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High light availability offsets low naturalness regarding diversity but cannot compensate for reduced ecological value: A case study of near-natural forests and tree plantations in Serbia

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Electronic Supplementary Material (ESM)

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Table S1. Details of the nine traits used for the functional diversity analyses

Trait	Data type	Source
Start of flowering	nominal with three levels: blooming from early spring (months 1 to 4); blooming from early summer (months 5 and 6); blooming from late summer (months 7 to 9)	Király (2009)
Flowering duration	numeric (number of months)	Király (2009)
Specific leaf area (*SLA*)	numeric ($mm^2 \cdot mg^{-1}$)	Kleyer et al. (2008); Lhotsky et al. (2016); E-Vojtkó et al. (2020); Gyalus et al. (2022); McIntosh-Buday et al. (2022)
Mean plant height	numeric (cm)	Király (2009)
Thousand seed mass	numeric (g)	Török et al. (2013, 2016); Royal Botanic Gardens Kew (2017)
Life-form type	fuzzy coding with 8 levels: tree and shrub; semishrub; dwarf shrub; hemicryptophyte; geophyte; therophyte; hemitherophyte; epiphyte	Horváth et al. (1995); Király (2009)
Seed dispersal type	fuzzy coding with 4 levels: anemochor (dispersal by air); rainwash (dispersal on the open soil surface by flowing water during heavy rainstorms); autochor (self-despersal); zoochor (dispersal by animals)	Fitter and Peat (1994); Csontos et al. (2002); Royal Botanic Gardens Kew (2017); USDA Forest Service (2017)
Pollination type	fuzzy coding with 3 levels: insects; wind; self-pollination	Fitter and Peat (1994); Kühn et al. (2004); USDA Forest Service (2017)
Reproduction type	fuzzy coding with 2 levels: generative; vegetative	Kühn et al. (2004)

Table S2. Statistical results of the pairwise comparisons of species composition

Pair	*F* model	R^2	*P*
NF-PA	5.805	0.244	0.001
NF-PP	3.209	0.151	0.001
NF-RP	6.173	0.255	0.001
PA-PP	2.217	0.109	0.012
PA-RP	7.075	0.282	0.001
PP-RP	3.882	0.177	0.001

NF – oak-linden forests; PA – *Populus alba* forests; PP – plantations of non-native *Pinus sylvestris*; RP – plantations of non-native *Robinia pseudoacacia*; *P*-values were adjusted by the false discovery rate method

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Table S3. Statistical results of the pairwise comparisons of native species number, non-native species number, Shannon diversity, functional diversity, phylogenetic diversity, naturalness value, and ecological indicator value for light intensity (*L*-value)

Pair	Non-native species number	*W*-value	*N*-value	*R*-value	*L*-value	Naturalness
NF-PA	0.728	**0.007**	**< 0.001**	0.368	**< 0.001**	0.618
NF-PP	0.063	0.850	0.096	0.785	**0.003**	**0.010**
NF-RP	**0.032**	0.850	0.596	0.445	**0.002**	**< 0.001**
PA-PP	**0.033**	0.177	0.172	0.064	**0.014**	0.168
PA-RP	**0.005**	**0.007**	**< 0.001**	**0.017**	**< 0.001**	**0.002**
PP-RP	0.909	0.850	**0.023**	0.941	0.104	0.300

Bold – significant *P*-values; *W*-value – ecological indicator for soil moisture; *N*-value – ecological indicator for soil nutrient content; *R*-value – *R*-value – ecological indicator for soil reaction; *L*-value – ecological indicator for light availability; NF – oak-linden forests; PA – *Populus alba* forests; PP – plantations of non-native *Pinus sylvestris*; RP – plantations of non-native *Robinia pseudoacacia*; *P*-values were adjusted by the false discovery rate method

Table S4. Statistical results between observed *SES.RaoQ* values and the null model expectation (two-sided Wilcoxon signed rank test)

Habitat	*SES.RaoQ* (*PD* for all species)		*SES.RaoQ* (*FD* for all traits)	
	V	*P*	*V*	*P*
NF	5	**0.019**	1	**0.004**
PA	38	0.322	18	0.375
PP	29	0.922	8	**0.049**
RP	12	0.131	2	**0.006**

