.

When carrying out mycotoxin analysis internally, operators use mostly bandage kits or other methods of analysis. When rapid analysis is required, the majority of collectors and traders also use external analysis. However, external analysis is also used to validate analysis carried out internally, or to complement for missing data, for example when internal testing equipment is not available.

In the case that a participant to the survey declared that there was an exceedance of regulatory limits, only 11% of the participants recalled a product lot. It is important to note that, while in the 2019 survey the majority of product recalls were due to entirely to commercial complaints, in 2021 they are due to official controls.



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# REGULATORY SITUATION

## Foodstuffs

The Commission Regulation (EC) No 1881/2006 of 19 December 2006 sets maximum levels for certain contaminants in foodstuffs, amongst others for mycotoxins.

## Feedingstuffs

Recommended guidance values for different mycotoxins in animal feed, feed materials and feedingstuffs are available through Commission Recommendation 2006/576/EC from 17 August 2006 on the presence of deoxynivalenol, zearalenone, ochratoxin A, T-2 and HT-2 toxins and fumonisins in products intended for animal feeding. Commission Directive 2002/32/EC on undesirable substance in animal feed foresees maximum levels for aflatoxin B1 and rye ergot (*Claviceps purpurea)* in feed materials.

## Recommendation regarding presence of T-2 and HT-2 toxins

Discussions on T-2 and HT-2 toxins have been going on for several years. In March 2013, the Commission published a recommendation (2013/165/EU) regarding the presence of T-2 and HT-2 toxin in cereals and cereal products. Member States are asked to perform, with the active involvement of feed and food business operators, a monitoring for the presence of T-2 and HT-2 toxins in cereals and cereals products.

The recommendation includes indicative levels for the sum of T-2 and HT-2 toxins (µg/kg) for unprocessed cereals, cereal grains for direct human consumption but also for cereal products for feed and compound feed (rice and rice products are not included).

## Maximum levels for mycotoxins in food and feed

The table 1 here below summarizes the limits and guidance values for food and feed.



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**Table 1: Summary of CURRENT regulatory levels for mycotoxins in food and feed (data from Commission Regulation (EC) No 1881/2006 – consolidated version 3 May 2022; Directive 2002/32/EC – consolidated version 28 November 2019 and Commission Recommendation (EC) 2006/576) – consolidated version 02 August 2016)**

| Mycotoxins | | Foodstuffs<br>Regulated maximum levels | Feedingstuffs<br>levels |
|---|---|---|---|
| STORAGE MYCOTOXINS | Aflatoxins | <u>Sum of $B_1$, $B_2$, $G_1$, and $G_2$:</u><br>- **4 ppb** for cereals and products derived from cereals (excluded maize, rice and processed cereal products, baby foods and dietary foods for infants)<br>- **10 ppb** for maize and rice<br><br><u>Aflatoxin B1:</u><br>- **2 ppb** for cereals and products derived from cereals (excluded maize, rice and processed cereal products, baby foods and dietary foods for infants)<br>- **5 ppb** for maize and rice<br>- **0.1 ppb** for processed cereal-based foods and baby foods for infants and young children<br>- **0.1 ppb** for Dietary foods for special medical purposes intended specifically for infants | **Maximum level:**<br>**20 ppb** for feed materials<br>**(Directive 2002/32/EC)** |
| | OTA<br>(Ochratoxin A) | - **5 ppb** for unprocessed cereals<br>- **3 ppb** for All products derived from unprocessed cereals, including processed cereal products and cereals intended for direct human consumption except for:<br>– processed cereal-based foods and baby foods for infants and young children **(0.5 ppb),**<br>– dietary foods for special medical purposes intended specifically for infants **(0.5 ppb),**<br>– wheat gluten not sold directly to the consumer **(8 ppb)** | <u>**Recommended guidance values:**</u><br>**250 ppb** for feed materials (cereals and cereal products)<br>**(Commission Recommendation (EC) 2006/576)** |
| FIELD MYCOTOXINS | DON<br>(Deoxynivalenol) | - **1250 ppb** for unprocessed cereals other than durum wheat, oats and maize<br>- **1750 ppb** for unprocessed durum wheat and oats<br>- **1750 ppb** for unprocessed maize except for unprocessed maize intended to be processed by wet milling (starch production)<br>- **750 ppb** for cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, with the exception of:<br>– Processed cereal-based foods and baby foods for infants and young children **(200 ppb)**<br>– Milling fractions of maize with particle size > 500 micron falling within CN code 1103 13 or 1103 20 40 and other maize milling products with | <u>**Recommended guidance values:**</u><br>**8000 ppb** for cereals and cereal products (**12000 ppb** for maize by-products)<br>**(Commission Recommendation (EC) 2006/576)** |



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| | | particle size > 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(750 ppb)**<br>– Milling fractions of maize with particle size ≤ 500 micron falling within CN code 1102 20 and other maize milling products with particle size ≤ 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(1250 ppb)** | |
| **FIELD MYCOTOXINS** | **ZEA (Zearalenone)** | - **100 ppb** for unprocessed cereals other than maize<br>- **350 ppb** for unprocessed maize except for unprocessed maize intended to be processed by wet milling (starch production)<br>- **75 ppb** for cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, with the exception of:<br>– Maize intended for direct human consumption, maize-based snacks and maize-based breakfast cereals **(100 ppb)**<br>– Processed cereal-based foods (excluding processed maize- based foods) and baby foods for infants and young children **(20 ppb)**<br>– Processed maize-based foods for infants and young children **(20 ppb)**<br>– Milling fractions of maize with particle size > 500 micron falling within CN code 1103 13 or 1103 20 40 and other maize milling products with particle size > 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(200 ppb)**<br>– Milling fractions of maize with particle size ≤ 500 micron falling within CN code 1102 20 and other maize milling products with particle size ≤ 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(300 ppb)** | **Recommended guidance values:** **2000 ppb** for cereals and cereal products (**3000 ppb** for maize by-products) **(Commission Recommendation (EC) 2006/576)** |
| | **FUMONISINS B1+B2** | - **4000 ppb** for unprocessed maize except for unprocessed maize intended to be processed by wet milling (starch production).<br>- **1000 ppb** for Maize intended for direct human consumption, maize-based foods for direct human consumption, with the exception of:<br>- Maize-based breakfast cereals and maize-based snacks **(800 ppb)**<br>- Processed maize-based foods and baby foods for infants and young children **(200 ppb)**<br>- Milling fractions of maize with particle size > 500 micron falling within CN code 1103 13 or 1103 20 40 and | **Recommended guidance values:** **60000 ppb** for maize and maize products **(Commission Recommendation (EC) 2006/576)** |



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| | | | |
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| | | other maize milling products with particle size > 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(1400 ppb)**<br>- Milling fractions of maize with particle size ≤ 500 micron falling within CN code 1102 20 and other maize milling products with particle size ≤ 500 micron not used for direct human consumption falling within CN code 1904 10 10 **(2000 ppb)** | |
| | **Ergot sclerotia** | - **0.2 g/kg** for unprocessed cereals with the exception of maize, rye and rice<br>- **0.5 g/kg** for unprocessed rye *(this will be reduced to 0.2 g/kg, as of 1st July 2024)* | **Maximum level: 1 g/kg** for feed materials and compound feed containing unground cereals **(Directive 2002/32/EC)** |
| | **Ergot alkaloids**<br><br>*(Note: The maximum level for ergot alkaloids refers to the lowerbound sum of the following 12 ergot alkaloids: ergocornine/ ergocorninine; ergocristine/ergocristinine; ergocryptine/ergocryptinine (α- and β-form); ergometrine/ergometrinine; ergosine/ ergosinine; ergotamine/ergotaminine. In the lowerbound sum, the contribution of each non-quantified epimer is set at zero)* | - **100 ppb** for milling products of barley, wheat, spelt and oats (with an ash content lower than 900 mg/100 g) *(this will be reduced to 50 ppb as from 1.7.2024*<br>- **150 ppb** for milling products of barley, wheat, spelt and oats (with an ash content equal or higher than 900 mg/100 g)<br>- **150 ppb** for Barley, wheat, spelt and oats grains placed on the market for the final consumer<br>- **500 ppb** for rye milling products and Rye placed on the market for the final consumer *(this will be reduced to 250 ppb as from 1.7.2024)*<br>- **400 ppb** for wheat gluten<br>- **20 ppb** for processed cereal-based food for infants and young children | |
| | **Sum of T-2 and HT-2** toxin indicative levels, from which in case of repetitive findings, onwards investigations should be performed * | **Unprocessed cereals:**<br>- **200 ppb** for barley (including malting barley) and maize<br>- **1000 ppb** for oats (with husk)<br>- **100 ppb** for wheat, rye and other cereals<br><br>**Cereal grains for direct human consumption:**<br>- **200 ppb** for oats<br>- **100 ppb** for maize<br>- **50 ppb** for other cereals | **Recommended guidance values:** **500 ppb** for other cereal products (**2000 ppb** for oat milling products (husks)) * |

*** (Commission recommendation 2013/165/EU)**

**Note: PPB means Part Per Billion (µg/kg)**



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## INTRODUCTION

This report aims to show the results of a biannual survey on the management of mycotoxins carried out by COCERAL members.

COCERAL is considered as the voice representing the European cereals, oilseeds, pulses, olive oil, oils and fats, animal feed and agrosupply trade. COCERAL members act in the food and feed supply chain, both at the level of agrosupply distributors and grain traders (Figure 1).

**Agrosupply distributors** often advise farmers all along the production cycle - on the choice of seed varieties and the of use of fertilisers and plant protection products, also taking into account the local conditions (environmental, pedo-climatic, economics, etc.). Many agrosupply distributors also provide information about the time of intervention on the crop, the role of meteorological conditions, or the correct dosage for the chosen product.

