The effect of forestry treatments on forest site, biodiversity and regeneration: the Pilis Forestry Systems Experiment

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Motivation

Necessity of the integration of timber production and conservation in forest mangement in Hungary

- Forest cover in Hungary: ~21%
 - Managed forests: 96%
 - Protected (management restrictions): 21%

Applied silvicultural systems:

- Rotation forestry, shelterwood system (natural regeneration) → native submontane forests
- Rotation forestry, clear-cutting system (artificial regeneration) → lowland forests and plantations
- Continuous cover forestry, selection system → new!, ~4%, more open stands with continuous forest cover

Important to study the relationships between forest management and biodiversity

Experiments, Location

Mature sessile oak hornbeam forests

Pilis Forestry Systems 80 yr

Pilis Gap 90 yr

Framework of Pilis Foresty Systems Experiment

Experimental design

- 5 treatments:
 - preparation cutting (d=80 m)
 - gap cutting (d=20 m)
 - clear-cutting (d=80 m)
 - retention tree group (d=20 m)
 - control
- 6 replicates complete block design
- BACI (Before-After-Control-Impact): all measurements started in 2014

Relative Diffuse Light (2016)

F=55.843***

Kovács et al. 2018, Forests

Elek et al. 2018, Scientific Reports

Species composition 2016 (NMDS)

Plants

Natural regeneration

Size categories: 0-20 cm 20-50 cm 50-130 cm >130 cm C - Control CC - Clear-cutting G - Gap P - Preaparation cutting R - Retention tree group

Natural regeneration

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Growth of planted seedlings (2015-2018)

C – Control CC - Clear-cutting

- G Gap
- P Preaparation cutting
- R Retention tree group

Tinya et al. 2020. Forest Ecology and Management

Conclusions for management

- Clear-cutting: extreme microclimate, detrimental to soil organisms, dominance of non-forest herb species
- Gaps: favorable light conditions, temperate microclimate, increased soil water content, favorable for soil organisms, increased understory cover with forest species
- Preparation cutting: similar conditions to control
- Retention tree group: compensate light effect and temperature range increment, but it can not compensate the increased temperature, bad for soil organisms, low understory cover
- Regeneration is similarly optimal in gaps than in clear-cuts, propagule limitation for oaks, dominance of shade tolerants
- Soil organisms are the most sensitive groups on the treatments
- Continuous forest cover forestry is more favorable for conservation purposes than rotation (shelterwood) forestry system

- Further step 1: new local experiment
- Pilis Gap Experiment 2018-
- 6 gap types
- 6 replicates in blocks

COST ACTION CA 18207, 2019-2022

BOTTOMS UP: Biodiversity Of Temperate forest Taxa Orienting Management Sustainability by Unifying Perspectives

- Chair: Dr. Sabina Burrascano (see her poster)
- 17 countries, 70 participants

Objectives

- The Action will put local multi-taxon data together to deliver:
- 1. a standardized data platform of multi-taxon biodiversity and structure;
- 2. a network of forest monitoring sites with baseline information;
- 3. shared protocols for multi-taxon and structure sampling;
- 4. a coordinated network of forest manipulation experiments;
- 5. analysis of the relationships between multi-taxon biodiversity, structure and management;
- 6. indicators and thresholds of sustainable forest management directly tested on biodiversity;
- 7. management guidelines to be applied in forest certification and within protected areas.

Thank you for your attention!

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