

Effects of grazing and cutting on the establishment of pioneer trees in the “Oranienbaumer Heide”

M. Sc. Anne Hopf, Kassel University

Supervisors: Prof. Dr. G. Rosenthal & Prof. Dr. S. Tischew (HS Anhalt)

The history of the „Oranienbaumer Heide“

Until 1992 military use -> large bare soil and sandy heathland biotopes



Importance of the area for nature conservation

- More than 800 plant species
- Characteristic bird species of (semi-)open habitats
- Species rich insect fauna

Grey hair-grass



Moonwort



Nightjar

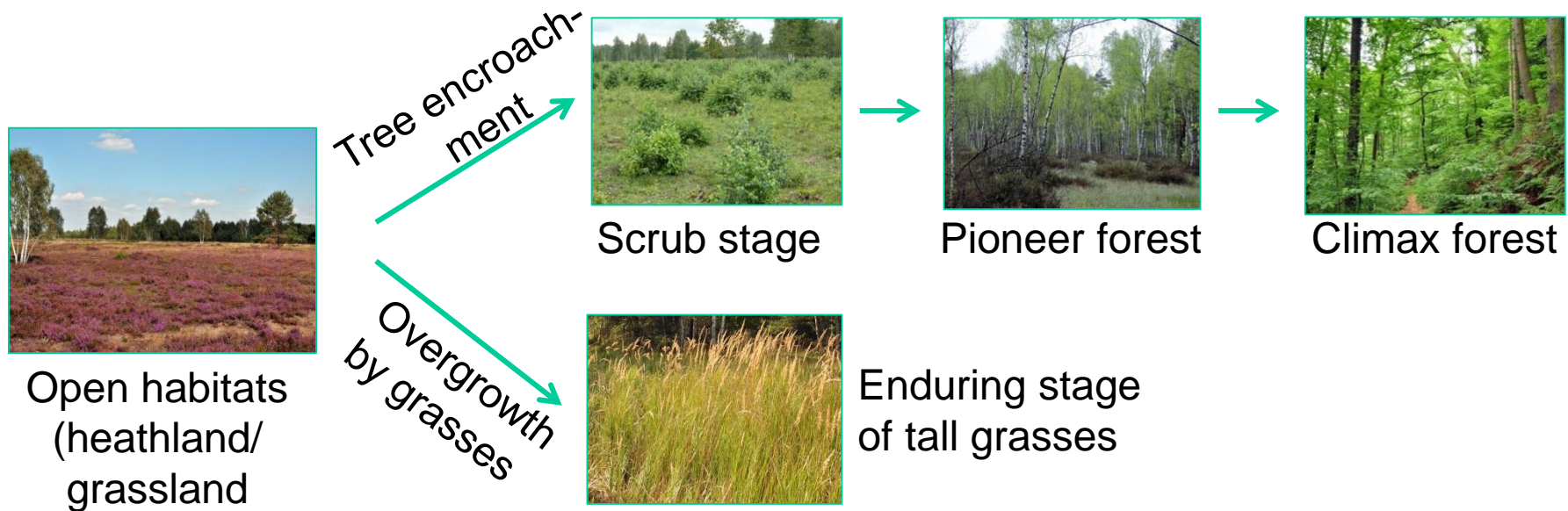


Red-backed shrike



Natural succession as a threat to open habitats

- Overgrowth by trees or tall grasses in the course of natural succession



Solution: low intensity year-round grazing by large herbivores?



Konik horses

and

Heck cattle

Were introduced in the „Oranienbaumer Heide“
in 2008 on pasture of 800 ha

Pioneer trees in open habitats

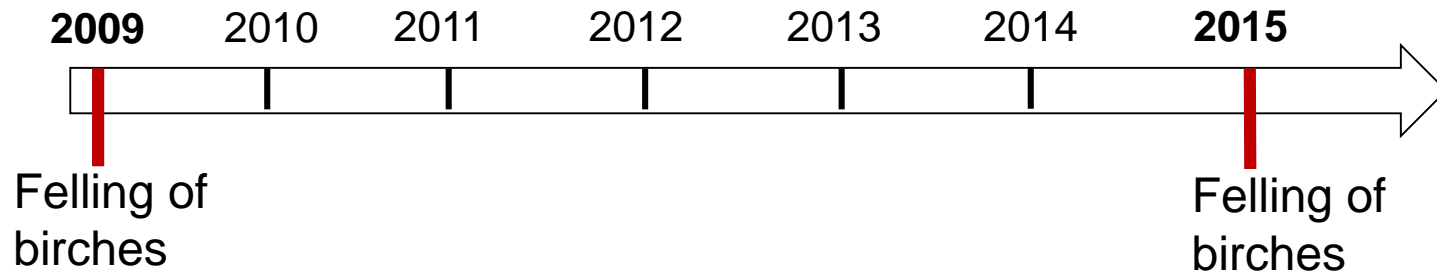
- Lack of information about effects of grazing by horses and cattle on tree encroachment in the Oranienbaumer Heide
- > Focus on pioneer tree species: *Betula pendula*, *Pinus sylvestris* und *Populus tremula*