**Grain collectors and international traders** intervene after the grain is harvested. Collectors sample and analyse the crops at reception. Then they dry, clean and protect the grain from insect infestations in order to adapt the crops to both the regulatory requirements and the commercial contracts.

Agrosupply distributors and grain trading operators contribute to the management and control of mycotoxins in the batches traded within European Member States.

**This report will highlight which tools and actions are put in place to manage the risk of mycotoxins by agrosupply distributors and grain traders.**


**Figure 1 Composition of the food and feed supply chain. COCERAL members act before and after the farmers as agrosupply distributors, grain collectors and international traders.**



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## SURVEY DESIGN

- **Population of concern**
  - European agrosupply distributors and grain trading companies.
  - The survey includes replies from Austria, Belgium, France, Germany, Greece, Italy, the Netherlands, Poland, and Romania.
  - The operators from the member states who replied to the survey are members of national associations of COCERAL.

- **Enquiry setting**
  - Operators have been consulted via a questionnaire (see Annex 1) sent to them by email.
  - The enquiry was launched on 20 October and closed on 30 November 2021
  - The COCERAL Secretariat received 26 replies, covering a total volume of traded grains of 34 million tonnes (equivalent to about 15% of total EU market share).

The description of the method for processing the replies can be found in Annex 2.

## STARTING DATA

- The survey starting data was collected through the questionnaire. The participants were asked to specify the volume of grain traded on a yearly basis and the number of farmers the operator is dealing with.
- All data received from operators from the same Member State were aggregated.

- **Volume of traded grains**
  - The volume of traded grains is composed of the volume collected from European farmers and of grains imported into the European Union.
  - The results of the questionnaire are expressed proportionally to the total volume of grains traded within each member state.
  - The external data on EU imports and intra-EU trade is sourced from Eurostat.



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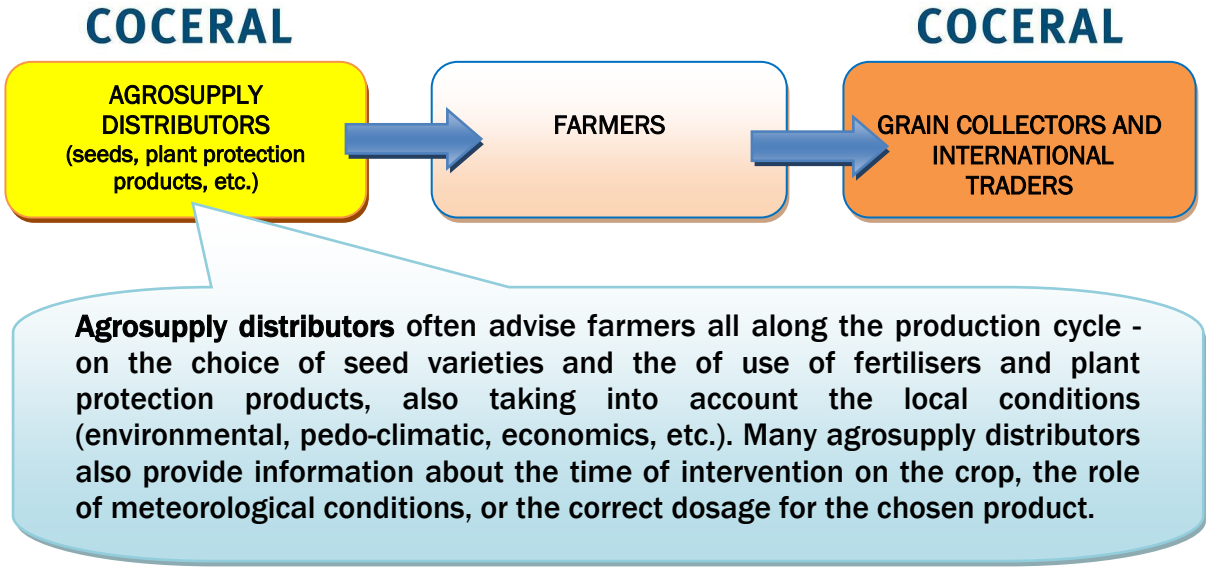
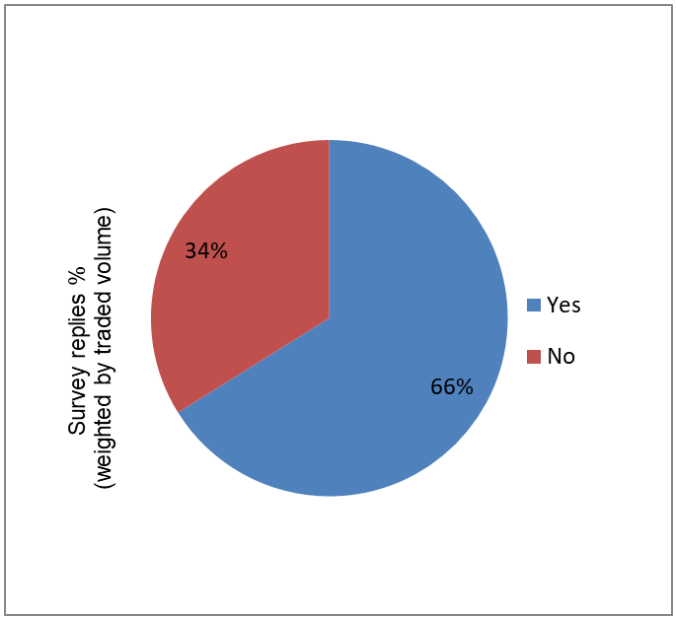
# 1 Minimising risks posed by mycotoxins in the field

This section refers to the agrosupply section members of COCERAL.




## 1.1 Do you specifically advise farmers on mycotoxins management?




66% of the agrosupply distributors indicated that they advise farmers on practices aimed at minimising the risk of mycotoxin development on cropland. This highlights that mycotoxin management is still a key concern for COCERAL agrosupply members, and that operators use their role to contribute to the management of mycotoxins in field. It has to be mentioned that there was a small decrease in advice provided from agrosupply distributors to farmers since the last survey in 2019 (73%).



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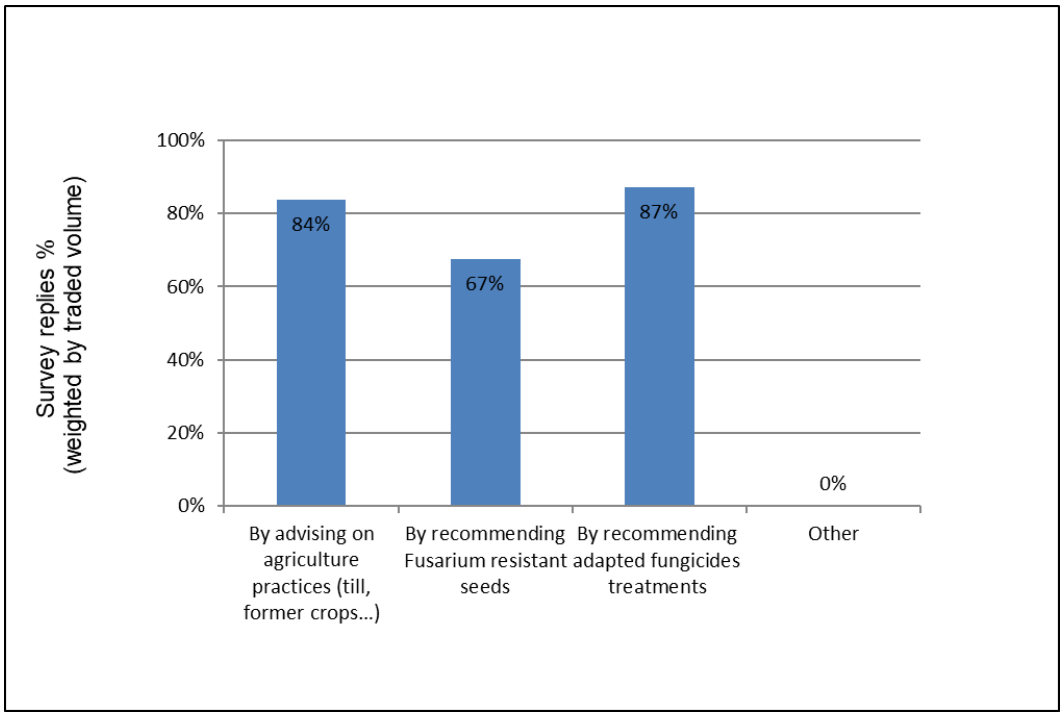
## 1.2 How do you manage risks of mycotoxins in the field? (multiple answers possible)




**As in 2019, when advising farmers regarding mycotoxins, agrosupply distributors put their emphasis on recommending fusarium resistant seeds and specific fungicide treatments, although more emphasis has been put in advising farmers with best agricultural practices. Another approach pursued in one country is through industry agreed best practice approaches, detailing risk and strategies for minimizing risk.**
**Furthermore, agrosupply distributors generally (81 % of the participants to the survey 2021 confirmed so) also sell the seeds and fungicides they recommend, with the exception of France (where advisory services and selling services of agrosupply should be different and separate, according to the Ordonnance 2019-361 (also called informally "EGAlim"[1]))**

[1] Ordonnance n° 2019-361 du 24 avril 2019 relative à l'indépendance des activités de conseil à l'utilisation des produits phytopharmaceutiques et au dispositif de certificats d'économie de produits phytopharmaceutiques : https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000038410181/



