

Foliar spectra and traits of bog plants across nitrogen deposition gradients

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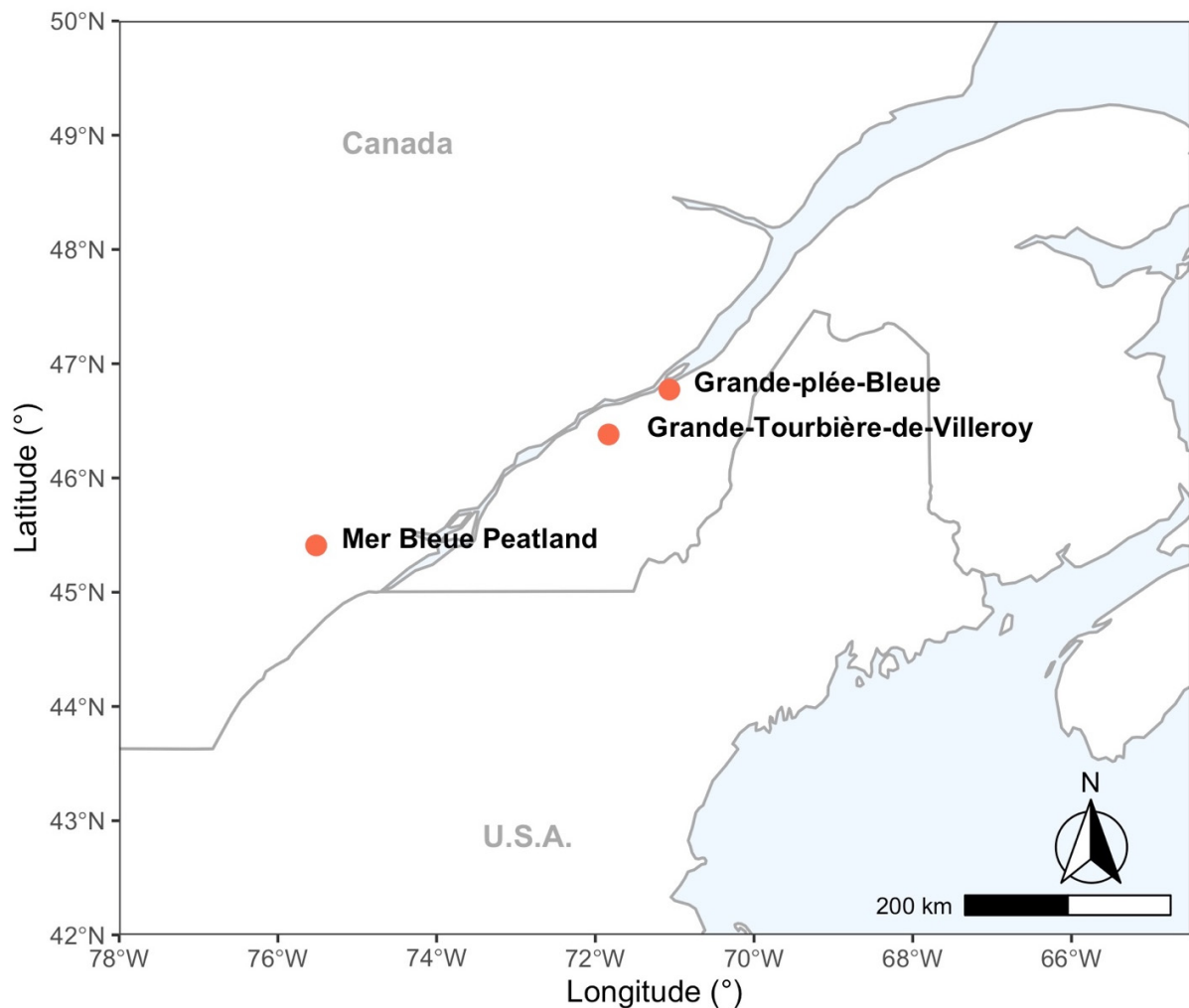


Figure S1. Location of the three ombrotrophic bogs in southern Québec and Ontario (Canada): La Mer Bleue peatland, La Grande-Tourbière-de-Villeroy and La Grande-plée-Bleue. The fertilization experiment is located at La Mer Bleue.

