

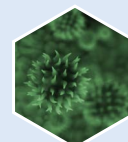
Prevention and Mitigation of Mycotoxin Contamination of Food and Feed Caused by Climate Change



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Introduction

Argitox is a new collaborative project, which funded under Interreg Atlantic Area Priority 3: Strengthening the territory's resilience to risks of natural, climate and human origin. Agritox will carry out research on mycotoxins in food and feed. It aims to advance the development of a mycotoxin warning network that will increase consumer safety, as well as establish some possible indicator of risks related to climate change.

The project is led by Professor Luis Botana from the University of Santiago de Compostela (USC), Lugo Campus, Spain. Agritox has eight project partners from five countries and five Atlantic Area Regions. The consortium is composed of USC (Lugo Campus, Spain); CIFGA (Lugo, Spain); DEPO-EFA, County Council of Pontevedra – Areeiro Phytopathological Station (Pontevedra, Spain); INIAV, The National Institute for Agricultural and Veterinary Research (Porto, Portugal); CAVC, Vila do Conde Agricultural Cooperative (Porto, Portugal); Teagasc (Dublin, Ireland), Queens University Belfast (Belfast, Northern Ireland) and ANSES, French Agency for Food Environmental and Occupational Health & Safety (Fougères, France). Each project partner has specific profiles needed to achieve the project objectives and results.

The main objective of Agritox is to provide the Atlantic Area food and feed industries with information and technical solutions to avoid the contamination by mycotoxins, which is an increasingly relevant issue due to the influence of climate change. The attainment of this overall objective will lead to improving the competitiveness of SMEs in the agri-food and livestock sectors in the Atlantic Area, and to identifying the safest and most innovative products along the value chain through the transfer of emerging technologies in early detection of mycotoxin contamination and its eventual mitigation. To achieve this objective, the Agritox consortium (RTO's, national bodies, laboratories and agricultural cooperatives) will develop an integrated system approach for the prevention and mitigation of mycotoxin contamination, which will be put at the disposal of affected industries along the value chain. Food and feed industries have a need for innovative analytic toxicity prevention strategies (e.g. toxicity alert systems and risk management plans) to produce safer food products for humans and animals. Agritox will result in alert methods and risk management plans that will be available by the industry, and effective and feasible. They will facilitate the adoption of safer uses by the companies, namely SMEs, not only for a better and safer cultivation, harvest and storage of human food and animal feed, but also for achieving safer food products for the final consumer, thus covering the whole value chain.

Specific Objectives

- To engage with Atlantic Area stakeholders to promote awareness about regulated, emerging and masked mycotoxins along with their occurrence patterns in the feed and food.
- To identify the existing mycotoxin detection methods across all stages of the value chain, from the agricultural fields to the industrial processes of food and feed.
- To develop a comprehensive reference database of mycotoxins, that will provide Atlantic Area stakeholders with occurrence information and technical support.
- To identify mycotoxin risks for the food and feed sectors.
- To develop and pilot a cost-efficient, easy-to-use Mycotoxin Alert System for food and feed.
- To engage with stakeholders through dissemination and training events to facilitate technology and knowledge transfer beyond the project.

This project has received funding from the Interreg ATLANTIC AREA Subsidy Contract EAPA_998/2018 - Agritox.

Partners



Project Workplans

Work Package 1: Coordination

The managing structure designed to ensure a proper project coordination and implementation will be based on the following elements: Monitoring Committee, Technical Committee and the Common Secretariat. The Monitoring Committee will be responsible for the general co-ordination of the project, ensuring the proper functioning of the partnership, serving as a link between the beneficiaries and acting as the maximum responsible for the project. It will include a representative of each beneficiary with decision-making capacity and it will be responsible for decision making in terms of management, coordination and financial issues. The Technical Committee will be integrated by a representative of each beneficiary and it will be responsible for ensuring the correct coordination and compliance with the project calendar. The Financial Management and Steering Systems will be set up from the beginning of the project implementation and an Administrative and Financial

Manual will be distributed among all partners to ensure a specific accountability is used by all to fulfil all program requirements in terms of payment requests and progress reports. In addition to this, an Evaluation Plan will define the methodology to carry out the different project evaluations, as well as there will be two evaluations throughout the project lifetime. Internal communication channels will be established, ensuring adherence to the schedule. AGRITOX website will be an important internal channel of communication among the project partners for exchanging information through its intranet. Finally, a strategy on risk management will be designed to contain the guidelines and standards required to ensure all project procedures and results. It will identify potential risks for each WP and assess them in terms of probability and impact. To each risk, a mitigation measure will be proposed. The strategy will be regularly updated to match the project needs or at any time and under request of a partner.

Project Strategy



Work Package 2: Communication

A **communication plan** was developed for the project to define the communication strategy and fundamental aspects such as target audiences, covering potential beneficiaries, relevant stakeholders, industrial users and involved associations and clusters from the different sectors (food, feed, etc.) and EU citizens (general public).

