

## 4.8. Interactions between plant response to environment and fungal microbiome in developing maize silks in relation to mycotoxin risk

Giacomo Boscarol<sup>1</sup>, Francesco Boscutti<sup>1</sup>, Alessandra Di Francesco<sup>1</sup>, Giuseppe Firrao<sup>1</sup>, Marco Vuerich<sup>1</sup>, Dora Scarpin<sup>1</sup>, Giacomo Trotta<sup>1,2</sup>, Enrico Braidot<sup>1</sup>, Valentino Volpe<sup>3</sup>, Thomas Lazzarin<sup>3</sup>, Maurizio Martinuzzi<sup>3</sup>, Michele Fabro<sup>3</sup>, Elisa Petruzza<sup>1</sup>

<sup>1</sup>Department of Agriculture, Food, Environmental and Animal Sciences, University of Udine, via delle Scienze 208, 33100 Udine, Italy; <sup>2</sup>Dipartimento di Scienze della Vita, Università di Trieste, Via L. Giorgieri, 10, 34127 Trieste, Italy;

<sup>3</sup>Servizio fitosanitario e chimico, ricerca, sperimentazione e assistenza tecnica, ERSA, Pozzuolo del Friuli, Italy

Maize (*Zea mays* L.) is one of the most important crops worldwide both in terms of yield and land surface used, which are constantly increasing. One of the most critical stages for maize reproduction and seed establishment is the emergence of silk from cob: silks are particularly susceptible to environmental stresses and represent a preferential entry route for mycotoxin-producing fungi such as *Fusarium verticillioides* and *Aspergillus flavus* (1). Moreover, from elongation to senescence, silks become a sink organ enriched in nutrients (e.g. Non-Structural Carbohydrates (NSC)), and a crossway for various primary and secondary metabolites. In maize silks, these metabolites are expected to be significantly affected by environmental stress conditions (2) and by the maturation stage of silk tissues themselves, possibly affecting the fungal colonization of the ear tissues. In temperate regions of cultivated maize, also pathogen growth and mycotoxin production are thought to be affected by environmental factors, such as alterations in temperature, rainfall and humidity (3), which are strictly related to climate change.

The aim of this study is to investigate the impact of the environmental conditions on the fungal microbiome in maize developing silks at two different phenological stages. To do so, some eco-physiological parameters have been measured in 5 plots under contrasting climate conditions, and the complete fungal microbiome has been sequenced for each plot, both at the beginning of emergence and at the senescence of silks.

In this study we expect to get new insights into the interplay of the environmental conditions, i.e. precipitation and temperature, and phenological stage of silks in determining the fungal microbiome of maize silks. We do believe that climate-induced plant response might be pivotal in shaping the microbiome communities by favouring some fungal groups and disfavouring others during early silk colonization.

1) Thompson, M. E. H. & Raizada M. N. Fungal pathogens of maize gaining free passage along the silk road. *Pathogens*, 7(4), 81 (2018).

2) Slewinski, T. L. Non-structural carbohydrate partitioning in grass stems: a target to increase yield stability, stress tolerance, and biofuel production. *Journal Of Experimental Botany*, Vol. 63, No. 13, pp. 4647-4670 (2012).

3) Magan, N. & Medina, A. Integrating gene expression, ecology and mycotoxin production by *Fusarium* and *Aspergillus* species in relation to interacting environmental factors. *World Mycotoxin J.* 9, 673–684 (2016).