Valuable but threatened: How the abandonment of traditional forest management systems influences the occurrence of a rare tree species

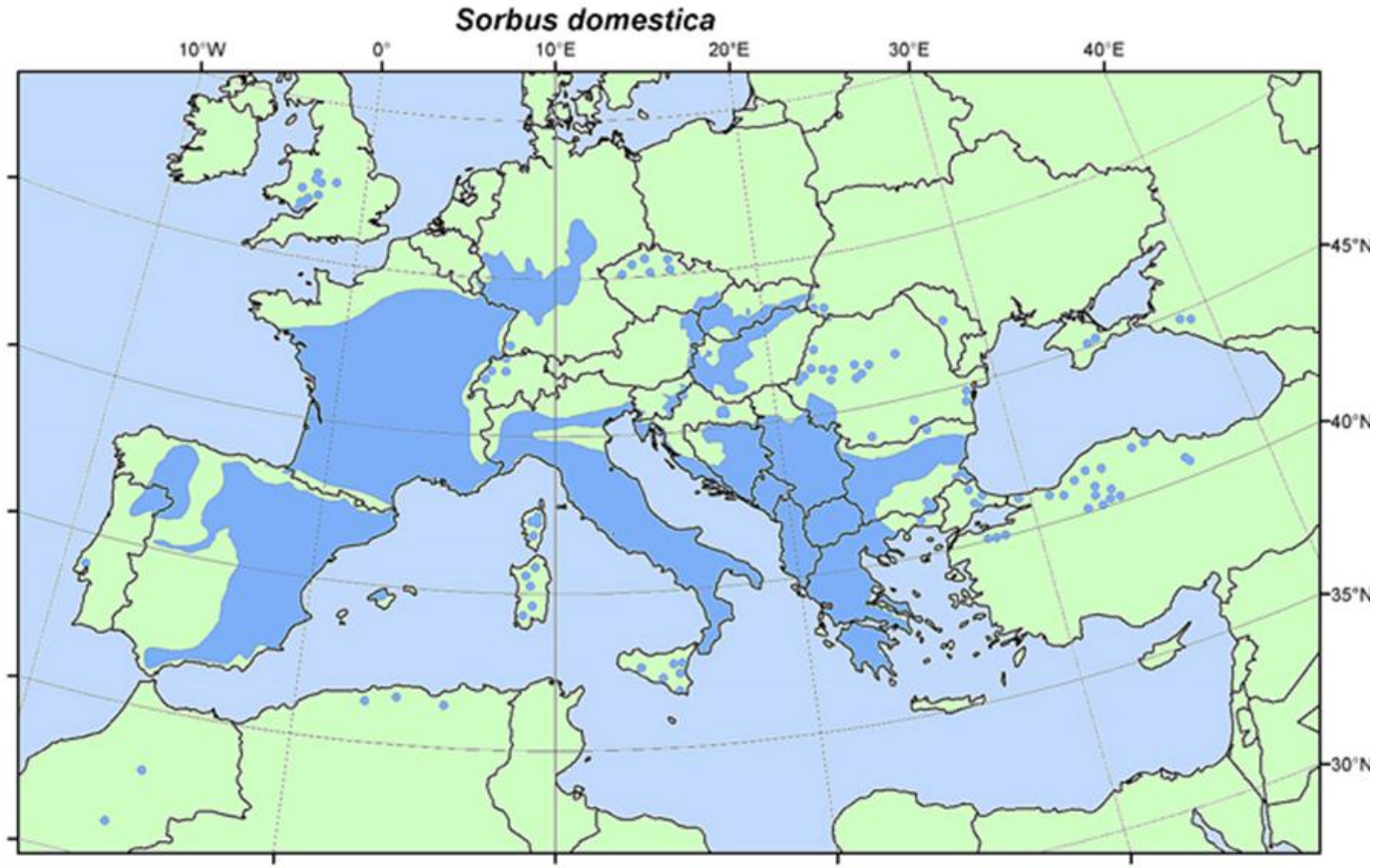
Albert-Ludwigs-Universität Freiburg

21st July 2016

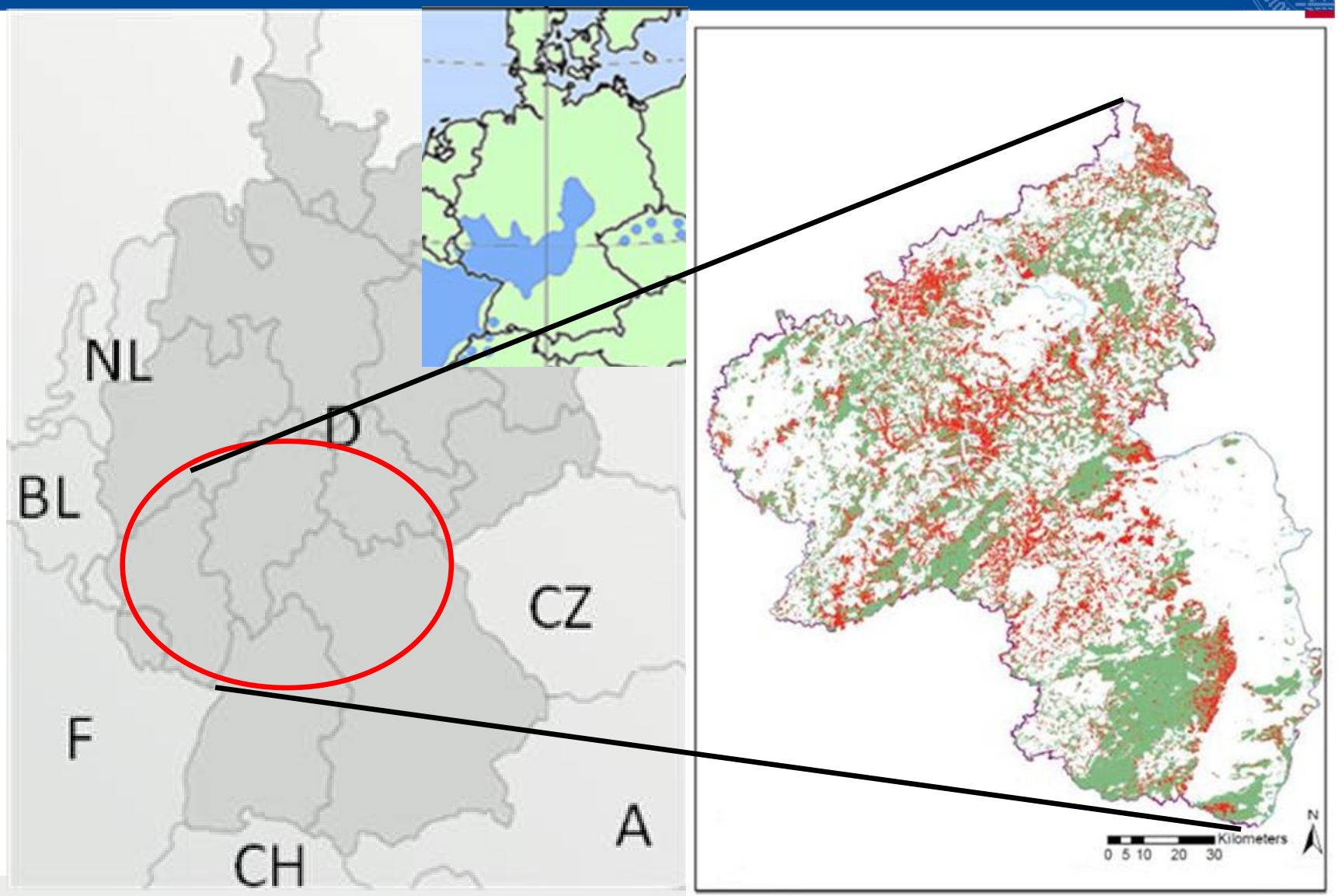
Waldbau
Silviculture

UNI FREIBURG

Distribution of *S. domestica*



- Potentially large distribution area
- Ecological niche is only a fraction of the physiological niche


NL
D
BL
CZ
F
A
CH
Kilometers
0 5 10 20 30
N

Objectives and Research Questions

