

PROJECT INFORMATION

Project title: Biological invasion pattern and ash growth dynamics

Project ID: 155

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PROJECT DESCRIPTION

Objectives: The objective of this project is to reach a comprehensive understanding of the dynamics and consequences of Ash dieback (*Hymenoscyphus fraxineus*) on crown health and tree growth of Common Ash (*Fraxinus excelsior*).

The general Ash Dieback spread pattern is well understood in Europe. Several regional studies have analyzed crown condition time series in monitoring plots over a few years (usually 3-8 years). Yet, at most of these study sites crown condition monitoring only started when the disease was already known to be present in the stand.

To date, a Europe-wide quantitative assessment within a systematic observation network is lacking. The ICP Forests Level 1 crown condition assessments – mostly predating the presence of Ash Dieback – are a perfect dataset for such a large-scale and long-term assessment of annually resolved crown condition throughout Europe. Because the ICP Forests Level 1 plots are evenly spread on the landscape and are not situated at targeted locations, e.g. in provenance trials or specific permanent research plots, inferences drawn from those plots can be more readily interpolated and upscaled.

Growth increments from repeat measurements of diameter at breast height (DBH) would increase the value of such an analysis. For this reason, data from Level 2 plots would perfectly complement the gridded Level 1 plot data.

Questions to be addressed are:

- 1) What is the general crown condition status of Ash and its temporal and spatial evolution within the monitoring network?
- 2) Do weather patterns (e.g. warm/cold-wet/dry summer) influence the disease progression (negative changes in crown condition) both on a spatial and intra-tree scale?
- 3) How high are defoliation-caused growth increment losses across Europe?

Methods: Temporal and spatial evolution of crown condition and growth increment will be investigated with generalized (linear) mixed-effects models including monthly climate data. This model will be used to relate growth increment to climate and crown condition, and will be used to estimate defoliation-caused growth increment losses.

Together with additional data (repeat diameter measurements and tree rings widths) from forest inventory and intensive monitoring plots from Switzerland, the analyzed ICP Forests data will be part of a peer-reviewed publication.