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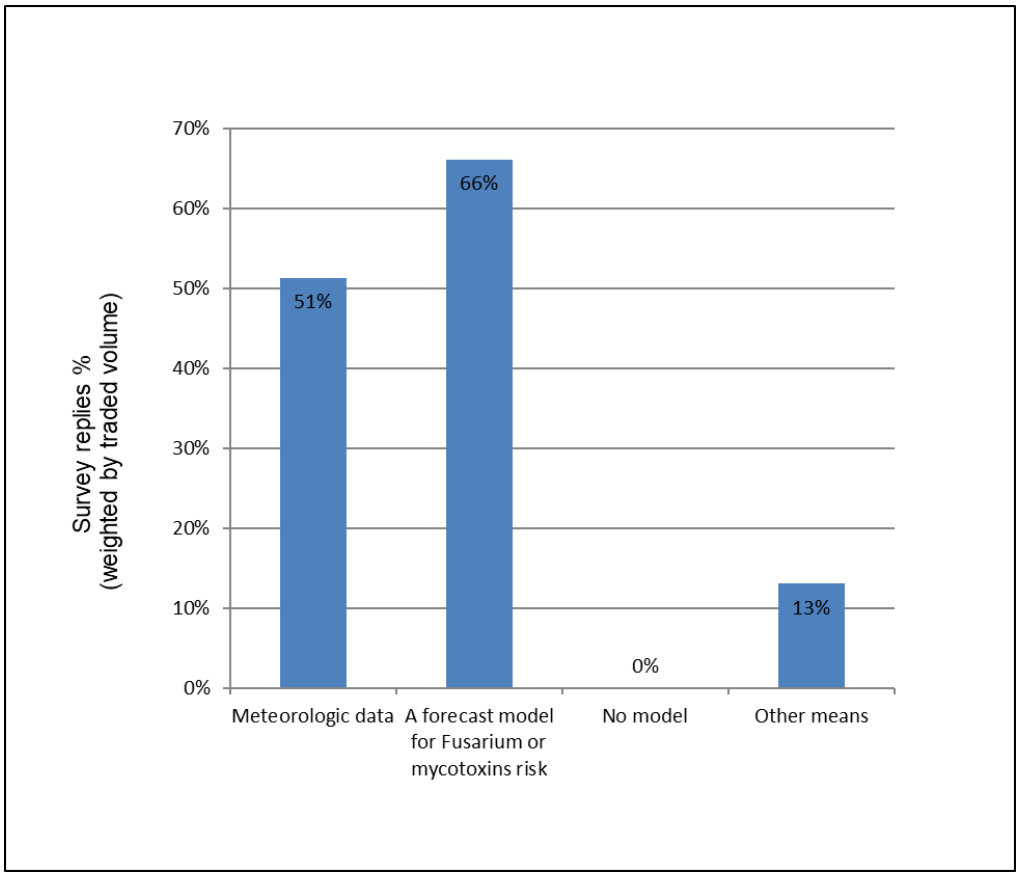
## 1.3 When advising farmers, what kind of approach to manage mycotoxins are you using? (multiple answers possible)




**The dominant models agrosupply distributors use when advising farmers seem still to be forecast models for fusarium or mycotoxin risk. Meteorological data is still used by a large part. Some also use other means such as observation, or provide online tools (slight decrease since 2019, from 23% to 13%). No respondents indicated that they use no model (as in 2019).**

**If the forecast model is used, this is still normally proposed by plant protection companies or technical institutes (see graph below). However, compared to the 2017 survey results, the role of technical Institutes and Public authorities has considerably increased (cumulatively 46% in 2021 against 29% in 2019).**



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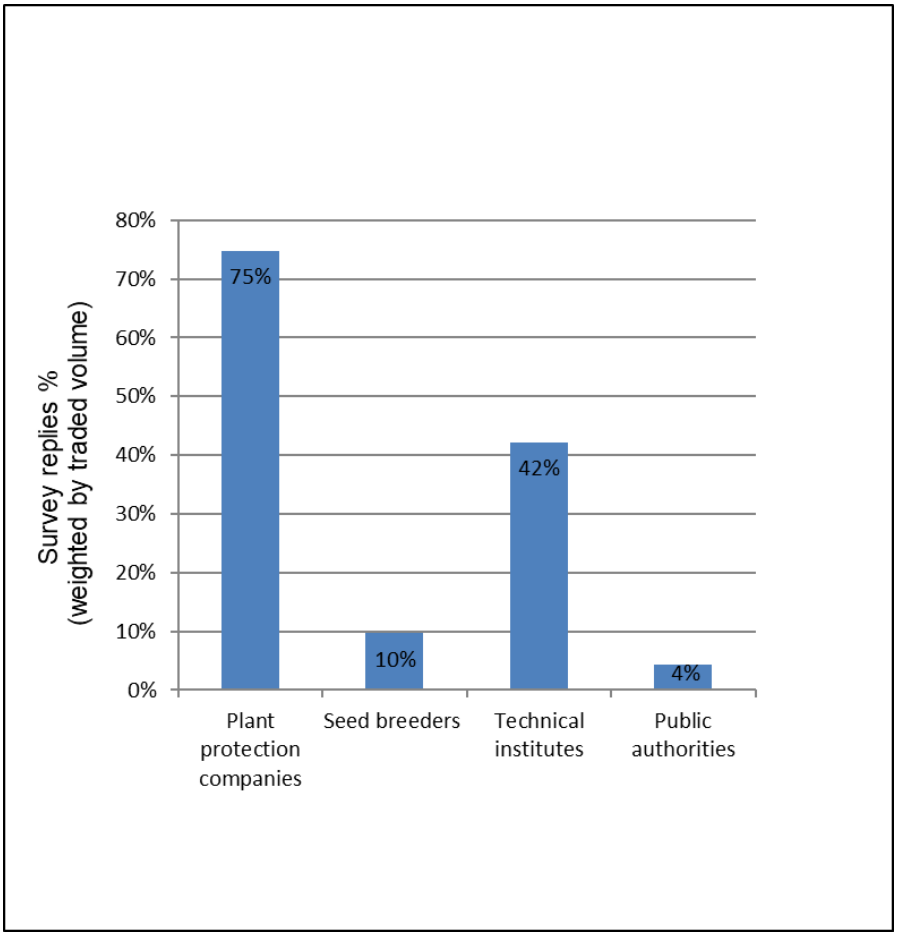
### 1.3.1 In case you apply the Forecast Model, by whom has it been proposed?



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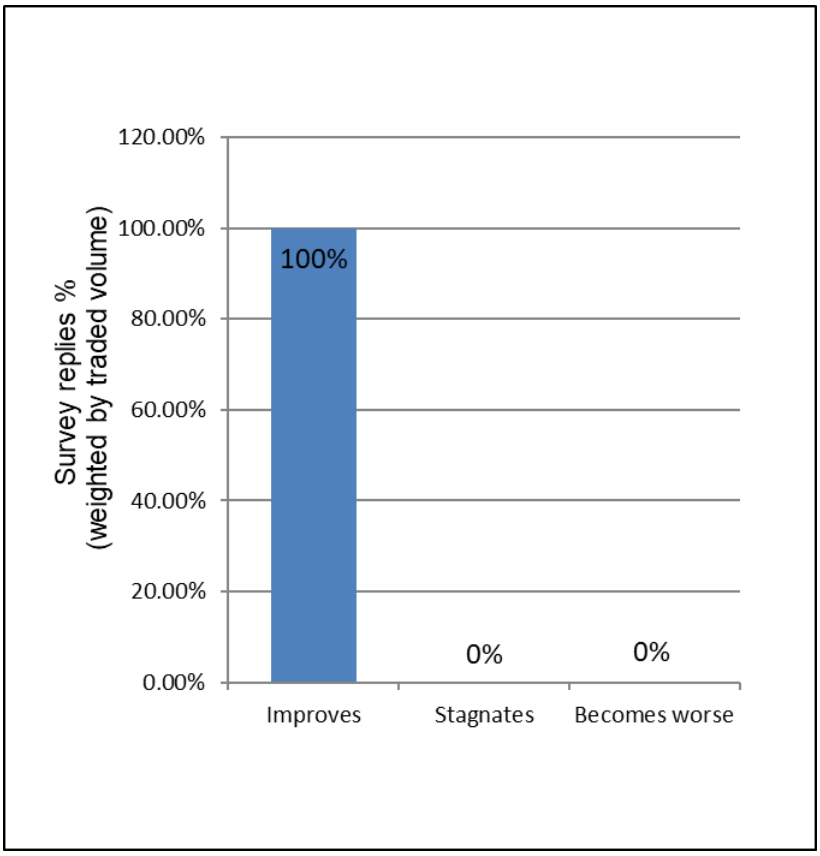
## 1.4 After advising farmers, the management of mycotoxins risk improves, stagnates or becomes worse?




