

Diversity and Functional Relevance of Canopy Arthropods in Central Europe

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Table S1. Distribution of the 1,152 foggings carried out in different sites in Central Europe with forest type specific information. Research was carried out from 1995 to 2020; unmanaged forests, com=commercial forest, prim=primary forest).

Country	Area	Year	Foggings	Altitude	Forest type	Literature
Germany	Steigerwald	1995, 1996, 2004-2007 2011-2013	131	350	Light oak forest, formerly uses as coppice with standard (com)	
Germany	Münnerstadt	1997, 1998	41	330	Light oak forest, formerly uses as coppice with standard (com)	
Germany	Hainich	1997, 2008, 2011	90	400	Randomly chosen forest sites (com, unmanaged)	Fischer et al. 2010
Germany	Leipzig	2003, 2006, 2008	81	160	Mixed floodplain forest (com, unmanaged)	Unterseher et al. 2007
Germany	Alb	2007, 2008, 2012	125	800	Randomly chosen forest sites (com, unmanaged)	Fischer et al. 2010
Germany	Chorin	2010	143	80	Randomly chosen forest sites (com, unmanaged)	Fischer et al. 2010
Germany	Elb-Auen Dessau	2016, 2017, 2020	182	75	Mixed hardwood floodplain forest	
Germany	Schwebheim	2007	18	210	Pure birch stand on moorland meadow (unmanaged)	
Germany	Spessart	2004	1	580	Old oak forest (unmanaged)	
Romania	Semenic	1999	13	1000	Natural beech forest (prim)	
Slovenia	Kocevje	1999	19	850	Dinaric silver fir-european beech forest (prim)	Boncina, A. 1999
Poland	Bialowieca	2001-2004	249	160	Mixed forest, prim (oak-hombeam-linden), unmanaged	Falinski, J.B. 1986 Jedrzejewska B., Jedrzejewski, W. 1998
Poland	Borezka	2003	11	200	Mixed forest (oak-hombeam-linden), unmanaged	
Poland	Kampinoski	2003	15	80	Oak-pine Mixed forest (prim, unmanaged)	
Poland	Komanza	2003	7	480	Mixed beech forest (com)	
Poland	Nurzec	2003	8	160	Oak forest (com)	
Belarus	Asinniki	2004	9	160	Oak forest (com)	
Belarus	Svislac	2004	16	140	Riverine Mixed forest (com)	

Table S2. Number of arthropods per taxon sorted by individual numbers. The total number of trees fogged was 1,152. Because of their high local abundance and ecological impact aphids and ants are shown separately. Thysanoptera, Acarina, and Collembola were not included due to large differences in numbers between sampled trees.

Taxa	Counts	Percent
Diptera	586037	18.05
Homoptera	499463	15.38
Aphidae	251623	7.75
Coleoptera	358202	11.03
Heteroptera	354998	10.93
Psocoptera	347474	10.70
Hymenoptera	296325	9.13
Formicidae	140455	4.33
Lepidoptera	184379	5.68
Araneae	96517	2.97
Opiliones	7479	0.23
Plecoptera	85426	2.63
Neuroptera	15906	0.49
Blattodea	7005	0.22
Orthoptera	6136	0.19
Mecoptera	2627	0.08
Trichoptera	1930	0.06
Raphidioptera	1246	0.04
Dermaptera	829	0.03
Isopoda	606	0.02
Diplopoda	468	0.01
Chilopoda	451	0.01
Ephemeroptera	424	0.01
Molluska	256	0.01
Pseudoscorpion	87	0.00
Archaeognatha	77	0.00
Megaloptera	43	0.00
Odonata	39	0.00
Annelida	11	0.00
Total	3246519	100

Table S3. Assignment of arthropods to feeding guilds as they were collected by fogging in June. Only few individuals of adult Lepidoptera were collected in June, which were not included in the analysis. Taxa were also assigned to one of three categories according to their abundance and constancy in the canopy: major = regularly frequent, minor = regularly rare, sporadic = sporadic occurrence.