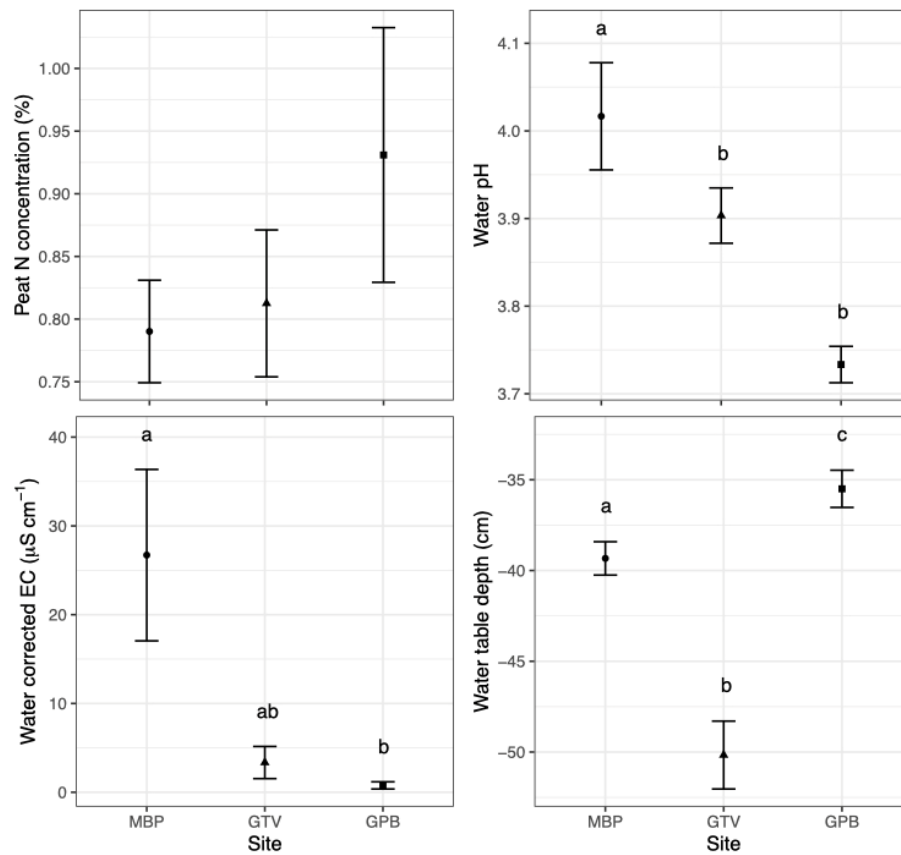


Figure S2. Mean values ($n = 6$) and standard error of (a) peat N concentration (%), (b) pH in the peat water, (c) Corrected electrical conductivity (EC) in the peat water and (d) water table depth (cm) for each bog at time of sampling. MBP: Mer Bleue peatland, GTV: Grande-tourbière-de-Villeroy, GPB: Grande-plée-Bleue. Letters indicate differences among groups ($P < 0.05$). Sites are ordered based on total N content in peat samples.

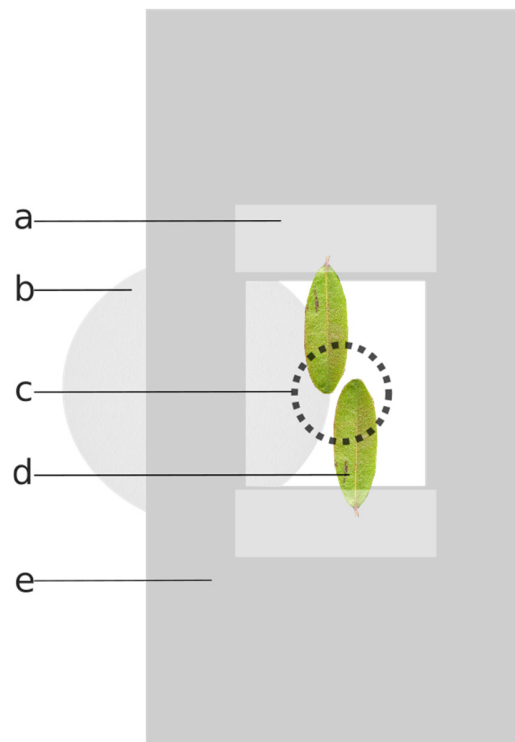


Figure S3. Custom sample mount for sampling leaf spectra of small leaves. The features represented are (a) adhesive paper, (b) filter paper (unfixed), (c) the location of the leaf port, (d) leaf array and (e) sample platform. For details, see Laliberté & Soffer [38].