**All agrosupply distributors advising farmers on agricultural practices normally observe an improvement of the mycotoxin risk management of farmers (100%). The level seems to be considerably increased when compared to 2019 (64%).**
**By further enhancing the collaboration between the principal actors involved and gathering more knowledge concerning the mycotoxins and their prevention, distributors continuously aim to improve the situation.**



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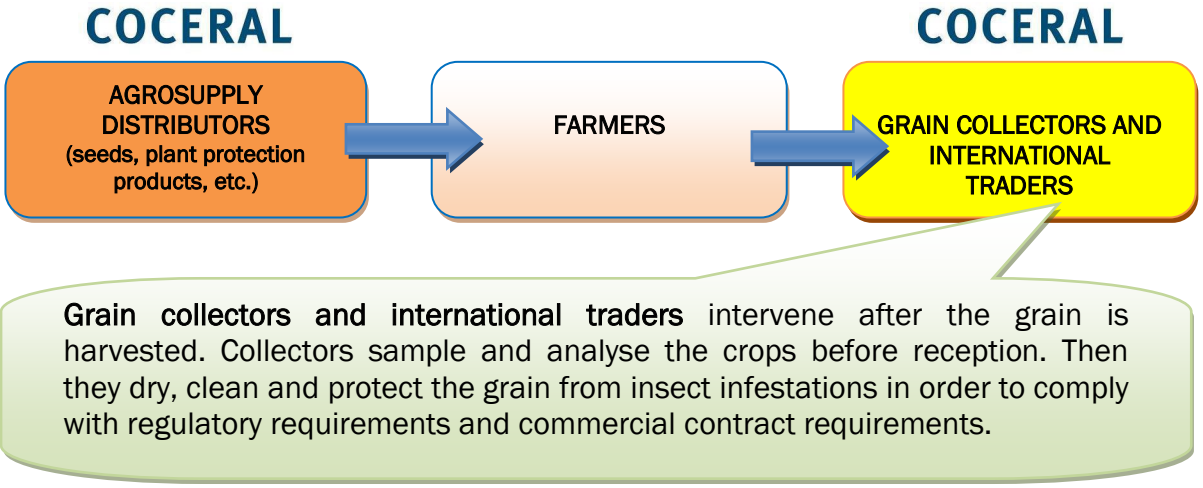
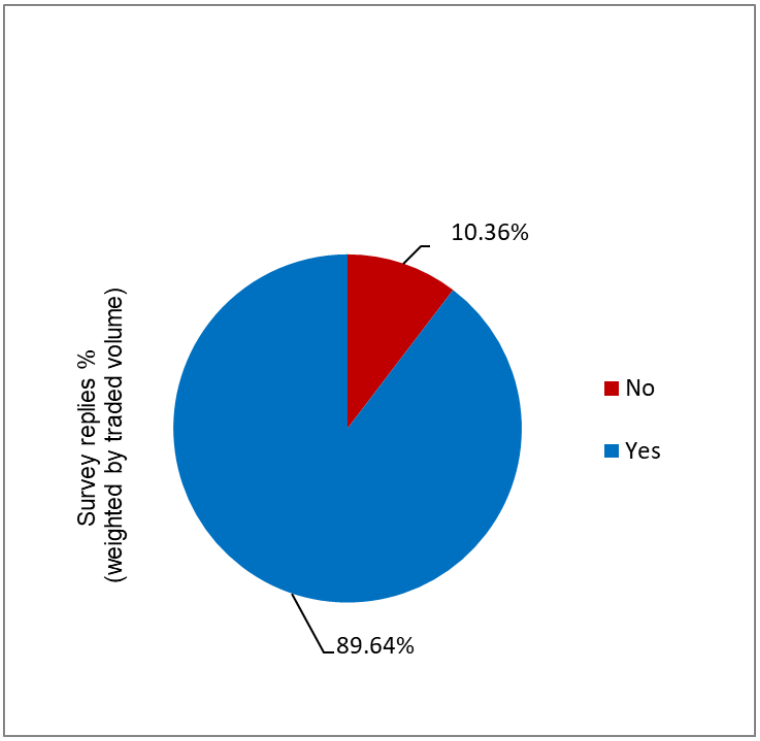
# 2 Sampling, analysis and detection of mycotoxins

**This section refers to grain collectors and international traders members of COCERAL.**




## 2.1 Do you carry out sampling in your lots for the detection of mycotoxins?




**This graph confirms the trend in growing awareness and extent of the level of monitoring that operators put in place for mycotoxin detection: almost 90% of the respondents to the survey indicated that they carry out mycotoxin sampling operations on their lots.**



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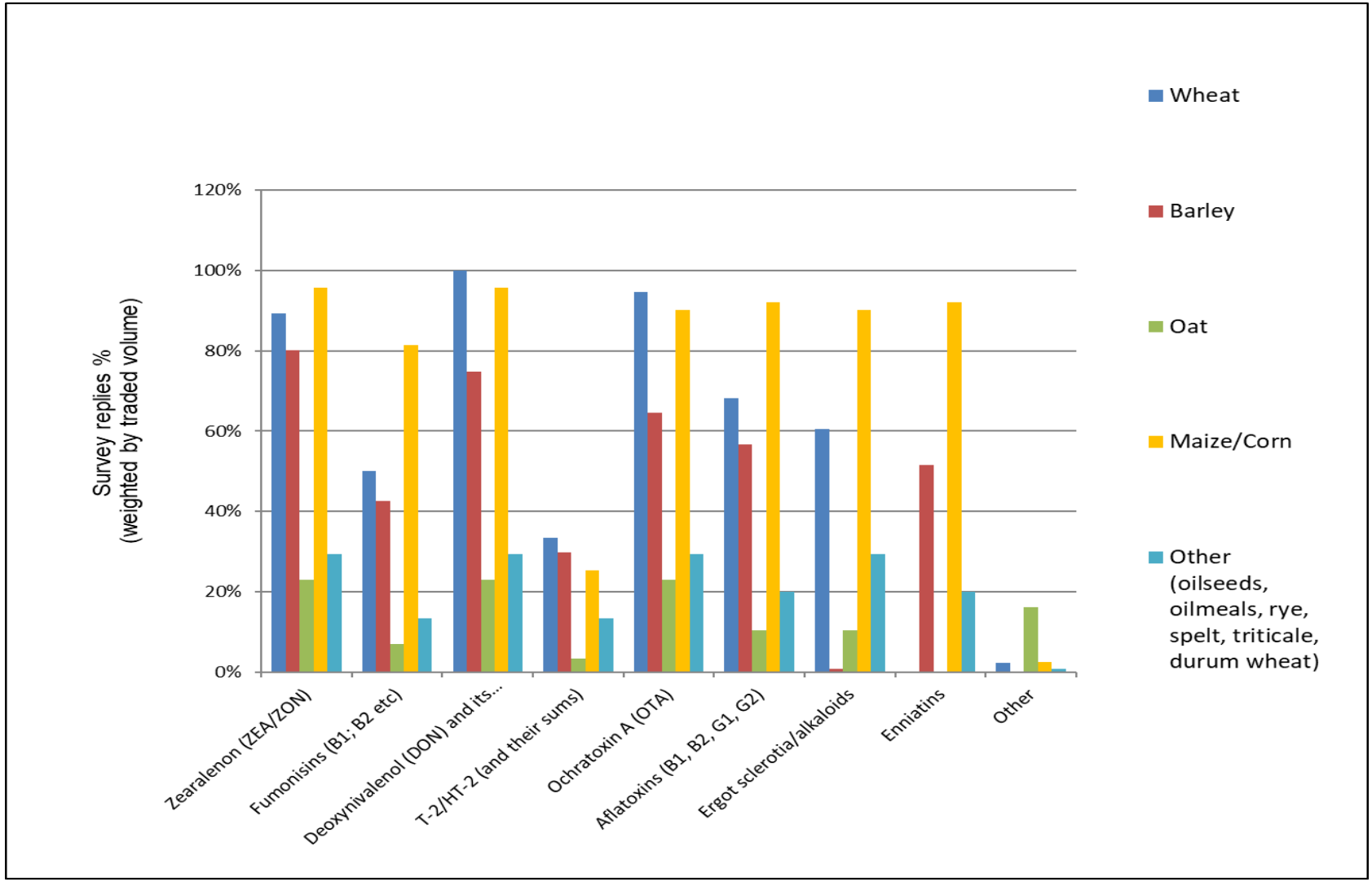
### 2.1.1 If YES, which mycotoxin/s are you analysing and in which crop/s? (multiple answers possible)



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The chart at page 16 indicates the level of testing of different crops regarding the different mycotoxins.

**Maize, wheat** and **barley** appears to be the most tested crops, with Zearalenone, DON, Ochratoxin A and Aflatoxins being the mycotoxins tested by the largest number of operators. More than 80% of the participating operators tested **maize** also on ergot sclerotia and/or alkaloids and Enniatins. Data on **maize** also indicates that ergot sclerotia and/or alkaloids and Enniatins testing is performed more on this crop than on wheat and barley.

The survey findings suggest that other crops are less frequently tested on mycotoxins than wheat, maize, barley, and oat.

In comparison to survey replies in 2019, some changes in testing patterns can be observed:

- On **Zearalenone**, a higher level of testing was done on oat, in comparison to the 2019 report.
- **Fumonisins** were also tested more often on wheat and barley, with test on oats remaining at the same level of 2019, while testing on maize has slightly decreased.
- Many more operators indicated that they tested all crops on **DON** as they did in 2019 **(it is important to know that, once again, 100% of operators tested DON on wheat).** Moreover, testing DON in other crops has doubled in comparison to the survey 2019, while DON testing on oat has reduced by half (in terms of %).
- **T-2 + HT-2 toxins** testing has remained at the same level of 2019, with an increase on barley (from 18 to 30%) and other crops (which were not tested in 2019, according to participants).
- **Ochratoxin A** testing has slightly decreased since 2019 on barley and oat, while it doubled for other crops.
- Regarding **aflatoxins**, 2021 survey results confirm the same trend as per 2019 survey (higher testing on wheat and maize and barley than on oat and other crops).
- Testing for **ergot sclerotia and/or alkaloids** remains the same as in the 2019 survey, except for other crops, where testing has also doubled, and on oat, where it has reduced by half (in terms of %).
- Testing on **Enniatins** has remained the same on maize (as in 2019) but it tripled (in terms of %) on Barley and doubled (in terms of %) on other crops.



