



Early stage litter decomposition across biomes

Ika Djukic, Sebastian Kepfer-Rojas, Inger Kappel Schmidt, Klaus Steenberg Larsen, Claus Beier, Björn Björn, Kris Verheyen, and the TeaComposition members

1Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland
(ika.djukic@umweltbundesamt.at)

Through litter decomposition enormous amount of carbon is emitted to the atmosphere. Numerous large-scale decomposition experiments have been conducted focusing on this fundamental soil process in order to understand the controls on the terrestrial carbon transfer to the atmosphere. However, previous studies were mostly based on site-specific litter and methodologies, adding major uncertainty to syntheses, comparisons and meta-analyses across different experiments and sites. In the TeaComposition initiative (Fig. 1), the potential litter decomposition is investigated by using standardized substrates (Rooibos and Green tea) for comparison of litter mass loss in 336 sites (ranging from -9 to +26 °C MAT and from 60 to 3113 mm MAP) across different ecosystems worldwide. In this study we tested the effect of climate (temperature and moisture), litter type and land-use on early stage decomposition (3 months) across nine biomes. We show that litter quality was the predominant controlling factor in early stage litter decomposition, which explained about 65 % of the variability in litter decomposition at a global scale. The effect of climate, on the other hand, was not litter specific and explained < 0.5 % of the variation for Green tea and 5 % for Rooibos tea, and was of significance only under unfavorable decomposition conditions (i.e. xeric versus mesic environments). When the data were aggregated at the biome scale, climate played a significant role on decomposition of both litter types (explaining 64 % of the variation for Green tea and 72 % for Rooibos tea). No significant effect of land-use on early stage litter decomposition was noted within the temperate biome. Our results indicate that multiple drivers are affecting early stage litter mass loss with litter quality being dominant. In order to be able to quantify the relative importance of the different drivers over time, long-term studies combined with experimental trials are needed.