

Detection of *Fusarium* species producers of fumonisins in maize grains in Portugal

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Introduction

Maize is among the most important food and feed crops. The decrease of maize quality is mainly caused by fungal growth on ears and by their associated-mycotoxins production. The consumption of mycotoxin-contaminated maize results in acute or chronic consequences in human and animal health. Several species of fungi produce mycotoxins, but the main producers belong to the genera *Aspergillus*, *Penicillium* and *Fusarium*. The aim of this preliminary study was to assess the effect of two different treatments in *Fusarium* growth on ears and to correlate it with fumonisins recently detected in maize grains.

Methods

Maize (variety P0933) was sown and collected in 2018, in two different locations (A and B), in the Tagus watering area, Portugal. In location A, part of the field was supplemented with more 200 kg/ha of a fertilizer containing K, Mg and S (treatment 1), whereas in the other part was used the recommended doses of fertilization (control 1). In location B, a similar scheme was followed, with a part of the crop supplemented with 1.5 L/ha of a product with mycorrhizas (treatment 2). Maize grains were sampled at harvest and after being dried and stored. The maize grains were disinfected with 1% NaOCl for 5 min, plated in malachite green agar 2.5[1] and incubated at 27 °C for 7 days. Pure *Fusarium* colonies were obtained by single spore isolation and then cultivated onto PDA, CLA and SNA and incubated at 27 °C for 10 days. The *Fusarium* spp. isolates (N=197) were identified by macro and microscopic morphology [2] and grouped in morphotypes. Some isolates were selected to confirm their identification by sequencing TEF1- α , using primers EF1-728F and EF1-986R [3].

Discussion

In this preliminary results was verified, with both treatments, an increase of maize grains infected with *Fusarium* species. The species isolated were *F. verticillioides*, *F. subglutinans*, *F. proliferatum*, *F. graminearum* and *F. oxysporum*. In all samples, the most frequent species found was *F. verticillioides*, followed by *F. subglutinans* and *F. proliferatum*. These results are in accordance with what has been described in other countries of South Europe [4]. As *F. verticillioides* is described as the major producer of fumonisins, its high frequency in this maize samples can constitute one of the major contribution for the high levels of fumonisins recently found in. In this way, is important to continue studying the diversity and incidence of the different *Fusarium* species, specially *F. verticillioides*. As this is a preliminary study, it is important to extend it to obtain more conclusive results.

Results

Effect in the amount of grains infected by *Fusarium* species

The treatment 1, with higher fertilization resulted in an increase of 11.5% of grains infected with *Fusarium* species, while the treatment 2 resulted in an increase of 7%. Samples from treatment 1 had always more grains infected with *Fusarium* than in the respective control, decreasing after storage. With treatment 2, however, the amount of grains infected increased after storage.

