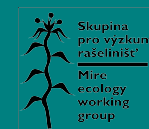




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# West Carpathian fen and bog vegetation at high altitudes

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# Study area

- Western Carpathians



all Mountains above  
1500 m a.s.l. (timberline)

Vysoké Tatry  
Západné Tatry  
Belianske Tatry  
Nízke Tatry  
Veľká Fatra  
Malá Fatra



# Main Aims

- Major types of the (sub)alpine fen and bog vegetation and their syntaxonomical interpretation
- Major gradients in vegetation composition and species richness
- Relative importance of micro site vs. larger scale valley characteristics





# Methods

- data set 224 phytosociological relevés (new original data, literature data)
- Cluster analysis (Ward's method, Euclidean distance)
- subset of 120 relevés (new original data with measured pH and conductivity)
- Indirect gradient analysis (DCA)
- Correlations
- Regression trees



# Results: Numerical classification

***Scheuchzerio-Caricetea fuscae*** R. Tx. 1937

**\**Calliervo sarmentosi-Eriophoretum angustifolii*** Hadač et Váňa 1967

- Dg: *Eriophorum angustifolium*, *Juncus filiformis*, *Carex panicea*, *Viola palustris*, *Calliargon sarmentosum*, *Carex echinata*, *Sphagnum subsecundum*, *Sphagnum teres*,



***Drepanocladetum exannulati*** Krajina 1933

- Dg: *Warnstorfia exannulata*

***Sphagnion cuspidati*** Krajina 1933

(*Sphagno cuspidati-Caricetum limosae* Osvald 1923, *Carici rostratae-Sphagnetum cuspidati* Osvald 1923)

- Dg: *Sphagnum cuspidatum*, *Carex rostrata*, *Carex limosa*, *Warnstorfia fluitans*



\* New Association for Slovakia



# Results: Numerical classification

**Oxycocco-Sphagnetea** Br.-Bl. et R.Tx. ex Westhoff et al. 1946

**\*Sphagno nemorei-Caricetum canescentis** Hadač 1969

- Dg: *Sphagnum russowii*, *S. girgensohnii*, *Avenella flexuosa*

**Trichophoro cespitosi-Sphagnetum compacti** Warén 1926

- Dg: *Carex pauciflora*, *Sphagnum compactum*, *Vacc. myrtillus*



**Carici lachenalii-Eriophoretum vaginati** (Krajina 1933) Šoltés  
in Valachovič et al. 2001

- Dg: *Campanula alpina*, *Oreochloa disticha*, *Carex atrata*, *Festuca picturata*, *Carex lachenalii*, *Juncus trifidus*, *Eriophorum vaginatum*, *Homogyne alpina*



