

Table S1. List of species recorded in the study area.

Table 51. List of species recorded in the study area.																			
Species	Abbr.	L_light	T_K_ mp era tur e	co nti ne nta ure on e	M_R_ ist cti rog en	N_ rea nit rog en	Thal lus type	Asco mata. type orma tion	Spo res sept atio n	Asexu al.repr oducti on.of.b oth.bio nts	Asexual. reprodu ction.of. mycobio nt	Ascomat a.texture. pigmenta tion	Spores.dar k.pigmenta tion	Secondar y.metabol ites	Photobiont .type	Ascomata area mm ²	Spore shape nm/nm	Spore volume µm ³	
<i>Acrocordia gemmata</i> (Ach.) A. Massal.	Acr.gem	5	6	3	6	6	2	crust ose	perith ecia	2- celle d	absent	pycnidia	ascomata with carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,44178609 3	2,1	1099,875
<i>Alyxoria varia</i> (Pers.) Ertz & Tehler s.l.	Aly.var	4	6	4	5	6	3	crust ose	lirella	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,4398226	3,8	839,6367
<i>Amandinea punctata</i> (Hoffm.) Coppins & Scheid.	Ama.pun	7		6	3	5	7	crust ose	Lecid ea	2- celle d	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	no substance s	chlorococco id and other green	0,1256636	1,96428 5714	352,8766
<i>Anaptychia ciliaris</i> (L.) Körb.	Ana.cil	7	5	5	5	7	4	frutic ose	Lecan ora	2- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	no substance s	chlorococco id and other green	9,62111937 5	1,90476 1904	9 238,95
<i>Anisomeridium biforme</i> (Borrer) R. C. Harris	Ani.bif							crust ose	perith ecia	2- celle d	absent	pycnidia	ascomata with carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,09621119 3	2,66666 6667	202,102
<i>Arthonia</i>	Art.art							crust	artho	mult	absent	absent	ascomata	spores not	no	<i>Trentepohli</i>	0,11044652	3,11111	148,4831

<i>arthonioides</i> (Ach.) A.L. Sm.									ose	nia	i- celle d				with carbonize d structures	pigmented	substance s	<i>a</i>	3	1111	
<i>Arthonia atra</i> (Pers.) A. Schneid	Art.atr	4	6	3	4	5	3	crust ose	artho nia	mult i- celle d	absent	absent	ascomata with carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,15904299 4	4,76923 0769	96,2391		
<i>Arthonia didyma</i> Körb.	Art.did							crust ose	artho nia	2- celle d	absent	absent	ascomata without carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,04665261 1	2,64957 2649	277,8225		
<i>Arthonia radiata</i> (Pers.) Ach.	Art.rad	3	5	4	4	5	4	crust ose	artho nia	mult i- celle d	absent	absent	ascomata with carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,17720531 1	3,33333 3333	252,6275		
<i>Arthonia vinosa</i> Leight.	Art.vin	3	5	5	6	3	1	crust ose	artho nia	2- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	antraquin oses	chlorococco id and other green	0,09621119 4	2,88888 8888	137,8772		
<i>Arthothelium ruanum</i> (A. Massal.) Körb.	Ath.rua	3	6	2	4	5	3	crust ose	artho nia	muri form	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	no substance s	<i>Trentepohli a</i>	0,86590074 4	2,48484 8485	730,7786		
<i>Arthothelium spectabile</i> A. Massal.	Ath.spe	3	7	2	4	5	3	crust ose	artho nia	muri form	absent	absent	ascomata with carbonize d structures	spores pigmented	no substance s	<i>Trentepohli a</i>	0,56744969 4	2,29629 6296	2959,0566		
<i>Athalia pyracea</i> (Ach.) Arup, Frödén & Söchting	Aha.pyr	7		6	3	7	5	crust ose	Lecan ora	2- celle d	absent	pycnidia	ascomata without carbonize d	spores not pigmented	antraquin oses	chlorococco id and other green	0,19634937 5	1,92	245,5078		