1. **To determine the relation between coppicing and the occurrence of *S. domestica.***
    - Does coppicing increase species frequency?

2. **To describe growth of *S. domestica* in aged oak coppice forests.**
    - Is species loss promoted by (passive) conversion of oak coppice forests into high forest?
    - Is *S. domestica* outcompeted by the surrounding oaks due to increasing light concurrence?

Research area

Selection criteria:

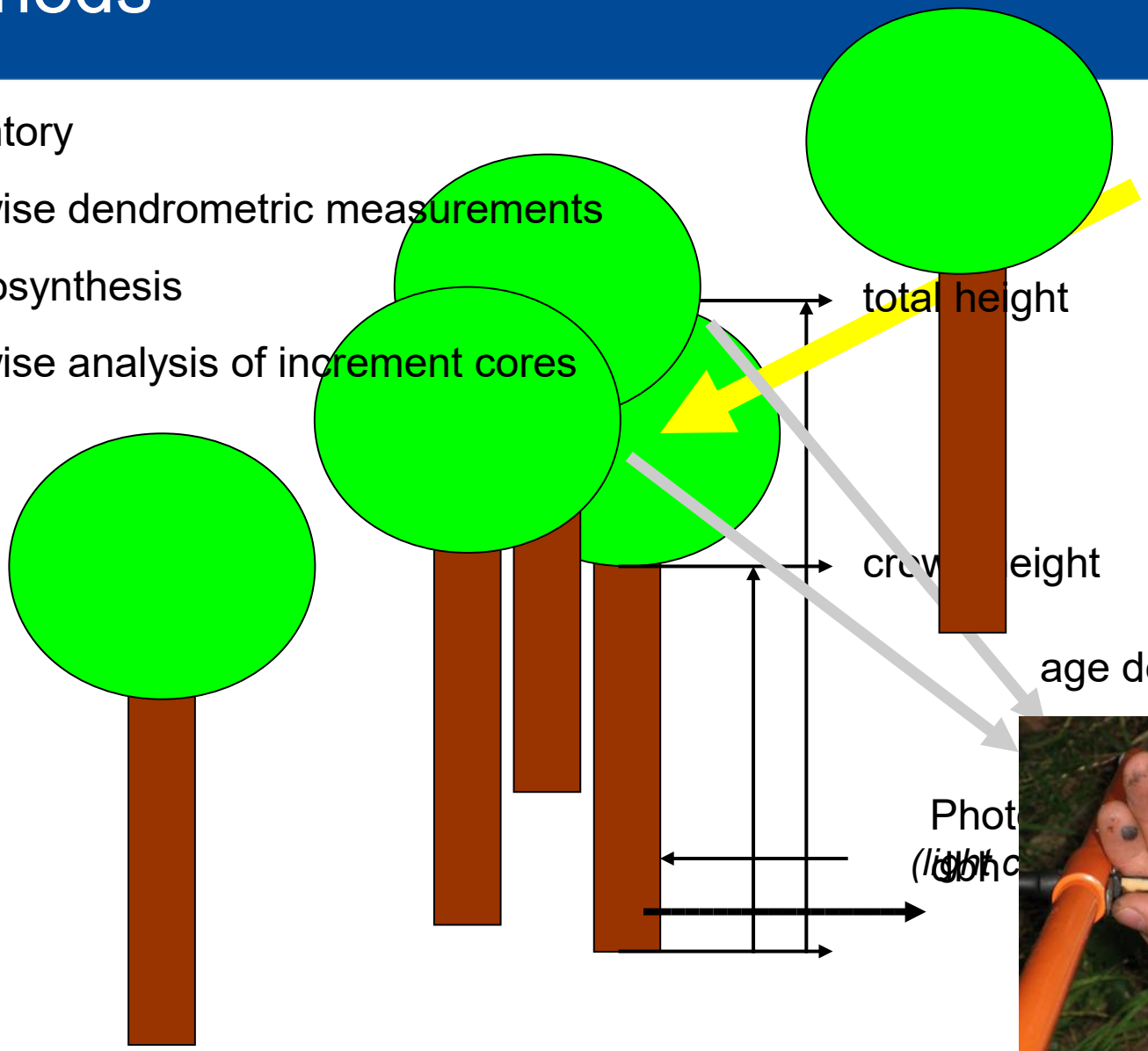
- former/aged oak coppice (*Quercus petraea*)
- stand age ≈ 90 years
- no silvicultural measures since last coppicing

