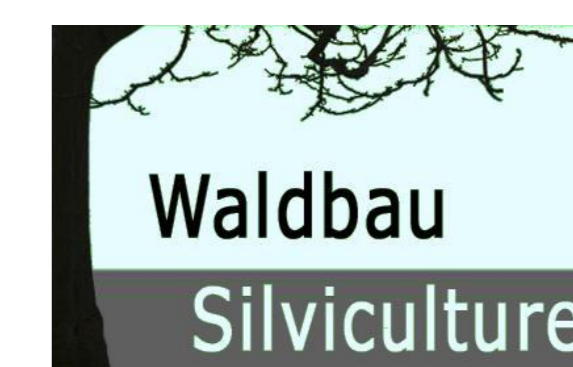


Regeneration and growth of service tree (*Sorbus domestica* [L.]) in former oak coppice forests in southwest Germany

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Introduction

Sorbus domestica L. is one of the rarest tree species in Central Europe, being classified as endangered in Austria, Germany and Switzerland. Many of the recorded individuals are growing in aged oak coppice forests. Although its timber is of high value, there is little quantitative information on its regeneration and growth dynamics. Since coppicing is no longer practiced, it is unclear whether the *S. domestica* population can persist in a continuous cover forest system or if coppicing is needed for species preservation.



Fig. 1: Autumn foliage of *Sorbus domestica*.

Objectives and Research Questions

The objectives of this study are to analyse stand development and growth related competition processes between *S. domestica* and other tree species (mainly *Quercus petraea* (Matt.) Liebl.) in order to understand current and future forest succession processes and to anticipate landscape development within the extended aged coppice areas of western Germany.

- 1) Does *S. domestica* regeneration depend on coppicing or does the species regenerate continuously?
- 2) How strong is the influence of competition by companion species on growth of *S. domestica*?

Study site and sampling design

S. domestica trees were inventoried in three forest administration districts in Rhineland-Palatinate, southwest Germany. All sample trees were located in former oak coppice forests that were harvested ca. 80 ago and remained unthinned since then.

For each sample tree (> 1,3 m) height, diameter and crown area was measured (N=66). For age determination and growth analysis increment cores were taken from 46 *S. domestica* trees 50 cm above ground level (Fig. 2). For comparison of tree age and growth neighboring oaks (*Quercus petraea*) were measured and cored similarly (N=73).

Materials and Methods



Fig. 2: Coring of *S. domestica* 50 cm above ground level.

- Increment core preparation was challenging due to ring wedging and missing year rings.
- To improve year ring visibility we used laborious sanding procedures and highlighter.
- Growth ring widths were measured to the nearest 0.001 mm using a scanner in conjunction with WinDENDRO™ software.
- For age determination a master chronology was generated for every study site.
- The master chronology was used for visual and calculatory crossdating.

