Mycokey

Integrated and innovative key actions for mycotoxin management in the food and feed chain

Lay summaries

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MycoKey

European Commission

HORIZON 2020

UNIVERSITÀ CATTOLICA del Sacro Cuore

In Vitro and in field response of different fungicides against *Aspergillus flavus* and *Fusarium* species causing Ear Rot Disease of maize

ISSUE

Aspergillus flavus, the main aflatoxin B1 producing fungal species, *Fusarium graminearum*, a deoxynivalenol producer, and the fumonisin-producing species *F. proliferatum* and *F. verticillioides* are the main toxigenic fungi that colonize maize.

Several strategies are available to control toxigenic fungi and related mycotoxins, such as chemical control. However, there is poor knowledge on the efficacy of fungicides on maize plants since few molecules are registered.

ISPA

Maize Ear Rot Disease agents sensitivity to fungicides

In vitro and in field fungal response to fungicides

APPROACH

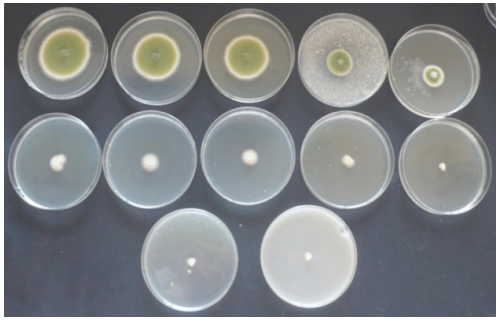
The sensitivity of *F. graminearum*, *F. proliferatum*, F. *verticillioides,* and *A. flavus* to **eleven fungicides**, selected based on their different modes of action, was evaluated.

In vitro, both mycelial growth and conidial germination inhibition were evaluated.

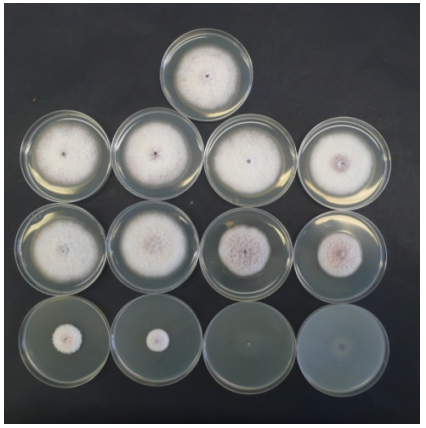
In field, the most effective fungicides based on in vitro results (prothioconazole against *Fusarium* species and boscalid against *A. flavus*) were selected. Fungal symptoms were evaluated on maize plants in field. The fungal species contamination was detected re-isolating colonies from maize kernels.

Commercial Name	Active Ingredient	Active Ingredient Tested (mg L^{-1})	Chemical Group *	Group Name *	Target Site *	Mode of Action *
Cantus Zulu	Boscalid Isopyrazam	500–50–5 200–20–2	pyridine-carboxamides pyrazole-4-carboxamides	SDHI (Succinate dehydrogenase inhibitors)	complex II: succinate-dehydrogenase	Respiration
Carnival Proline Icarus Opinion Ecna Caramba Score	Prochloraz Prothioconazole Tebuconazole Propiconazole Metconazole Difenoconazole	400–40–4 200–20–2 320–32–3.2 250–25–2.5 90–9–0.9 250–25–2.5	Imidazoles Triazolinthiones Triazoles	Demethylation Inhibitors SBI Class I	C14-demethylase in sterol biosynthesis	Sterol biosynthesis in membranes
Celest	Fludioxonil	50–5–0.5	phenylpyrroles	PP-fungicides (PhenylPyrroles)	MAP/Histidine—Kinase in osmotic signal transduction	signal transduction
Enovit Metil FL	Thiophanate-methyl	1500–150–15	Thiophanates	MBC-Fungicides (Methyl Benzimidazole Carbamates)	β-tubuline assembly in mitosis	mitosis and cell division
Folpan80	Folpet	1200–120–12	phthalimides	Phthalimides	multisite contact activity	Multisite contact activity

* Information from Fungicide Resistance Action Committee (FRAC), available at www.FRAC.info.