Area:

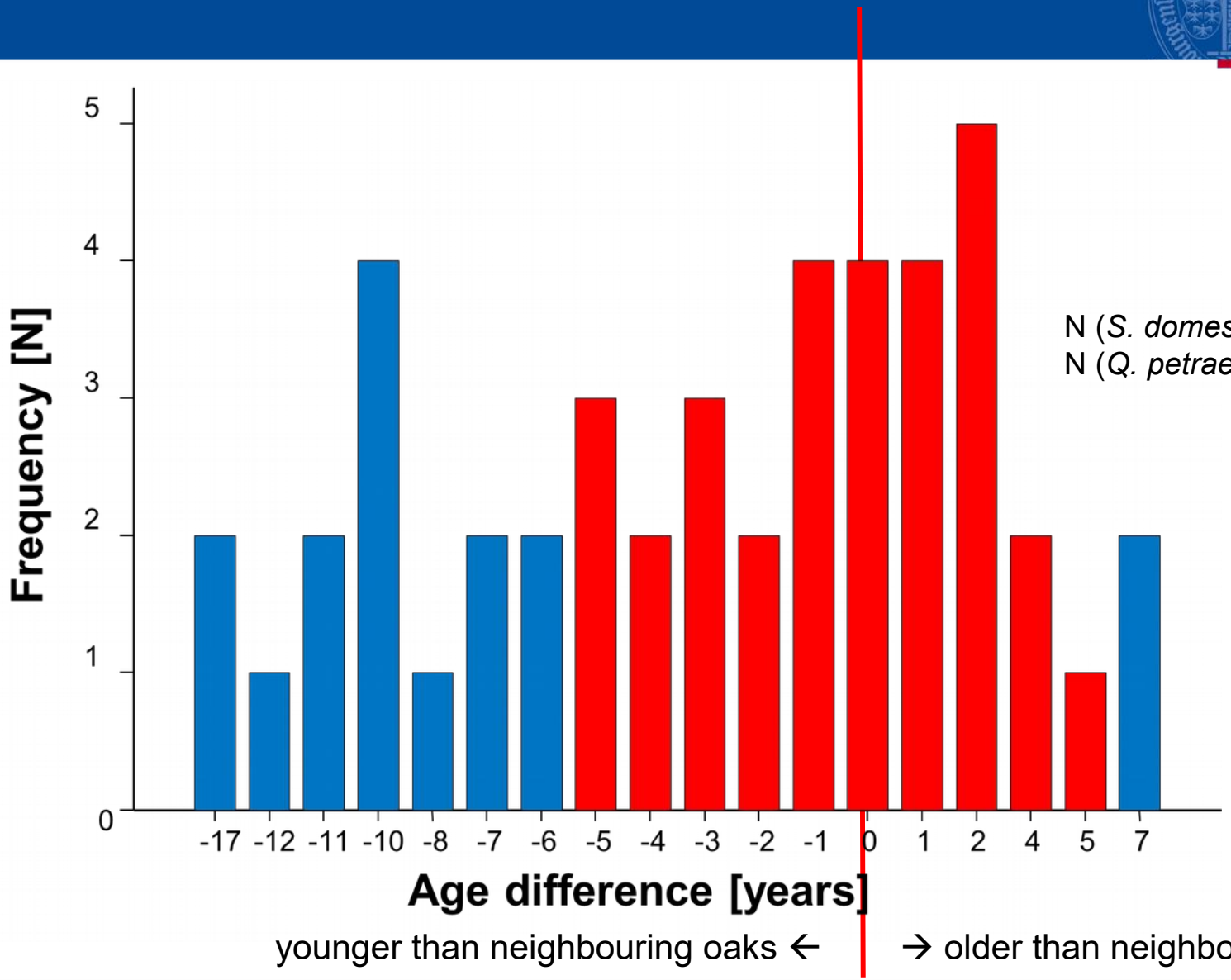
- Rheinhessen
- Boppard
- Soonwald

Methods

1. inventory
2. pairwise dendrometric measurements
3. photosynthesis
4. pairwise analysis of increment cores

