

## Supplementary Material

# More than you can see: Unraveling the ecology and biodiversity of lichenized fungi associated with leaves and needles of 12 temperate tree species using high throughput sequencing.

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**Table S1.** Comparisons between lichenized fungal community compositions associated with all tree species (i), broadleaved (ii) and coniferous tree species (iii) using analysis of similarities (ANOSIM) and non-parametric multivariate analysis of variance (NPMANOVA) based on relative abundance data and the Bray-Curtis distance measure. Bold letters indicate statistical significance.

(i) All tree species

Comparison	ANOSIM	NPMANOVA
<i>Q. roburvs. F. excelsior</i>	$R = 0.00$ , $P = 1.000$	Pseudo $F = 0.64$ , $P = 0.594$
<i>Q. roburvs. P. avium</i>	$R = 0.00$ , $P = 0.397$	Pseudo $F = 1.11$ , $P = 0.347$
<i>Q. roburvs. P. menziesii</i>	$R = 0.02$ , $P = 0.317$	Pseudo $F = 1.20$ , $P = 0.314$
<i>Q. roburvs. P. abies</i>	$R = 0.32$ , <b><math>P = 0.046</math></b>	Pseudo $F = 2.50$ , $P = 0.064$
<i>Q. roburvs. P. sylvestris</i>	$R = 0.72$ , <b><math>P = 0.008</math></b>	Pseudo $F = 4.54$ , <b><math>P = 0.009</math></b>
<i>Q. roburvs. L. decidua</i>	$R = 0.64$ , <b><math>P = 0.007</math></b>	Pseudo $F = 6.07$ , <b><math>P = 0.008</math></b>
<i>F. excelsiorvs. P. avium</i>	$R = 0.00$ , $P = 0.571$	Pseudo $F = 1.11$ , $P = 0.435$
<i>F. excelsiorvs. P. menziesii</i>	$R = 0.00$ , $P = 0.386$	Pseudo $F = 1.52$ , $P = 0.218$
<i>F. excelsiorvs. P. abies</i>	$R = 0.10$ , $P = 0.214$	Pseudo $F = 2.22$ , $P = 0.153$
<i>F. excelsiorvs. P. sylvestris</i>	$R = 0.34$ , <b><math>P = 0.016</math></b>	Pseudo $F = 3.18$ , <b><math>P = 0.009</math></b>

Comparison	ANOSIM	NPMANOVA
<i>F. excelsior</i> vs. <i>L. decidua</i>	$R = 0.34$ , $P = 0.034$	Pseudo $F = 5.45$ , $P = 0.024$
<i>P. avium</i> vs. <i>P. menziesii</i>	$R = 0.00$ , $P = 0.378$	Pseudo $F = 0.88$ , $P = 0.514$
<i>P. avium</i> vs. <i>P. abies</i>	$R = 0.12$ , $P = 0.233$	Pseudo $F = 0.87$ , $P = 0.485$
<i>P. avium</i> vs. <i>P. sylvestris</i>	$R = 0.77$ , $P = 0.018$	Pseudo $F = 4.45$ , $P = 0.018$
<i>P. avium</i> vs. <i>L. decidua</i>	$R = 0.31$ , $P = 0.104$	Pseudo $F = 1.84$ , $P = 0.109$
<i>P. menziesii</i> vs. <i>P. abies</i>	$R = 0.12$ , $P = 0.181$	Pseudo $F = 1.54$ , $P = 0.184$
<i>P. menziesii</i> vs. <i>P. sylvestris</i>	$R = 0.76$ , $P = 0.008$	Pseudo $F = 4.79$ , $P = 0.008$
<i>P. menziesii</i> vs. <i>L. decidua</i>	$R = 0.31$ , $P = 0.048$	Pseudo $F = 3.54$ , $P = 0.033$
<i>P. abies</i> vs. <i>P. sylvestris</i>	$R = 0.79$ , $P = 0.009$	Pseudo $F = 6.53$ , $P = 0.009$
<i>P. abies</i> vs. <i>L. decidua</i>	$R = 0.13$ , $P = 0.078$	Pseudo $F = 1.76$ , $P = 0.042$
<i>P. sylvestris</i> vs. <i>L. decidua</i>	$R = 0.97$ , $P = 0.007$	Pseudo $F = 19.28$ , $P = 0.008$

(ii) Broadleaved tree species

Comparison	ANOSIM	NPMANOVA
<i>Q. robur</i> vs. <i>F. excelsior</i>	$R = 0.00$ , $P = 1.000$	Pseudo $F = 0.64$ , $P = 0.599$
<i>Q. robur</i> vs. <i>P. avium</i>	$R = 0.00$ , $P = 0.403$	Pseudo $F = 1.11$ , $P = 0.342$
<i>F. excelsior</i> vs. <i>P. avium</i>	$R = 0.00$ , $P = 0.574$	Pseudo $F = 1.11$ , $P = 0.425$

