

LINKING LITTER DECOMPOSITION TO SOIL CARBON STOCKS UNDER NON-NATIVE AND NATIVE TREE SPECIES



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BACKGROUND

Norway spruce is threatened by increasing drought events and subsequent insect infestations. Due to a higher drought tolerance, Douglas fir and European larch represent a non-native and a native alternative to spruce. How these tree species affect litter decomposition and soil carbon (C) sequestration is, however, uncertain.

OBJECTIVES

This study investigates the partitioning of litter mass loss for Norway spruce, Douglas fir and European larch and links it to soil C sequestration. Litter mass loss during decomposition will be partitioned into C mineralisation and leaching of dissolved organic carbon (DOC).

By using a novel approach of combined field and laboratory measurements this study aims to

- a detect species specific differences in litter mass loss partitioning,
- b link mass loss partitioning to biochemical properties of litter and
- c link mass loss partitioning to soil carbon stocks.

HYPOTHESIS

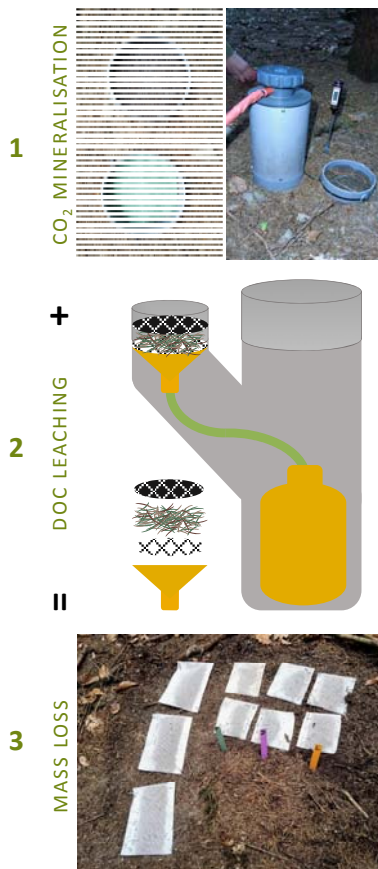
Tree species with higher partitioning into leaching of DOC have higher soil C stocks.

STUDY SITE

The study takes place in the Vienna Woods, Lower Austria. Pure stands of *P. abies*, *P. menziesii* and *L. decidua* were selected for measurements. Six plots were set up per stand. Measurements will be conducted from April to November 2018.



a PARTITIONING OF LITTER MASS LOSS



¹RESPIRATION (R) MEASUREMENTS

$$R_{\text{LITTER}} = (R_{\text{SOIL}} + R_{\text{LITTER}}) - (R_{\text{SOIL}})$$

SAMPLING BIWEEKLY

²LYSIMETERS

SAMPLING BIWEEKLY

³LITTER BAGS

SAMPLING MAY / AUG / NOV

b BIOCHEMICAL PROPERTIES & PROCESSES



- MICROBIAL RESPIRATION AND TEMPERATURE SENSITIVITY
- LIGNIN, CELLULOSE, C/N
- ENZYMATIC ACTIVITY
- MICROBIAL BIOMASS

c SOIL CARBON SEQUESTRATION



¹SOIL SAMPLING
ANALYSIS OF C STOCKS

EXPECTED OUTCOMES

- Improved understanding of tree species effects on the forest soil C cycle
- New insights into the complex process of litter break down