Analysis of mycobiomes to uncover biodiversity: a case study between soil fungi and orchid species in Sweden

Alice Toms  
*North Carolina State University*

Shahid Mahmood  
*Swedish University of Agricultural Sciences*

Roger D. Finlay  
*Swedish University of Agricultural Sciences*

Jan Stenlid  
*Swedish University of Agricultural Sciences*

James B. White  
*North Carolina State University*

See next page for additional authors

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**Recommended Citation**
Toms, Alice; Mahmood, Shahid; Finlay, Roger D.; Stenlid, Jan; White, James B.; Cubeta, Marc A.; and Carbone, Ignazio, "Analysis of mycobiomes to uncover biodiversity: a case study between soil fungi and orchid species in Sweden" (2019). Middle Atlantic States Mycological Conference 2019. https://trace.tennessee.edu/masmc/21

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Authors
Alice Toms, Shahid Mahmood, Roger D. Finlay, Jan Stenlid, James B. White, Marc A. Cubeta, and Ignazio Carbone
Analysis of mycobiomes to uncover biodiversity: a case study between soil fungi and orchid species in Sweden
Alice Toms1,3, Shahid Mahmood2, Roger D. Finlay1, Jan Stenlid2, James B. White3, Marc A. Cubeta3, Ignazio Carbone1,3
1Bioinformatics Research Center, North Carolina State University, 2Department of Forest Mycology and Plant Pathology, Swedish University of Agricultural Sciences, Uppsala, 3Center for Integrated Fungal Research, Department of Entomology and Plant Pathology, North Carolina State University

An analytical approach and framework were developed to examine the soil mycobiome associated with orchids in Sweden as a case study and proxy for improved taxonomic placement and understanding of fungal biodiversity. DNA was extracted, amplified, and sequenced using the entire ITS region from soil sampled from eight locations in central Sweden. Sequence data were analyzed using the DADA2 pipeline in order to use the resulting amplicon sequence variants (ASVs) for higher resolution of fungi present in the soil. Initial taxonomic assignments were performed using the UNITE database, and association between fungal order and orchid species was subsequently measured using Chi-square tests. This analysis showed an apparent enrichment of Sebacinales, which are fungi commonly associated with roots of orchids and other plant species. Further taxonomic resolution and insight into trophic behavior of sampled Sebacinales across different host plants was examined using the Tree-Based Alignment Selector (T-BAS) toolkit version 2.1. This analysis was based on a comprehensive Sebacinales phylogeny of the ITS region developed by Oberwinkler and colleagues. Phylogenetic placement showed a clear affinity of putatively sampled Sebacina taxa to other Sebacinales reference taxa that represent beneficial endomycorrhizal symbionts of orchids, ectomycorrhizae, and saprobic lifestyles.