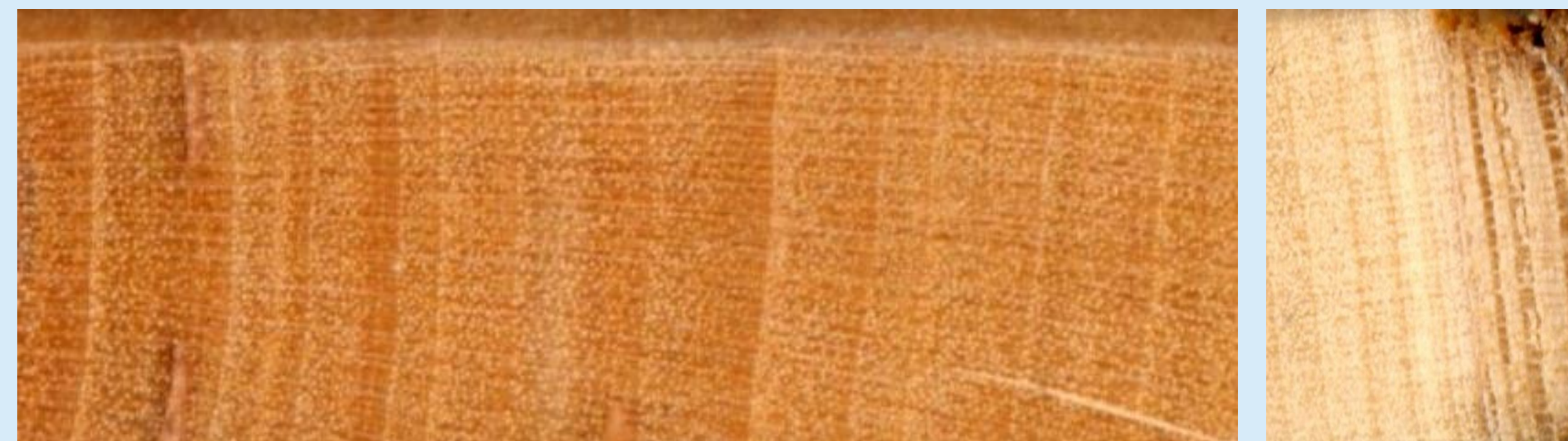


Fig. 3: Section of an increment core of *S. domestica*. Note the indistinct annual rings and the ring widths in the outer part of the section. Sudden growth change is probably triggered by repeated browsing.

Results

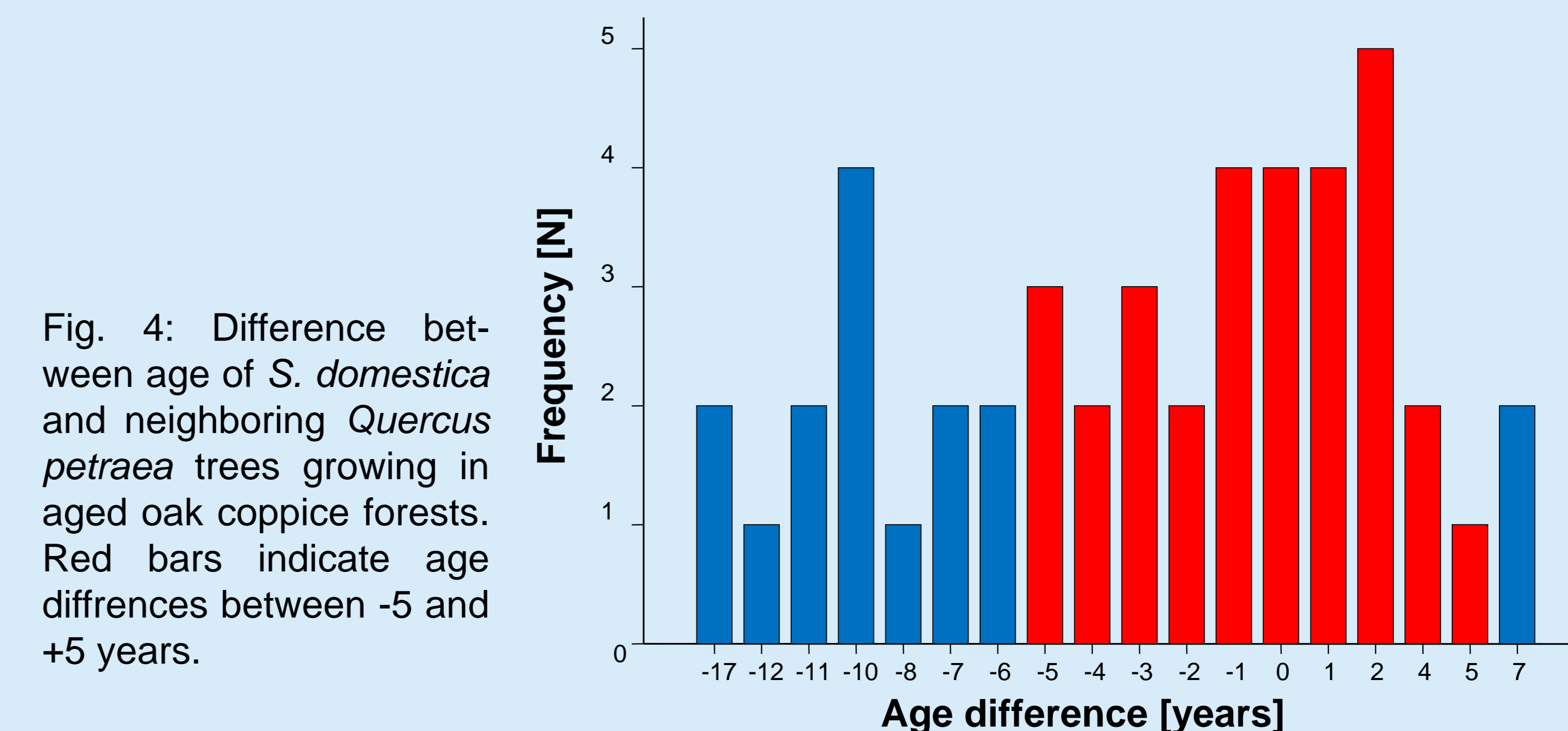


Fig. 4: Difference between age of *S. domestica* and neighboring *Quercus petraea* trees growing in aged oak coppice forests. Red bars indicate age differences between -5 and +5 years.

