

Towards a more nature-based silviculture: effects of experimental forestry treatments on forest regeneration in an oak-hornbeam stand

Introduction

- Conservational concerns are increasingly important in timber production forest management
- Besides clear-cutting and shelterwood forestry systems, the more nature-based continuous cover forestry is spreading in the temperate regions
- To evaluate the success of tree regeneration in various forestry treatments is relevant both from conservational and forestry aspects

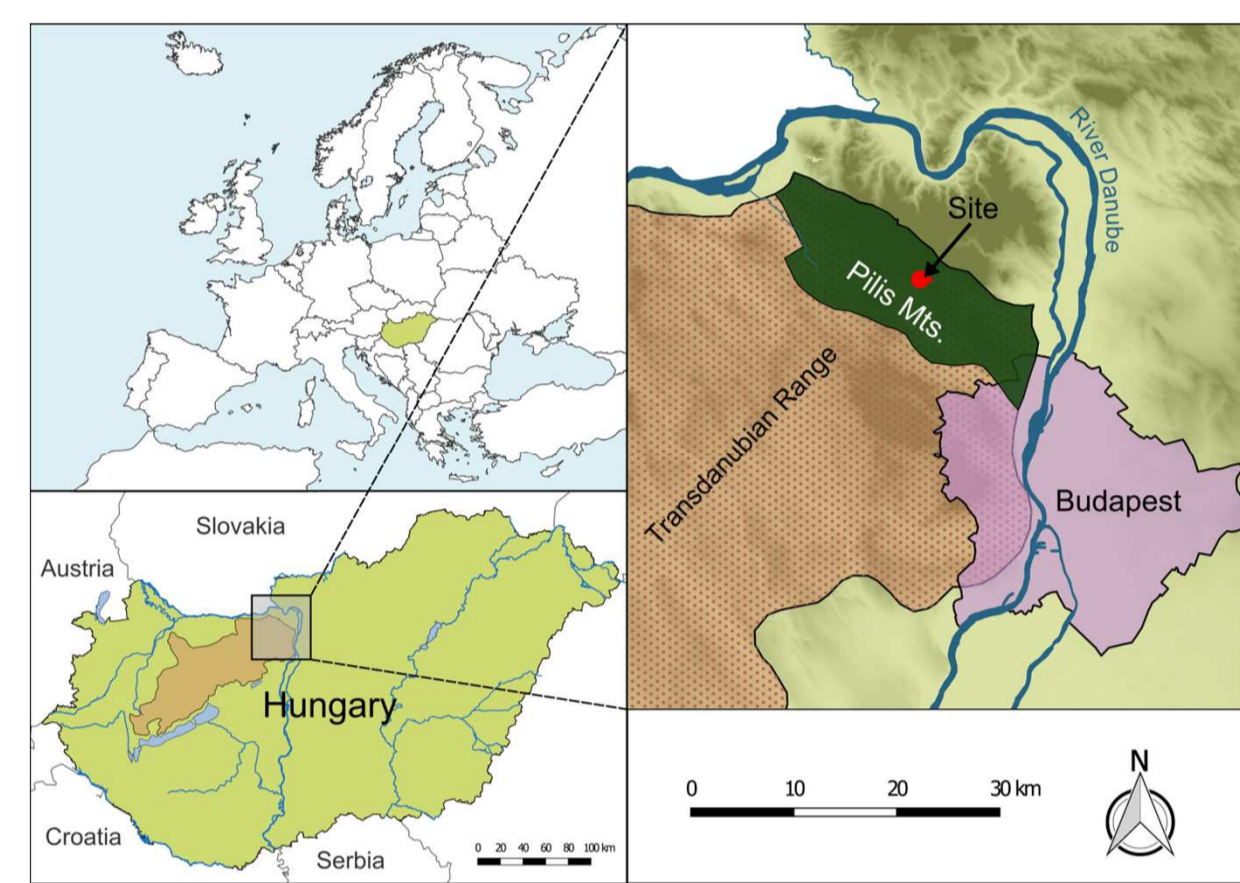
Aims of the study

- To investigate the effects of different forestry treatments – belonging to various forestry systems – on the mortality and growth of the tree regeneration

Methods

Data collection:

- „Pilis Experiment” (Pilis Mountains, Hungary)
- managed *Quercus petraea* – *Carpinus betulus* stand
- 5 treatments, 6 replications (30 plot)
- plots fenced against browsing
- 5 tree species
- 750 planted seedlings (5 individuals/species/plot)
- measurement before and 3 years after the cuttings



Recorded variables of the seedlings:

- survival
- height
- stem diameter
- shoot number
- leaf area

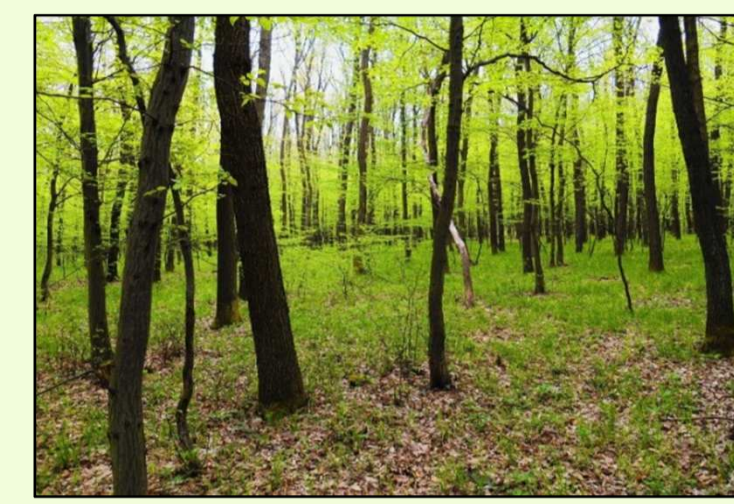
Here we show only survival and height results

Data analysis:

- Linear mixed effect models
- Dependent variables: mortality, height growth
- Fixed effect: treatments, random effect: blocks



Experimentally established treatments



Control – closed stand (C)



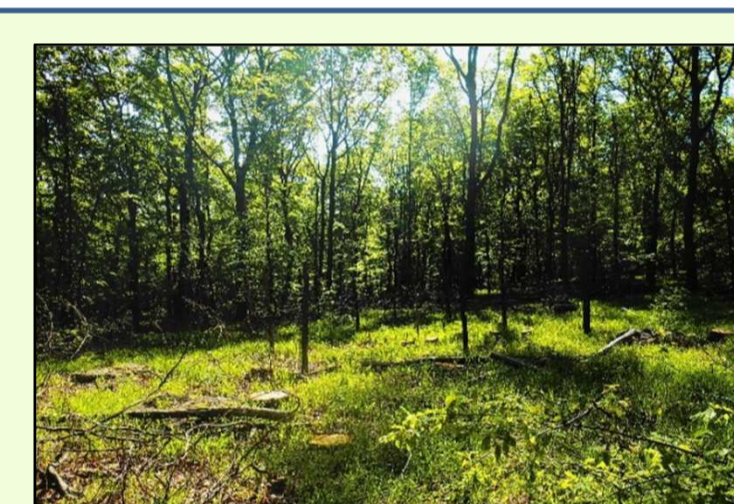
Clear-cutting (CC)



Retention tree group (R)



Uniform preparation cutting (P)



Gap-cutting (G)



?

Planted tree species



Sessile oak
(*Quercus petraea*)



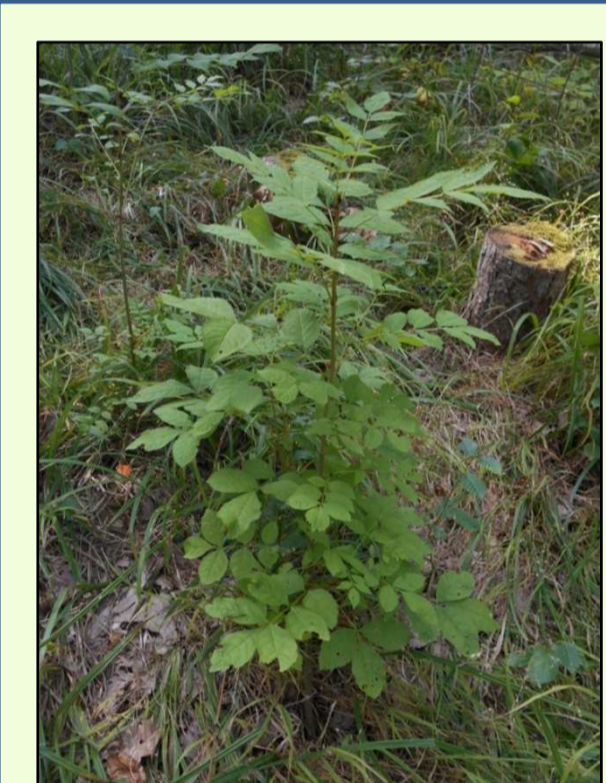
Turkey oak
(*Quercus cerris*)