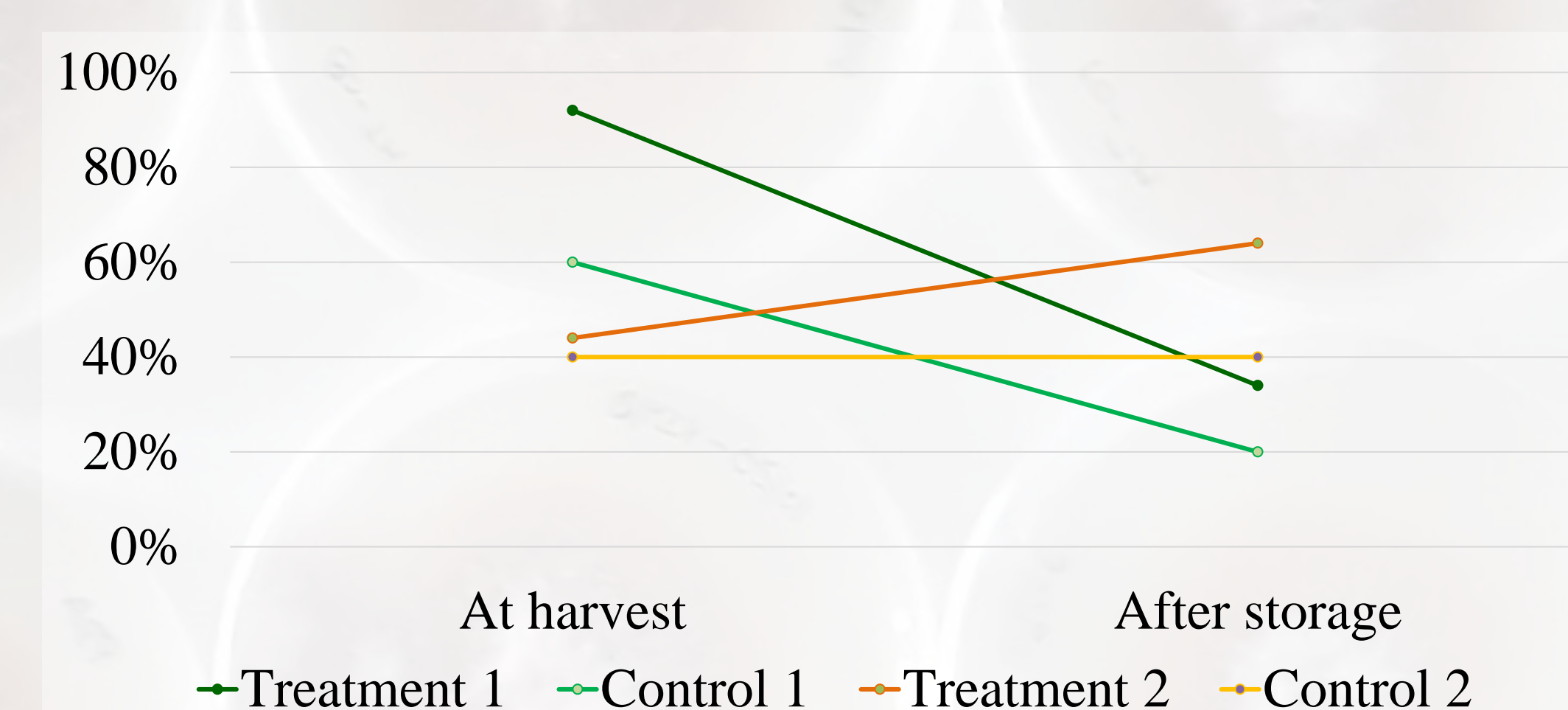


Figure 1 – Frequency of maize grains infected with *Fusarium* species per each treatment and respective controls, at harvest and after storage.

Diversity of *Fusarium* species

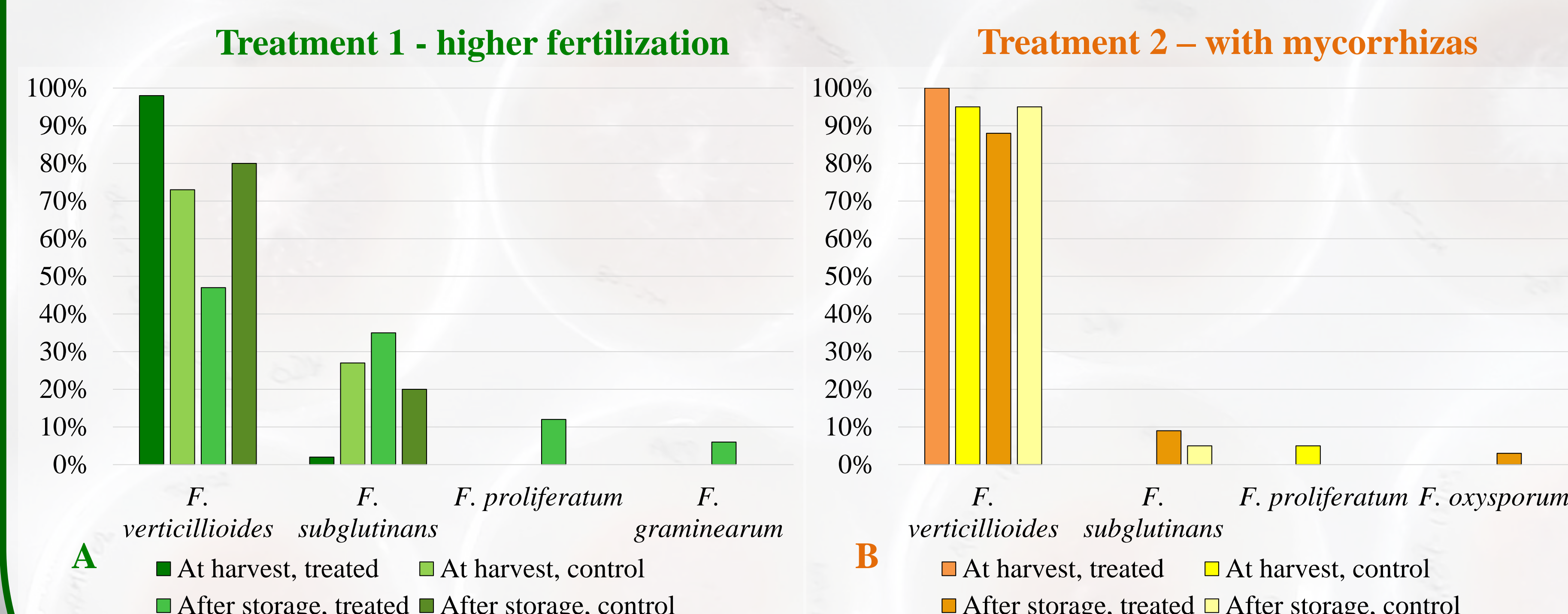


Figure 2 – Frequency of *Fusarium* species verified with treatment 1 (A) and treatment 2 (B) and respective controls, at harvest and after storage.

References

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