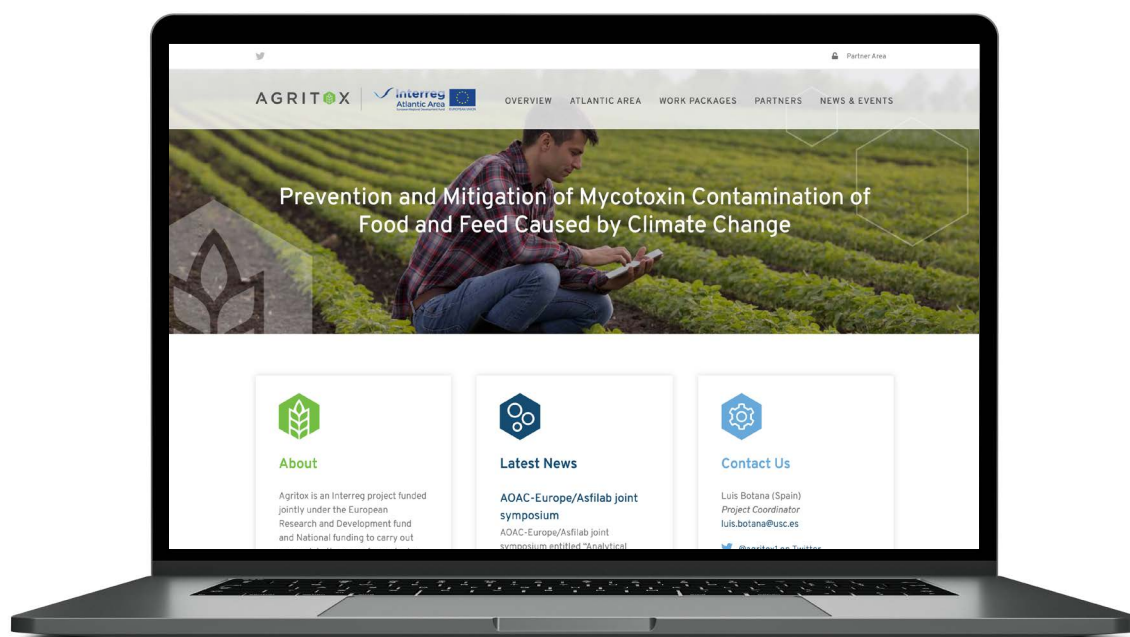
The main messages to be communicated to the target audiences, specifically:

- Benefits of adopting prevention and mitigation strategies against mycotoxins (e.g. growing cereals or food manufacturing).
- Benefits of cooperating at territorial level in the project, cofinanced by the EU.
- Benefits of using the AGRITOX Toxicity Alert System.

The Communication Strategy combines Online and Offline channels. The Strategy is organised in four blocks, see above:

The **Channels**, include: partners' regional ecosystems, making a strategic use of their network and sites to spread AGRITOX's key messages; European related initiatives, establishing a strategic cooperation; publishing news about the project in Social Media; AGRITOX's website and publications (newsletters, booklets, flyers); general media (press articles, interviews); and others. TEAGASC are responsible for coordinating the communication strategy and its different tasks. All partners will be involved by spreading the results among their networks.

A project website was established and went live in January 2020, which has the domain name, www.agritox.eu. This website introduces the Interreg Atlantic area and provides an overview of the project work programme. Project progress will be regularly updated through reports under the work packages section of the website and news & event section. A profile of the partners and contact details is provided under the partners section for each research organisation. The social media presence of the project is maintained on twitter, [@agritox1 on Twitter](https://twitter.com/agritox1).



Work Package 3: Captilisation

Regional Working Groups will be created to identify and analyse the different emerging and masked toxins that appear in cereals, wine, beer, milk or eggs for example, and existing prevention and mitigation methods and procedures in their regions, as well as previous projects.

The main objective will be gather the opinion of stakeholders in each territory. A web-based platform, AGRITOX Network, will be created to guarantee the sustainability and visibility of the project. This website will show the prevention and mitigation toxicity methods developed by the RTOs for relevant industries and administrations over the project implementation. Industry will be able to reflect in it their demands in terms of integration of methods and procedures within the whole value chain and, specifically, relating to food processing protocols. It will increase the interaction among providers (RTOs) and end-users (industry and administration) and promote the market uptake of analytical and toxicity detection procedures and methods. Once the AGRITOX Network is fully set-up, it will be launched at EU level to cover all actors in the Atlantic Region.