Bold – significant *P*-values; *SES.RaoQ* – standardised effect size of Rao's quadratic entropy; *PD* – phylogenetic diversity; *FD* – functional diversity; NF – oak-linden forests; PA – *Populus alba* forests; PP – *Pinus sylvestris* plantations; RP – *Robinia pseudoacacia* plantations

Table S5. Data on the cover value (%) of the canopy (mean ± standard deviation, *n*=10) in four habitat types

	NF	PA	PP	RP
Canopy cover	79.0 ± 13.7	58.0 ± 16.8	60.0 ± 17.6	77.0 ± 9.4

NF – oak-linden forests; PA – *Populus alba* forests; PP – *Pinus sylvestris* plantations; RP – *Robinia pseudoacacia* plantations

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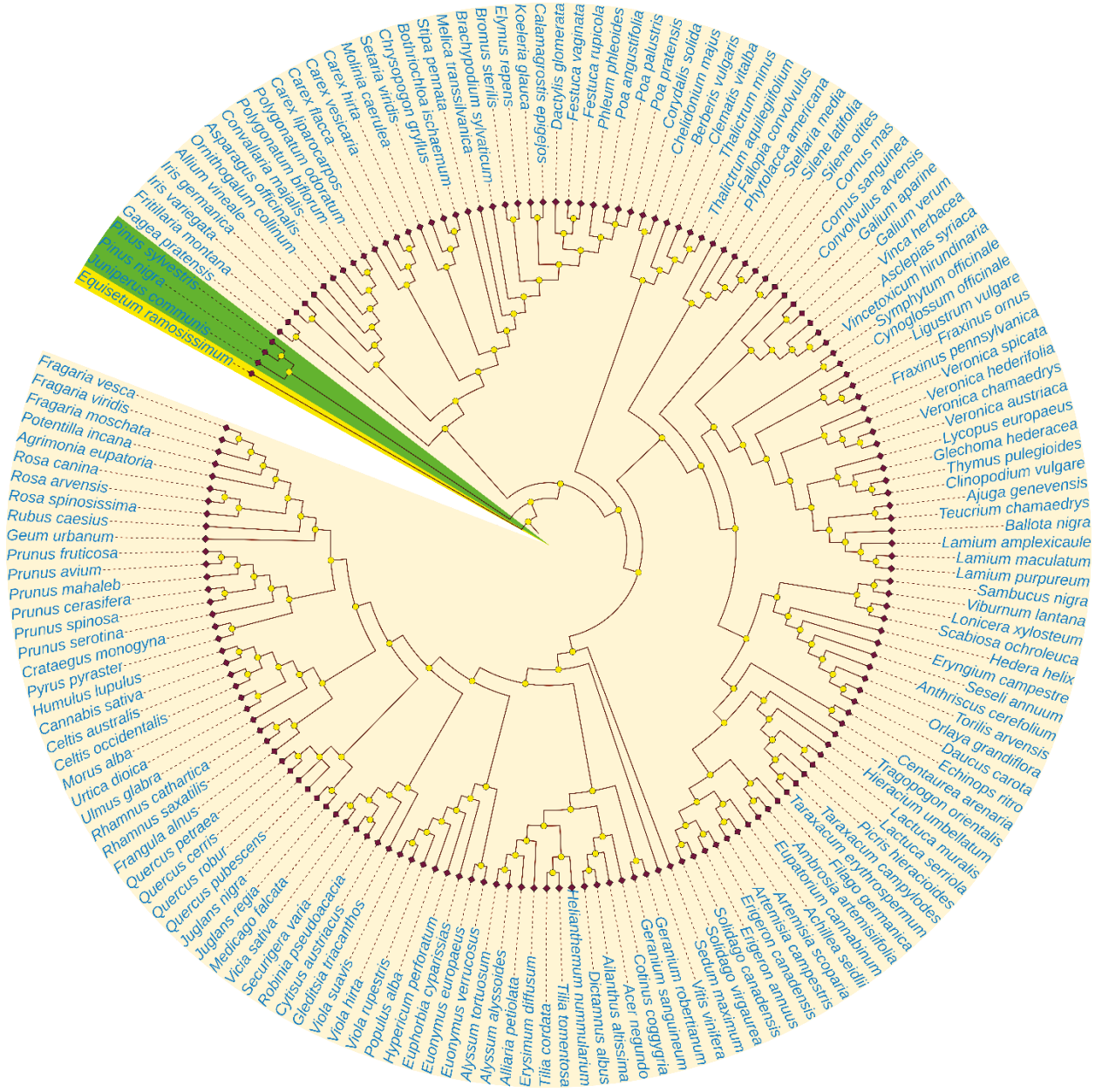

