Effect of stand structure on bryophyte diversity in Hungarian mixed forests

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General aims

Potential explanatory variables:

Forest stand
Landscape
History

??? →

Organism groups:
(diversity, composition)

Herbs
Seedlings
Bryophytes
Lichens
Fungi
Saproxylic beetles
Spiders
Birds

Dependent variables: species richness and composition of bryophytes

Forest floor assemblages (subtrates: soil, logs)

Epiphytic assemblages

Plot level explanatory variables

- Tree species composition: diversity, proportion of tree species
- Stand structure: size distribution of trees, shrub layer, veteran trees, deadwood
- Light conditions: relative light (mean, heterogeneity)
- Proportion of substrates: open soil, litter, deadwood
- Soil and litter properties: pH, acidity, N,P,K
- Microclimate: humidity, temperature
- Landscape variables: proportion and heterogeneity of landcover types
- Historical variables: site and landcover types from 1853

Tree level explanatory variables (epiphytes)

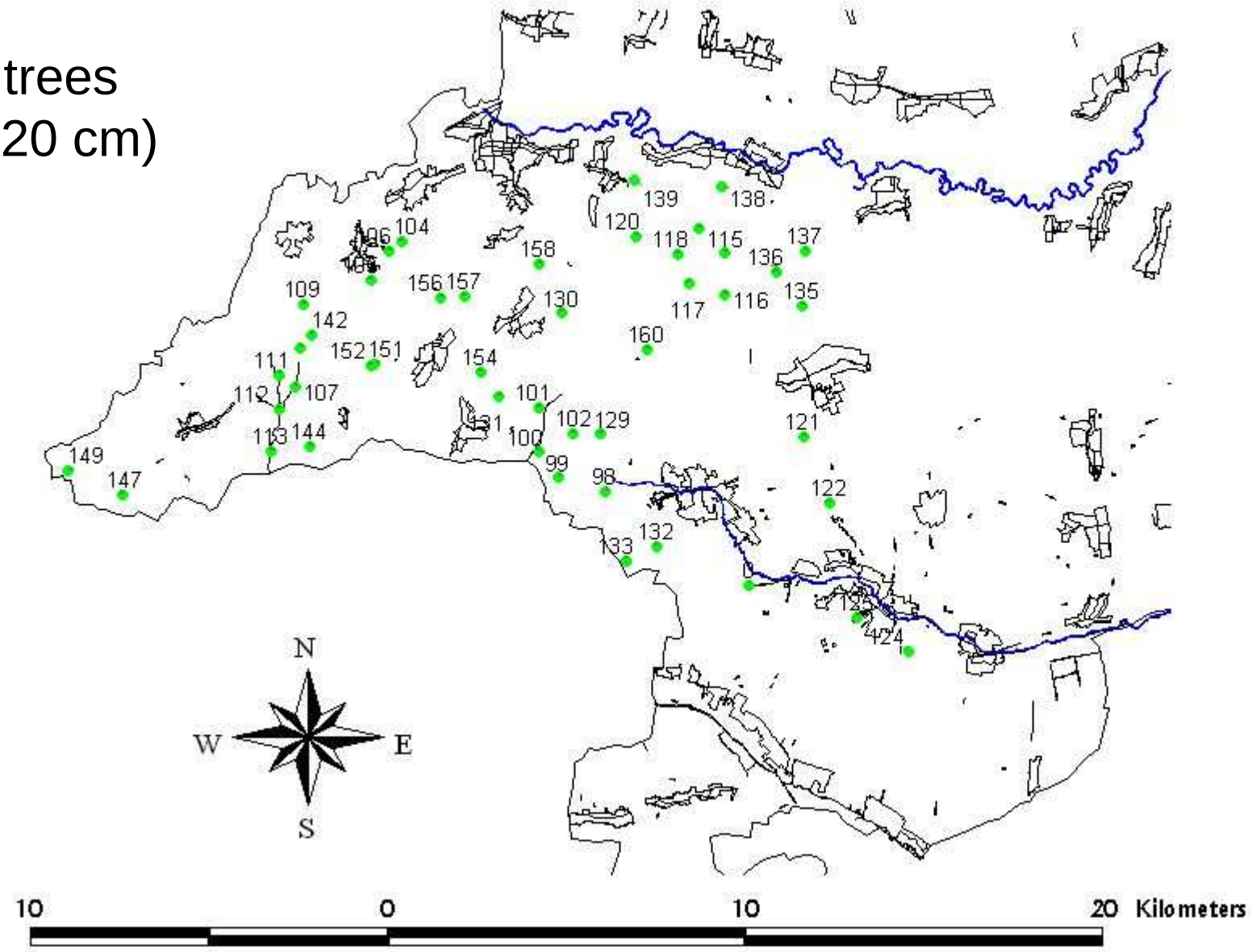
- Tree species
- DBH
- Light

Study area:

Őrség National Park

35 stands, 30 x 30 m plots

~1000 trees (DBH>20 cm)



Data analysis

Species richness	Regression models (General Linear Models)
Species composition	Direct ordination (Redundancy Analysis)

Species richness of ground-floor bryophytes

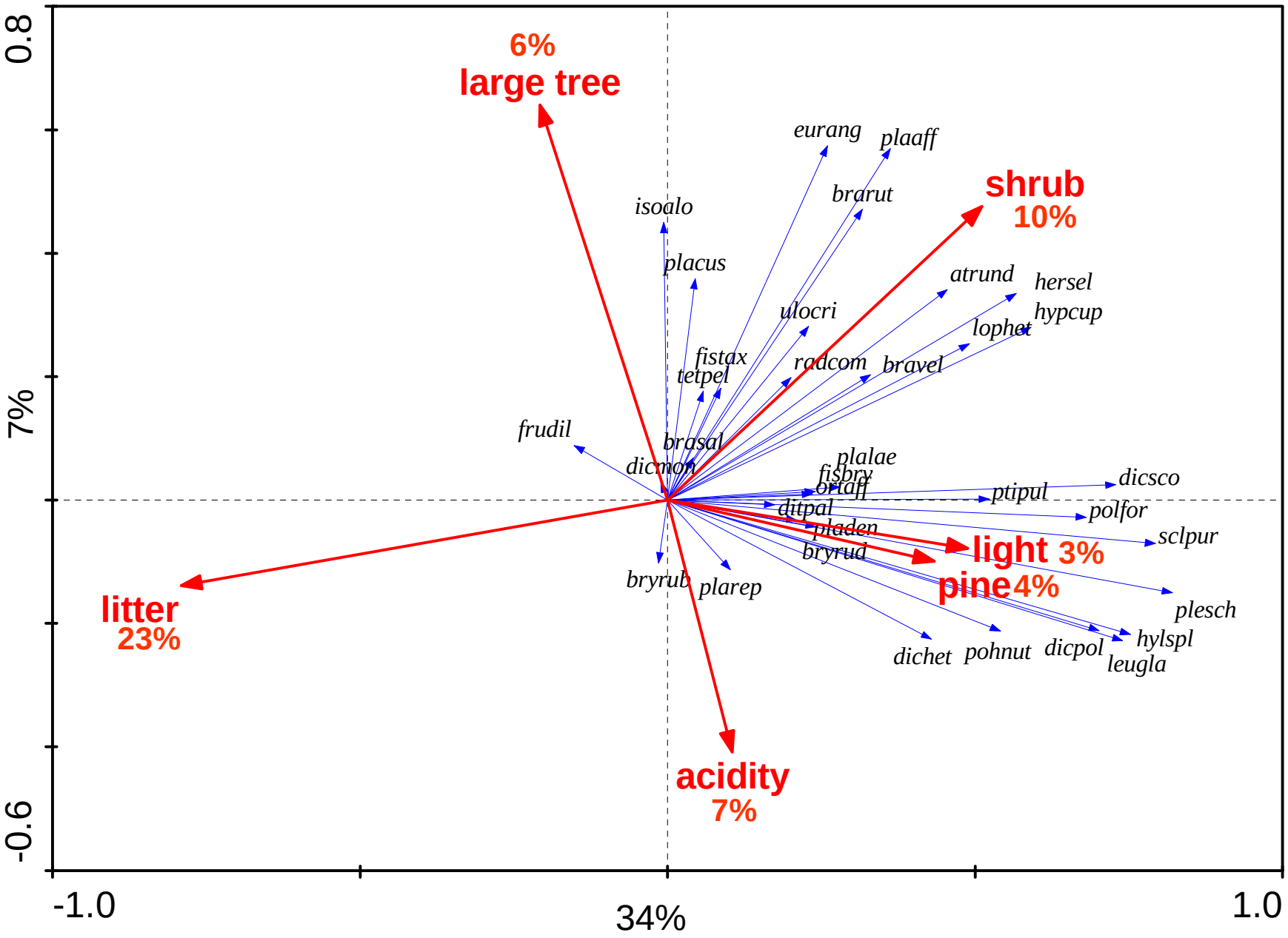
Species pool: 79

Plot level species richness: 19 (8-34)