Young pines (left) and birches (right) are colonising the open areas

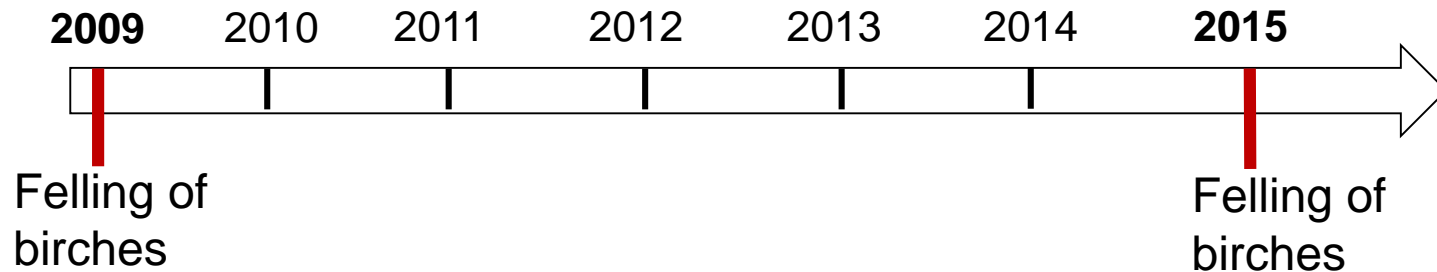
Tree removal measures in the „Oranienbaumer Heide“

- Initial felling of trees in different parts of the pasture



Tree removal measures in the „Oranienbaumer Heide“

- Initial felling of trees in different parts of the pasture



- Cutting back resprouting birches



Using brush cutters



Mulching

Main research question

- What is the effect of grazing and tree cutting on the establishment of pioneer trees in the “Oranienbaumer Heide”?

Main research question and hypotheses

- What is the effect of grazing and tree cutting on the establishment of pioneer trees in the “Oranienbaumer Heide”?
- > The effects of grazing differ per habitat type.
- > Saplings within the pasture are more strongly browsed than saplings in fenced-off parts which are impenetrable for horses and cattle.

Main research question and hypotheses

- What is the effect of grazing and tree cutting on the establishment of pioneer trees in the “Oranienbaumer Heide”?
- > The effects of grazing differ per habitat type.
- > Saplings within the pasture are more strongly browsed than saplings in fenced-off parts which are impenetrable for horses and cattle.
- > Cutting back birch stump shoots regularly reduces their regeneration potential.
- > Mulching of birch stump shoots is more effective than using brush cutters.

Investigated habitat types

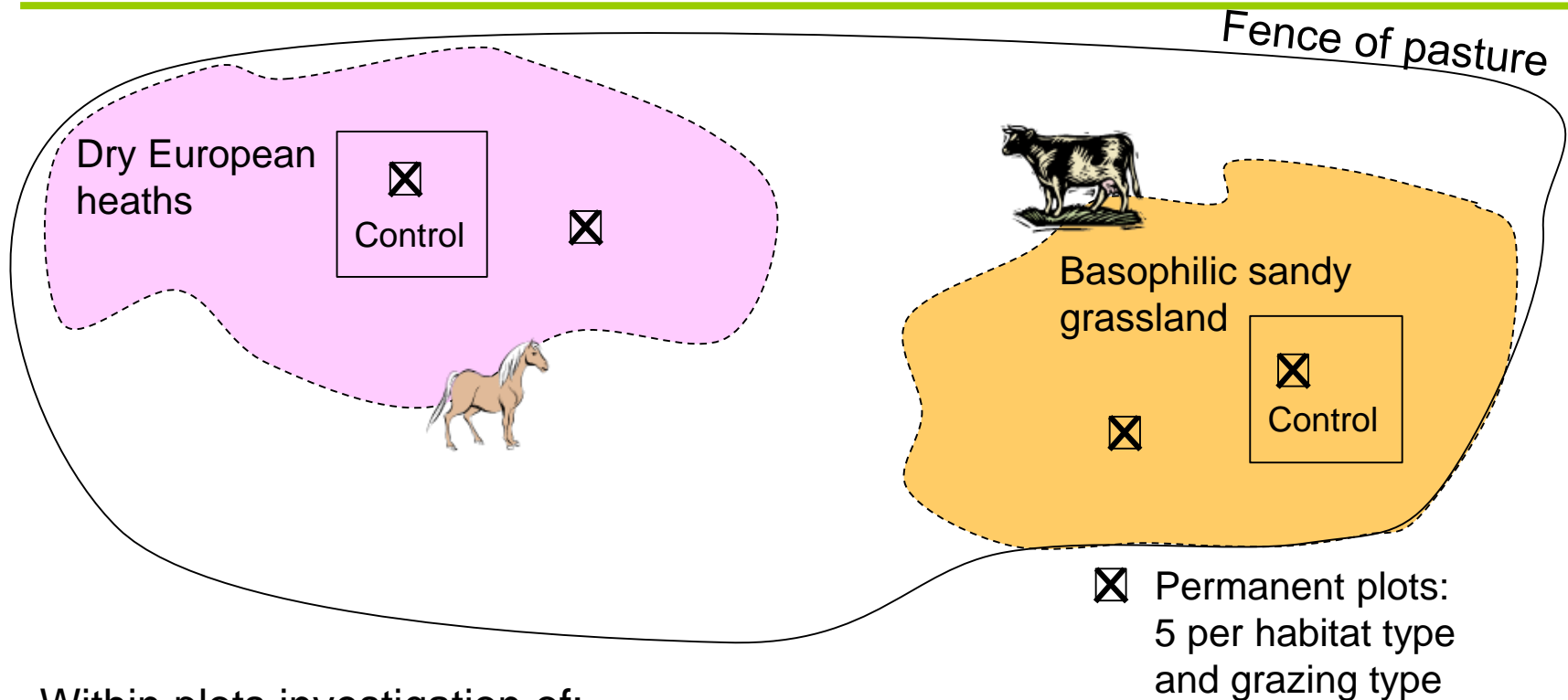


Dry European heaths (HT 4030)

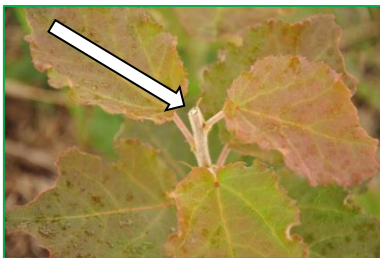


Basophilic sandy grasslands (HT 6120)