Figure S1. Phylogenetic tree containing 167 species

The yellow zone includes one pteridophyte species, the green zone includes three gymnosperm species, while the remaining species are angiosperms

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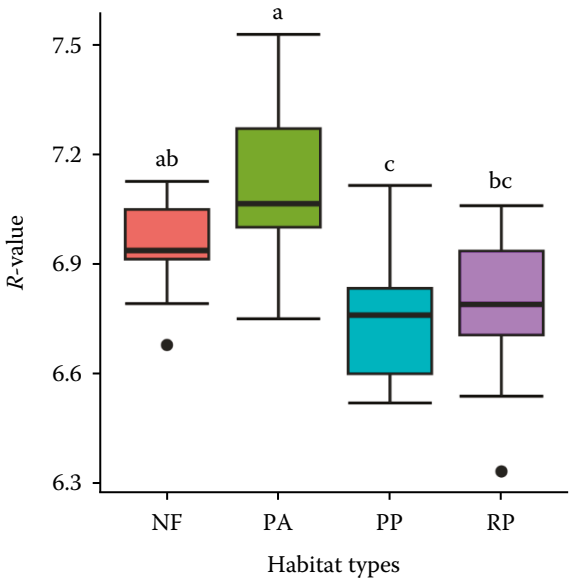

Figure S2. Mean ecological indicator values for soil reaction (pH) for the studied habitats after the outlier of *Pinus* plantations is eliminated

a–c – significant differences ($P < 0.05$); NF – oak-linden forests; PA – *Populus alba* forests; PP – *Pinus sylvestris* plantations; RP – *Robinia pseudoacacia* plantations; *R*-value – ecological indicator for soil reaction

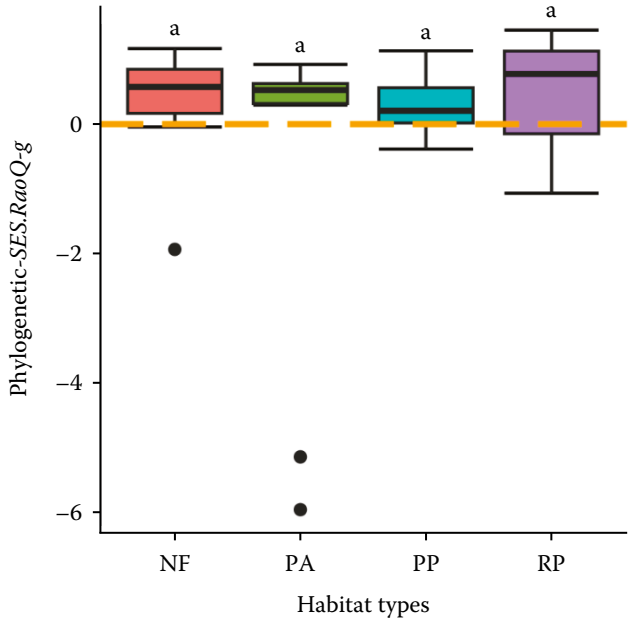

Figure S3. Phylogenetic diversity excluding non-angiosperm species of the oak-linden forests (NF), *Populus alba* forests (PA), *Pinus sylvestris* plantations (PP), and *Robinia pseudoacacia* plantations (RP)

a – significant difference ($P < 0.05$); *SES.RaoQ-g* – standardised effect size of Rao's quadratic entropy with non-agniosperms excluded

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