Taxon	Classification	Feeding guild
Diptera	major	phy, zoo, myc, xyl, sap, para
Homoptera	major	phy (sap-suckers)
Heteroptera	major	zoo, phy.zoo, myc, phy (sap-suckers)
Coleoptera	major	phy, zoo, xyl, myc, sap
Psocoptera	major	epiphyll grazer
Hymenoptera	major	phy, para
Lepidoptera	major	phy (chewers)
Araneae	major	zoo
Formicidae	minor	zoo
Aphidae	minor	phy (sap-suckers)
Neuroptera	minor	zoo
Opiliones	minor	zoo
Blattodea	minor	sap
Orthoptera	minor	phy (chewers)
Dermaptera	minor	sap
Plecoptera	sporadic	epiphyll grazer
Ephemeroptera	sporadic	non-feeding
Trichoptera	sporadic	non-feeding
Mecoptera	sporadic	zoo
Raphidioptera	sporadic	zoo
Megaloptera	sporadic	zoo
Odonata	sporadic	zoo
Isopoda	sporadic	sap
Diplopoda	sporadic	sap
Chilopoda	sporadic	zoo
Pseudoscorpiones	sporadic	zoo
Archaeognatha	sporadic	sap
Annelida	sporadic	sap
Molluska	sporadic	sap

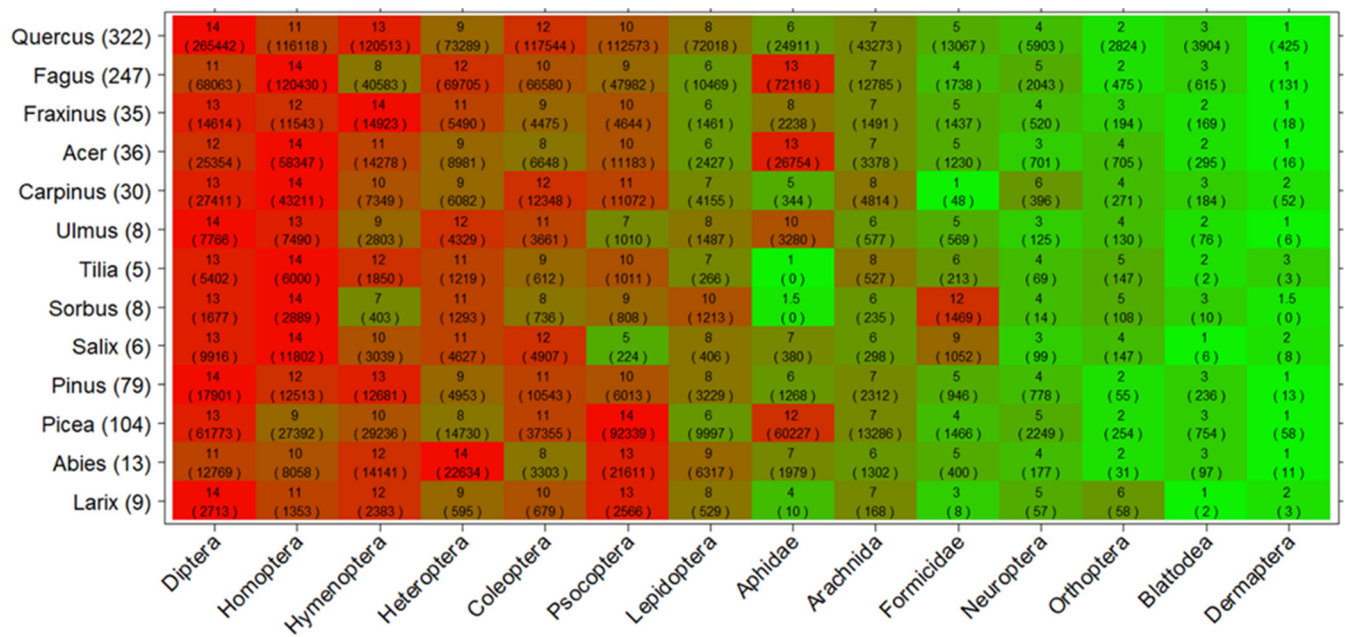


Figure S1. Ranked taxa abundance in the canopy communities of all fogged tree genera total number of individuals in brackets below taxon rank. The darker the shade of green, the higher the rank of the particular group; the highest values are shown in bright red. Tree genera on the y-axis number of foggings in brackets. Included are all tree genera fogged in more than five trees. Mass occurrence of individual taxa (see text) are excluded.