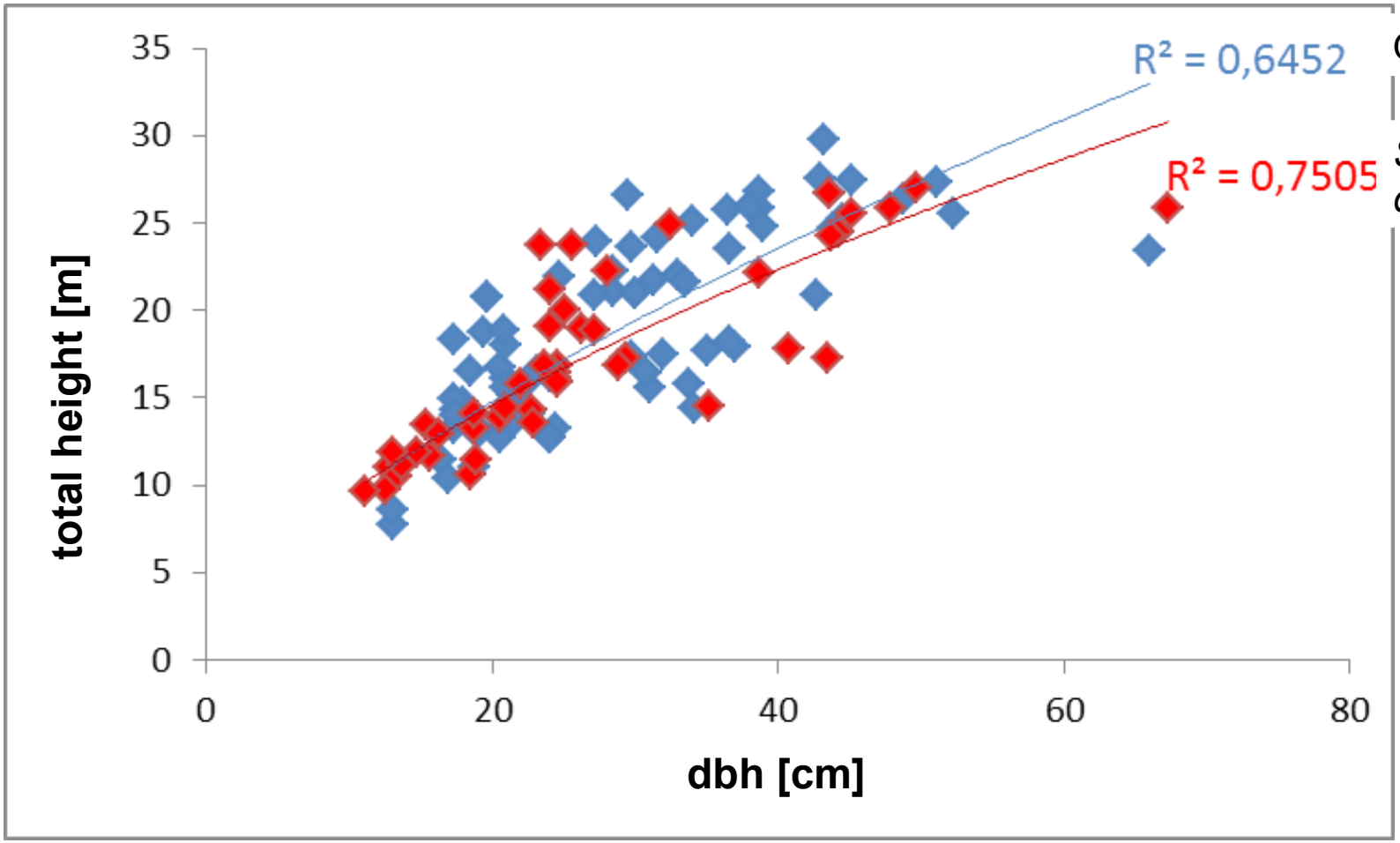


Results



N (*S. domestica*) = 46
N (*Q. petraea*) = 73

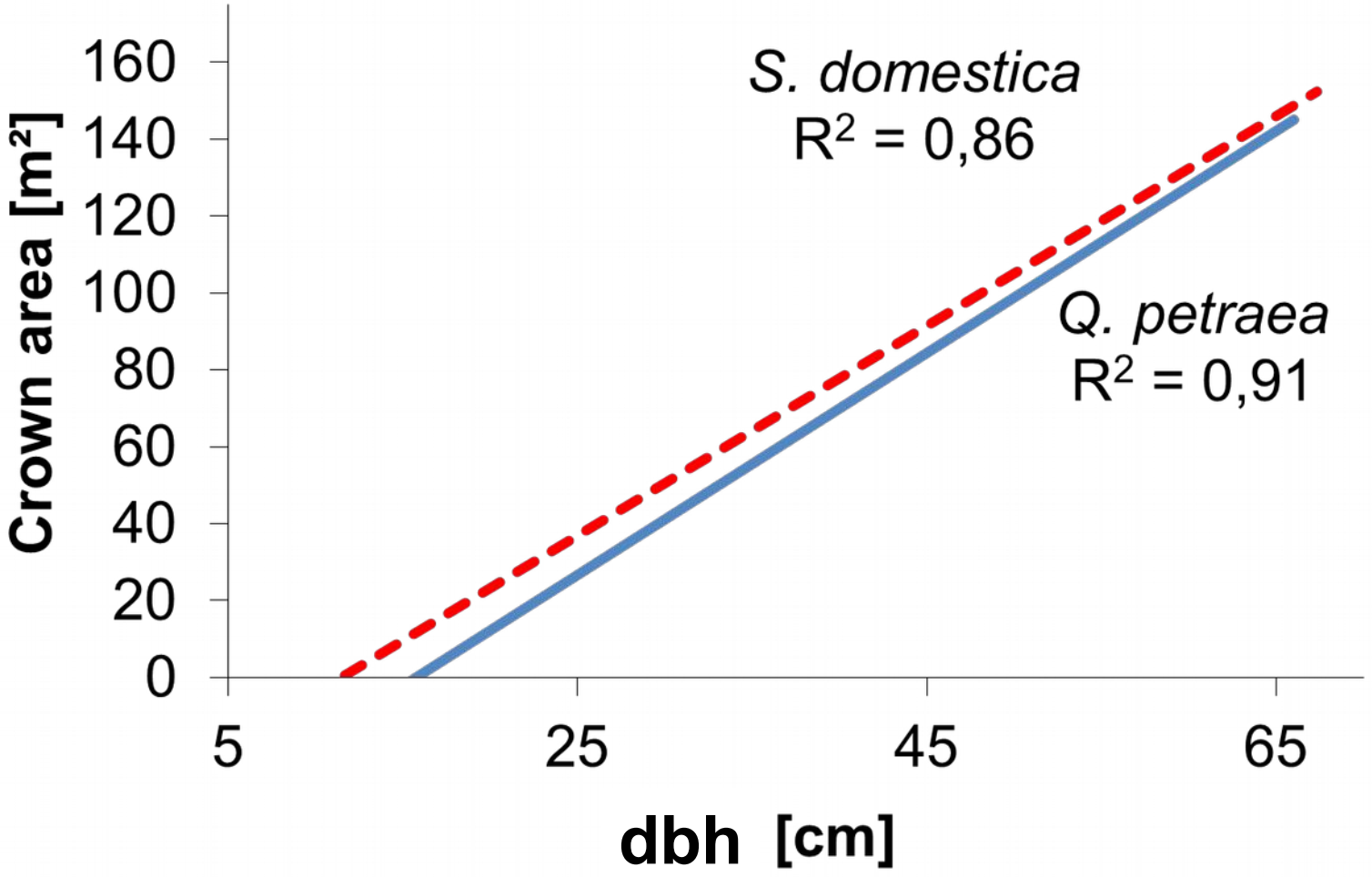
Results



Oaks

Sorbus domestica

Results


Crown area [m²]
160
140
120
100
80
60
40
20
0
5
25
45
65
dbh [cm]
S. domestica
R² = 0,86
Q. petraea
R² = 0,91