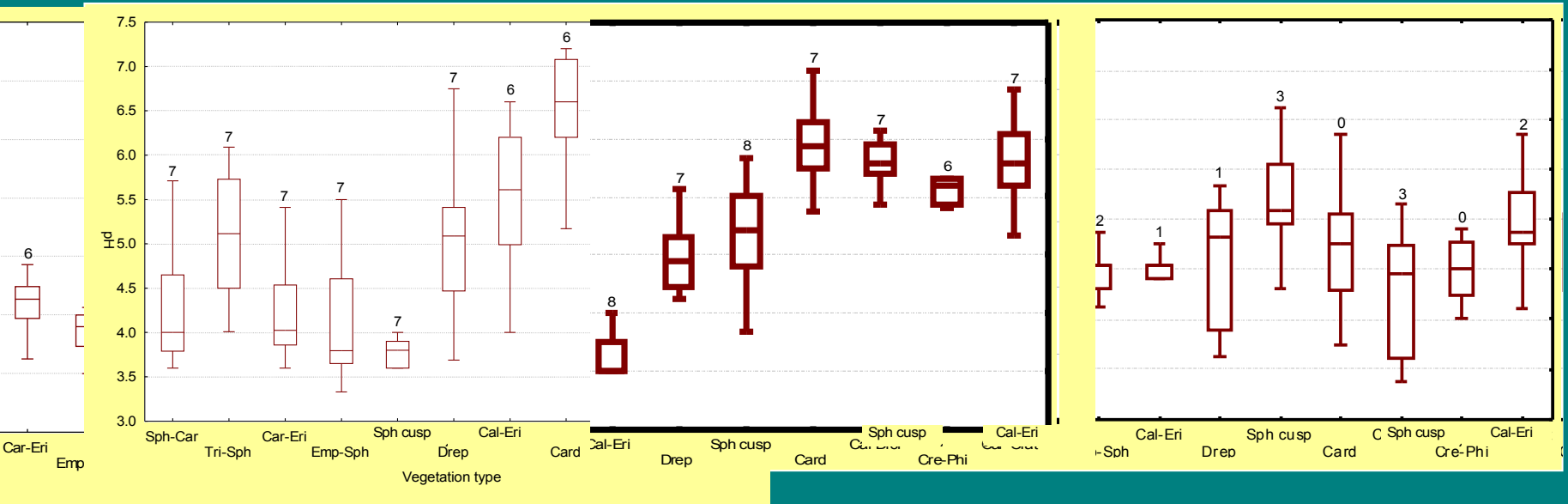
**Empetro nigri-Sphagnetum fusci** Osvald 1923

- Dg: *Oxycoccus microcarpus*, *Oxycoccus palustris*, *Empetrum nigrum* agg., *S. magellanicum*, *Vaccinium uliginosum*, *S. rubellum*, *S. fuscum*, *S. recurvum* agg., *Polytrichum strictum*, *Eriophorum vaginatum*