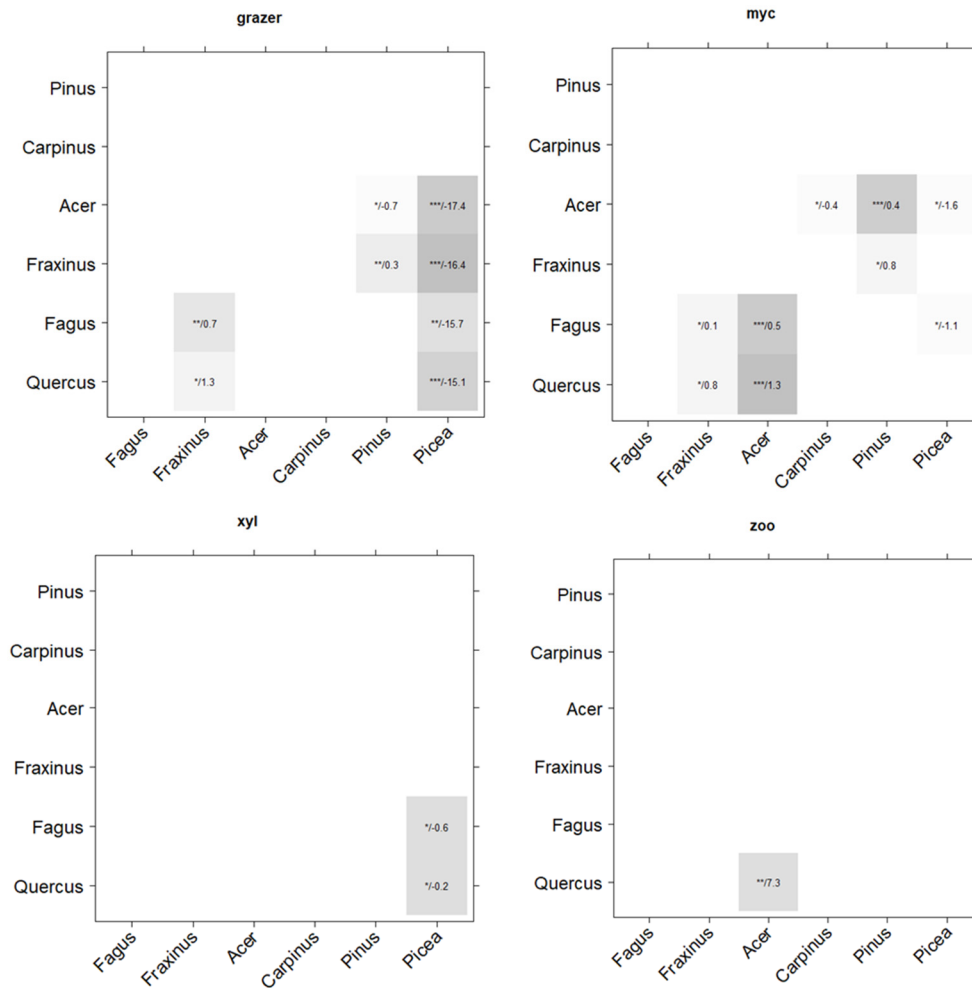


Figure S2. Pairwise Wilcoxon tests with Benjamini-Hochberg p-value adjustment of eight feeding guilds on all tree genera. Only tree genera with more than ten trees fogged are considered. Visualised are p-values; numbers are mean differences in percentages of specimens per tree and feeding guild percent individuals on y-axis minus percent individuals on x-axis. Non-significant comparisons not shown.

Table S4. Full model results of the regression models of guild composition between tree genera shown in MS.

ALL Foggings					
	Df	SumOfSqs	R2	F	Pr..F.
gattung	6	6.48089	0.20146	21.80808	0.00001
area	11	6.7077	0.20851	12.31161	0.00001
year	5	4.27481	0.13288	17.26159	0.00001
prim.dist	1	0.13076	0.00406	2.64002	0.04127
height	1	0.03485	0.00108	0.70366	0.56755
leaf.cover	1	0.03291	0.00102	0.66451	0.59434
altitude	1	0.04531	0.00141	0.91487	0.43176
Residual	292	14.46268	0.44957	NA	NA
Total	318	32.16991	1	NA	NA

Deciduous trees					
	Df	SumOfSqs	R2	F	Pr..F.
gattung	4	4.7756	0.18789	28.15782	0.00001
area	10	5.72385	0.22519	13.49953	0.00001
year	5	4.56828	0.17973	21.54834	0.00001
prim.dist	1	0.32375	0.01274	7.63551	0.00012
height	1	0.06567	0.00258	1.54889	0.18871
leaf.cover	1	0.04317	0.0017	1.01808	0.37941
altitude	1	0.08038	0.00316	1.89583	0.12158
Residual	232	9.83688	0.38701	NA	NA
Total	255	25.41758	1	NA	NA