Model

Variable	Sign	Var%
Litter cover	-	15.5
DBH heterogeneity	+	8.3
Density of medium trees (DBH 30-40 cm)	-	7.4
Tree species richness	+	4.0

Species composition of ground-floor bryophytes



Plot level species richness of epiphytic bryophytes

Species pool: 60

Plot level species richness: 14 (5-27)

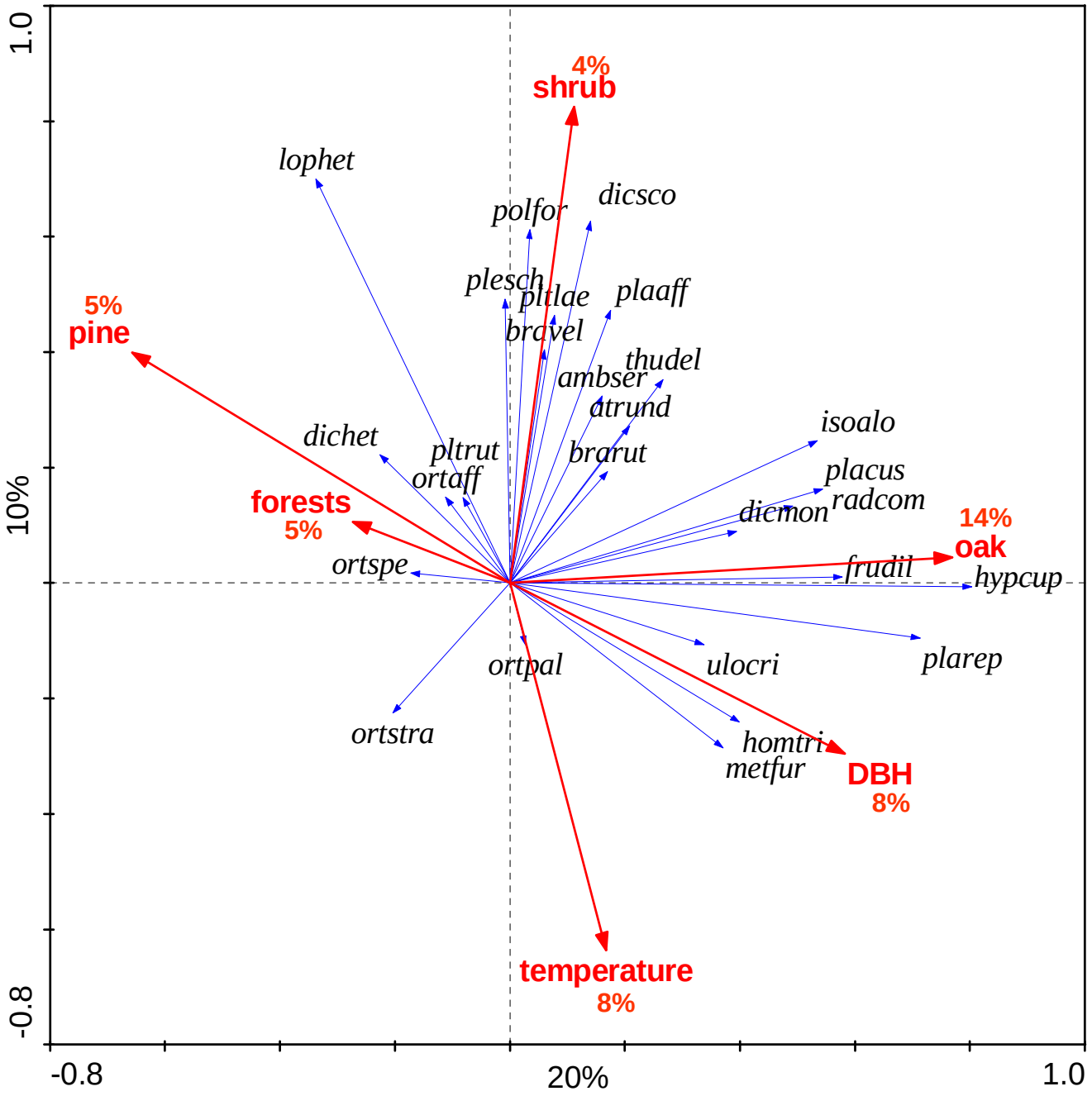
All species

Variable	Sign	Var%
Shrub density	+	23.4
Tree species diversity	+	18.3
Tree density	-	10.5
Veteran tree density	+	6.7

