

## Can forest fungi contribute to sustainable forestry?

**Network title:** *NEFOM – North European Forest Mycologists*  
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**Fungi are present everywhere in the forest. They decompose dead organic material, provide nutrients to the trees and cause damage as plant pathogens. This research network integrates research on forest fungi across North European countries by coordinating database developments, thematic conferences, field surveys, workshops, phd courses and inter-institutional study visits.**



A NEFOM phd student, Fahri Hasby, sampling soils for a meta-transcriptomics study to evaluate fungal activities after clearcutting close to Österbybruk, Upland, October 2017. Photo: Karina Clemmensen.

Northern forests and forestry are currently debated in relation to several important societal values, such as wood production, climate mitigation, carbon sequestration and biodiversity conservation. In the northern setting, all these processes are – to some extent - affected by the diverse fungal communities residing in the forests. Several recent studies have indicated large effects of modern forestry, such as clearcutting and stump harvesting, on fungal communities and the processes they perform, for example nutrient uptake by mycorrhizal fungi. In order to secure sustainable forestry and avoid loss of important fungal-driven processes in the future, it is important to understand to which extent different management and environmental factors affect forest fungi.

North European forests and forestry are exposed to conditions that are specific to northern conditions, such as short growing season, low temperatures, nitrogen limited primary production and low organic matter decomposition rates. Trees that form ectomycorrhizal symbioses with soil-living fungi typically dominate boreal and temperate forests, and fungi are particularly important for decomposition processes and nutrient transfer to the trees, and as tree pathogens. Further, particular fungal communities are characteristic of Nordic forests. Therefore, research cooperation aimed at understanding the environmental and management-related drivers of fungal diversity and community patterns as well as understanding how different fungi affect forest processes and production is highly needed. This is particularly important in times where forests are publicly debated in relation to several important societal values, which may also be directly affected by fungal-driven processes, such as wood production, climate mitigation and carbon sequestration, and biodiversity conservation. The main goal of the NEFOM network is to provide a platform facilitating research collaboration, data sharing and analysis infrastructure and phd education. During 2017 this goal was reached through our annual conference, a number of smaller meetings and workshops and phd courses, and by continued development of databases.

All members in the NEFOM network – as most microbial ecologists - depend on molecular techniques in our research. The extent to which DNA- and RNA-based data are useful for inferring species-level autecology, biogeographical patterns and functional properties of fungal communities depend completely on the extent to which we are able to define, name and characterize ‘molecular species’ in a consistent and comparable way. Therefore, continued development of these techniques in a cooperative manner across research labs is crucial. Only regional coordination will allow building up databases containing consistent and comparable data, both of species occurrences across different systems and of their taxonomic and functional metadata. The NEFOM network is evolved around the group of researcher who initially started the UNITE database (on fungal DNA sequences focusing on Nordic systems and continues to strengthen the collaboration between leading Northern European mycology research groups.

With fungal communities controlling several key functions of the forest ecosystem, such as tree nutrition, tree health and organic matter decomposition, we firmly believe that our research efforts are crucial. Given the clear need for coordination of research methods and data storage at the Nordic-to-Northern European level, our network activities generate synergies that facilitate both high-level research education and evidence-based knowledge to direct sustainable forest management. Within the NEFOM network, several recent studies have indicated large effects of modern forestry, such as clearcutting and stump harvesting, on fungal communities and linked processes. The theme “Roles of fungi in sustainable forestry” of the annual NEFOM meeting attracted many participants, and one conclusion was a need for more cross-talk between fungal ecologists, forest ecologists and the forestry sector, in order to work out whether and how important fungal-driven processes may be secured and contribute to sustainable forestry.