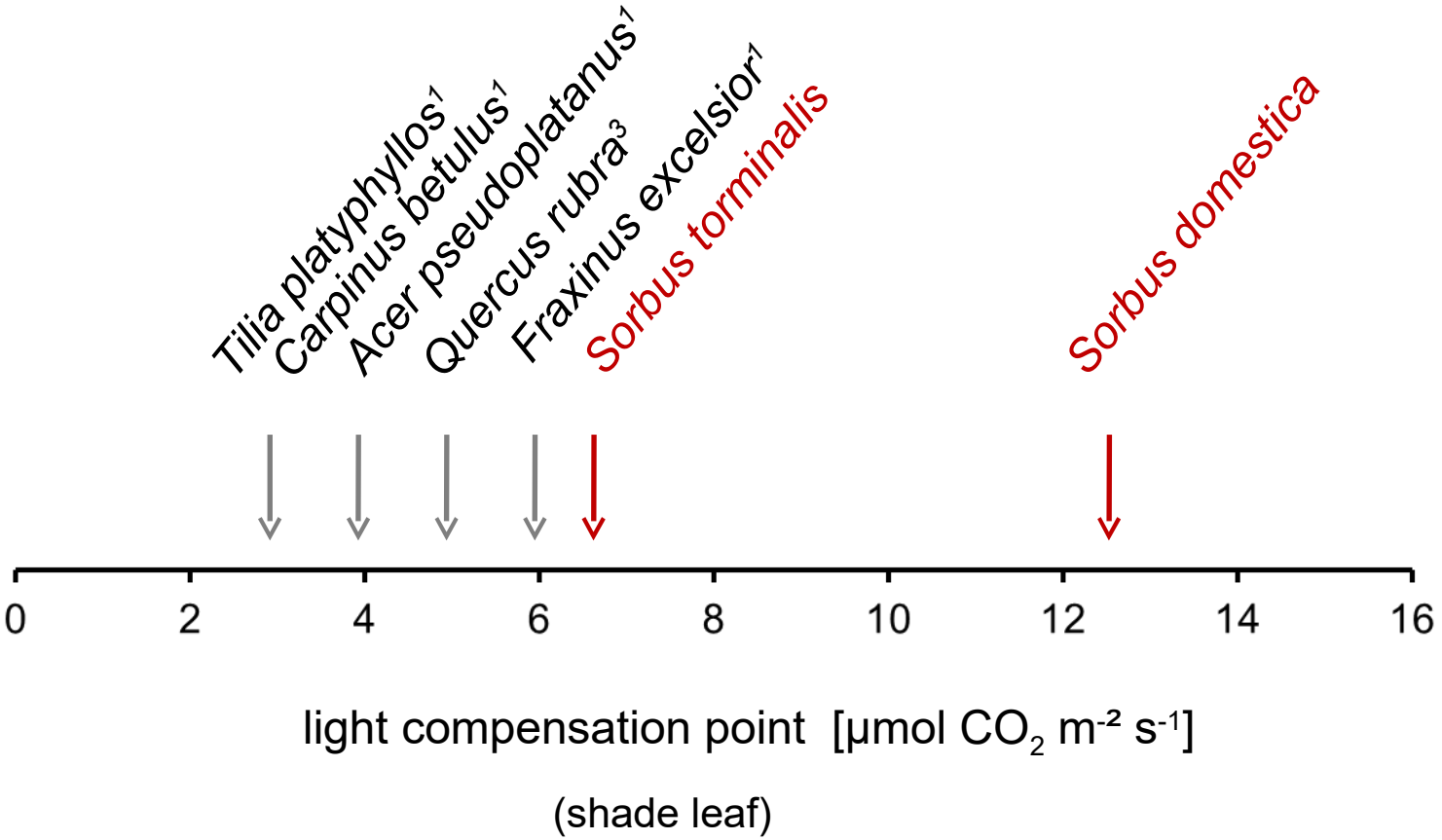
Results

dominant ⟶ dead

N	1 [%]	2 [%]	3 [%]	4a [%]	4b [%]	5a [%]	5b [%]
66	6	33	18	18	21	2	2

= more than 60 % +/- outcompeted

Results



[1]HÖLSCHER (2004)
[2]BAZZAS & CARLSON (1982)
[3]KAZDA *et al.* (1998)

Conclusions

- Dendrochronological data support the hypothesis that coppicing promotes the establishment of new *S. domestica* cohorts. Regeneration of *S. domestica* is depending on coppicing or comparable silvicultural measures.
- Growth patterns and photosynthesis measurements suggest that *S. domestica* is a light demanding species. In a continuous cover forest system the *S. domestica* population is unable to persist
- We conclude that (in absence of single tree specific measures) the abandonment of coppicing threatens the status of *S. domestica.*

Sorbus torminalis

Background:

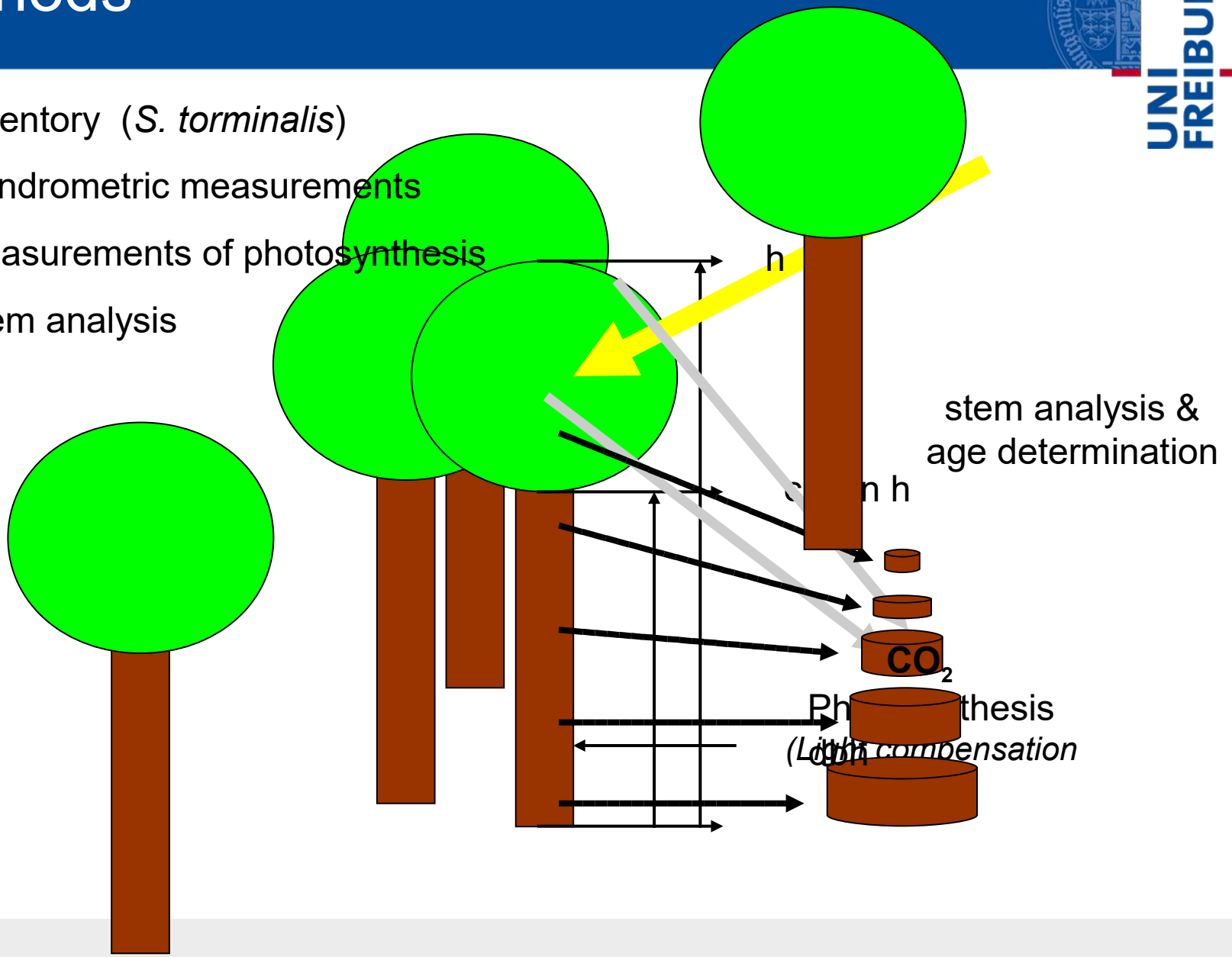
- Rare but valuable
- *S. torminalis* is threatened or rare because of:
  - low competitive strength & high light demand
  - low ability to regenerate generatively
  - insufficient silvicultural promotion
  - **conversion of coppice forests**

Research questions:

1. Is there a correlation between coppicing and the abundance of *S. torminalis*?
2. Will the conversion or abandonment of coppicing lead to the loss of *S. torminalis*?

