

Appendix S3: Supporting information for the Results section (Figures S7, S8, S9, S10).

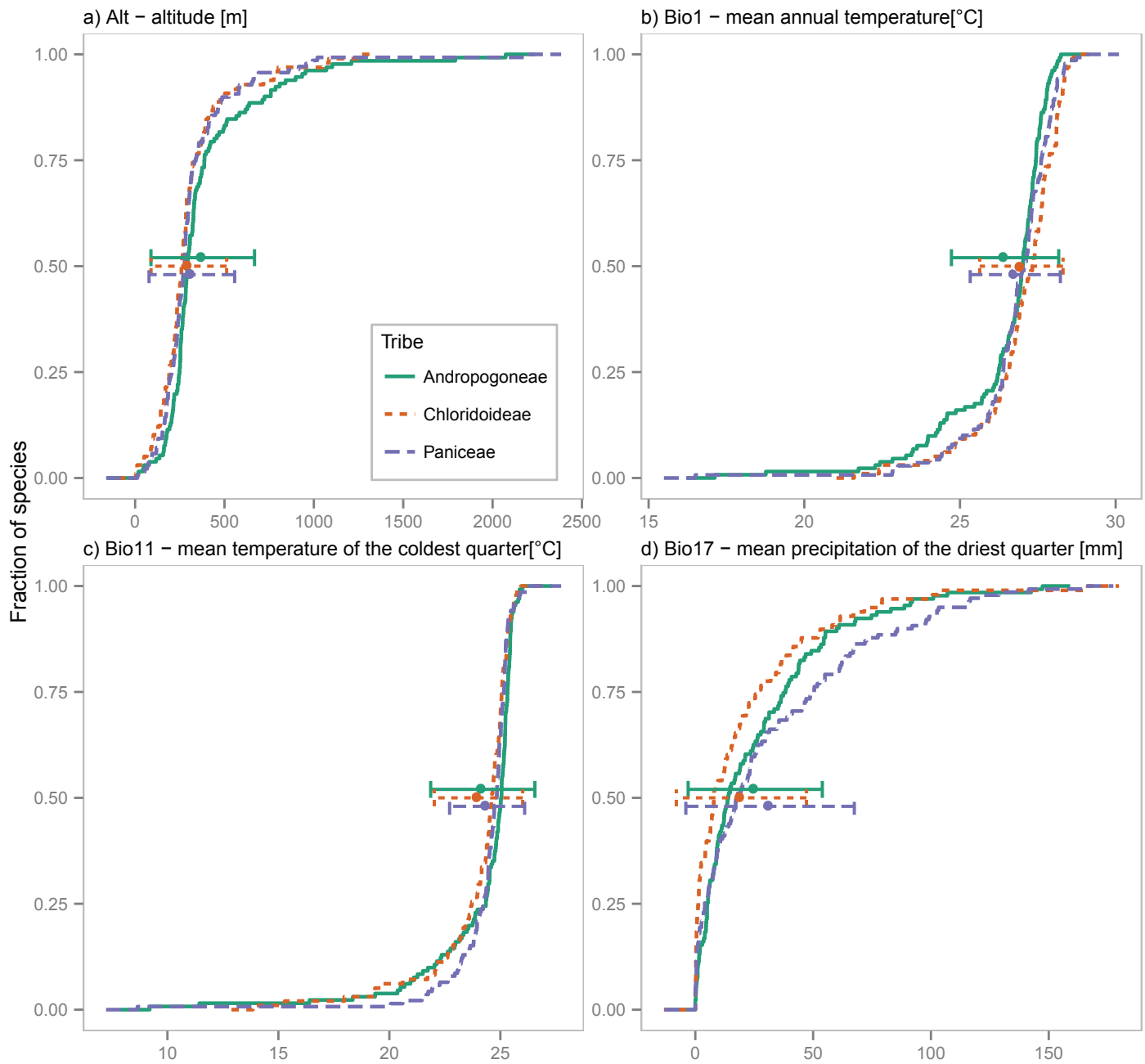
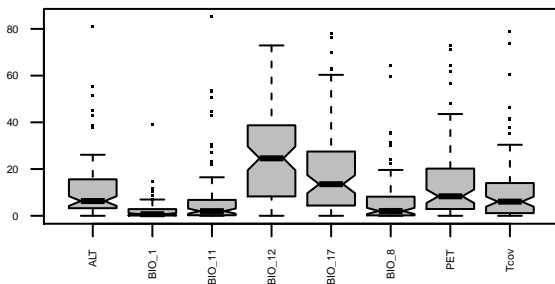
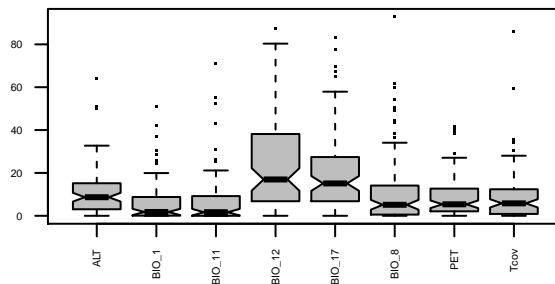