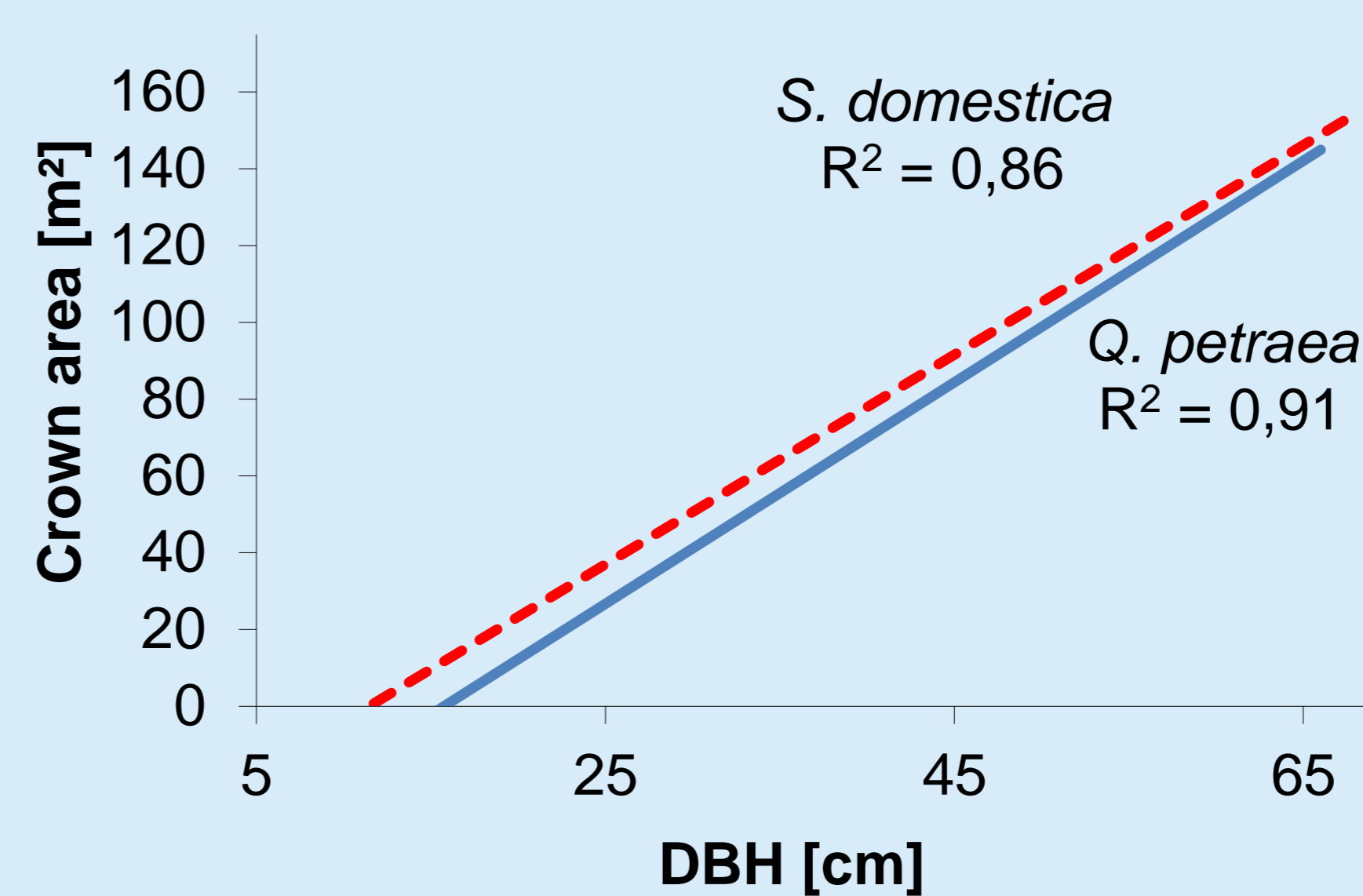


Fig. 5: Crown area in relation to DBH of *S. domestica* (dashed red line) and *Q. petraea* (solid blue line) growing in aged coppice forests.

