

Edge influence on understorey plant communities depends on forest management

Sanne Govaert , Ghent univ

Camille Meeussen Engineering, Ghent University, Gontrode-Melle, Belgium

Thomas Vanneste Engineering, Ghent University, Gontrode-Melle, Belgium

Kurt Bollmann Swiss Federal Institute for Forest, Snow & Landscape Research WSL, Birmensdorf, Switzerland

Jörg Brunet Southern Sweden Research Centre, Swedish University of Agricultural Sciences, Alnarp, Sweden

Sara A.O. Cousins Biogeography and Geomatics, Department of Physical Geography, Stockholm University, Stockholm, Sweden

Martin Diekmann Vegetation Ecology and Conservation Biology, Institute of Ecology, FB2, University of Bremen, Bremen, Germany

Bente J. Graae Department of Biology, Norwegian University of Science and Technology, Trondheim, Norway

Per-Ola Hedwall Southern Sweden Research Centre, Swedish University of Agricultural Sciences, Alnarp, Sweden

Thilo Heinken General Botany, Institute of Biochemistry and Biology, University of Potsdam, Germany

Giovanni Iacopetti Department of Agriculture, Food, Environment and Forestry, University of Florence, Florence, Italy

Jonathan Lenoir Ecologie et Dynamique des Systèmes Anthropisés » (EDYSAN), Jules Verne University of Picardie, Amiens, France

Sigrid Lindmo General Botany, Institute of Biochemistry and Biology, University of Potsdam, Germany

Anna Orczewska Faculty of Biology and Environmental Protection, University of Silesia, Katowice, Poland

Michael P. Perring Forest & Nature Lab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Gontrode-Melle, Belgium

Quentin Ponette

Jan Plue Biogeography and Geomatics, Department of Physical Geography, Stockholm University, Stockholm, Sweden

Federico Selvi Department of Agriculture, Food, Environment and Forestry, University of Florence, Florence, Italy

Fabien Spicher « Ecologie et Dynamique des Systèmes Anthropisés » (EDYSAN), Jules Verne University of Picardie, Amiens, France

Matteo Tolosano Forest & Nature Lab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Gontrode-Melle, Belgium

Pieter Vermeir Laboratory for Chemical Analysis (LCA), Department of Green Chemistry and Technology, Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium

Florian Zellweger Swiss Federal Institute for Forest, Snow & Landscape Research WSL, Birmensdorf, Switzerland

Kris Verheyen Forest & Nature Lab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Gontrode-Melle, Belgium

Pieter Vangansbeke Forest & Nature Lab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Gontrode-Melle, Belgium

Pieter De Frenne Forest & Nature Lab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Gontrode-Melle, Belgium

First published: 03 December 2019

<https://doi.org/10.1111/jvs.12844>

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:10.1111/jvs.12844



Abstract

Questions

Does the influence of forest edges on plant species richness and composition depend on forest management? Do forest specialists and generalists show contrasting patterns?

Location

Mesic, deciduous forests across Europe.

Methods

Vegetation surveys were performed in forests with three management types (unthinned, thinned 5-10 years ago and recently thinned) along a macroclimatic gradient from Italy to Norway. In each of 45 forests, we established five vegetation plots along a south-facing edge-to-interior gradient ($n = 225$). Forest specialist, generalist and total species richness, as well as evenness and proportion of specialists, were tested as a function of the management type and distance to the edge while accounting for several environmental variables (e.g. landscape composition and soil characteristics). Magnitude and distance of edge influence were estimated for species richness per management type.

Results

Highest total species richness was found in thinned forests. Edge influence on generalist plant species richness was contingent on the management type, with the smallest decrease in

species richness from the edge-to-interior in unthinned forests. In addition, generalist richness increased with the proportion of forests in the surrounding landscape and decreased in forests dominated by tree species that cast more shade. Forest specialist species richness however, was not affected by management type or distance to the edge, but only increased with pH and increasing proportion of forests in the landscape.

Conclusions

Forest thinning affects the plant community composition along edge-to-interior transects of European forests with richness of forest specialists and generalists responding differently. Therefore, future studies should take the forest management into account when interpreting edge-to-interior because both modify the microclimate, soil processes and deposition of polluting aerosols. This interaction is key to predict the effects of global change on forest plants in landscapes characterized by a mosaic of forest patches and agricultural land, typical for Europe.