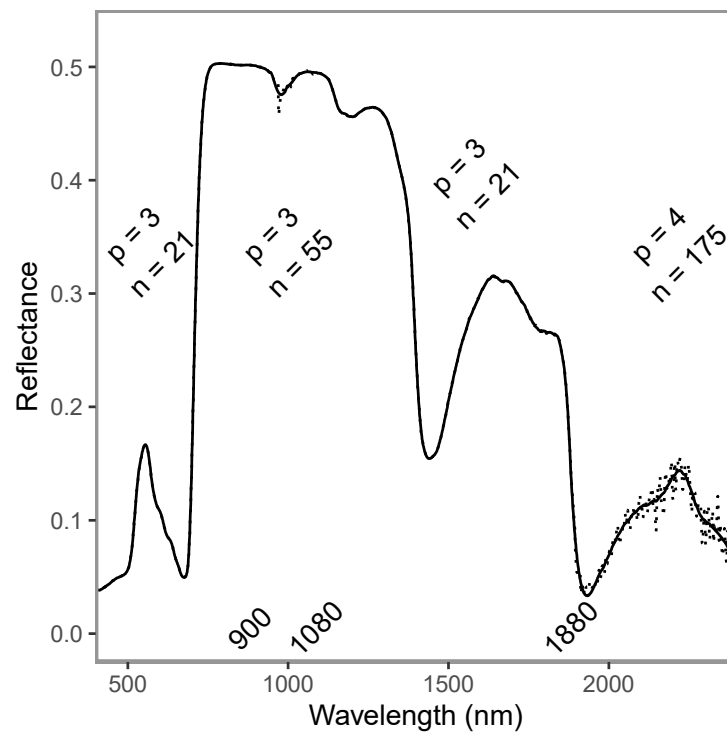


Figure S4. Parameters (n: filter length; p: filter order) and regions (coloured background) used for the Savitzky-Golay filter on leaf spectra (example). Solid line indicates resulting spectra, dots indicate original values.

Table S1. References for determination of wavelength range used in PLSR analyses on functional traits. LMA: leaf mass per area, LDMC: leaf dry matter content, LWC: leaf water content, N: nitrogen concentration, Chl: chlorophyll.

Functional trait	Wavelength range references	Wavelength range (nm)
C:N ratio	Curran, 1989; Yang et al., 2016	400–2400
Carotenoids (mg g ⁻¹)	Curran, 1989; Yang et al., 2016	400–760
Cellulose (%)	Curran, 1989	1200–2400
Chl <i>a</i> (mg g ⁻¹)	Curran, 1989; Yang et al., 2016	400–760
Chl <i>a</i> (mg m ⁻²)	Curran, 1989; Yang et al., 2016	400–760
Chl <i>b</i> (mg g ⁻¹)	Curran, 1989; Yang et al., 2016	400–760
Chl <i>b</i> (mg m ⁻²)	Curran, 1989; Yang et al., 2016	400–760
EWT (cm)	Curran, 1989; Garden, 1970	800–2400
Hemicellulose (%)	Curran, 1989	1200–2400
LDMC (mg g ⁻¹)	Curran, 1989; Garden, 1970	800–2400
Lignin (%)	Curran, 1989	1200–2400
LMA (g m ⁻²)	Asner et al., 2011	800–2400
LWC (mg g ⁻¹)	Curran, 1989; Garden, 1970	800–2400
N (%)	Curran, 1989; Yang et al., 2016	400–2400
Soluble carbon (%)	Curran, 1989	1200–2400
Total C (%)	Curran, 1989	1200–2400
C:N ratio	Curran, 1989; Yang et al., 2016	400–2400
Carotenoids (mg g ⁻¹)	Curran, 1989; Yang et al., 2016	400–760

Table S2. Statistical significance of site, species and their interactive (site:species) effect in linear mixed effect models for foliar traits from *E. vaginatum*, *K. angustifolium*, *C. calyculata* and *R. groenlandicum*. All treatments are combined. * $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$. LMA: leaf mass per area, LDMC: leaf dry matter content, LWC: leaf water content, N: nitrogen concentration, Chl: chlorophyll..