Figure S7. Cumulative distribution curves of each clade along four environmental variables. All species with a minimum of two collections were included. Each dot in the curve represents the mean value of collection localities of one species. The dot with error bar indicates, for each clade, the mean value of the clade and the standard deviation.

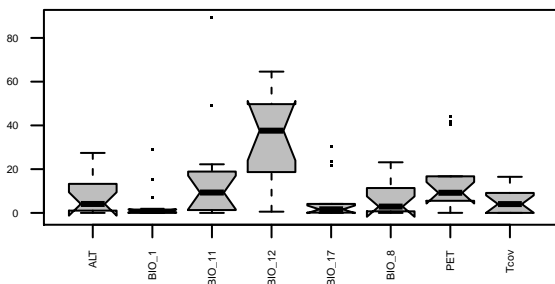
Contribution of each variable for Andropogoneae



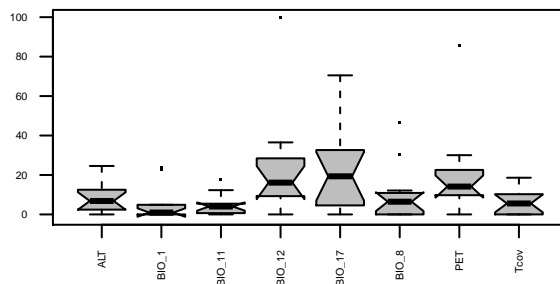
Permutation importance of each variable for Andropogoneae



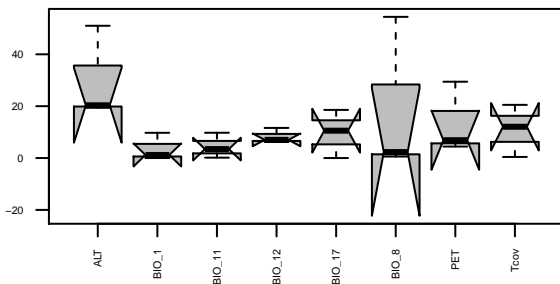
Contribution of each variable for Aristideae



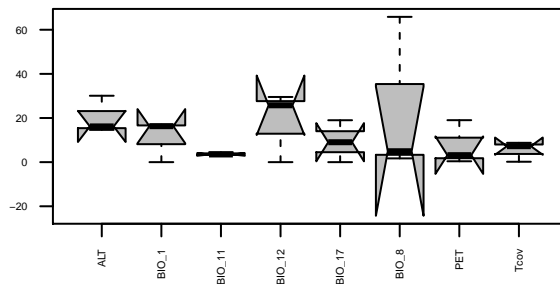
Permutation importance of each variable for Aristideae



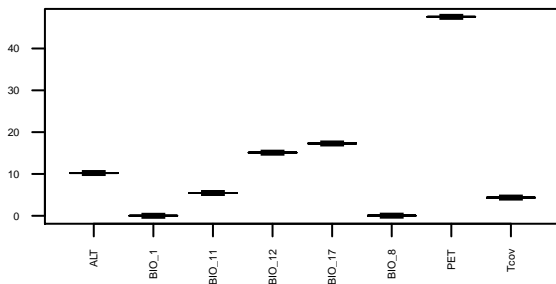
Contribution of each variable for Arundineae