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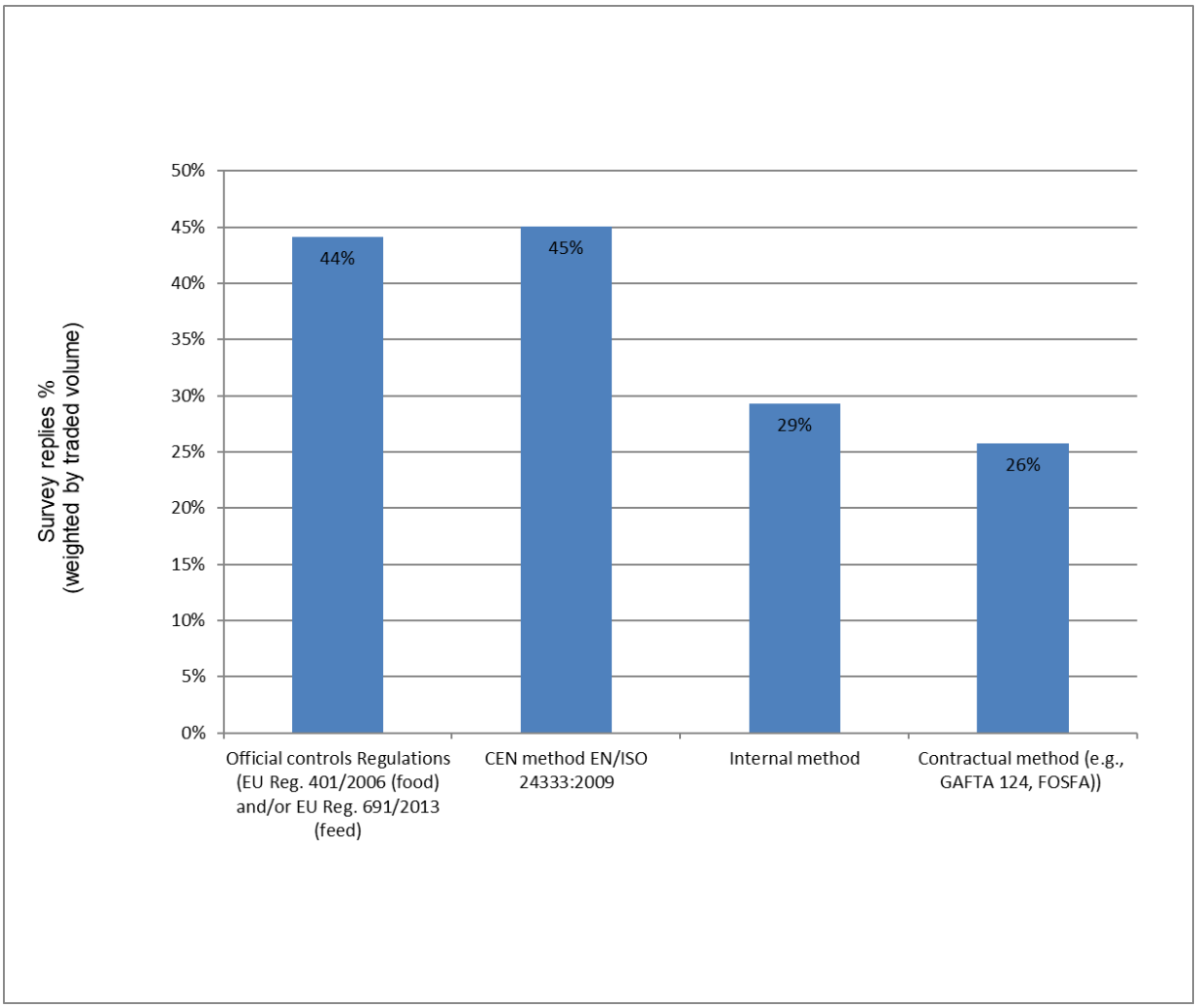
## 2.2 Which sampling method/s is/are used by your company for mycotoxins analyses?




**Regarding the sampling methods used by operators for mycotoxins analyses, the 2021 survey confirms the same trend outlined in the report 2019 (predominance of the use of EU official control regulation sampling plans and, to a minor extent, contractual methods (such as GAFTA 124 and FOSFA)), excepts for an two-fold increase in the use of the CEN method EN/ISO 24333:2009.**
**Contractual sampling requirements seem to often demand the application of GAFTA 124 and FOSFA.**



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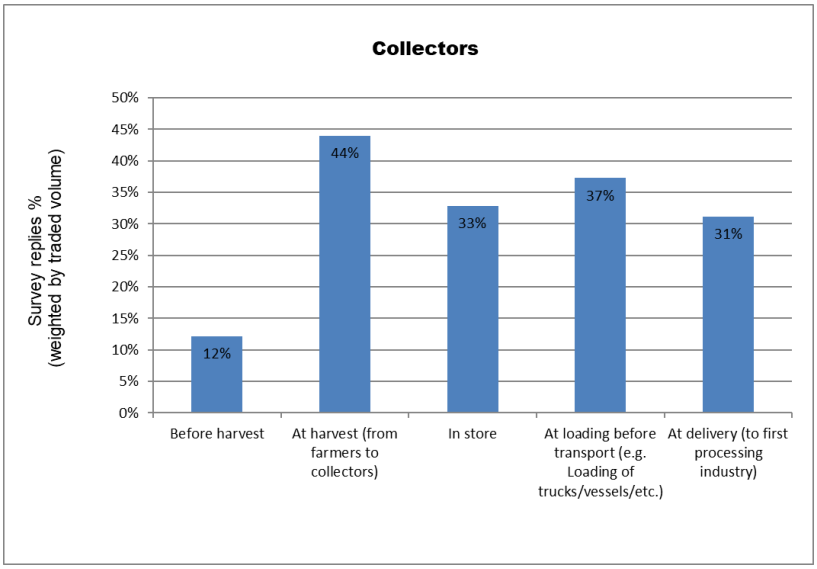
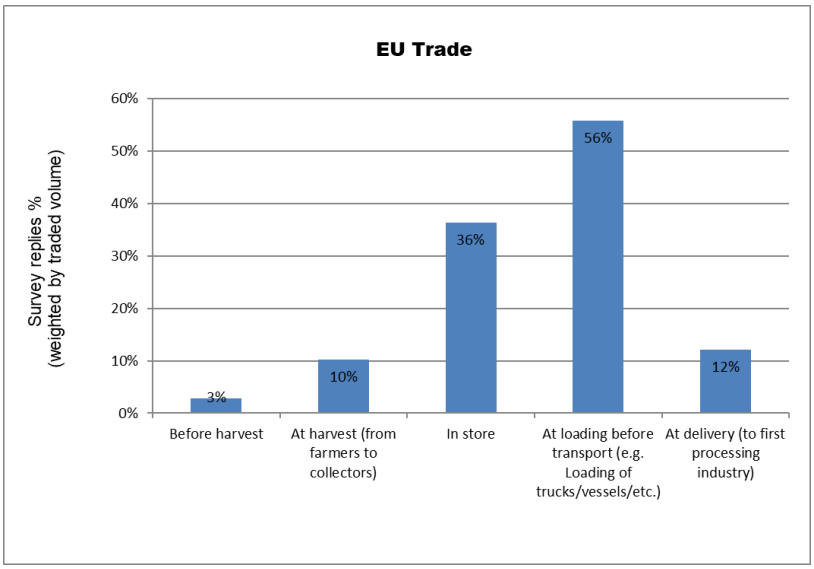
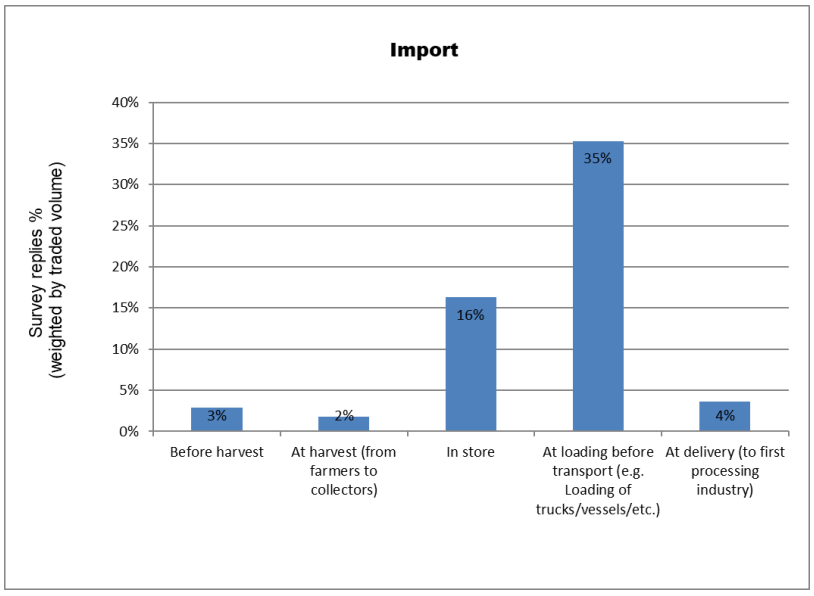
## 2.3 According to your activities, when do you test your lots for mycotoxins? (multiple answers possible)