Functional trait	Site effect	Species effect	Site : Species
N (%)	≤ 0.001 ***	≤ 0.001 ***	≤ 0.001 ***
Hemicellulose (%)	≤ 0.001 ***	≤ 0.001 ***	≤ 0.001 ***
Cellulose (%)	≤ 0.001 ***	≤ 0.001 ***	≤ 0.001 ***
Soluble carbon (%)	≤ 0.001 ***	≤ 0.001 ***	≤ 0.001 ***
C:N ratio	≤ 0.001 ***	≤ 0.001 ***	≤ 0.001 ***
Carotenoids (mg g ⁻¹)	0.0328 *	≤ 0.001 ***	≤ 0.001 ***
Total C (%)	≤ 0.001 ***	≤ 0.001 ***	0.0013 **
LDMC (mg g ⁻¹)	≤ 0.001 ***	≤ 0.001 ***	0.0305 *
LWC (mg g ⁻¹)	≤ 0.001 ***	≤ 0.001 ***	0.0305 *
Chl <i>b</i> (mg m ⁻²)	0.0017 **	≤ 0.001 ***	0.0322 *
Chl <i>b</i> (mg g ⁻¹)	0.0039 **	≤ 0.001 ***	0.0682
EWT (cm)	≤ 0.001 ***	≤ 0.001 ***	0.0856
LMA (g m ⁻²)	0.0026 **	≤ 0.001 ***	0.1168
Chl <i>a</i> (mg g ⁻¹)	≤ 0.001 ***	≤ 0.001 ***	0.1318
Chl <i>a</i> (mg m ⁻²)	≤ 0.001 ***	≤ 0.001 ***	0.1359
Lignin (%)	0.2244	≤ 0.001 ***	≤ 0.001 ***

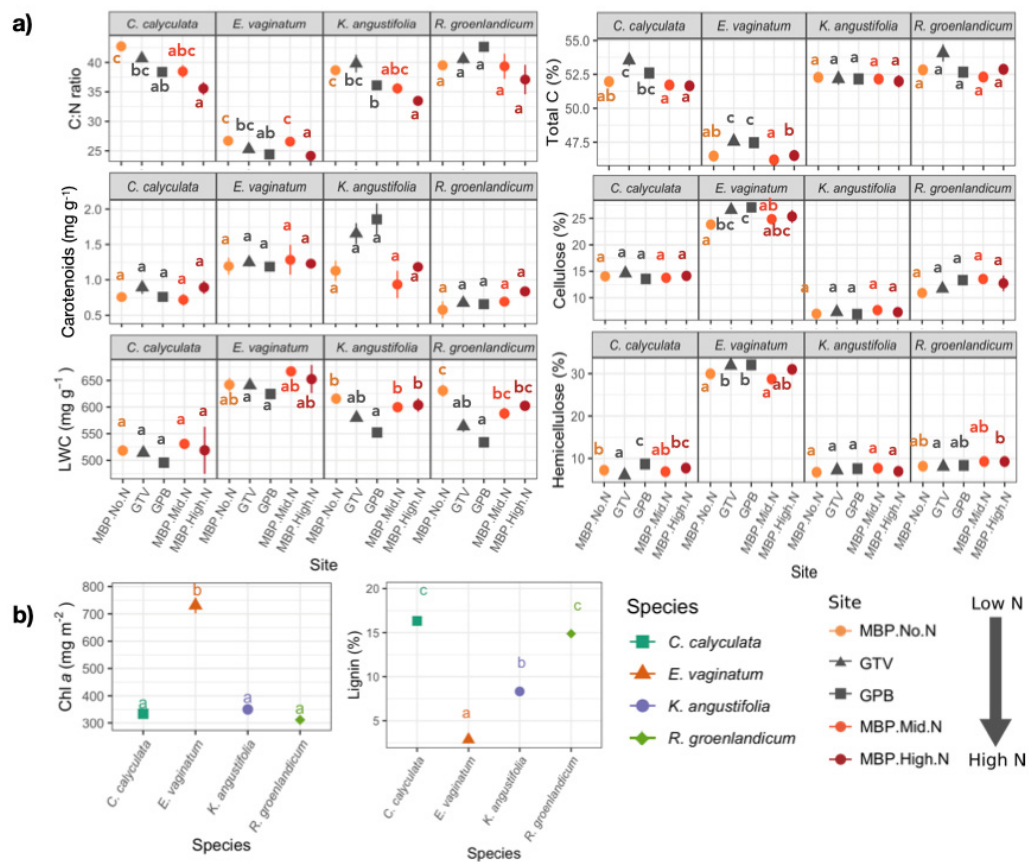


Figure S5. Mean (± standard error) chemical functional traits in relation to localization (a); sample size for MBP.No.N = 23, GTV = 24, GPB = 24, MBP.Mid.N = 12 and MBP.High.N = 11 and species (b); sample size for *E. vaginatum* = 23, *K. angustifolia* = 24, *C. calyculata* = 24 and *R. groenlandicum* = 23). LWC: leaf water content, Chl : chlorophyll. See Figure 2.1 for description of site acronyms. Colored points are from the Mer Bleue peatland. Different shapes indicate measurements from different bogs.