Assessing browsing and growth in „permanent plots“



Within plots investigation of:



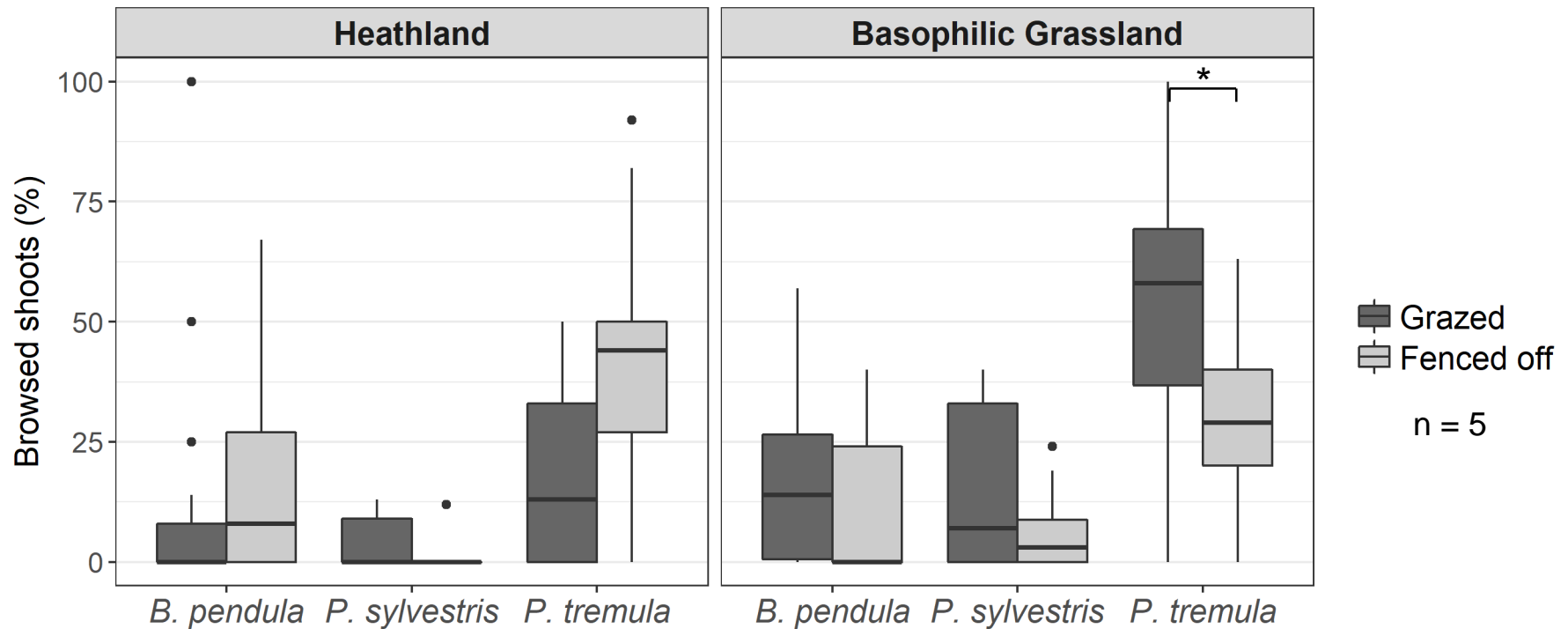
Browsing damage (winter/summer)



Growth parameters

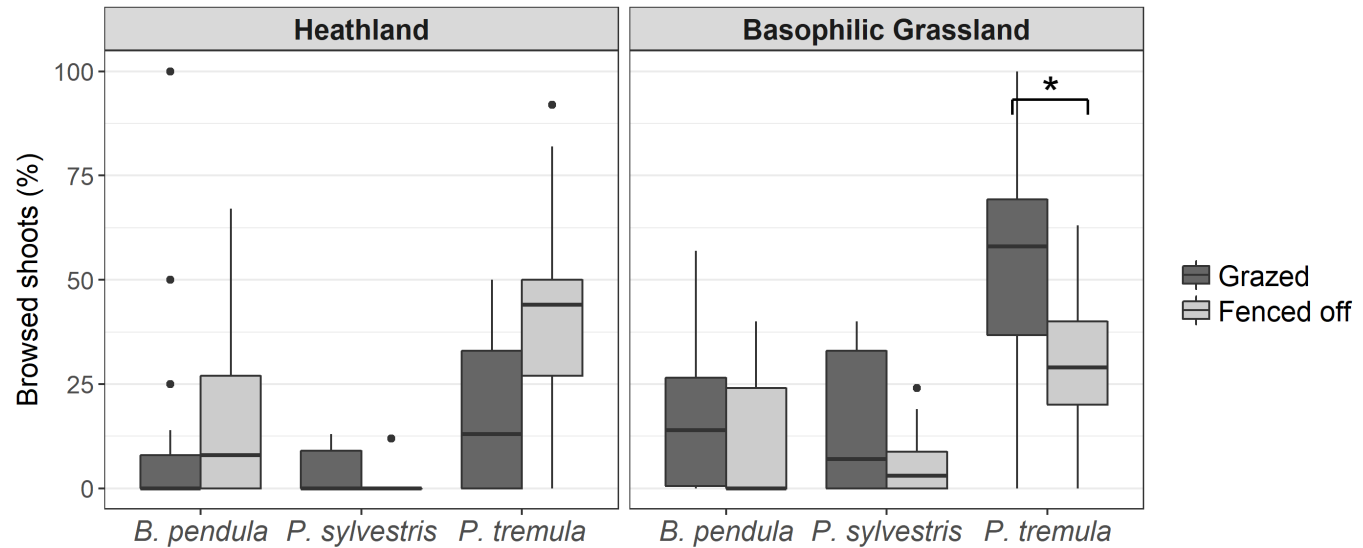
Comparison of browsing in grazed and control plots