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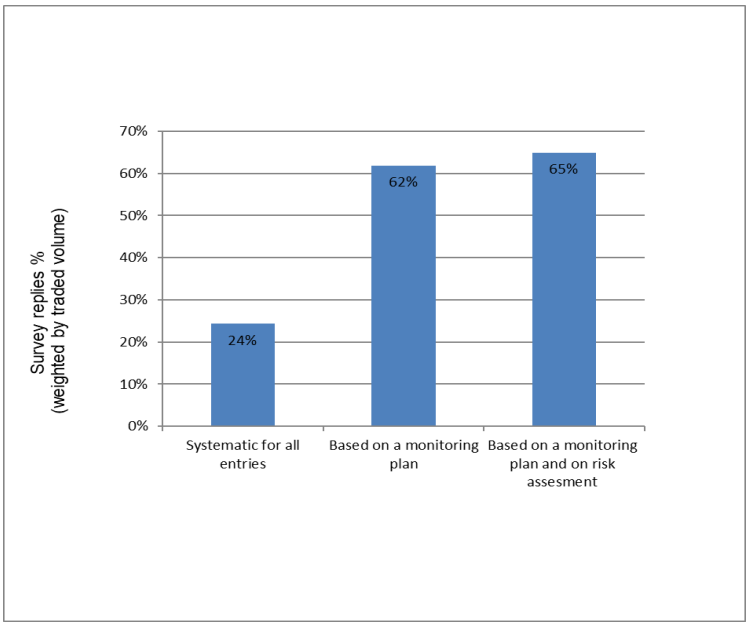
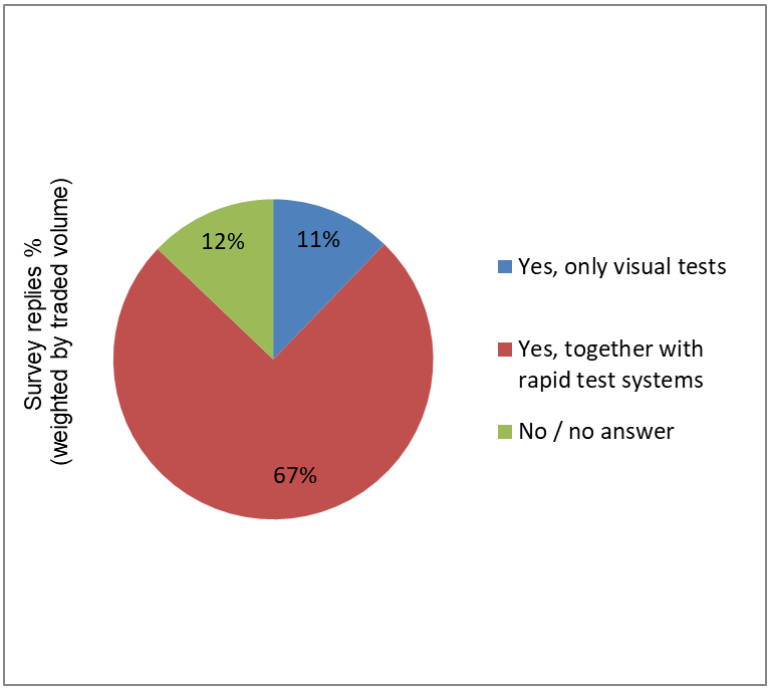
## 2.4 Which frequency of testing are you applying? (multiple answers possible)




Those operators that perform mycotoxin testing normally follow a monitoring plan with a risk assessment (65%), while 62% follow a simple monitoring plan. 24% of the operators even perform systematic testing for all entries.
These data confirm the trend outlined in the 2019 report.

## 2.5 Do you carry out visual tests?




About 70% of operators carry out visual tests as a support to rapid test systems. Such practice seems more common than in the 2019 survey, where about 40 % indicated that they had done so.



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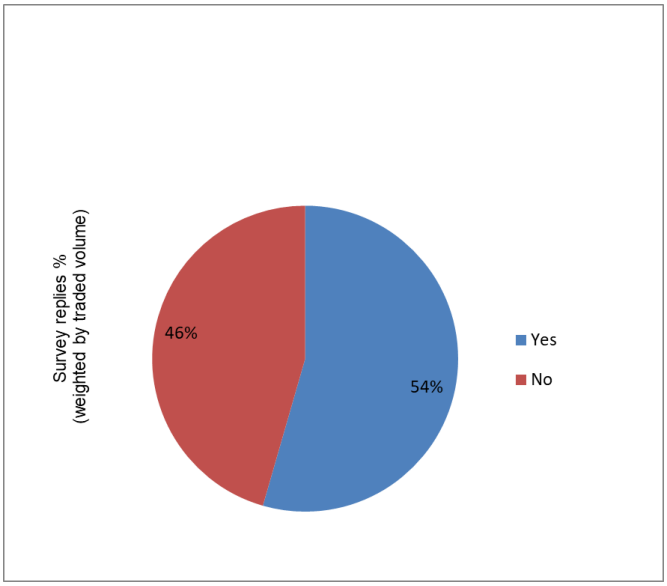
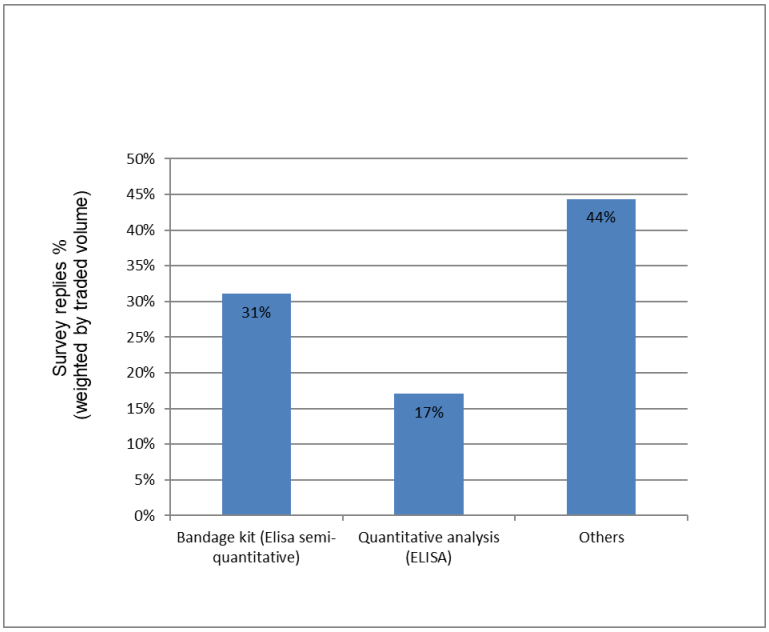
## 2.6 Do you carry out your own mycotoxins analysis at your company?




The level of internal testing of mycotoxins keeps the same trend as in the 2019 survey.

### 2.7.1 If you carry out mycotoxin analysis at your company, which kind of method of rapid test do you use? (multiple answers possible)




The graph indicates a balanced use of bandage kits and other systems (not specified by participants to the survey). This trend was also confirmed in the 2019 report, although the use bandage kits has slightly decreased (from 41 to 31%) and the use of quantitative analysis (ELISA) has slightly increased (from 12 to 17%).
Operators declared that the main supplier of bandage kits is still Neogen (about 50% of the replies), as also confirmed in 2019 report, while about 40% of participants confirmed that the supplier of ELISA quantitative analysis is R-Biopharm and, to a minor extent, other suppliers (not specified by participants).



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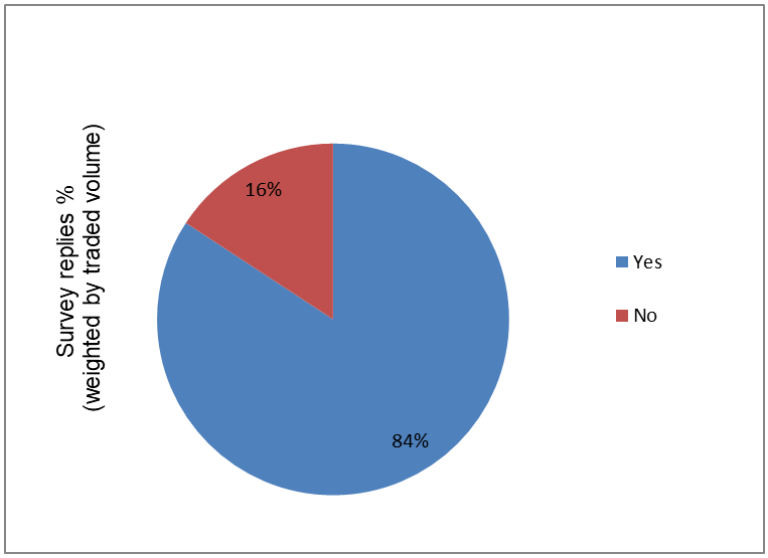
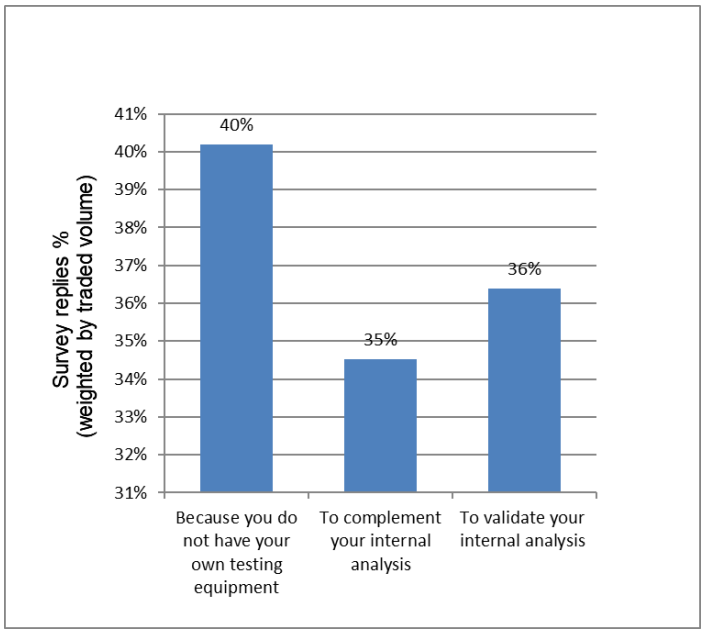
## 2.7 Do you carry out analysis to evaluate the presence of mycotoxins by external laboratories?




Rapid analysis is required when a lot is received at a silo or warehouse and therefore rapid tests to support on-site decisions of lot acceptance are frequently used. Compared to 2019, the trend is confirmed.