Coniferous trees					
	Df	SumOfSqs	R2	F	Pr..F.
gattung	1	0.97537	0.16196	17.73496	0.00001
area	7	1.96693	0.3266	5.10918	0.00001
year	2	0.18552	0.0308	1.6866	0.13537
prim.dist	1	0.03589	0.00596	0.6525	0.583
height	1	0.16038	0.02663	2.91623	0.03824
leaf.cover	1	0.05045	0.00838	0.91738	0.42608
altitude	1	0.00801	0.00133	0.14561	0.94885
Residual	48	2.63986	0.43834	NA	NA
Total	62	6.02242	1	NA	NA

Poland, Quercus trees					
	Df	SumOfSqs	R2	F	Pr..F.
area	3	1.56339	0.23692	18.77119	0.00001
year	2	1.92806	0.29218	34.72448	0.00001
prim.dist	1	0.35093	0.05318	12.64048	0.00001
height	1	0.08318	0.01261	2.99633	0.02465
leaf.cover	1	0.0636	0.00964	2.2908	0.06657
Residual	94	2.60965	0.39547	NA	NA
Total	102	6.59881	1	NA	NA

Bialowieca, Quercus trees					
	Df	SumOfSqs	R2	F	Pr..F.
year	1	0.89442	0.2652	33.13414	0.00001
prim.dist	1	0.35093	0.10405	13.00025	0.00001
NorthSouth	1	0.09952	0.02951	3.68688	0.01337
WestEast	1	0.03427	0.01016	1.2697	0.26607
leaf.cover	1	0.07687	0.02279	2.84766	0.03584
Residual	71	1.91657	0.56828	NA	NA
Total	76	3.37259	1	NA	NA

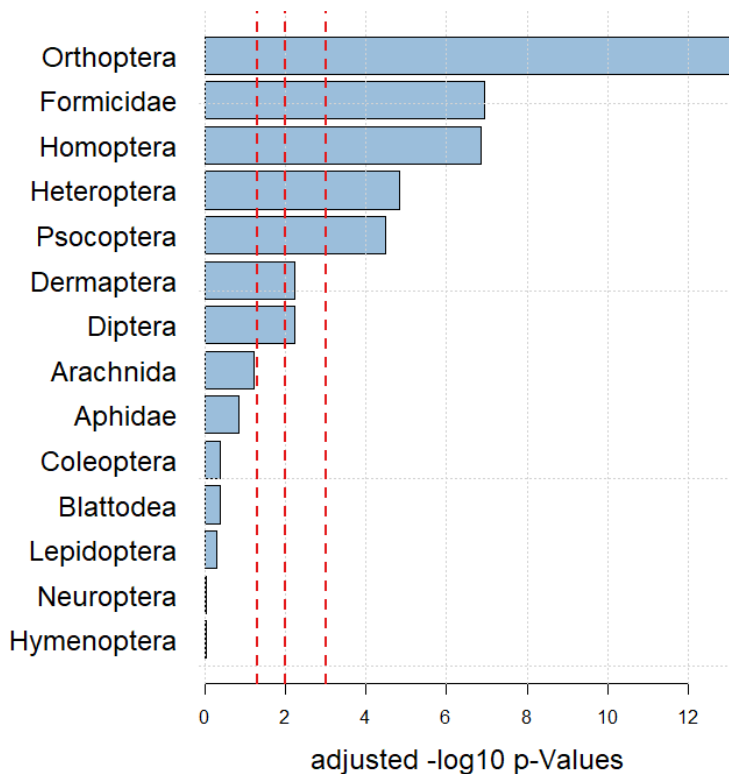


Figure S3. Horizontal bar-plots show multiple testing-adjusted significance levels of the mean abundance of taxa between coniferous and deciduous trees (Wilcox tests). Dotted red lines delineate significance levels on the log x-axis ($p = 0.05$; $p = 0.01$ and $p = 0.001$). Mean numbers of Arachnida, Aphids, Coleoptera, Blattodea, Lepidoptera (mainly caterpillars), Neuroptera and parasitic Hymenoptera differed not significantly between coniferous and deciduous trees. Number of foggings considered was 902. Only trees fogged more than 5 times were considered, mass events were excluded.