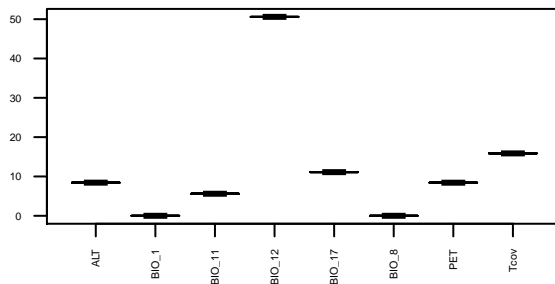
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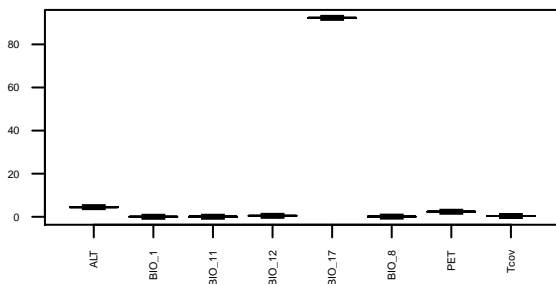
Contribution of each variable for Bambuseae



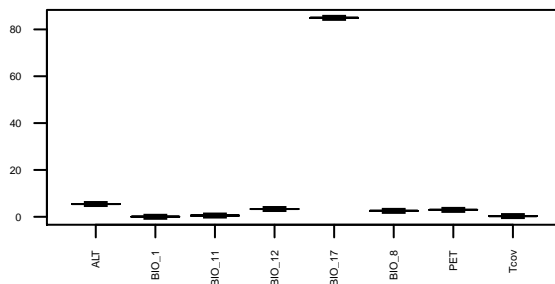
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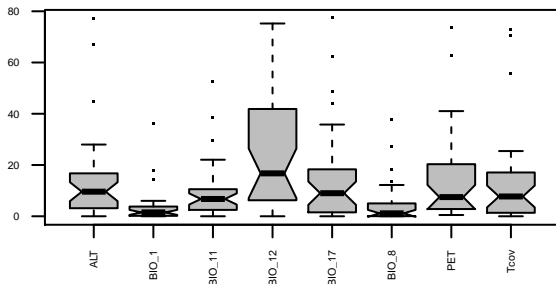
Contribution of each variable for Centothecae



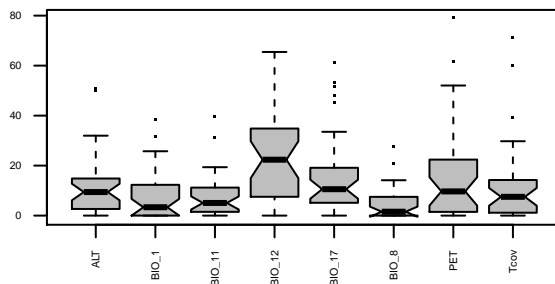
Permutation importance of each variable for Centothecae



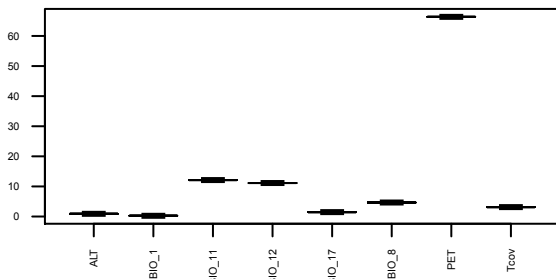
Contribution of each variable for Chlorideae



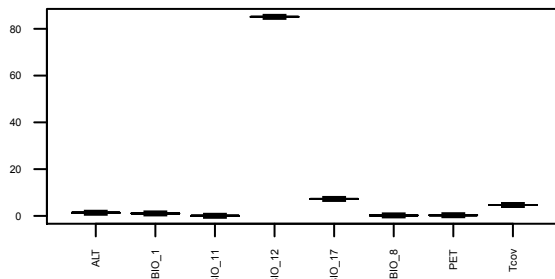
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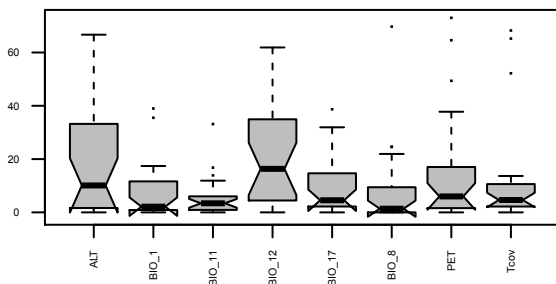
Contribution of each variable for Centropodia clade



