

PhD project: Fahri Hasby

Meta-transcriptomic analyses of microbial traits to study carbon dynamics in managed forests

I am a PhD student within the Soil Biology research group at the Department of Soil and Environment. My PhD project is about developing and using gene markers for microbial traits and ecosystem function to study carbon dynamics from meta-transcriptomic profile of managed pine forest in boreal ecosystem. The main focus of this project is to assess carbon-use efficiency (CUE)—an important parameter in carbon dynamics model.

This projects consists of three modules:

1. Laboratory Study

In the laboratory study, genome sequenced fungal strain will be used in artificial liquid culture system to Establish correlations between expressions of selected genes to CUE. Estimated CUE by direct measurement of carbon uptake and CO₂ will be related to total gene expression profile by mRNA-Seq. This selected gene markers will be used as a means to calculate an index of CUE based on gene expression

2. Field Study

In the field study, meta-transcriptomic indexes will be utilized to assess CUE of field samples at the ecosystem level (20 x 20 m plots). Sample will be taken from various sites to represent the successional stage of managed pine forest chrono-sequentially.

3. Modeling

The estimated CUE at the ecosystem level will be used to parameterize a carbon dynamic model and to investigate the effect of clear-cutting to long-term carbon dynamics.

My supervisors are:

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Florian Barbi; Researcher at the Department of Soil and Environment, SLU.

Karina Clemmensen; Researcher and Associate Senior Lecturer at the Department of Mycology and Forest Pathology, SLU.

Stefano Manzoni; Senior lecturer at the Department of Physical Geography, Stockholm University.