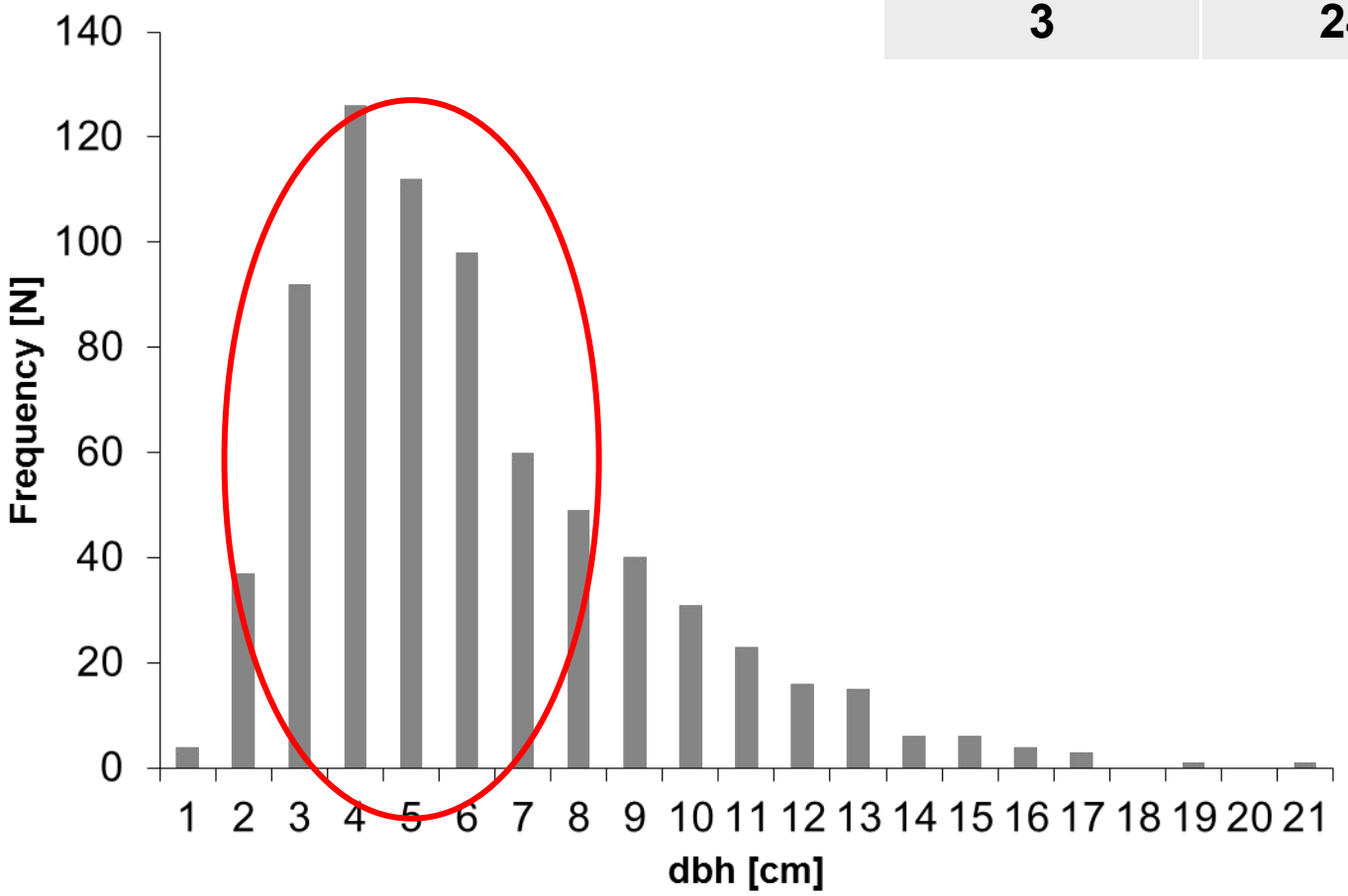
Methods

1. Inventory (*S. torminalis*)
2. Dendrometric measurements
3. Measurements of photosynthesis
4. Stem analysis



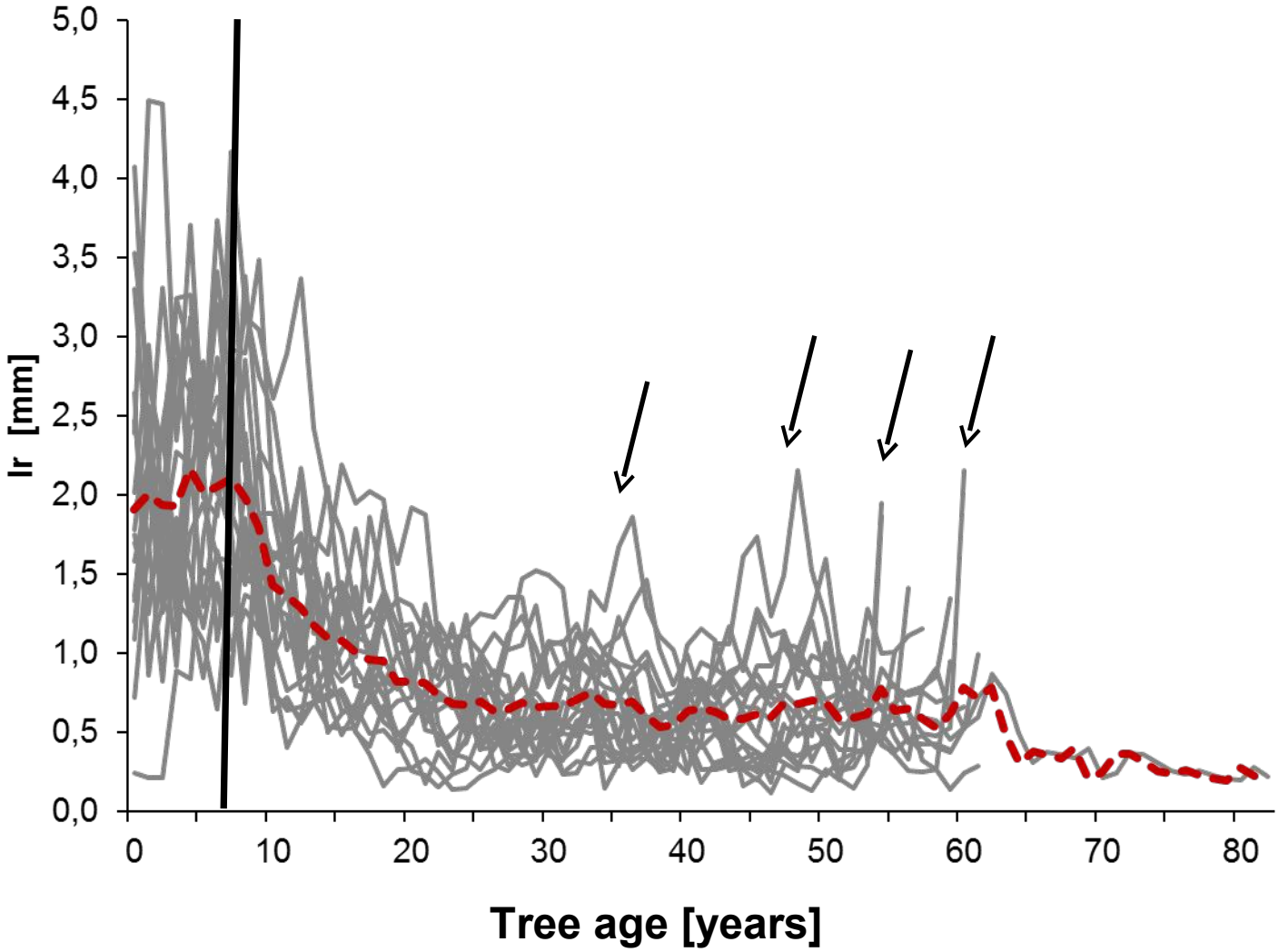
Results

Area [ha]	N/ha
3	241

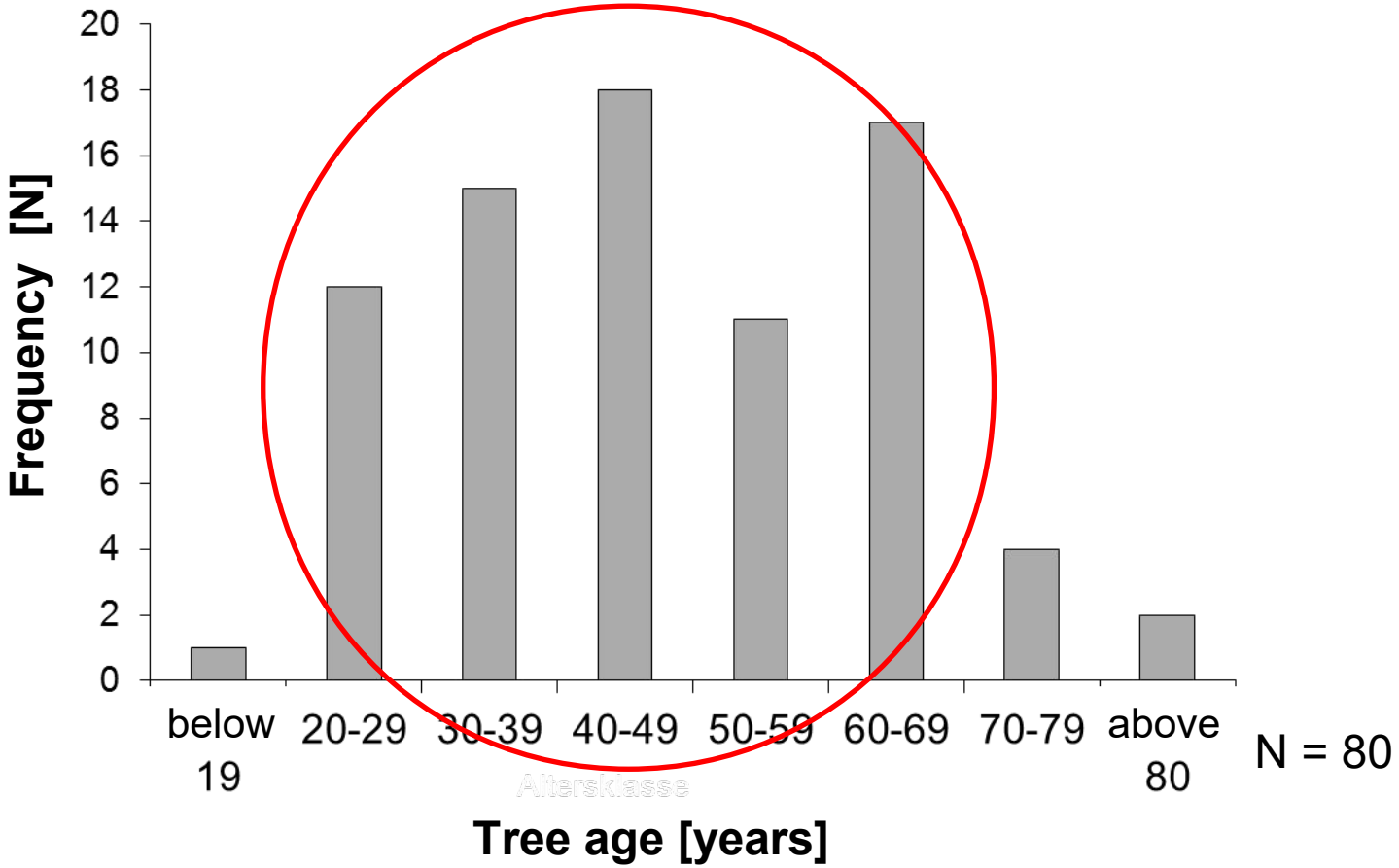


N = 724

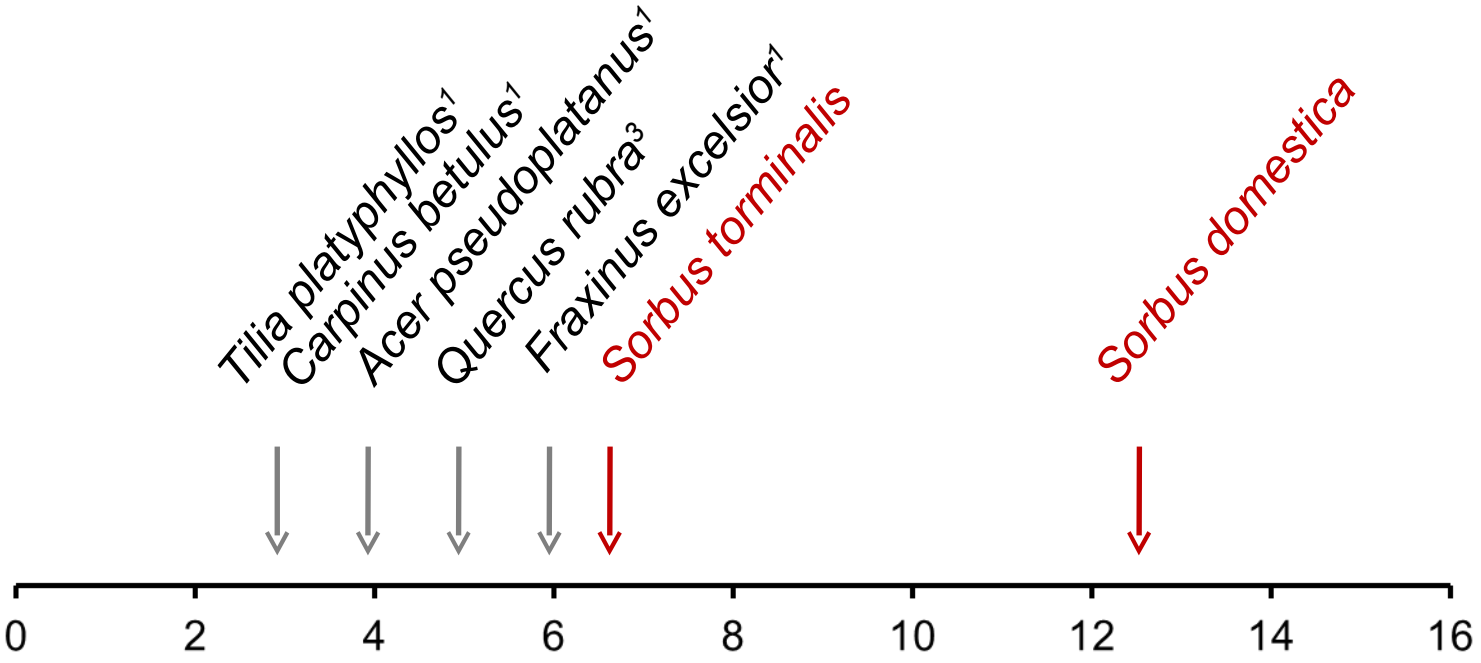
Results


5,0
4,5
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
Ir [mm]
0
10
20
30
40
50
60
70
80
Tree age [years]
N = 20

Results


Frequency [N]
20
18
16
14
12
10
8
6
4
2
0
below 19
20-29
30-39
40-49
50-59
60-69
70-79
above 80
Altersklasse
Tree age [years]
N = 80

Results



[1]HÖLSCHER (2004)
[2]BAZZAS & CARLSON (1982)
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Conclusions

- There is a correlation between coppicing and the abundance of *Sorbus torminalis*
- Regeneration is not depending on coppicing
- Shade tolerance of *S. torminalis* enables the lasting persistence of the species in aged coppice forests

Thank you for listening!

This presentation was supported by:

Wissenschaftliche Gesellschaft Freiburg im Breisgau

gefördert durch

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