Summer 2014

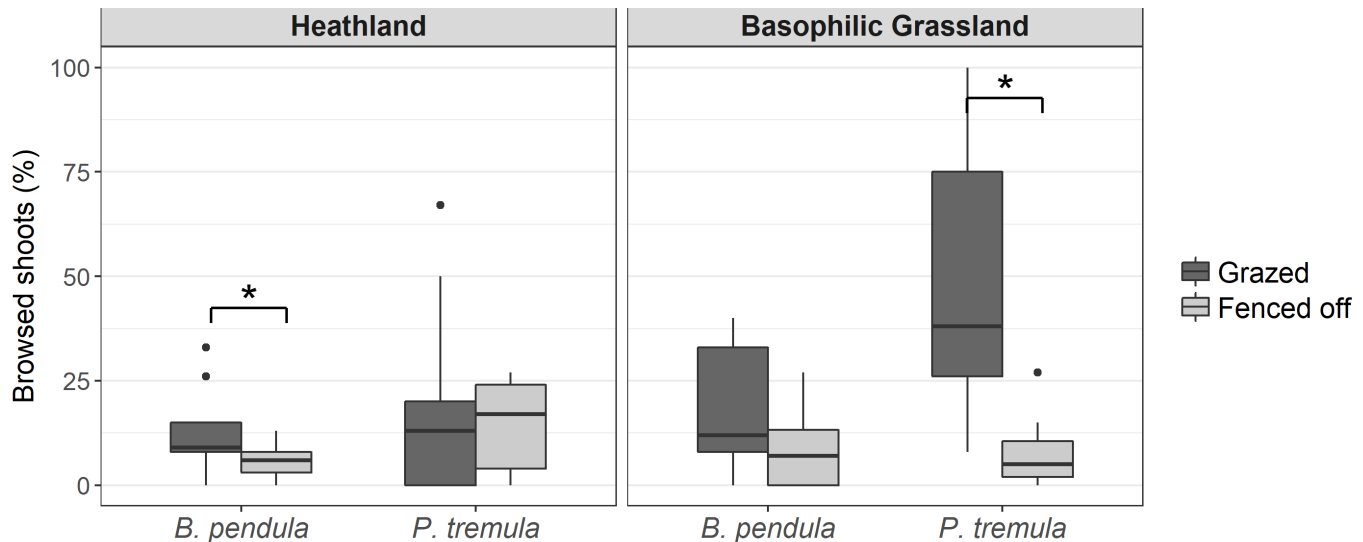


Browsing effect changes over the years

Summer
2014



Summer
2016



Increment of birch and aspen within two years

	<i>B. pendula</i>		<i>P. tremula</i>	
	Grazed	Fenced off	Grazed	Fenced off
Heathland	26 \pm 6*	38 \pm 10	1 \pm 5	1 \pm 9
Basophilic Grassland	17 \pm 10	16 \pm 9	0 \pm 5	8 \pm 3

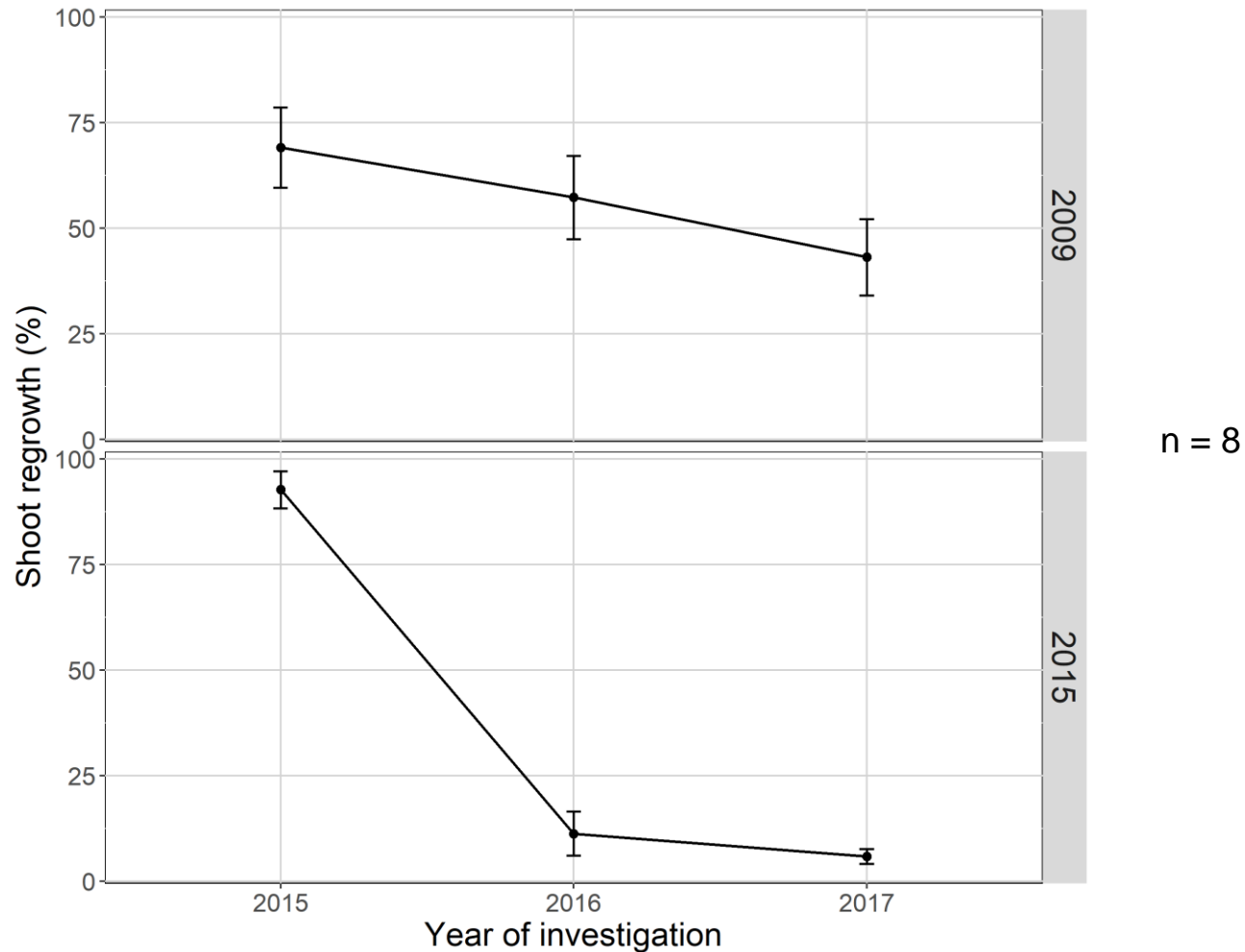
* Mean height increment from 2014 to 2016 in cm \pm standard error