Beech
(*Fagus sylvatica*)

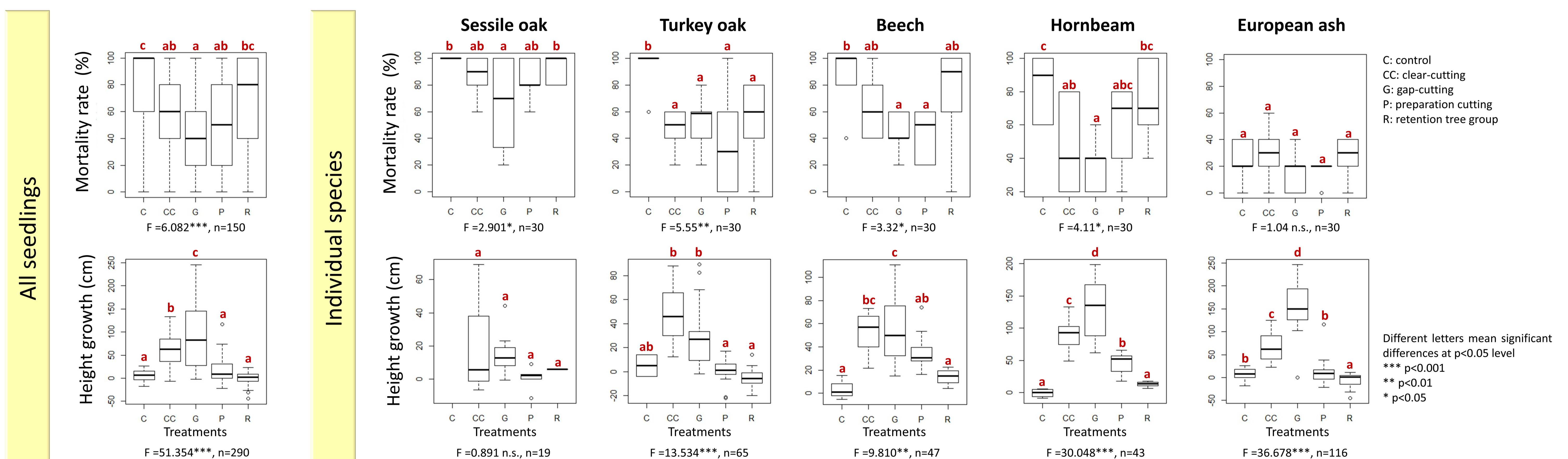


Hornbeam
(*Carpinus betulus*)



European ash
(*Fraxinus excelsior*)

Results



- **Mortality** of the seedlings was the lowest in the gap, and the highest in the control
- The **growth** of species was significantly affected by the treatments
- **Overall mean height growth** of the seedlings was the highest in the gap and intermediate in the clear-cutting
- Growth of **sessile oak** was weak in every treatment
- **Turkey oak** showed a significantly better growth in the clear-cutting and gap-cutting than in the other sites
- **Beech, hornbeam and ash** showed the largest height growth in the gap-cutting
- The development of seedlings in the **preparation cutting and retention tree group** was weak, similarly to the control sites

Conclusions

- For shade-tolerant species, gap-cutting proved to be the best treatment
- For oaks, gap was similarly suitable as clear-cutting
- Continuous cover forestry ensures the convenient tree regeneration, thus it can be a good alternative for the industrial forestry to achieve multiple (management and conservational) purposes
- To determine the long-term effects of the treatments sampling will continue in the following years

Acknowledgement

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Website of the Pilis Experiment

<http://piliskiserlet.okologia.mta.hu/en>