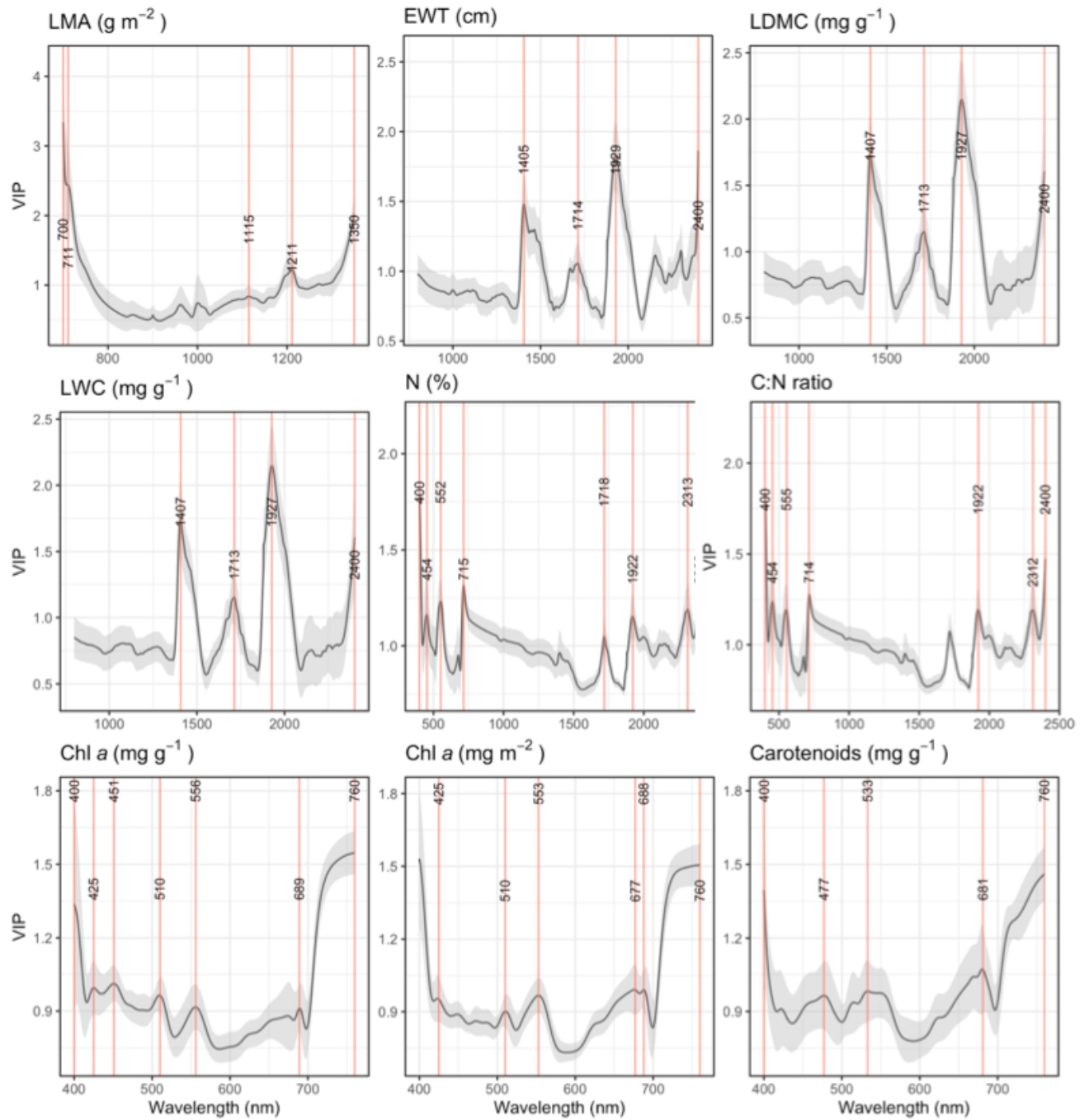


Figure S6. Continued.