## (iii) Coniferous tree species

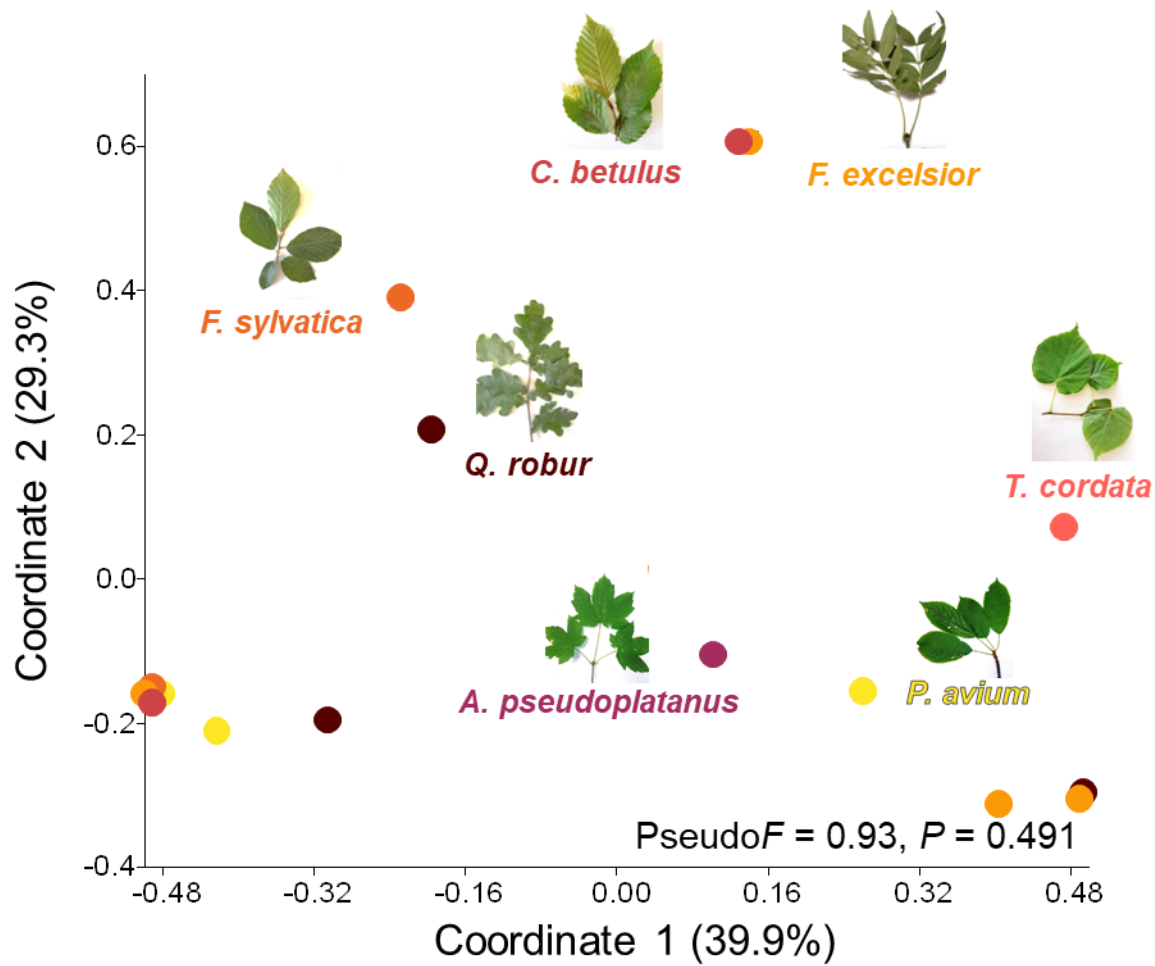
Comparison	ANOSIM	NPMANOVA
<i>P. menziesii</i> vs. <i>P. abies</i>	$R = 0.12$ , $P = 0.181$	Pseudo $F = 1.54$ , $P = 0.180$
<i>P. menziesii</i> vs. <i>P. sylvestris</i>	$R = 0.76$ , <b><math>P = 0.008</math></b>	Pseudo $F = 4.79$ , <b><math>P = 0.009</math></b>
<i>P. menziesii</i> vs. <i>L. decidua</i>	$R = 0.31$ , <b><math>P = 0.048</math></b>	Pseudo $F = 3.54$ , <b><math>P = 0.033</math></b>
<i>P. abies</i> vs. <i>P. sylvestris</i>	$R = 0.79$ , <b><math>P = 0.008</math></b>	Pseudo $F = 6.53$ , <b><math>P = 0.008</math></b>
<i>P. abies</i> vs. <i>L. decidua</i>	$R = 0.13$ , $P = 0.078$	Pseudo $F = 1.76$ , <b><math>P = 0.038</math></b>
<i>P. sylvestris</i> vs. <i>L. decidua</i>	$R = 0.97$ , <b><math>P = 0.007</math></b>	Pseudo $F = 19.28$ , <b><math>P = 0.007</math></b>

**Figure S1.** The 12 temperate tree species located in the Hainich-Dün region of Thuringia, Germany (51°12'N 10°18'E).



Google Maps, 2022. Hainich-Dün region of Thuringia. Google Maps [online] Available at: <https://www.google.com/maps>, [Accessed 12 July 2022].

**Figure S2.** Principal coordinates showing lichenized fungal community compositions in broadleaved tree species. Effects of tree species (only tree species with more than three replicates being considered) were tested with one-way PERMANOVA (based on relative abundance data and the Bray-Curtis distance measure). Color code of each data point indicates leaves and needles of different tree species and is consistent with the color code of Figure 2.



**Figure S3** Leaf/needle water content and pH of the 12 temperate tree species. Color code of each data point indicates leaves and needles of different tree species and is consistent with the color code of Figure 2. Yellow-red-brown color tone refers to the broadleaved tree species and blue-green color tone refers to the coniferous tree species. The statistical differences ( $P < 0.05$ ) as indicated by letters among different tree species were performed using one-way ANOVA or Kruskal-Wallis test.