### 2.7.1 If you carry out external analysis for the mycotoxin monitoring, what is the purpose? (multiple answers possible)?




External analysis is also used to confirm the results of internal testing and/or to provide for missing data. As in the survey from 2019, the reasons mentioned most often are the lack of internal testing equipment or to complement for internal analysis, but a considerable increase (from 15 to 36 %) can be seen in the need for validating internal testing data.



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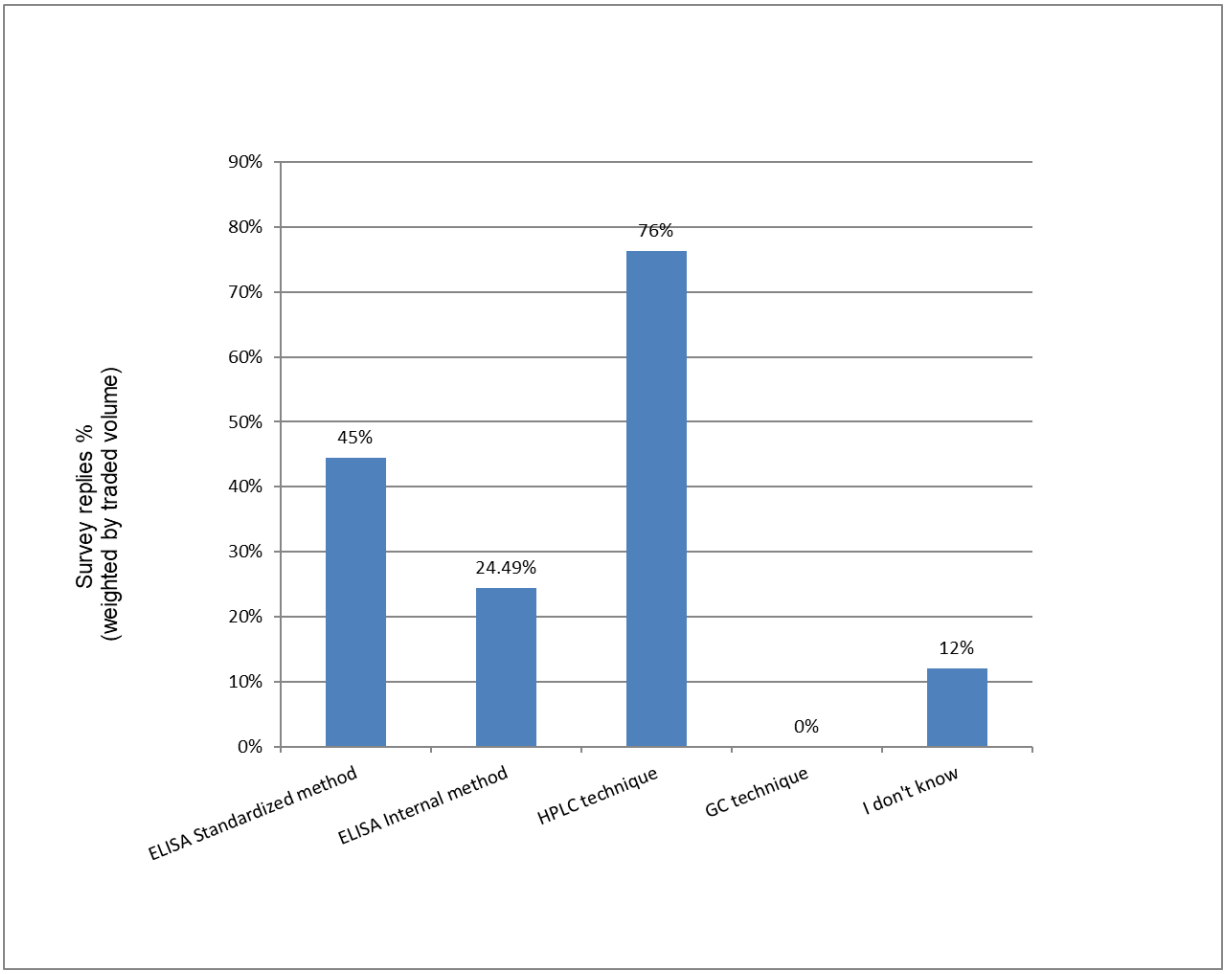
### 2.7.2. If you carry out external analysis for the mycotoxin monitoring, what is the methodology used by the laboratory? (multiple answers possible)?




**Compared to the 2019 survey, the use of ELISA (internal) methodology in external laboratories has increased (from 6% to 24%). The trend in use of ELISA (standardized) methodology also increased since 2019 (from 24 to 45%).**
**HPLC seems to remain the most used technique for external analysis since 2007 (with an increase from 55% (2019 survey) to 76% in 2021); the use of GC technique has considerably decreased from 13% (2019 data) to 0%, while 12% of the respondents did not declare or were not aware of the testing method in place by external laboratories.**



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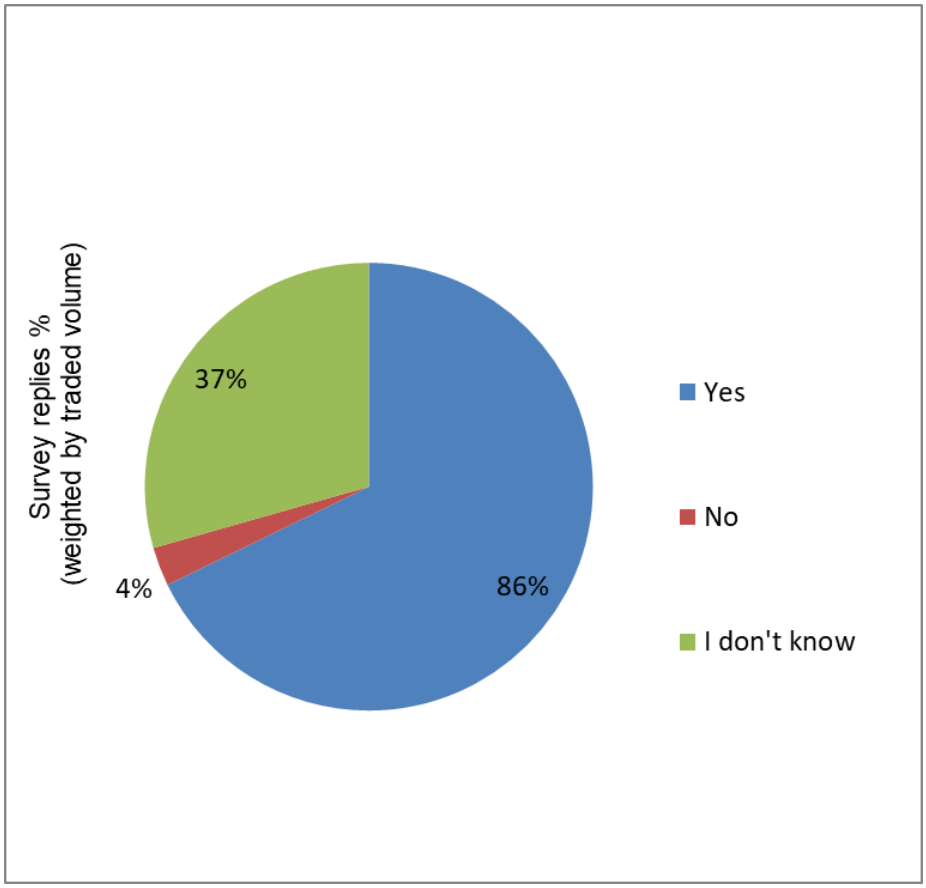
## 2.8 Is your testing laboratory accredited in accordance with the international standard ISO/IEC 17025?




**Since 2007, the number of laboratories used that are accredited with EN17025 seems to have significantly increased. This is a positive development as accredited laboratories must publish the level of uncertainty linked to the analysis they perform which enhances the level of transparency and the comparability of analysis results.**



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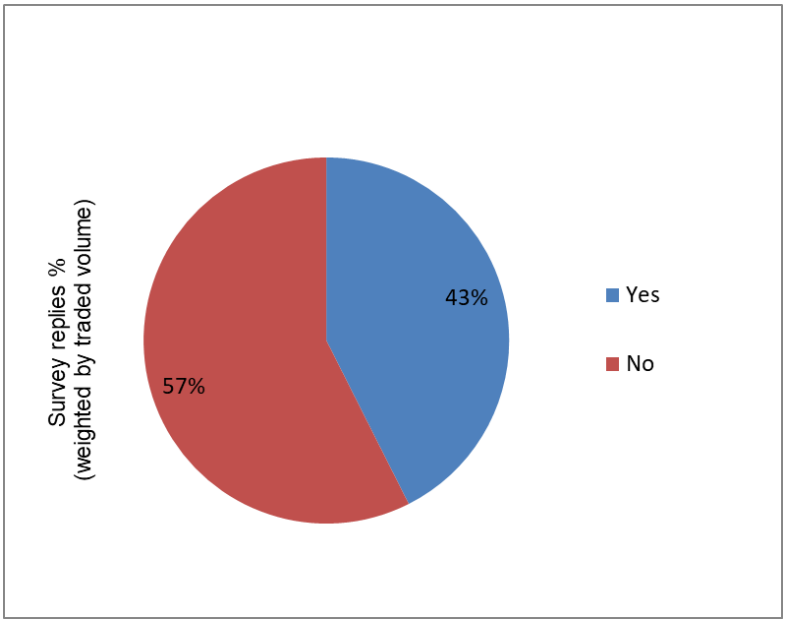
# 3 Regulation enforcement and controls

## 3.1 Have you been already controlled in the framework of the official regulation for mycotoxins in foodstuffs?




According to the survey replies, 43% of operators have been controlled within the framework of the official controls regulation on mycotoxins. This percentage was slightly lower in the 2019 report (29%).



