Outlook

Contact 9th Meeting of the Swiss Microbial Ecology from christene.vouillamoz@unine.ch

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Type of presentation:
Oral presentation

Title:
Dynamics of carbon, nitrogen, environmental factors and microbial communities across the life cycle of cultivated Morchella sextelata

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Abstract (300 words maximum): :
Morels (Morchella spp.) are gourmet edible fungi that have been successfully cultivated in China for a decade. However, their cultivation remains challenging due to their intricate life cycle and specific environmental requirements. While large-scale cultivation relies on a well-established approach that includes exogenous nutrition bags (ENBs) filled with nutrient-rich substrates to support mycelium growth, inconsistent yields highlight the need for a better understanding of the factors that govern morel development until obtaining the highly prized fruiting-bodies.
This study followed a morel cultivation cycle over six months in a Swiss farm and assessed, in both soil and ENBs, water content, pH, nitrogen and carbon quality and quantity, along with bacterial and fungal communities via 16S and ITS sequencing, respectively.
Our results reveal that ENBs exhibit enhanced water retention, nitrogen mineralization, and organic matter decomposition, despite hosting a more limited microbial diversity. This was evidenced by increased ammonium concentrations and fluctuating nitrate levels within the ENBs. Morels demonstrated a preference for decomposing labile carbon sources, such as starches, cellulose, and simple carbohydrates, while showing less degradation of recalcitrant compounds. In contrast, soil nitrate concentrations increased over time, suggesting active microbial nitrification, which is known to correlate with higher morel yields. In terms of microbial communities, Pseudomonas, a bacterial genus previously known to interact with morels and other fungi, was predominant, particularly in

the ENBs, alongside to Flavobacterium and Sphingomonas. The fungal community included several genera known for their coprophilic capabilities, such as Schizothecium, Ascobolus, and Peziza, especially prevalent at the end of cultivation. Their presence suggests an association to high nitrogen content and advanced stages of organic matter decomposition.
Altogether, these findings provide new insights into the interactions of morels with other soil microbes and with environmental factors, with potential implications for optimizing their growth conditions and cultivation processes in Switzerland.
