

Mycotoxins in cereals: control strategies and integration for energy use

Riferimenti

Tipo di progetto

Gruppo Operativo

Tematica

Difesa da malattie e infestazioni

Information

Time frame

2016 - 2019

Durata

36 months

Partners (no.)

5

Regione

Emilia-Romagna

Comparto

Cerealicoltura

Localizzazione

ITH53 - Reggio nell'Emilia

ITH56 - Ferrara

ITH58 - Forlì-Cesena

Costo totale

€360.738,66

Fonte di finanziamento principale

Programma di sviluppo rurale

Programma di sviluppo rurale

2014IT06RDRP003: Italy - Rural Development

Programme (Regional) - Emilia Romagna

Parole chiave

Pest /disease control

Plant production and horticulture

Agricultural production system

Sito web

<https://progetti.crpv.it/Home/ProjectDetail/6>

Project status

completed



Objectives

This project aims to develop strategies to prevent and control the risk of mycotoxins on cereals from the phase of field and storage, up to the possibility of using for energy use, in full respect of the rules, those productions, with mycotoxin content exceeding the limits imposed or recommended by applicable regulations.

Results

Integration of the cereal supply chain and biogas chain: mycotoxins and compliant products for biodigesters.

The introduction of contaminated maize into biodigesters did not significantly reduce the yield in biogas and biomethane compared to the witness testimony and the concentration of AFB1 measured in the extracted digestate was lower than expected. The definition of the product and qualitative characteristics of the product (maize destined for biodigesters) was determined by sampling carried out at the time of the conferring of the still green grain coming from early, medium and late hybrids.

A study was conducted on the formal path to be applied to lots of cereal grains for "energy use"; the legislation on digestate at national and regional level was also analyzed and summarized.

In light of the positive and reassuring results of the present experimentation, the Italian Biogas Consortium confirms the interest of the biogas plants in the use of maize contaminated by aflatoxins, provided that the price is interesting and the regulatory / authorization indications be clear both at the level of the Padanian and national Regions.

Activities

Use of bio-competitors (BCA) to reduce the risk of contamination by

aflatoxins on maize.

Validation of a forecasting model multi-toxin for the prediction of aflatoxin and fumonisin contamination during cultivation and harvesting. Rapid analytical methods based on biosensors (electronic nose). Procedures adopted during the storage for the introduction of category "product to energy use" for contaminated grains over the permitted limits for feed and food use

Partenariato

Role	Azienda	Address	Telephone	E-mail
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Partner	Università Cattolica del Sacro Cuore - Dipartimento di Scienze delle produzioni vegetali sostenibili (DI.PRO.VE.S.) - Piacenza	Via Emilia Parmense 84 29122 Piacenza PC Italy	0523 599269	diproves-pc@unicatt.it

Pratiche abstract

Description

Development and demonstration of innovative biological products to reduce the risk of contamination by aflatoxins on maize.

Results

Use of bio-competitors on maize to limit the infection of aflatoxigenic fungi.

On the basis of the demonstration tests included in this project and the results obtained in the use of open field for product

registration, it can be concluded that, in perspective, AF-X1 (product being registered) is an essential tool to have a guarantee of health of the national maize, at least with regard to the most dangerous and most binding contamination, namely the aflatoxin contamination.

Description

Better definition of a multi-toxin model (aflatoxin and fumonisin) useful to assess the risk of contamination during delivery and storage.

Results

Development and validation of a multi-toxin model.

The co-presence of several toxigenic fungi has a crucial effect on the production of mycotoxins, as well as on the growth of the fungi themselves. The results of the multitoxin model are still not entirely satisfactory, especially with regard to aflatoxins. The creation of a joint TOX-maize model, required a considerable effort to interpret the interactions that obviously needed further updates. Having in any case acquired all the necessary raw data, we believe we can reach a more satisfactory result in a reasonably short time

Description

Development of analytical tools to manage quickly and effectively contaminated grains at the entrance of storage .

Results

Final outcomes: Use of rapid analytical methods based on the electronic nose.

The semi-quantitative analytical method is promising, certainly for samples with high mycotoxin contamination. Through the statistical methods used, electronic nose sensors have been identified that can provide a discriminating response, particularly for maize.

However, there remains a criticality relative to the time required for the conditioning of the sample in the pre-analysis phase, inside the balloon, currently set at one hour, not compatible with the use to receive material in the collection centers.

Description

Definition of agreement to the use of contaminated grains in energy target, between producers and users to ensure the matching of supply and demand, favoring an adequate return on products for producers and users and guarantee the necessary traceability

Results

Final outcomes: Influence of irrigation technique on sensitivity to mycotoxins in maize.

Following this experimentation, it was not possible to obtain significant data on the influence of one irrigation technique rather than the other and on the volumes of water return. It is important to underline the fundamental criticality of the duration of the research, which proved too short or at least not long enough. Nevertheless, due to the reduction of aflatoxin contamination, the influence of irrigation was confirmed, in order not to place the plants in conditions of vegetative stress; even in a vintage like 2018, with a fairly well distributed rainfall during the cultivation period, statistically significant differences were found between the non-irrigated and the irrigated thesis.

Link utili

Titolo/Descrizione	Url	Tipologia
La ricerca: PSR 2014-2020	https://piacenza.unicatt.it/facolta/agraria-la-ricerca/progetti-di-sviluppo-rur...	Link ad altri siti che ospitano informazioni del progetto
sito web del progetto	https://progetti.crpv.it/Home/ProjectDetail/6	Sito web
MICOntrollo	http://www.stuard.it/micontrollo/	Link ad altri siti che ospitano informazioni del progetto
Progetti GOI (MICOntrollo)	http://goi.crpa.it/nqcontent.cfm?a_id=15273&tt=t_%20bt_app1_www	Link ad altri siti che ospitano informazioni del progetto
Video project presentation	https://www.youtube.com/watch?v=FzoHQWWS8dY	Materiali utili
Video project results	https://www.youtube.com/watch?v=aP1-PhEKxvc&t=	Materiali utili