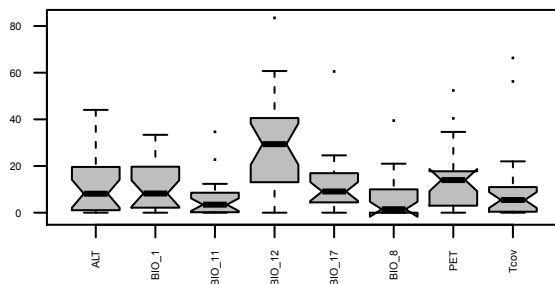
Permutation importance of each variable for Centropodia clade



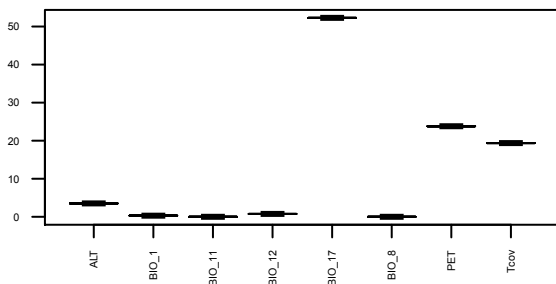
Contribution of each variable for Eragrostideae



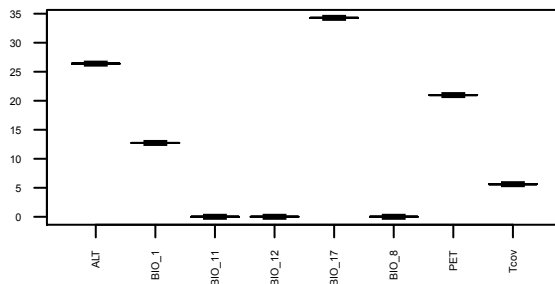
Permutation importance of each variable for Eragrostideae



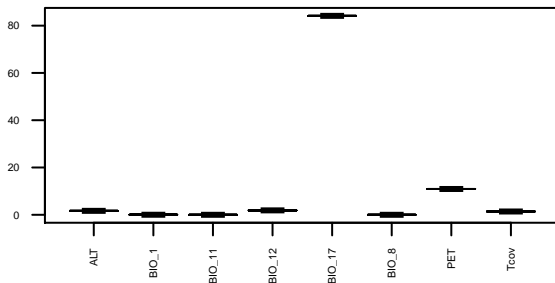
Contribution of each variable for Guaduellieae



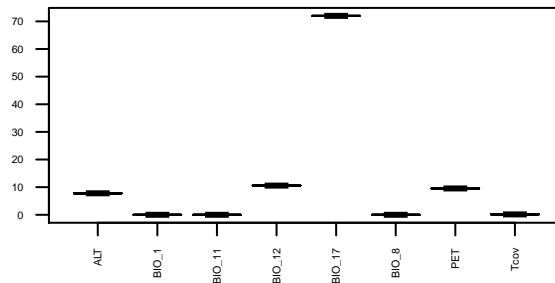
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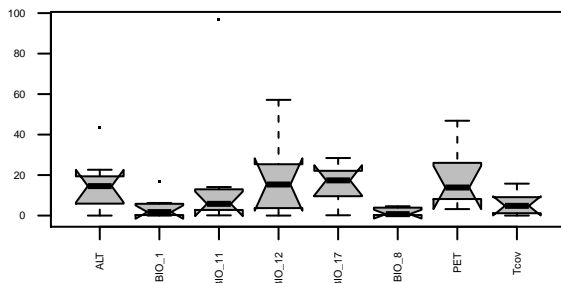
Contribution of each variable for Olyreae



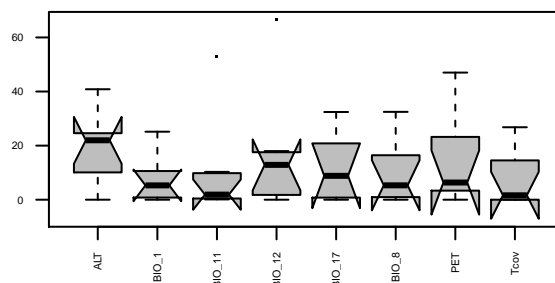
Permutation importance of each variable for Olyreae