Methods for investigation of shoot regrowth

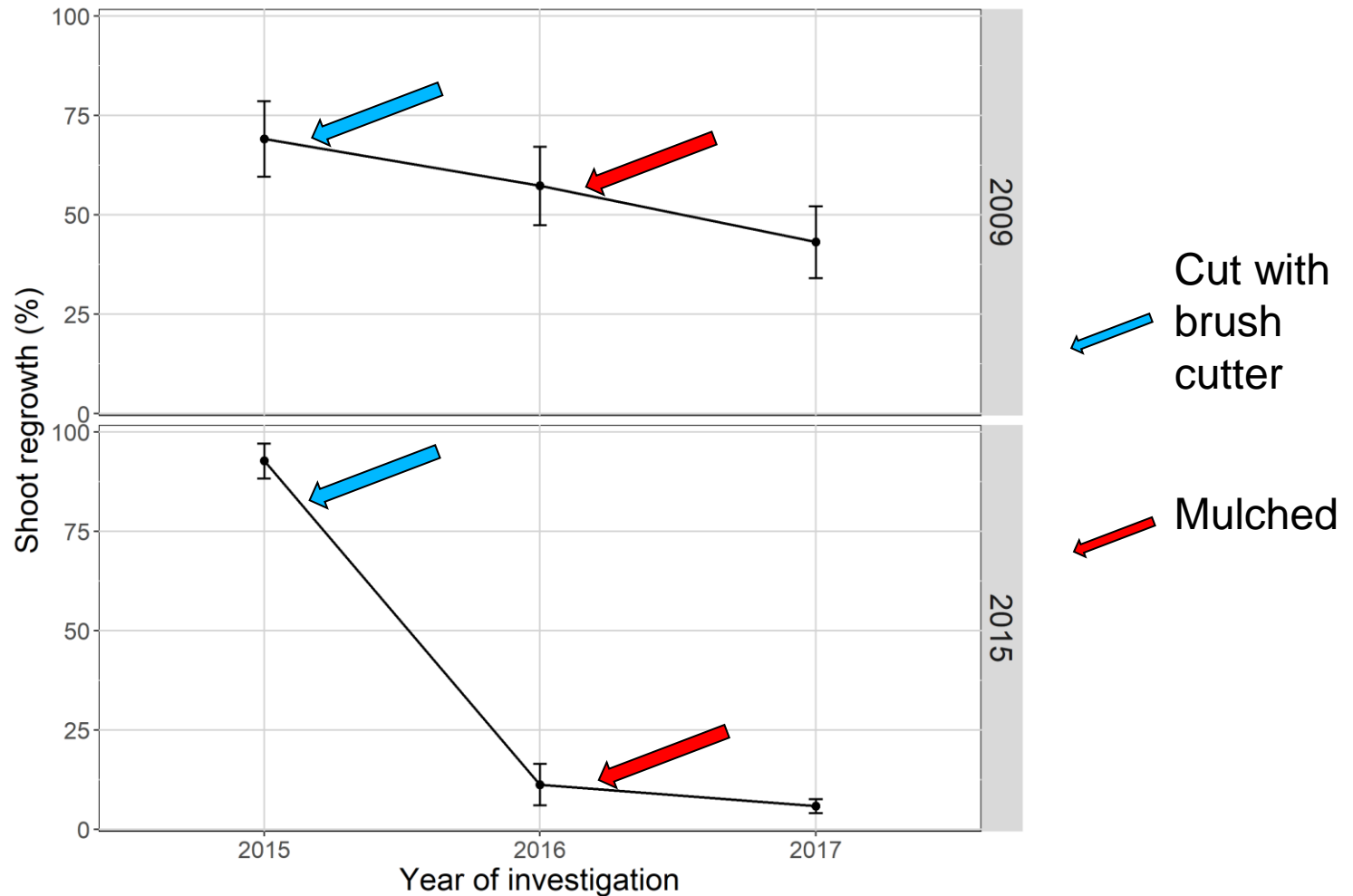
- Marking and measurement of birch stumps on 10x10m plots
- Recording stump shoot regrowth in 2015, 2016 and 2017
- Removal of stump shoots:
 - 2015: using brush cutters
 - 2016: mulching



Effects of frequency and timing of cutting measures



Effect of cutting method: brush cutting vs. mulching



Conclusions from investigations & (field) observations

	Browsing	Felling	Cutting/ Mulching	Drought
Birch <i>(B. pendula)</i>	± 0	± 0	-	--
Pine <i>(P. sylvestris)</i>	± 0	--	--	-
Aspen <i>(P. tremula)</i>	-	-	+	-