Specialist epiphytes

Variable	Sign	Var%
DBH	+	22.7
Pine	-	18.6
DBH:Pine	+	8.2

Plot level species composition of epiphytes

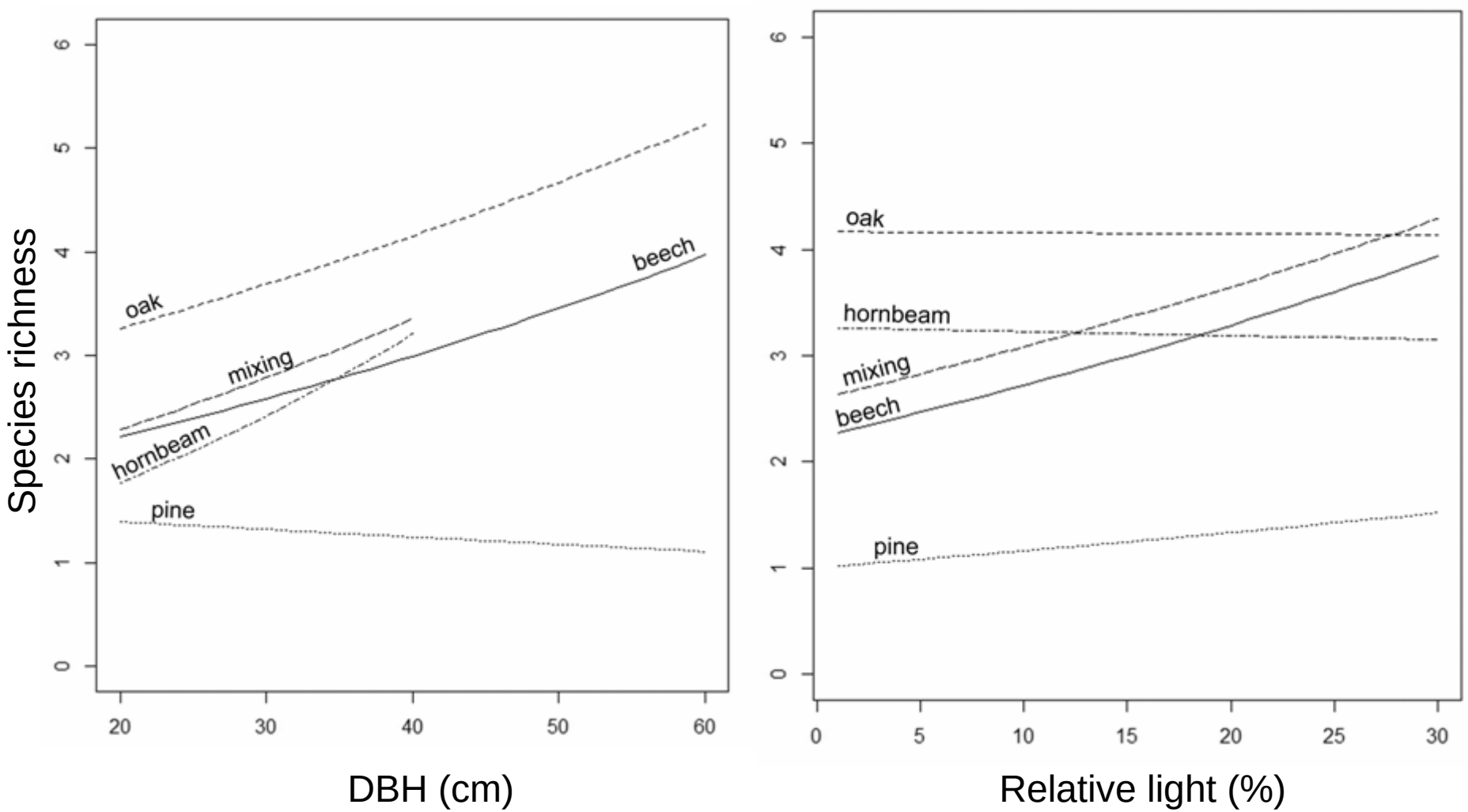


Tree level species richness of epiphytic bryophytes

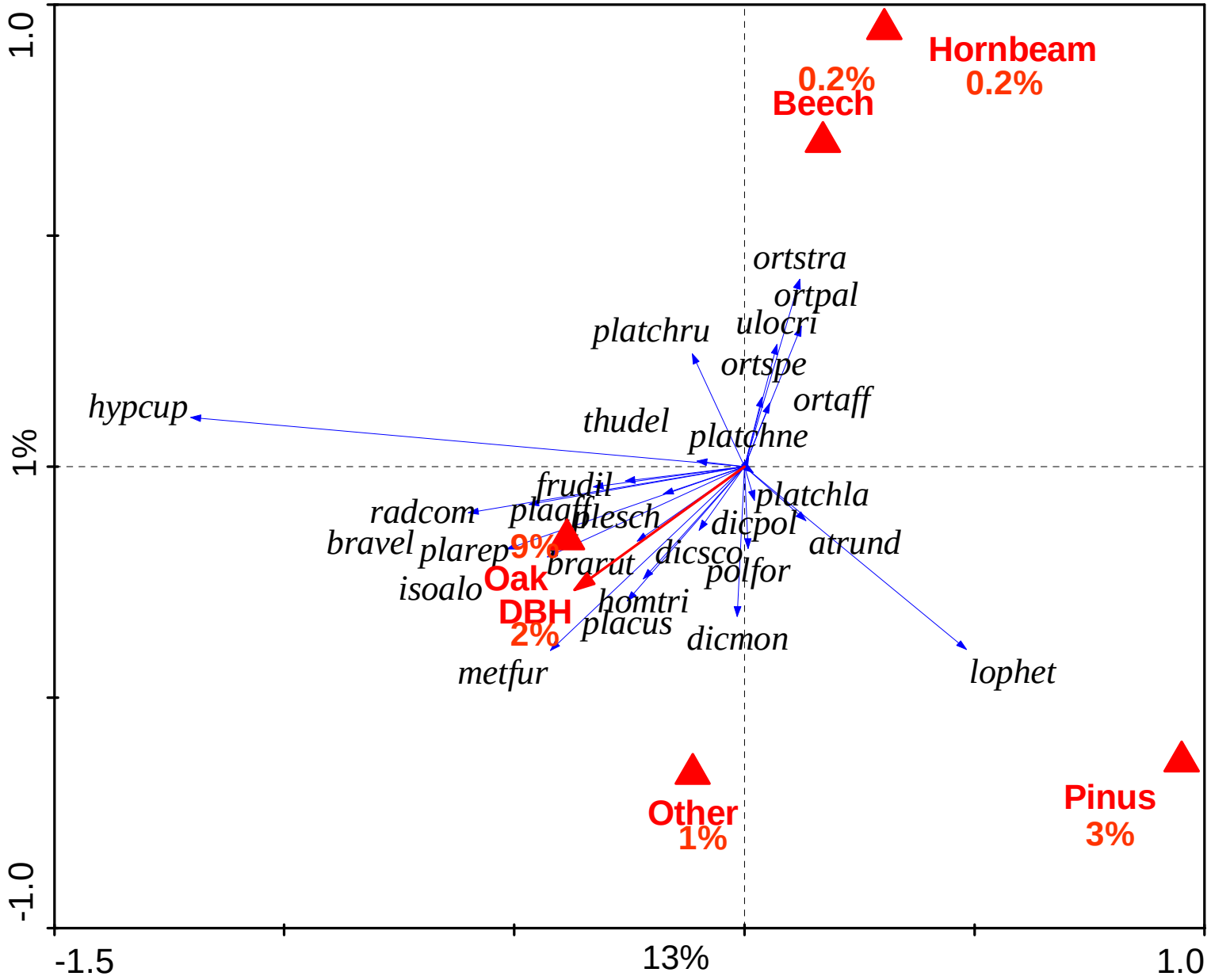
Tree level species richness: 3 (0-13)

Variable	Fixed effect%
Tree	81
DBH	6
Light	1
Tree:DBH	4
Tree:Light	3

Predicted tree level species richness of epiphytic bryophytes



Tree level species composition of epiphytes



Conclusions

Stand level factors more important than landscape and historical

Ground-floor bryophytes

Presence of potential substrates (soil, logs, litter negative effect)
Heterogenous structure, light conditions, shrub layer

Epiphytes

Tree species preference (oak high diversity)
Tree species diversity
Shrub layer ~ microclimate
Tree size (microhabitats, colonization time)

Considerations for management

Maintaining high tree species diversity, mixed stands based on natural regeneration

Small scaled disturbances (tree or group selection, continuos forest cover forestry), maintaining heterogenous structure and light

Presence of shrub layer

Conserving vetenary trees

Thank you for your attention!

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