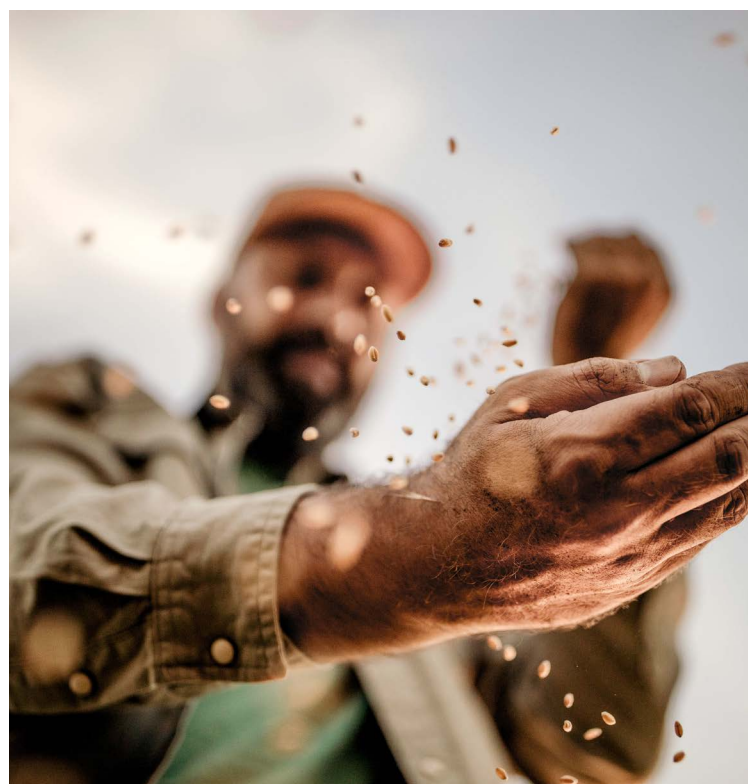
An Exploitation Plan will be defined stating how the project results will be exploited. All partners will be involved, with USC in charge of centralising all information from members of the consortium. CIFGA will develop the Platform in cooperation with USC and TEAGASC (Communication WP coordinator), conveying the information provided by the RTOs. The Consortium covers stakeholders affected by mycotoxin contamination in the whole food value chain:

- RTO's from Universities (USC, QUB and FCUP).
- RTO's from surveillance Agencies for regional/national governments (TEAGASC and Estación Fitopatológica Areeiro) Agencies from National Bodies (ANSES LABORATOIRE DE FOUGÈRES).
- Private Laboratory (CIFGA).
- Agricultural cooperative (CAVC) During the REGIONAL WORKING GROUPS.

Partners will be in direct contact with other RTO's, decision-makers and regional end-users. The AGRITOX Network will enable them to interact and share information, showcase the project results and promote the market uptake of toxicity detection procedures and methods. The Network will extend to stakeholders of different regions and Member States in the EU, aiming to be a reference in emerging toxins detection. Partners' profile relevance, previous joint collaborations and own networks will contribute to build not only a Network, but a Cluster of Excellence at EU level. Publications will be issued to raise awareness at regional, national and European level, namely: a RECOMMENDATION OF A REGULATORY FRAMEWORK FOR EMERGING MYCOTOXINS (see Activity WP4) based on results and the potential risks of toxins, targeting policy makers; and an Adopt Guide on the System for the end-users. The EXPLOITATION PLAN will identify stakeholders and markets to exploit project results.

Work Package 4: Identifying industry needs and prevention and mitigation processes

The aim of this WP is to identify which are the existing mycotoxin detection methods across all stages of the value chain, from the agricultural fields to the industrial processes of food and feed. The main sector will be cereals and their industrial processes, but products like wine, milk, eggs or beer will also be analysed. First of all, the consortium, coordinated by USC, will agree the document Terms of Reference that will enable them to identify and select detection methods following the same criteria in all the different regions. For selecting these criteria, they will consider the results of a survey which will be carried out with end-users. Partners will involve them through the Working Regional Groups. On the basis of these ToR, the Consortium will identify and select detection method to stablish prevention and mitigation processes. The RTOs will provide their hands-on experience in issues such as the optimum step where the analysis should be carried out in a food processing chain, time of analysis admissible, etc. A database of mycotoxins, including emerging and masked mycotoxins, will provide authorities with occurrence information and technical support, being a reference for setting limits in non-regulated emerging toxins. Database will include the corresponding risks of this mycotoxins in sectors like cereals, eggs, milk or wine, for example, as well as, risks in human or animal health. This database will be developed by ANSES with the inputs from the Consortium.