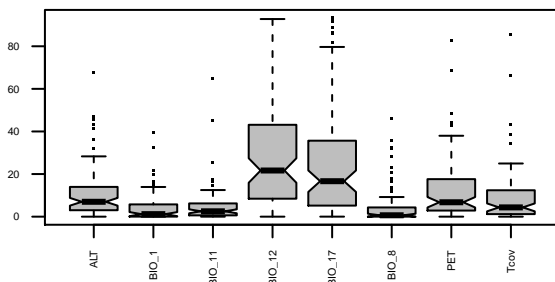
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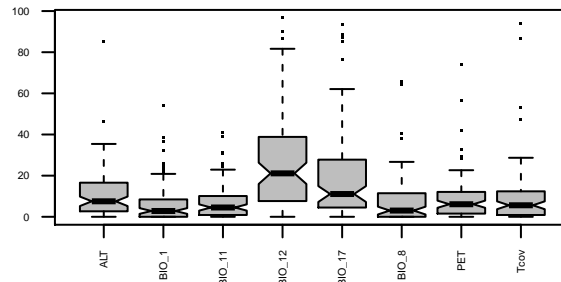
Permutation importance of each variable for Oryzeae



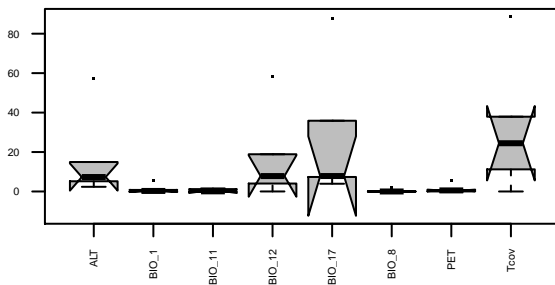
Contribution of each variable for Paniceae



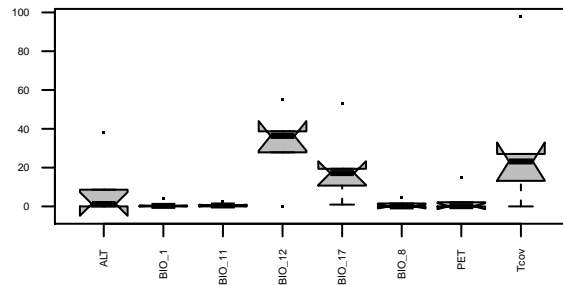
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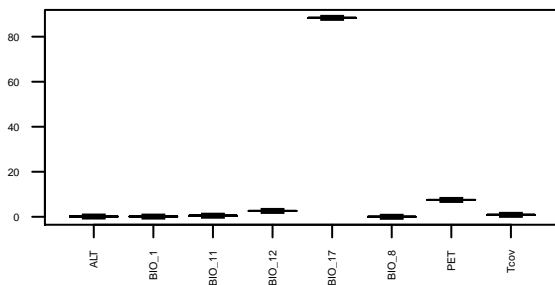
Contribution of each variable for Paspaleae



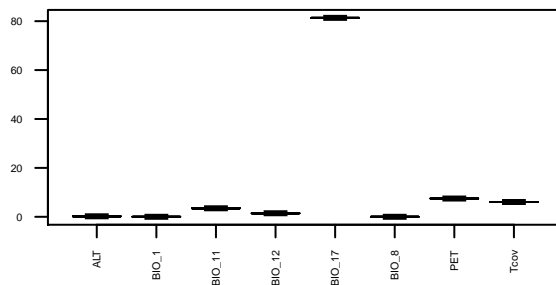
Permutation importance of each variable for Paspaleae



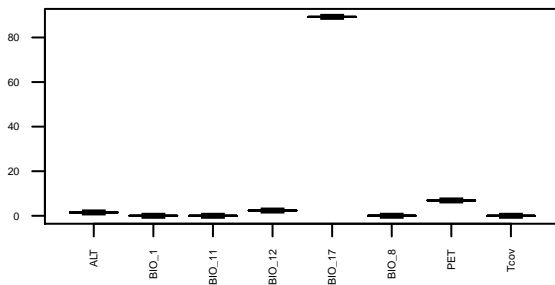
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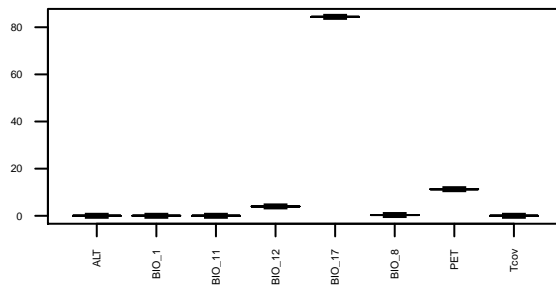
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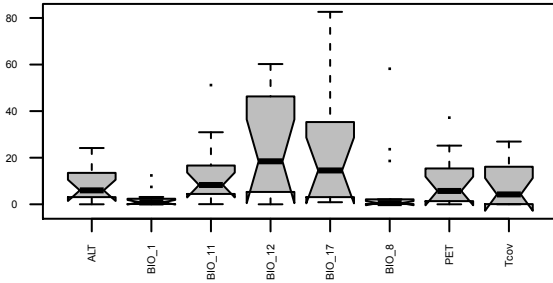
Contribution of each variable for Streptogynaeae



