



Natural resources and
bioeconomy
studies 29/2018

3rd Conference on Ecology of Soil Microorganisms

17–21 June 2018, Helsinki, Finland

Krista Kettunen & Oili Kiikkilä (Eds.)



ISBN 978-952-326-583-7 (Print)

ISBN 978-952-326-584-4 (Online)

ISSN 2342-7647 (Print)

ISSN 2342-7639 (Online)

URN <http://urn.fi/URN:ISBN:978-952-326-584-4>

Copyright: Natural Resources Institute Finland (Luke)

Authors: Krista Kettunen & Oili Kiikkilä (Eds.)

Publisher: Natural Resources Institute Finland (Luke), Helsinki 2018

Year of publication: 2018

Cover photo: Luke/Erkki Oksanen

Printing house and publishing sales: Juvenes Print, <http://luke.juvenesprint.fi>

**Ecology of
Soil Microorganisms**



4041 0729
Painotuote
Suomen Yliopistopaino Oy
Juvenes Print

P187 Links between soil CH₄ cycling and tree-derived CH₄ emissions on a forestry-drained peatland

Anuliina Putkinen^{1,2}, Iikka Haikarainen^{1,2}, Elisa Halmeenmäki^{1,2}, Petteri Pyykkö^{1,2}, Annalea Lohila³, Mika Korhikoski³, Hannu Fritze⁴, Mari Pihlatie^{1,2,5}

¹Department of Agricultural Sciences, University of Helsinki, Helsinki, Finland. ²Institute for Atmospheric and Earth System Research (INAR) / Forest Sciences, University of Helsinki, Helsinki, Finland. ³Finnish Meteorological Institute, Helsinki, Finland. ⁴Natural Resources Institute Finland, Helsinki, Finland. ⁵Viikki Plant Science Centre (ViPS), University of Helsinki, Helsinki, Finland

Recent studies have revealed the contribution of trees to the global methane (CH₄) emissions and thus questioned the nature of boreal forests solely as CH₄ sinks. However, the related mechanisms are still uncertain. We examined the potential role of soil CH₄ production and subsequent transport through the trees as a source of these emissions. Methane consumption in the soil profile and in the field layer mosses was also assessed. Measurements were conducted on two adjacent forested peatland subsites located in southern Finland (60°38' N, 23°57' E). Subsites differed in their water table level due to a partial tree removal, which decreased the evapotranspiration of the harvested subsite (HRV). In accordance with the higher water level, potential CH₄ production was higher in the HRV soil than at the control subsite. Similarly, the tree-derived CH₄ flux was significantly higher at the HRV subsite. Preliminary microbial analyses showed higher methanogen (*mcrA* gene) abundance in the HRV soil but no signs of methanogens in the trees. These results, and the decreasing CH₄ flux upward the tree trunk, were a strong indication of the transport of soil-derived CH₄ through the trees. Based on the fluxes, soils of both subsites were generally small CH₄ sinks, but there were differences in their potential for high- vs. low-affinity CH₄ oxidation. Mosses showed low CH₄ oxidation activity. Methanotrophic community structures are expected to reflect the above mentioned oxidation patterns. Combined, this study will give a detailed view on the role of different ecosystem components in the forest CH₄ cycling.

P188 Selection of high performance strains of edible mycorrhizal fungi for improved abiotic stress resistance

Miguel A. Ramos, Cindy Serafim, Nadine R. Sousa, Paula M. L. Castro

Escola Superior de Biotecnologia, Porto, Portugal

Ectomycorrhizal Fungi (EcM) may play an important role in improving tree vigor and enhancing ecosystem services delivered by trees. It is important to develop resilient EcM-inocula to improve tree health, including urban trees. The use of native strains with strong adaptive skills to different abiotic and biotic challenges could be determinant for the success of tree establishment. The present work focus on screening high performance strains of edible ectomycorrhizal specie *Lactarius deliciosus* and assess its performance and ability to grow and adapt to stresses scenarios to ensure a more sustainable choice of isolates. The ability of *L. del* to grow and acclimate to abiotic stresses was studied by analyzing the effects of exposure on growth and biochemical traits. Fungal plugs were placed in fresh medium, on top of a cellophane sheet and grown for four weeks at 3 levels of temperature, (15°C, 22°C, 29°C), water stress (0%, 15% and 30% of PEG 6000) and pH (5, 6, 7). They were also subjected to temperature shifts. Box-PCR technique was used as a molecular tool for fingerprinting to differentiate *L. del* strains. Among the different treatments the highest growth was obtained at 25°C, and 35°C was lethal to the mycelium after 15 days of exposure. Temperatures of 15°C and 30°C were clearly stress temperatures to be considered in subsequent studies. These points will represent innovative contributions to the understanding of what triggers mycelium development for sustaining healthy ecosystems.