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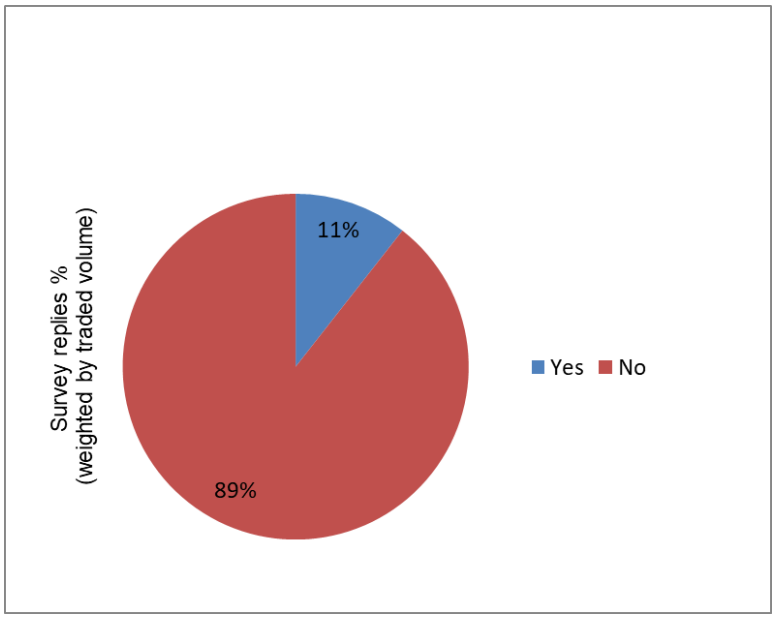
## 3.2 Apart from exceeding regulatory limits, did you have to conduct a product recall?




In the case that a participant to the survey declared that there was an exceedance of regulatory limits, only 11% of the participants recalled a product lot.
It is important to note that, while in the 2019 survey the majority of product recalls were due to entirely to commercial complaints, in 2021 they are due to official controls.



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# ANNEX 1: QUESTIONNAIRE "MYCOTOXIN MANAGEMENT" 2021

YOUR COMPANY IS (more than one answer is possible):

☐ Providing advice and selling seeds and/or Plant Protection Products (PPPs) (Agro-supply advisor on the use of PPPs)

➥ To how many farmers (approx.):

☐ Collecting grains from farmers

➥ Collected volume of grains (Crop year 2020/2021): tons

☐ Trading volumes of grains among the EU Member States

➥ Purchased volume from collectors (Crop year 2020/2021): tons

☐ Importing volumes of grains into the EU

➥ Imported volume into the EU (Crop year 2020/2021): tons

☐ Other, please specify:

SECTION 1. MINIMISING RISKS POSED BY MYCOTOXINS IN THE FIELD (for agrosupply members)

1.1 . Do you specifically advise farmers on mycotoxins management?
☐ NO (if no, please go to SECTION 2)
☐ YES

1.2 . How do you manage risks of mycotoxins in the field? (more than one answer is possible)
☐ By advising on agriculture practices (till, former crops…)
☐ By recommending Fusarium resistant seeds
☐ By recommending adapted fungicides treatments
☐ Other (please specify):

1.3 . Do you sell the recommended seeds or fungicides?
☐ Yes
☐ No

1.4 . When advising farmers, what kind of approach to manage mycotoxins are you using (more than one answer is possible)
☐ Meteorological data
☐ A forecast model for Fusarium or mycotoxins risk
☐ No model
☐ Others means (please describe)

1.4.1. In case you apply the Forecast Model, by whom has it been proposed?
☐ Plant protection companies
☐ Seed breeders
☐ Technical institutes
☐ Public authorities



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**1.5 . After advising farmers, the management of mycotoxins risk:**

- ☐ Improves
- ☐ Stagnates
- ☐ Worsens

**SECTION 2. SAMPLING, ANALYSIS AND DETECTION OF MYCOTOXINS (for grain collectors and traders)**

**2.1. Do you carry out sampling in your lots for the detection of mycotoxins?**

- ☐ NO (if no, please go to SECTION 3)
- ☐ YES:

**2.1.1 If YES, which mycotoxin/s are you analyzing and in which crop/s? Please tick the cells of the table below for each crop/mycotoxin combination**

| | Wheat | Barley | Oats | Maize/Corn | Other *(please specify which crop/s)* |
|---|---|---|---|---|---|
| Zearalenon (ZEA/ZON) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fumonisins (B1, B2 etc.) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Deoxynivalenol (DON) and its acetylated and modified forms (3-Ac-DON, 15-Ac-DON, DON3G) | ☐ | ☐ | ☐ | ☐ | ☐ |
| T-2 and HT-2 toxins (and their sums) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ochratoxin A (OTA) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Aflatoxins (B1, B2, G1, G2) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Nivalenol | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ergot sclerotia/alkaloids | ☐ | ☐ | ☐ | ☐ | ☐ |
| Enniatins | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other *(please specify)* | ☐ | ☐ | ☐ | ☐ | ☐ |

**2.2. Which sampling method/s is/are used by your company for mycotoxins analyses?**

- ☐ Official controls Regulations (EU Reg. 401/2006 (food) and/or EU Reg. 691/2013 (feed)
- ☐ CEN method EN/ISO 24333:2009
- ☐ Internal method – please specify
- ☐ Contractual method (e.g., GAFTA 124, FOSFA)) – please specify

**2.3. According to your activities, when do you test your lots for mycotoxins? (more than one answer is possible)**

| | Before harvest | At harvest (from farmers to collectors) | In store | At loading before transport (e.g., loading of trucks/vessels/etc.) | At delivery (to first processing industry) |
|---|---|---|---|---|---|
| Collector | ☐ | ☐ | ☐ | ☐ | ☐ |
| EU trade | ☐ | ☐ | ☐ | ☐ | ☐ |
| Import | ☐ | ☐ | ☐ | ☐ | ☐ |



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**2.4. Which frequency of testing are you applying? (more than one answer is possible)**

- ☐ Systematic for all entries
- ☐ Based on a monitoring plan
- ☐ Based on a monitoring plan and risk assessment (please specify)

**2.5. Are you certified under any food and/or feed safety management schemes (for example EFISC-GTP Code, GMP+FSA, GMP of OVOCOM, FEMAS, UFAS, TASCC, Q&S, CSA-GTP, GTAS, ISO 22000, etc.)?**

- ☐ Yes
- ☐ No

**2.5.1 If YES, please specify under which certification scheme/s you are accredited**

**2.6 Do you carry out visual tests?**

- ☐ Yes, only visual tests
- ☐ Yes, together with rapid test systems
- ☐ No

**2.7 Do you carry out your own mycotoxins analysis at your company?**

- ☐ Yes
- ☐ No

**2.7.1 If YES**, which kind of method of rapid test do you use for mycotoxin detection at your company?

- ☐ Bandage kit (Elisa semi-quantitative)
- ☐ Quantitative analysis (Elisa)
- ☐ Others (please, specify)

**2.7.2 Who is/are your supplier(s) of rapid tests?**

| | Bandage kit (Elisa semi-quantitative) | Elisa (quantitative) |
|---|---|---|
| Charm | ☐ | ☐ |
| Neogen | ☐ | ☐ |
| R-Biopharm | ☐ | ☐ |
| Other (please indicate) | | |



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**2.8 Do you carry out analysis to evaluate the presence of mycotoxins by external laboratories?**

- ☐ Yes
- ☐ No

**2.8.1 If YES**, what is the purpose of the external analysis?

- ☐ Because you do not have your own testing equipment
- ☐ To complement your internal analysis
- ☐ To validate your internal analysis

**2.8.2 If YES**, what is the methodology used by the lab?

- ☐ Elisa method
  - ☐ Standardised method (please specify):
  - ☐ Internal method (please specify):
- ☐ HPLC technique
- ☐ GC technique
- ☐ I don't know

**2.9 Is your testing laboratory accredited in accordance with the international standard ISO/IEC 17025:2005?**

- ☐ Yes
- ☐ No
- ☐ I don't know

**SECTION 3. REGULATION ENFORCEMENT AND CONTROLS**

**3.1. Have you been already controlled in the framework of the official regulation for mycotoxins in foodstuffs?**

- ☐ Yes
- ☐ No

**3.1.2 If YES**, by whom? (Please, indicate by which public service)

**3.2. Apart from exceeding regulatory limits, did you have to conduct a product recall?**

- ☐ Yes
- ☐ No

**3.3 If yes, was that recall the result of an official control or due to a commercial complaint?**

- ☐ Official control
- ☐ Commercial complaint

**4. Other comments on mycotoxin management**



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# ANNEX 2: METHOD FOR REPLIES PROCESSING

- **Method design**
  - The replies sent by the operators are assumed to be representative for the whole country they represent.
  - Each participant specified the volume of cereals traded; the total volumes mentioned representing 14% of the total volume of cereals traded in those countries.

- **Calculation steps and formula**
  - The reply to each question was weighted by the total contributions received for that country thus returning the country's-dependent mean reply: $R_C$ (%)
  - The volume of grains traded within each country was divided by the volume of grains traded within all the countries participating in the survey, thus obtaining $W_C$.
  - The overall result, R (%), was obtained as the average of all member states-dependent mean ($R_C$) weighted by $W_{MS}$ ( weight of the member state).

$$R=\sum_{MST} R_C * W_C$$

Where R (%) = overall result

$R_C$ = mean reply for member state (%)

$W_C = \frac{VC}{VAll}$ ; where $V_C$ = Volume traded in the participant country

$V_{All}$ = Total volume of countries participating to the survey



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