± 0 : almost no effect

- : slightly negative effect

-- : strongly negative effect

+ : slightly positive effect

Recommendations for management of pioneer trees

- > Mechanical removal of trees appears inevitable
- > Birch stumps shoots should be removed in first summer after felling
- > Shoot removal should (if possible) be implemented during vegetation period

Thanks to



For financial support

and the research group of
Prof. Rosenthal & Prof. Tischew
for scientific support

Investigated habitat types



Dry European heaths (HT 4030)

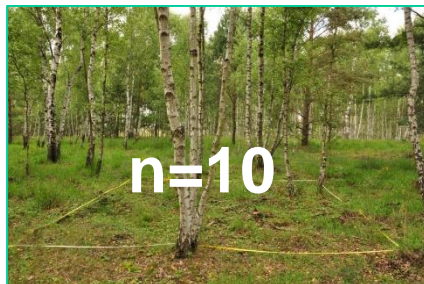
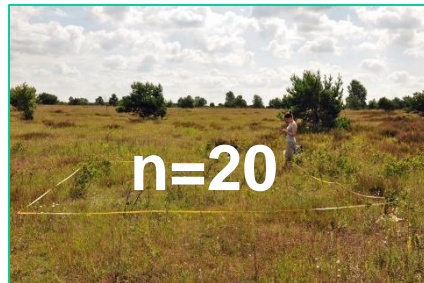


Xeric sand calcareous grasslands (HT 6120)