In vitro assays on fungal colonies growing on PDA amended with increasing concentrations of fungicides.



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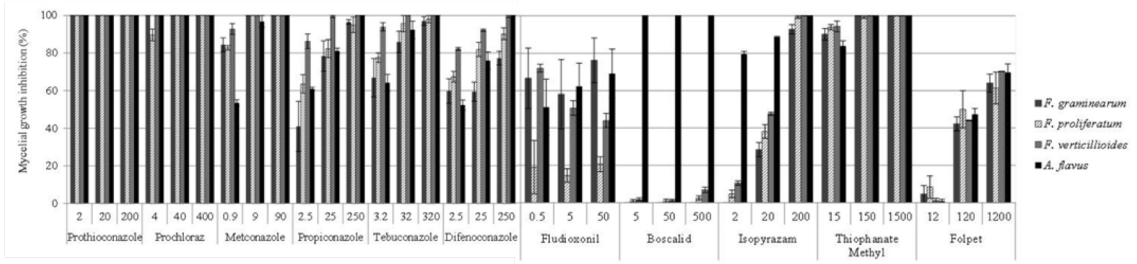
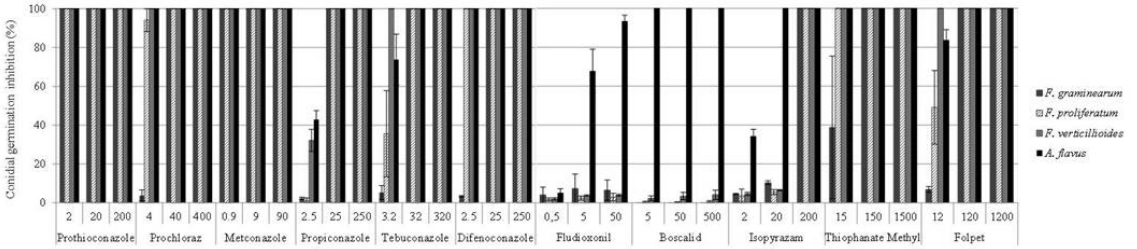
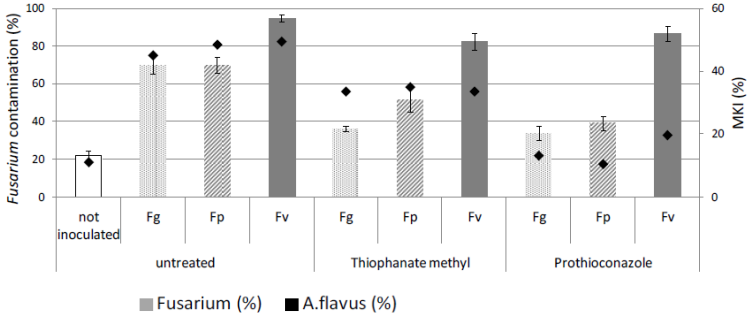
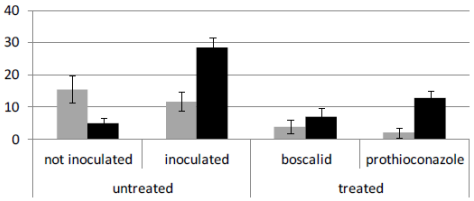
OUTCOMES

DMIs and MBCs showed the best inhibition activity for *Fusarium* species and *Aspergillus flavus, in vitro*. SDHIs are effective against *A. flavus* but ineffective for *Fusarium* species. The effectiveness of fungicides showing the best performance in vitro, was confirmed in field conditions. Prothioconazole and thiophanate methyl reduced *F. graminearum* (52 and 48%) and *F. proliferatum* contamination (44 and 27%). Prothioconazole and boscalid reduced *A. flavus* contamination (75 and 56%). This study could be useful to select the best molecules active against *Fusarium* and *Aspergillus* species associated with maize diseases.









Masiello M., Somma S., Ghionna V., Logrieco A.F., Moretti A. 2019. Toxins 2019, 11, 11. doi:10.3390/toxins11010011