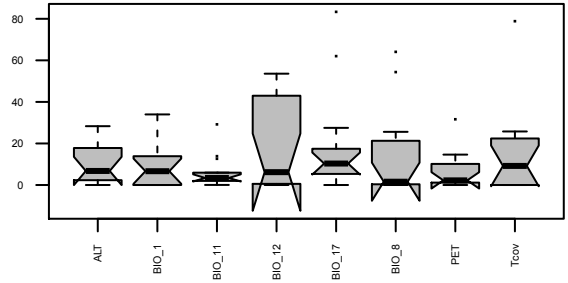
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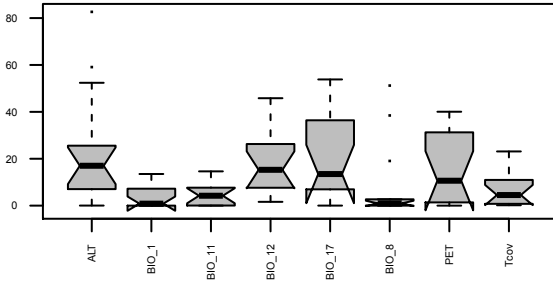
Contribution of each variable for Tristachyidae



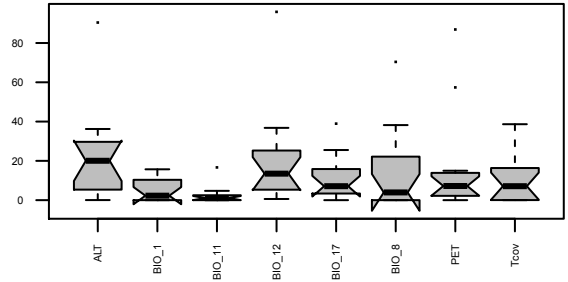
Permutation importance of each variable for Tristachyidae



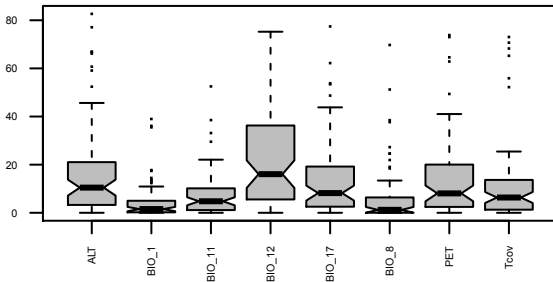
Contribution of each variable for Zoysieae



Permutation importance of each variable for Zoysieae



Contribution of each variable for Chloridoideae



Permutation importance of each variable for Chloridoideae

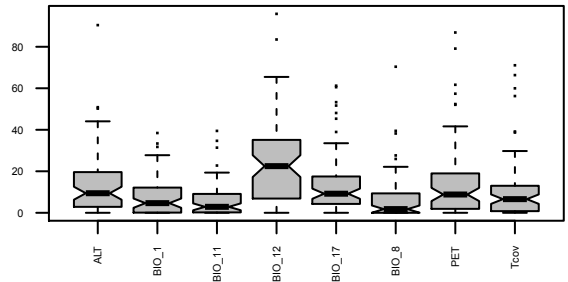


Figure S8. Boxplots representing the relative contribution and permutation importance of each environmental variable to the distribution models, binned for each 17 tribes and the subfamily Chloridoideae. The contribution depends on the path of the model and reflects how much the variable added to the model gain. The permutation importance is based on the final model and calculated by randomly permuting the values of that variable among the training points and measuring the resulting decrease in training AUC (Phillips et al. 2006). The boxplots represent the first (top) and third (bottom) quartile of the data, the median is represented by the line. Outliers are represented by the dots.