														structures								
<i>Bacidia arceutina</i> (Ach.) Arnold	Bac.arc	6	6	3	5	6	3	crust ose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata without carbonize d	spores not pigmented	no substance s	chlorococco id and other green	0,1256636	25,7142 8571	72,1793			
														structures								
<i>Bacidia laurocerasi</i> (Delise ex Duby) Zahlbr.	Bac.lau							crust ose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata without carbonize d	spores not pigmented	no substance s	chlorococco id and other green	1,101065	16	287,6697			
														structures								
<i>Bacidia rubella</i> (Hoffm.) A. Massal.	Bac.rub	6	6	3	5	7	5	crust ose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata without carbonize d	spores not pigmented	no substance s	chlorococco id and other green	0,56744969 4	20	217,8473			
														structures								
<i>Bactrospora dryina</i> (Ach.) A. Massal.	Bct.dry	4	6	2	4	3	1	crust ose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata without carbonize d	spores not pigmented	no substance s	<i>Trentepohli</i> <i>a</i>	0,15904299 4	2,2	18,0039			
														structures								
<i>Biatora globulosa</i> (Flörke) Fr.	Bia.glo							crust ose	Lecid ea	2- celle d	absent	absent	ascomata without carbonize d	spores not pigmented	no substance s	chlorococco id and other green	0,09621119 4	3,61224 4898	31,0977			
														structures								
<i>Bryoria fuscescens</i> (Gyelnik) Brodo & D. Hawksw.	Bry.fus	7	4	6	6	3	4	frutic ose	absen t	absen t	soredia	absent	absent	absent	benzyl esters+β- orcinol depsidone s	chlorococco id and other green						
														structures								
<i>Buellia disciformis</i> (Fr.) Mudd	Bue.dis	4	5	3	4	5	2	crust ose	Lecid ea	2- celle d	absent	pycnidia	ascomata with carbonize d	spores pigmented	β-orcinol depsides	chlorococco id and other green	0,5026544	2,52941 1765	813,5802			
														structures								
<i>Buellia erubescens</i> Arnold	Bue.eru							crust ose	Lecid ea	2- celle	absent	absent	ascomata with	spores pigmented	β-orcinol depsidone	chlorococco id and other	0,785	2,26666 67	500,478			

								d					carbonize d structures		s+β- orcinol depsides	green			
<i>Buellia griseovirens</i> (Turner & Borrer ex Sm.) Almb.	Bue.gri	4	5	5	4	5	4	crust ose	Lecid ea	muri form	soredia	absent	ascomata with carbonize d structures	spores pigmented	β-orcinol depsidone s+β- orcinol depsides	chlorococco id and other green	0,38465	2,15	1125,1756
<i>Buellia schaeferi</i> De Not.	Bue.sch							crust ose	Lecid ea	2- celle d	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	no substance s	chlorococco id and other green	0,04908734 4	2,46153 8462	44,2569
<i>Calicium adpersum</i> Pers.	Cal.ads	4	6	4	5	3	2	crust ose	stalke d	2- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	β-orcinol depsidone s+pulvinic acid derivatives	chlorococco id and other green	0,15904299 4	2,41666 6667	273,3975
<i>Calicium glaucellum</i> Ach.	Cal.gla	3	4	6	6	3	1	crust ose	stalke d	2- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	orcinol depsidone s+orcinol depsides	chlorococco id and other green	0,06379391 2	1,91304 3478	190,4813
<i>Calicium salicinum</i> Pers.	Cal.sal	3	4	6	5	4	2	crust ose	stalke d	2- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	β-orcinol depsidone s	chlorococco id and other green	0,06605192 9	2,11111 1111	100,7564
<i>Calicium viride</i> Pers.	Cal.vir	3	4	6	7	2	2	crust ose	stalke d	2- celle	absent	absent	ascomata with	spores pigmented	pulvinic acid	chlorococco id and other	0,13854411 9	1,88461 5384	271,0734

									d			carbonize d structures +ascomat a with pruina		derivative s	green				
<i>Candelariella xanthostigma</i> (Ach.) Lettau	Can.xan	7	5	5	3	5	5	crust ose	Lecan ora	1- celle d	soredia	absent	ascomata without carbonize d structures	spores not pigmented	pulvinic acid derivative s	chlorococco id and other green	0,23758274	2,33333 3333	111,3623
<i>Carbonicola anthracophila</i> (Nyl.) Bendiksby & Timdal	Crb.ant							crust ose	absen t	abse nt	soredia	absent	absent	absent	β-orcinol depsidone s	chlorococco id and other green			
<i>Cetraria sepincola</i> (Ehrh.) Ach.	Cta.sep	8	3	7	5	3	1	folio se	Lecan ora	1- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	aliphatic acids	chlorococco id and other green	4,90873437	1,82352 9412	73,3168
<i>Cetrelia cetrarioides</i> (Delise) W.L. Culb. & C.F. Culb. s.l.	Cet.cet	5	4	3	6	5	2	folio se	absen t	abse nt	soredia	absent	absent	absent	orcinol depsides	chlorococco id and other green			
<i>Chaenotheca brachypoda</i> (Ach.) Tibell	Cha.bra							crust ose	stalke d	1- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	pulvinic acid derivative s	chlorococco id and other green	0,01767144	1	22,4558
<i>Chaenotheca brunneola</i> (Ach.) Müll. Arg.	Cha.bru	3	4	6	6	3	1	crust ose	stalke d	1- celle d	absent	absent	ascomata with carbonize d structures	spores pigmented	β-orcinol depsides	chlorococco id and other green	0,04908734	1	33,52