# Results: Environmental characteristics



## ***Oxycocco-Sphagnetum***

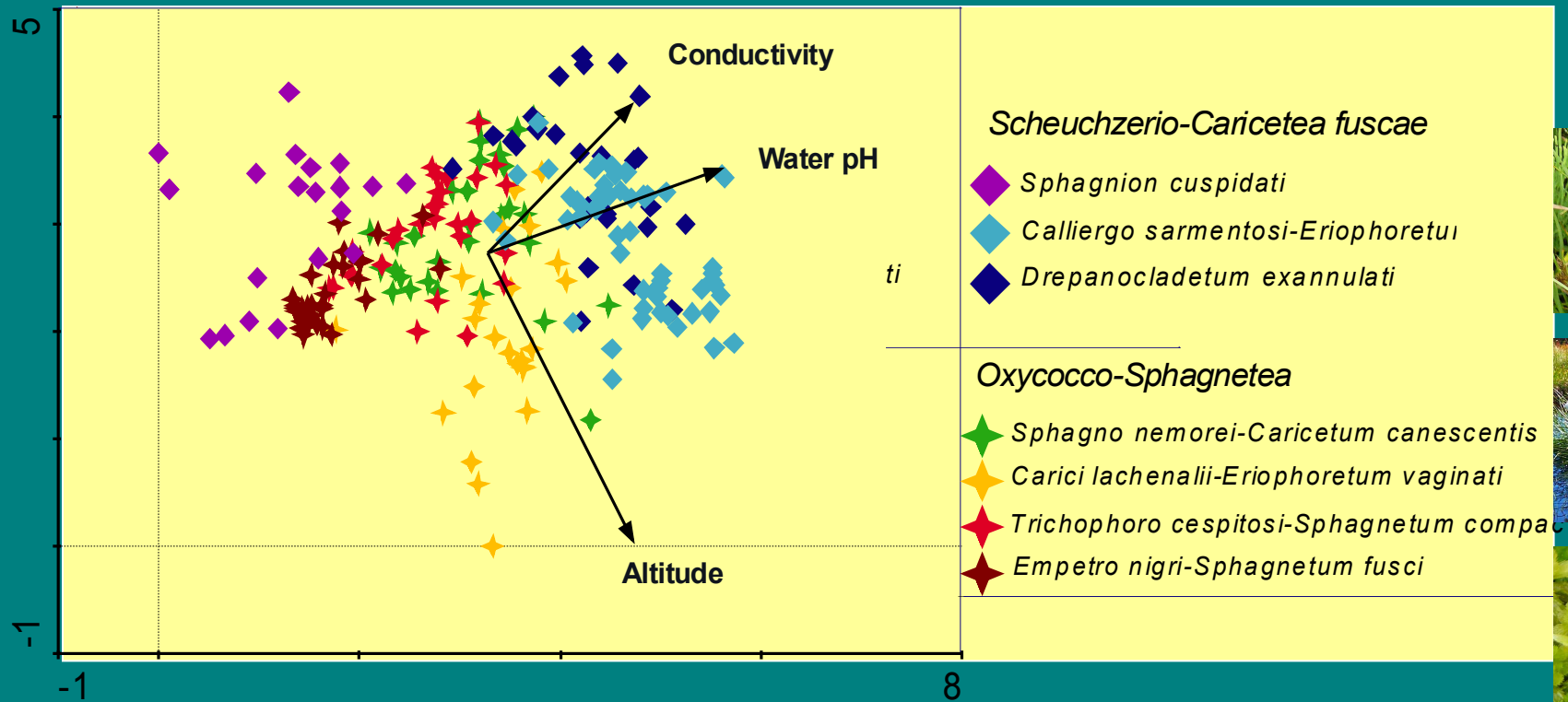
Sph-Car (*Sphagno nemorei*-*Caricetum canescentis*),  
 Tri-Sph (*Trichophoro cespitosi*-*Sphagnetum compacti*),  
 Car-Eri (*Carici lachenalii*-*Eriophoretum vaginati*),  
 Emp-Sph (*Empetro nigri*-*sphagnetum fusci*)