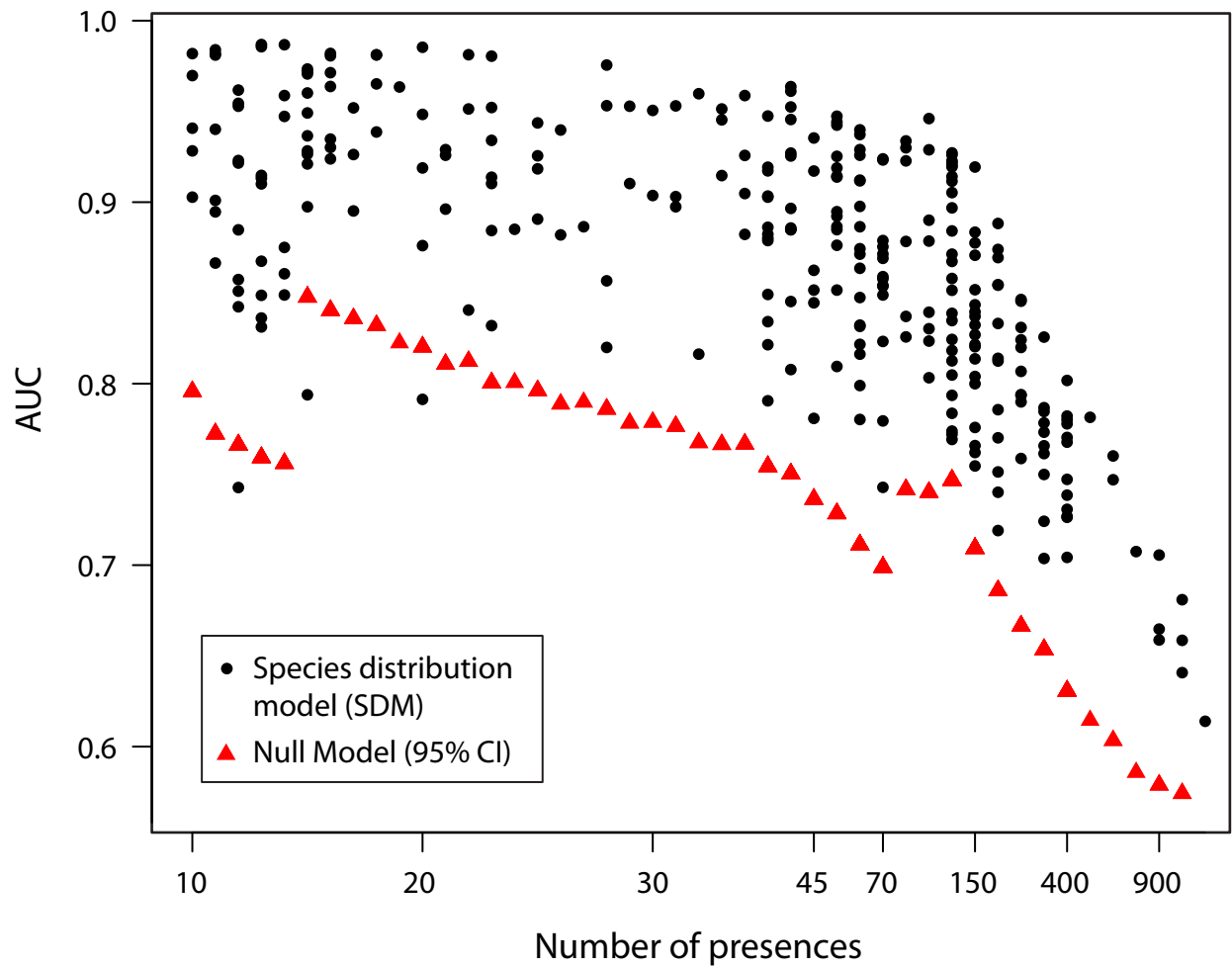


Figure S9. AUC values of environmental niche models (black dots) and the 95% confidence interval AUC values of the environmentally bias corrected null-models (red triangles). AUC values of SDM that are higher than their corresponding 95% C.I. AUC value of the null-model, significantly deviate from what would be expected by chance ($p < 0.05$). The three non-significant AUC values belong to *Chloris barbata*, *Digitaria acuminatissima*, and *Oryza brachyantha*.