Work Package 5: AGRITOX Toxicity Alert System: Joint design of an easy-to-use toxicity alert system in food and feed

The aim is to jointly design a cost-efficient, easy-to-use Alert System, which can be easily transferred across industries and regions, extending its impact not only to industries but also to public bodies in charge of protection and control of toxicity in food. A number of processes and strategies will be short-listed and prioritised per industrial sector. This will be done after an exhaustive analysis of the value chain by each industry. A set of terms of reference will be selected to ensure the compatibility among the different food and feed sectors to develop a valid methodology for industrial implementation. A number of approaches will be studied to cover the full range of industries where the alert system will be piloted afterwards. Once compatibility is ensured, an Alert system will be developed and adapted according to the specific prevention and mitigation procedures. It will lead to the establishment of a new procedure and, potentially, to a marketable service in this area. To define the alert system's final configuration, opinions from relevant stakeholders will be discussed in a transnational Strategic Workshop. Based on conclusions from this workshop, an Adoption Guide will be issued, which will be used to pilot the system in WP6. The involvement of end-users in this WP is essential to approve the system. All partners will be involved in this work package. USC will be in charge of coordinating and centralising all the information from the members of the consortium.

Work Package 6: Industrial pilots of AGRITOX Toxicity Alert System

The objective of WP6 is to pilot the **alert system** concerning mycotoxins across various food and feed sectors, as well as at different stages of the production cycle. The partners involved in the project have direct contact with grain industries and feed compounders, wine producers and the dairy sector.

To achieve this, each partner will engage directly with interested stakeholders who will facilitate the pilot alert system, the results of which will be collated through QUB. Due to the significant amount of resources required for efficient coordination across the five regions involved, the pilots of this toxicity alert system will be carried out across two sets of dates.

A final report from the results and conclusions will be issued, entitled ***"Prevention Toxicity Alert System for food and feed industries"***. With this being a hot topic at EU level, the aim will be to issue an article in an international journal or to submit a communication at a relevant conference.

QUB will be in charge of coordinating this pilot phase and will centralise all the information from the members of the consortium involved in the trials.

Project Progress

Project Meetings

26th of April 2019

The USC hosted the kick-off meeting of AGRITOX that took place in **Lugo (NW Spain)**.

24th October 2019

1st Technical Coordination Meeting held at **Queens University Belfast**.

Wednesday 5th March 2020

Next Agritox project meeting scheduled by **TEAGASC in Dublin**.

Stakeholder events

19th June 2019

The USC has participated in a seminar organized in the Faculty of Economics and Business Administration in **Santiago de Compostela (NW Spain)**. Agritox project has been presented in this event to the FAN-BEST project consortium and other stakeholders from business and academy sectors.

19th September 2019

The USC held a meeting in **Sada (NW Spain)** with companies from the food and feed manufacturing sector. The presence of mycotoxin in food and feed was addressed, and the methods currently available to minimize their impact on humans and animals were discussed.

Tuesday 3rd December 2019

QUB meet with Dr Ramon Muns, Higher Scientific Officer, **Agri-Food and Biosciences Institute (AFBI), Hillsborough**. Discussed animal trial on mycotoxin mitigation

Monday 20th January 2020

QUB visit to **Agrifood and Biosciences Institute in Belfast** to discuss logistics of animal trial on mycotoxin mitigation.

14th of February 2020

Teagasc, Ireland held teleconference with Food and Drink Ireland to discuss Mycotoxins in Cereals and Agritox project.

4th of February 2020

Teagasc, Ireland, hold two teleconference calls with oats stakeholders to discuss Mycotoxins in Cereals and Agritox project.

March 2020

Teagasc meet with Irish Breakfast Cereal Association Meeting at **Teagasc Oak Park, Ireland**.

Events

14th - 16th October 2019

QUB hosted The World Mycotoxin Forum meets IUPAC in **Belfast, Northern Ireland**.

5th - 8th November 2019

The 9th International Symposium on Recent Advances in Food Analysis (RAFA) in **Prague, Czech Republic**.

September 1-5, 2019

The USC has participated in the XVI MaNaPro & XI ECMNP joint meeting, that was held in **Peniche, Portugal**. The project was presented among the attendees to this international conference.

Workshops

Wednesday 22nd and Thursday 23rd January 2020

R-Biopharm Rhône Ltd held workshop in the **Institute for Global Food Security, School of Biological Sciences**. The workshop focussed on the use Immunoaffinity columns (IAC), specifically their 11+ Myco MS-PREP® IAC.

24th October 2019

The USC has attended to the kick-off seminar on the FOOD FORTRES programme that was held in **Belfast**.

Conference Presentations

October 2019

PhD student Oluwatobi Kolawole presented some of his work on mycotoxins entitled "Occurrence of mycotoxin in feed and comparative assessment of a range of commercial feed additives" at the World Mycotoxin Forum in Belfast, Northern Ireland.

Publications by Project Partners

Kolawole, O., Meneely, J., Greer, B., Chevallier, O, Jones, D., Connolly, L., Elliott, C. (2019) Comparative *In Vitro* Assessment of a Range of Commercial Feed Additives with Multiple Mycotoxin Binding Claims. *Toxins*, Vol. 11, Issue 11. [Full Text](#)