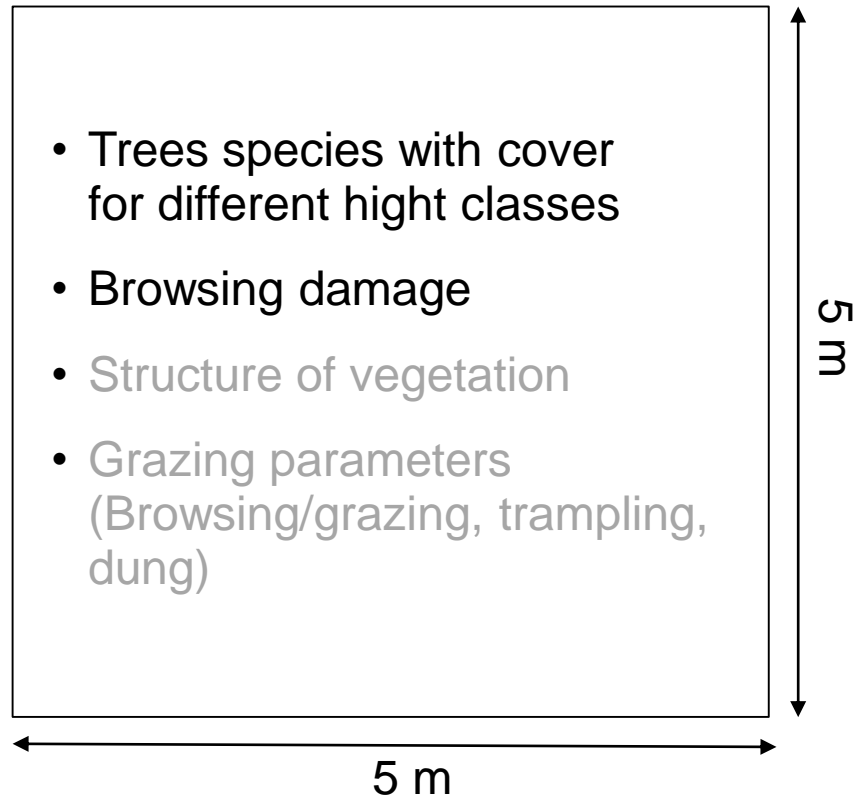


(Birch) Pioneer forests

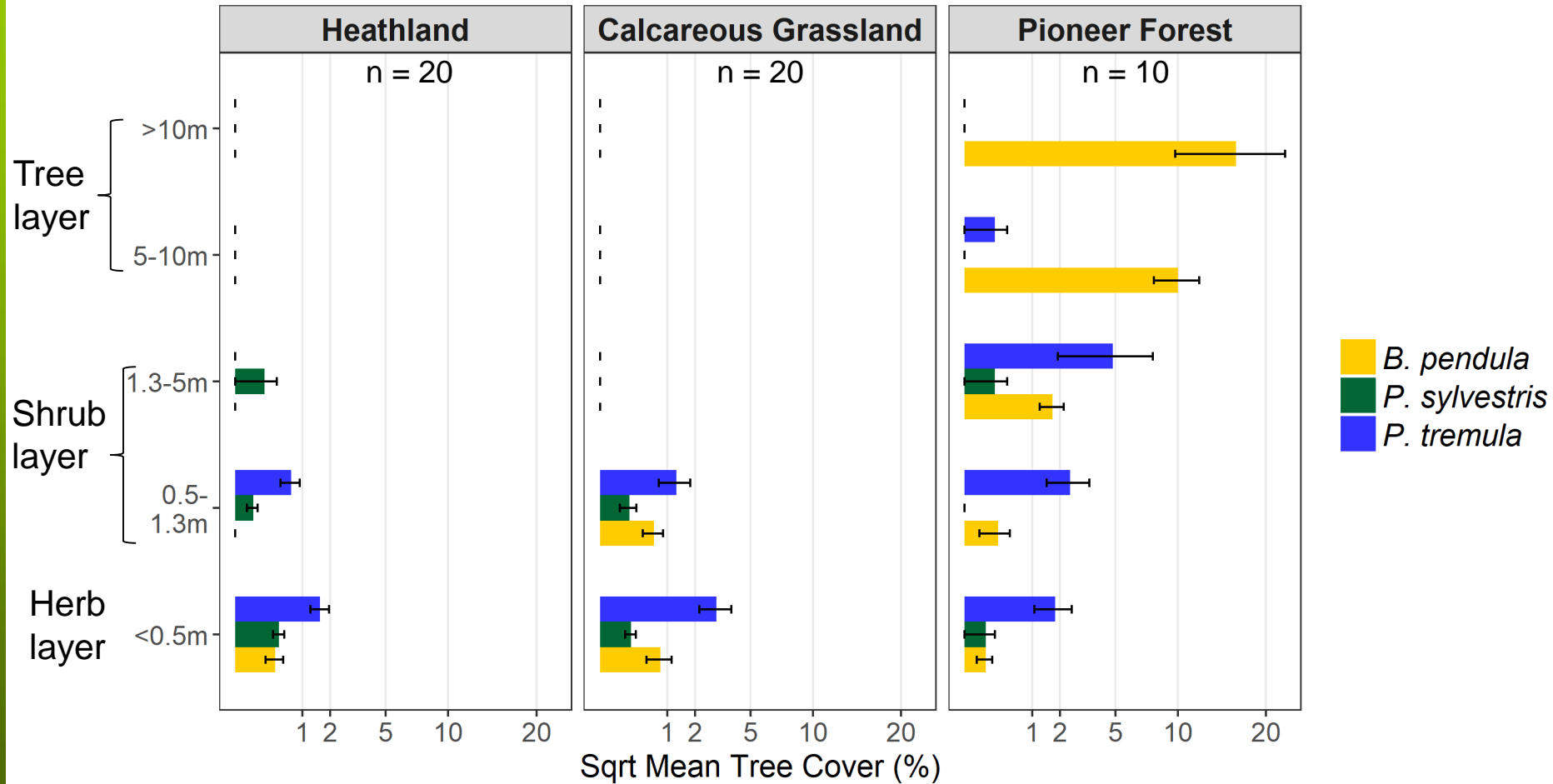
Choice and establishment of „overview plots“