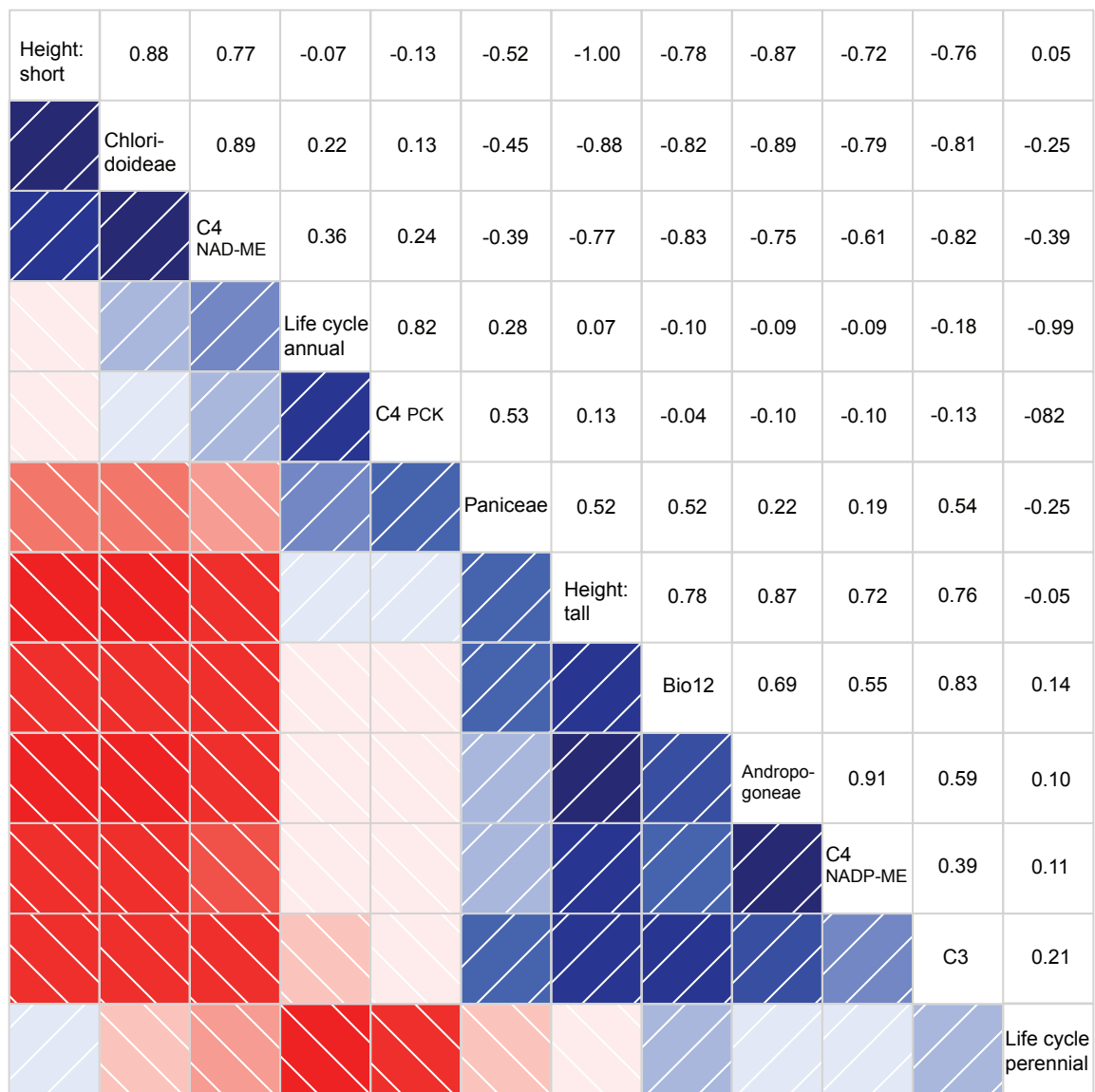


Figure S10. Pairwise Pearson's correlation coefficient between the spatial distribution of mean annual precipitation (Bio12), the three species rich clades, and the functional groups (photosynthesis type, life cycle, height). Colours indicate the direction (blue: positive; red: negative) and the intensity (dark: high; light: low) of the correlation