

**Between the state of eubiosis, meliorbiosis and dysbiosis  
- the role of the plant microbiome on the example of wheat endosphere  
mycobiome research.**

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Wheat continues to be a key food source for humans and livestock. Therefore, it is necessary to maintain its production at a constant level, regardless of the emerging factors reducing yield, intensified by climatic changes and the conditions of the agricultural environment.

Interactions between plants and their associated microbiome are critical to host performance and resistance to environmental disturbance. However, in order to shape these interactions, it is necessary to understand the structure and function of microbiome and, consequently, to identify symbiotic microorganisms that can be used to maintain plant health and wellness.

Therefore, we aimed to decipher the structure of the wheat endosphere mycobiome and understand the intricate interdependencies between wheat and its endophytic fungi that can have profound effects on plant processes and functions and its ecosystem. Using culture- dependent and independent methods, we have identified a huge number of coexisting endogenous fungi representing different lifestyles and mode of nutrition. To gain insight into interactions between wheat and endogenous fungi, the responses of plants to treatment with endophytic fungi were investigated by analyzing morpho-physiological parameters and the wheat transcriptome and metabolome.

We observed that the community structure of fungi occurring in the wheat endosphere is diversified, and its species composition is determined by the variety, organ and form of wheat. We have also shown that cultivation conditions and agrotechnics have a significant impact on the formation of the mycobiome structure. Moreover, we noticed that endophytic fungi, and in general - changes in the mycobiome composition, significantly affect the growth and fitness of wheat.

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