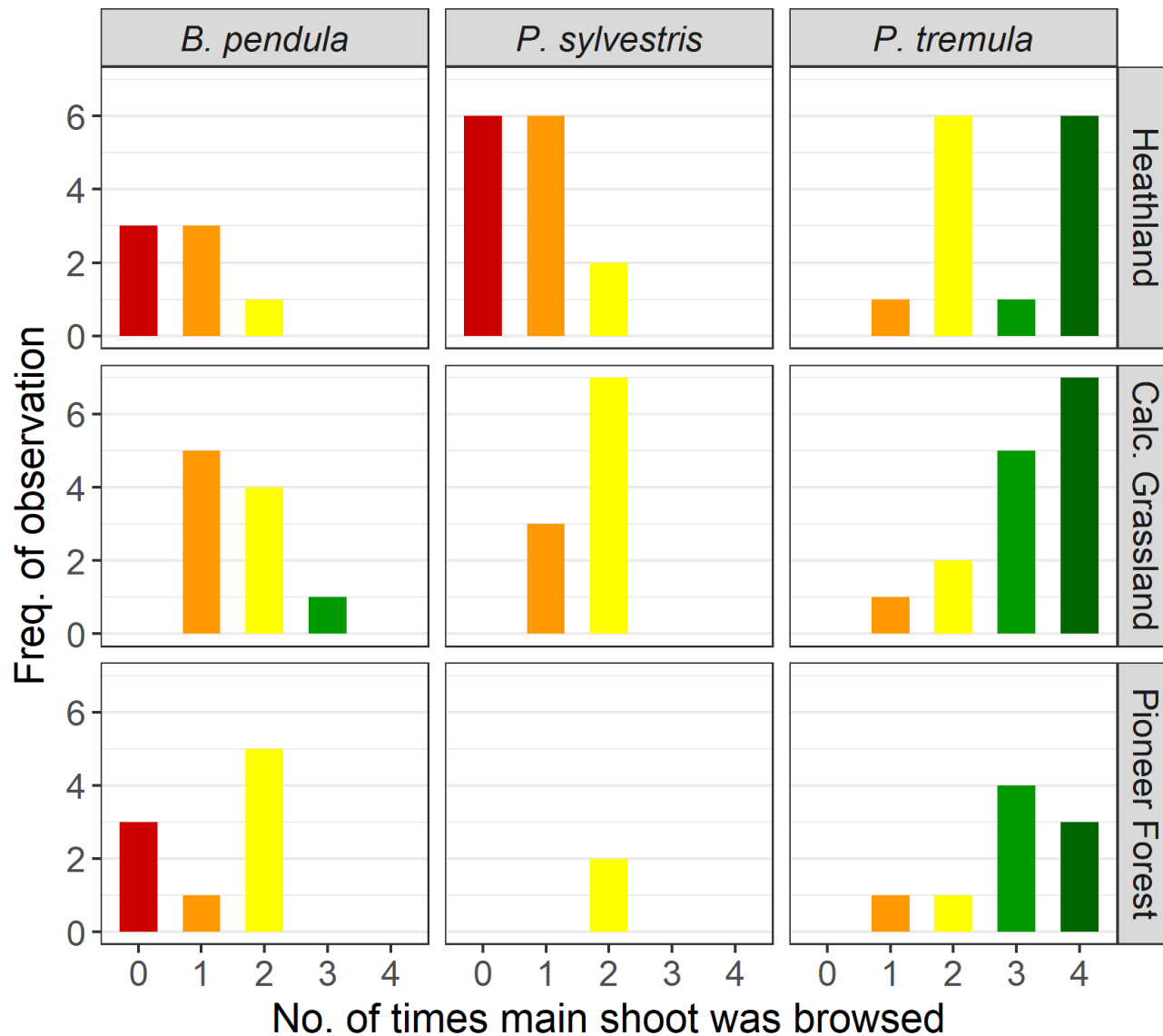
Example of an overview plot



Tree cover in the investigated habitat types



Habitat type specific analysis of the browsing



Sowing Experiment: Design

6 blocks per open habitat type



One block consists of three treatments

Fence of pasture

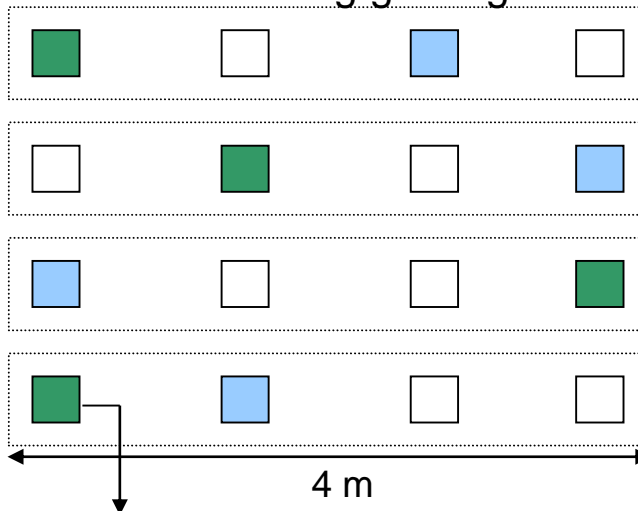
Control:
Fallow
land

Regular
grazing

Strong
grazing






Treatment: Strong grazing



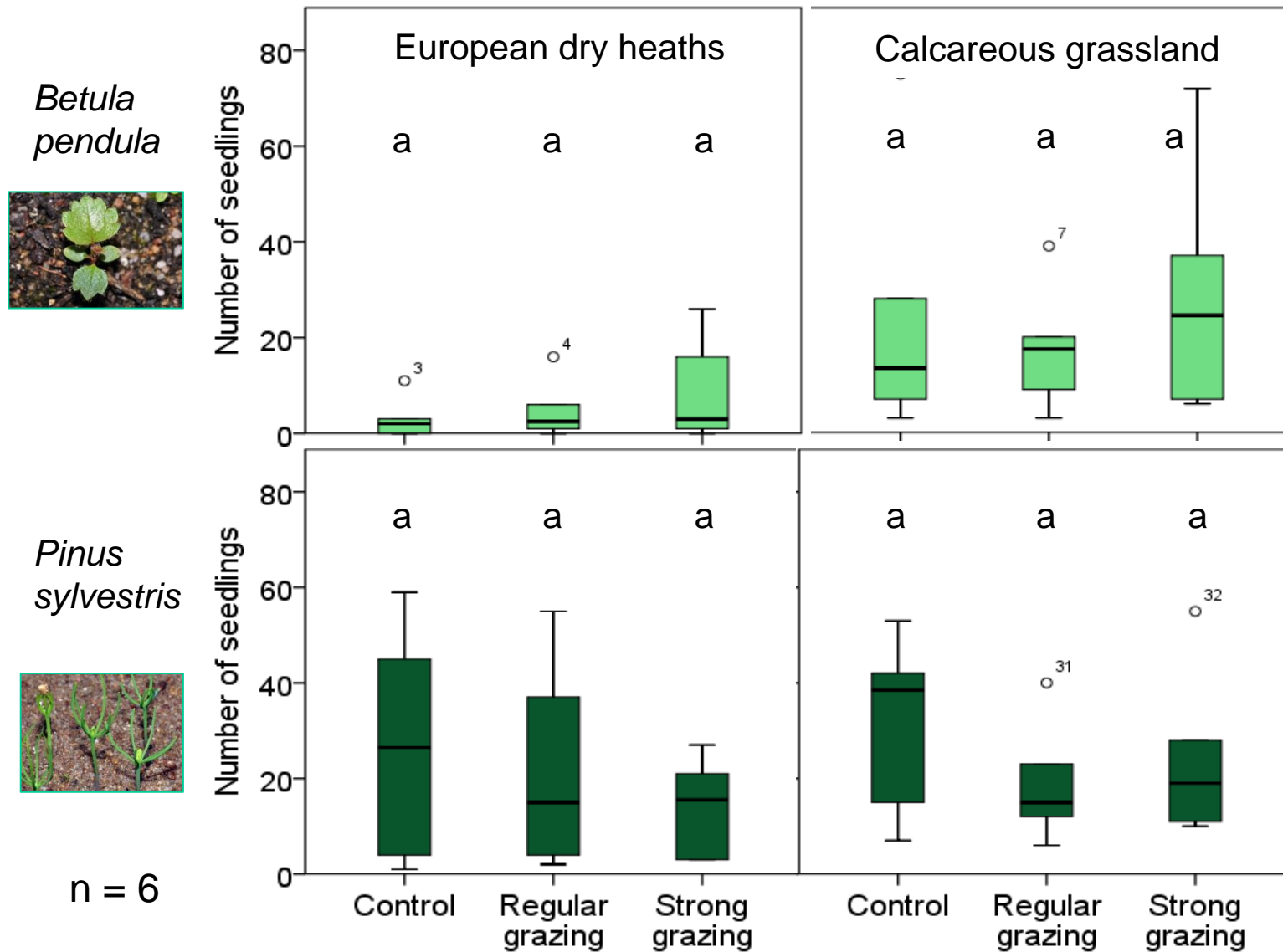
50 cm * 50 cm subplots for sowing



Simulated trampling
and grazing

-  *Pinus sylvestris*
-  *Betula pendula*
-  0-subplots without sowing

Sowing Experiment: Results – Germination



Sowing Experiment: Results – Survival *P. sylvestris*