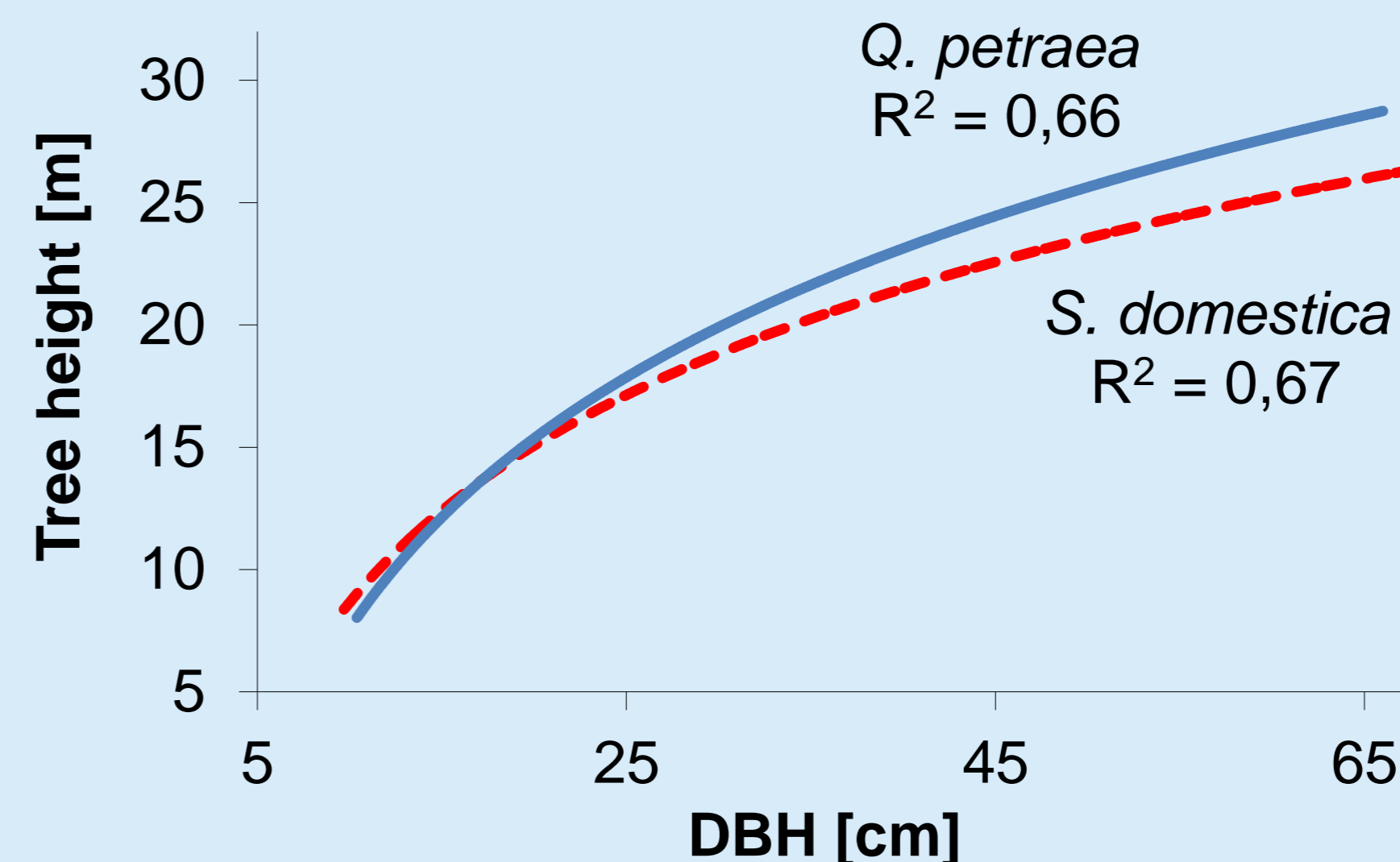


Fig. 6: Tree height in relation to DBH of *S. domestica* (dashed red line) and *Q. petraea* (solid blue line) growing in aged oak coppice forests.

Conclusions

- Regeneration of most *S. domestica* trees was limited to the last coppicing event (Fig. 4). Dendrochronological data support the hypothesis that coppicing promotes the establishment of new *S. domestica* cohorts.
- Growth patterns suggest that *S. domestica* a light demanding species that is unable to survive long periods of intensive competition (Fig. 5, 6).
- We conclude that abandonment of coppicing in these forests does threaten the status of *S. domestica*.
- In order to preserve species occurrence, a) the resumption of coppicing should be taken into consideration wherever advisable or b) be released from interspecific competition.

Acknowledgment

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