## ***Scheuchzerio-Caricetea fuscae***

Cal-Eri (*Calliergo sarmentosi*-*Eriophoretum angustifolii*),  
 Drep (*Drepanocladetum exannulati*),  
 Sph cusp (*Sphagnion cuspidati*)

# Results: Gradient analysis

## Detrended Correspondence Analysis (DCA)





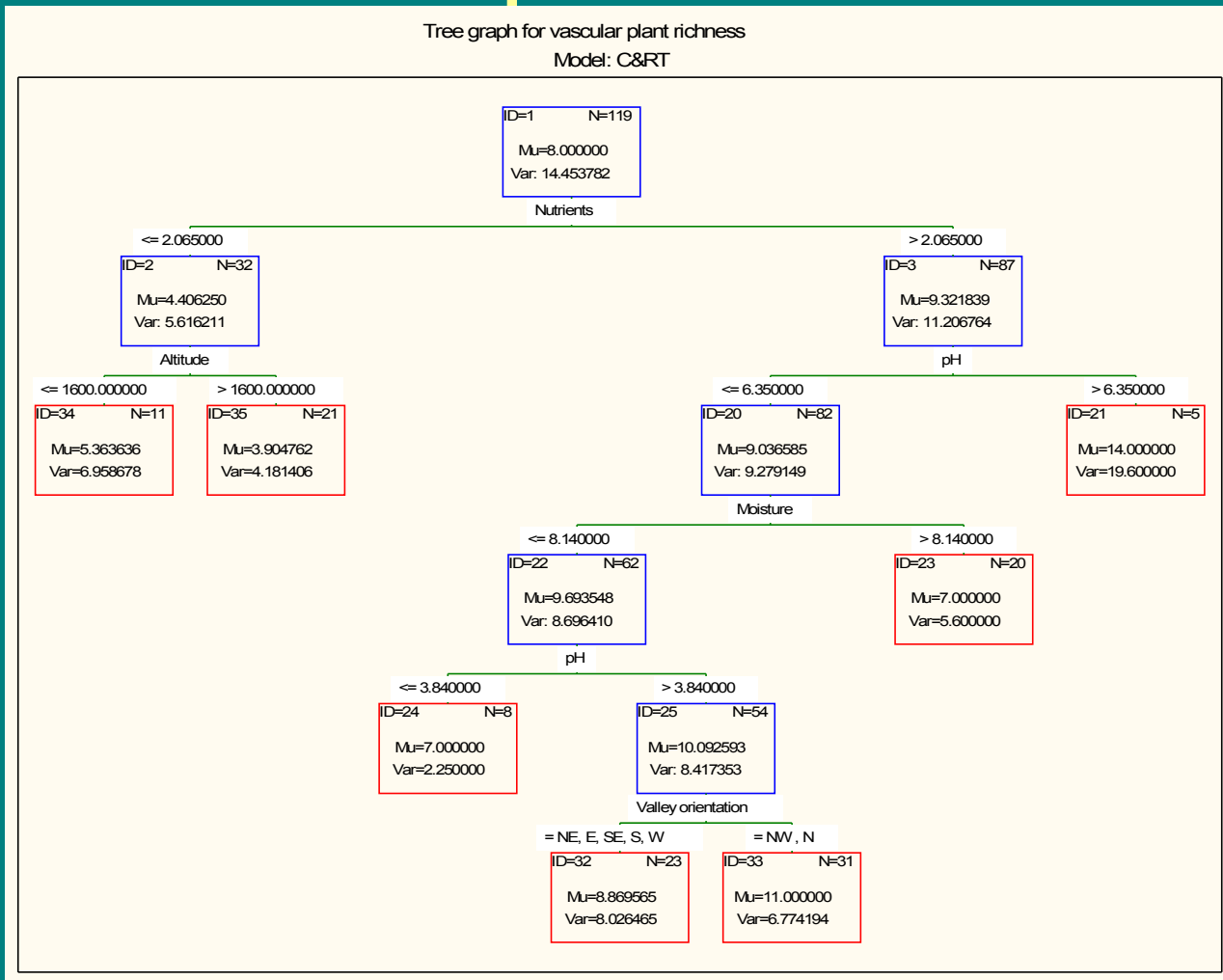
# Results: Species richness

- Correlation using the Spearman rank correlation coefficient

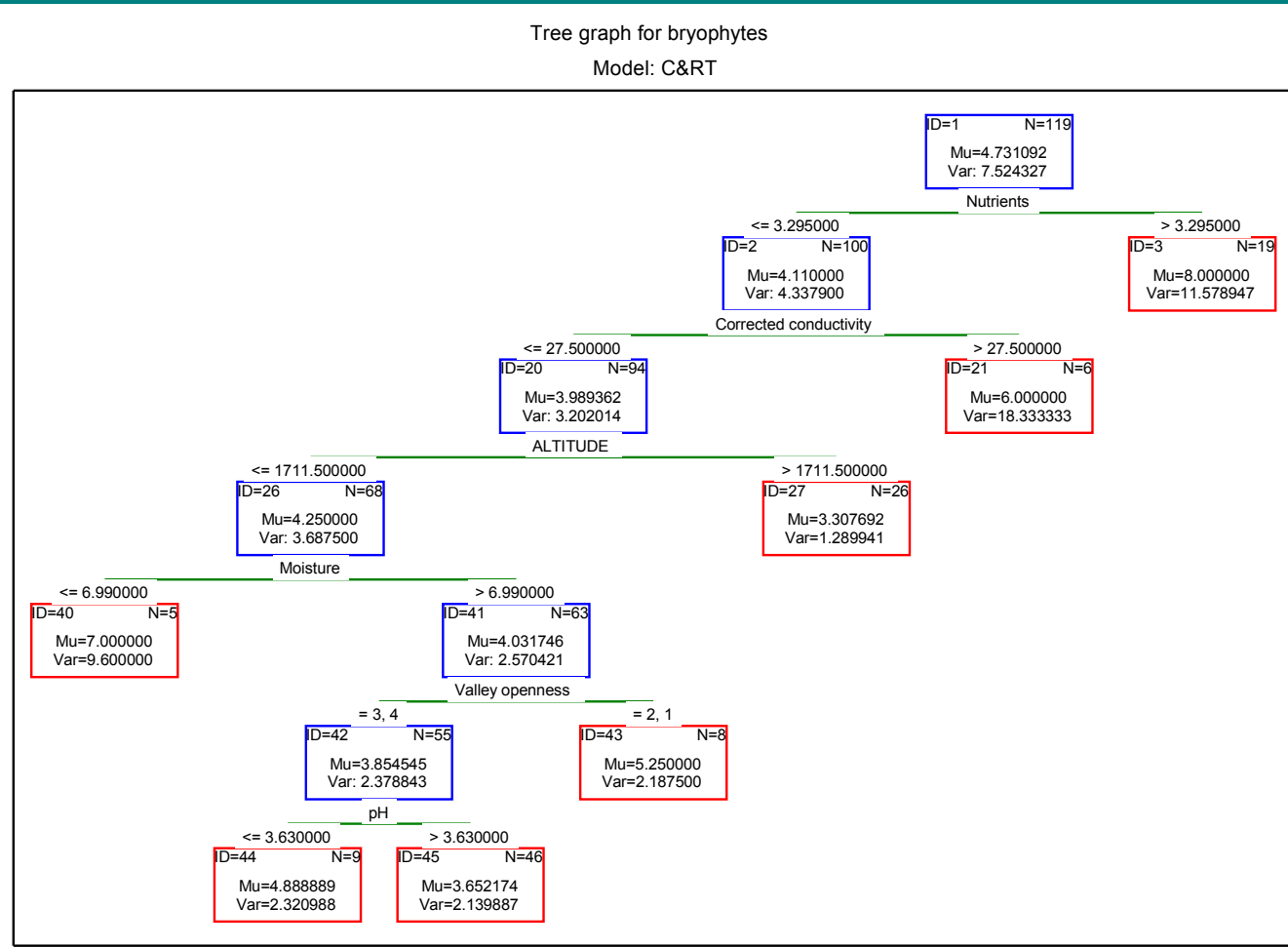
	Altitude	pH	Corrected conduct.	E Moisture	E Soil Reaction	E Nutrients
Bog subset ( <i>Oxycocco-Sphagnetea</i> )						
All species	n.s.	n.s.	n.s.	-0.42**	0.31*	0.36*
Bryophytes	n.s.	n.s.	n.s.	n.s.	-0.35*	-0.36*
Vascular plants	0.32*	0.34*	n.s.	-0.56**	0.51**	0.56**
Fen subset ( <i>Scheuchzerio-Caricetea fuscae</i> )						
All species	n.s.	0.47**	0.37*	-0.56**	0.58**	0.68**
Bryophytes	n.s.	0.38*	n.s.	-0.56**	0.65**	0.62**
Vascular plants	n.s.	0.55**	0.39*	-0.65**	0.62**	0.61**



# Results: Species richness



# Results: Species richness





# Conclusions

- The fen vegetation (*Scheuchzerio-Caricetea fuscae*) was divided into 3 distinct groups, the bog vegetation (*Oxycocco-Sphagnetea*) into 4 groups.
- The major gradient in species composition was associated with water pH in both subsets, also nutrient availability is important.
- In alpine vegetation, pH explains higher share of variability in fen vegetation (6.4 %), in species composition of bogs is less important, but still significant.
- The species composition of fens above the timberline in Western Carpathians seems to be strong dependent on altitude.
- There is only weak correlation between the number of vascular plants and pH in bogs, but strong correlation was found in fens.





Thank you for your attention...

