

PROJECT INFORMATION

Project title: Seed C – Carbon allocation to fruits and seeds in European forests as a function of climate, atmospheric deposition and nutrient supply.

Project ID: 44

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PROJECT DESCRIPTION

The **aim** of the project is to gain knowledge on the relation between seeding / fruiting and stem growth / foliage growth as well as the possible drivers for mast years for the main European tree species Norway spruce, Scots pine, European beech and pedunculate or holm oak.

The **objectives** of the study are

- to identify drivers for mast years
- to derive information about carbon allocation in the above mentioned species
- to identify relations between high seeding / fruiting activity and tree growth / foliage production

Scientific background of the project:

Climate and atmospheric deposition are affecting tree growth and carbon allocations in forests. While tree stem growth is partially increasing in Europe, allocation to crown foliage seems to decrease. Mast and seed years seem to increase in frequency (Övergaard et al. 2007, Paar et al. 2011). The question of how global warming, increased nitrogen deposition and CO₂ concentrations are influencing the frequency and intensity of seed production is highly important for the estimation of forest development under global change. The proposed project intends first to estimate the reoccurring fruit and mast years of the main European tree species using the available large-scale ICP Forests data base (level I plots) and literature studies of the main European tree species, i.e. common beech, Norway spruce, Scots pine and oak species. In a second step the Swiss and the European ICP Forests level II plots with available litterfall, crown condition and tree growth data will be used to quantify the amount of carbon that is allocated in different years to stem wood growth, leaf/needle growth and seed and cone production. Out of a wide range of hypotheses for the occurrence of mast years three need to be mentioned: the resource allocation or economy of scale hypothesis, the pollination efficiency hypothesis and the predator satiation hypothesis (Kon et al. 2005, Kelly and Sork 2002). These are not exclusive and several of them may hold at the same time (Kon et al. 2005).

The objectives of the study are

- To statistically analyse climate and deposition related interactions in relation to fruiting, stem growth and foliage estimates
- To develop simple carbon allocation models for the above mentioned factors for different species