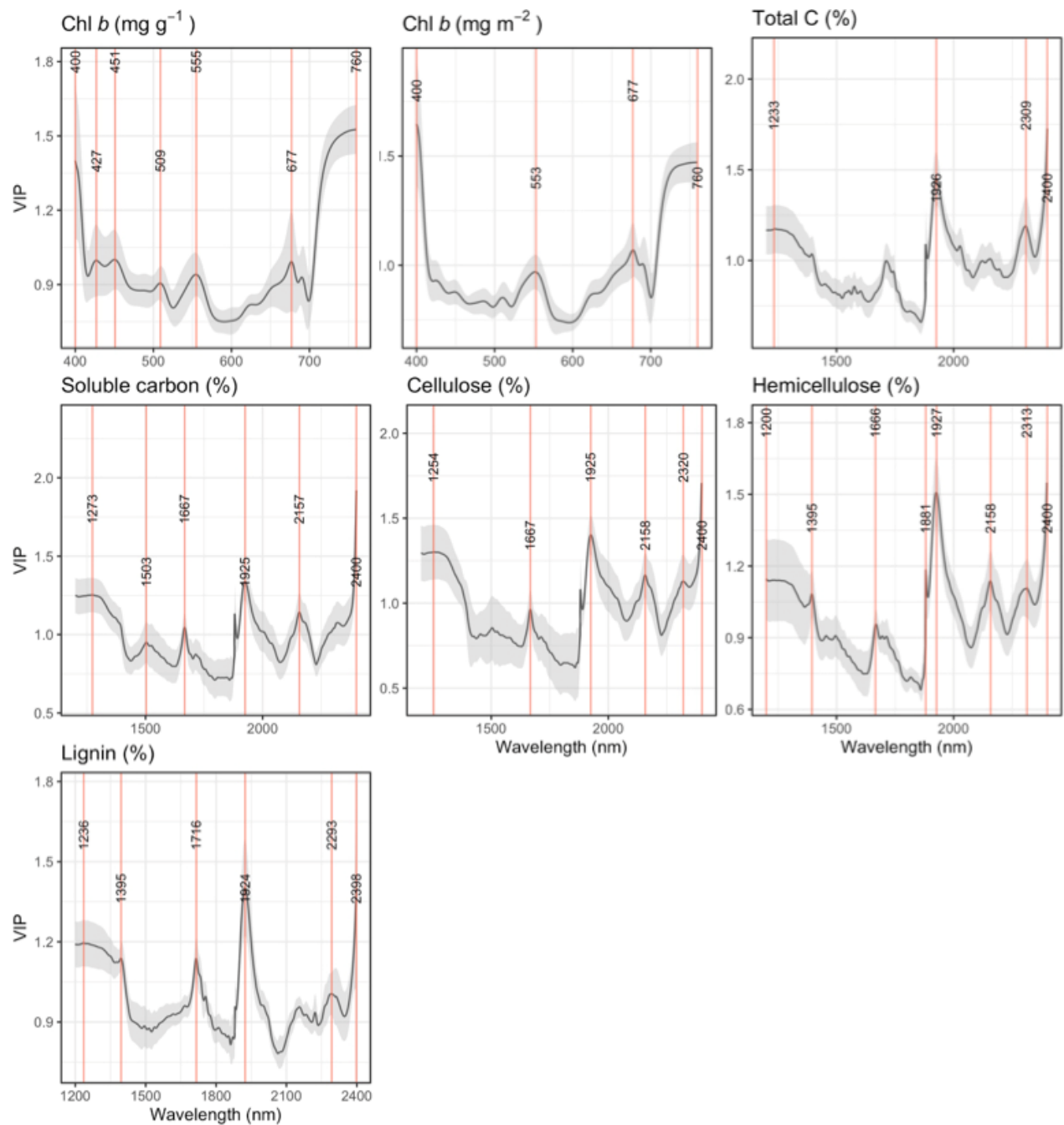


Figure S6. Variable importance of the predictors (VIP) of wavelengths indicating their contribution to the prediction of foliar traits. Highest contributions are indicated (red lines). LMA: leaf mass per area, LDMC: leaf dry matter content, LWC: leaf water content, N: nitrogen concentration, Chl: chlorophyll.