ARPHA Conference Abstracts 8: e149217
doi: 10.3897/aca.8.e149217

OPEN ACCESS

Conference Abstract

Effects of soil parameters on radial stem growth of four spruce stands in Austria

Anita Zolles‡, Sonja Vospernik§, Silvio Schueler‡

‡ Austrian Research Centre for Forests, Vienna, Austria
§ BOKU (University of Natural Resources and Life Sciences), Vienna, Austria

Corresponding author: Anita Zolles (anita.zolles@bfw.gv.at)

Received: 10 Feb 2025 | Published: 28 May 2025

Citation: Zolles A, Vospernik S, Schueler S (2025) Effects of soil parameters on radial stem growth of four spruce stands in Austria. ARPHA Conference Abstracts 8: e149217. https://doi.org/10.3897/aca.8.e149217

Abstract

Understanding tree growth in relation to environmental conditions is essential, particularly in the context of climate change, where rising temperatures, frequent droughts, and disturbances threaten forest health and productivity. This study analyzes high-resolution data from four intensively monitored *Picea abies* stands in Austria (2010–2020), where dendrometers recorded hourly stem increments on 10 trees per site. These measurements enable a detailed analysis of growth responses to environmental changes. The data were collected as part of the ICP Forests and LTER monitoring initiatives. In this study, we tested different generalized additive mixed models (GAMs) to evaluate various energy and moisture-indicating parameters derived from on-site measurements, aiming to determine which input parameters best model tree growth. The best model consisted of combinations of soil moisture (SM) and soil temperature (ST) data. Furthermore we analysed how the relationships established differ for three different times during the growing season. We found that high SM consistently had a positive effect on tree growth, wheras the effect of ST varied depending on the timing. Our findings underscore the importance of monitoring soil conditions, particularly for species like *Picea abies*, which are known for their sensitivity to environmental changes due to their shallow rooting systems and vulnerability to drought.

© Zolles A et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Keywords

dendrometer, tree growth, soil moisture, soil temperature, generalized additive mixed models

Presenting author

Anita Zolles

Presented at

POSTER

Conflicts of interest

The authors have declared that no competing interests exist.