<i>Chaenotheca chlorella</i> (Ach.) Müll. Arg.	Cha.chl							crustose	stalked	1-celled	absent	absent	ascomata with carbonized structures +ascomata with pruina	spores pigmented	pulvinic acid derivatives	chlorococcoid and other green	0,0314159	1,928571429	43,3076
<i>Chaenotheca chrysocephala</i> (Ach.) Th. Fr.	Cha.chr	3	4	6	6	2	2	crustose	stalked	1-celled	absent	absent	ascomata with carbonized structures +ascomata with pruina	spores pigmented	pulvinic acid derivatives	chlorococcoid and other green	0,055154539	1,666666667	79,5445
<i>Chaenotheca ferruginea</i> (Turner) Mig.	Cha.fer	5		6	3	2	4	crustose	stalked	1-celled	absent	absent	ascomata with carbonized structures	spores pigmented	antraquinoses	chlorococcoid and other green	0,096211194	1	220,957
<i>Chaenotheca furfuracea</i> (L.) Tibell	Cha.fur	3	4	4	4	3	2	leprose	stalked	1-celled	absent	absent	ascomata with carbonized structures +ascomata with pruina	spores pigmented	pulvinic acid derivatives	chlorococcoid and other green	0,017671444	1	9,7468
<i>Chaenotheca gracilentia</i> (Ach.) Mattsson & Middelb.	Cha.gra	2	5	3	4	5	2	leprose	stalked	1-celled	absent	absent	ascomata with carbonized structures +ascomata with pruina	spores pigmented	other substances	chlorococcoid and other green	0,017671444	1	10,8924
<i>Chaenotheca phaeocephala</i>	Cha.pha	5	5	5	4	3	3	crustose	stalked	1-celled	absent	absent	ascomata with	spores pigmented	pulvinic acid	chlorococcoid and other	0,061575164	1	143,8348

(Turner) Th. Fr.									d				carbonize d structures +ascomat a with pruina		derivative s	green			
<i>Chaenotheca trichialis</i> (Ach.) Th. Fr.	Cha.tri	3	5	5	4	4	2	crust ose	stalke d	1- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	other substance s	chlorococco id and other green	0,04908734 4	1	22,4558
<i>Chaenotheca xyloxena</i> Nádv.	Cha.xyl							crust ose	stalke d	1- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	no substance s	chlorococco id and other green	0,04908734 4	1	22,4558
<i>Chrysothrix candelaris</i> (L.) J. R. Laundon	Chr.can	4	5	4	4	3	2	lepro se	absen t	abse nt	soredia	absent	absent	absent	pulvinic acid derivative s	chlorococco id and other green			
<i>Cladonia arbuscula</i> (Wallr.) Flot. subsp. <i>beringiana</i> Ahti	Cla.a.be	8		6			1	frutic ose	absen t	abse nt	absent	pycnidia	absent	absent	β-orcinol depsidone s+usnic acid derivative s	chlorococco id and other green			
<i>Cladonia arbuscula</i> (Wallr.) Flot. subsp. <i>mitis</i> (Sandst.) Ruoss	Cla.a.mi	9		7			1	frutic ose	absen t	abse nt	absent	pycnidia	absent	absent	aliphatic acids+β- orcinol depsidone s+usnic acid derivative	chlorococco id and other green			

<i>Cladonia botrytes</i> (K. G. Hagen) Willd.	Cla.bot							fruticose	Lecidea	1-celled	absent	pycnidia	ascomata without carbonized structures	spores not pigmented	β -orcinol depsides+ usnic acid derivative	chlorococcoid and other green	0,7853975	3,8181818	41,589
<i>Cladonia caespiticia</i> (Pers.) Flörke	Cla.cae	6	5	3	5	2		fruticose	Lecidea	1-celled	absent	pycnidia	ascomata without carbonized structures	spores not pigmented	β -orcinol depsidones	chlorococcoid and other green	1,038688193	3,428571429	76,9913
<i>Cladonia cenotea</i> (Ach.) Schaer.	Cla.cen	6	4	6	6	2	1	fruticose	absent	absent	soredia	absent	absent	absent	β -orcinol depsides	chlorococcoid and other green			
<i>Cladonia chlorophaea</i> (Flörke ex Sommerf.) Spreng. s.l.	Cla.chl							fruticose	absent	absent	soredia	pycnidia	absent	absent	β -orcinol depsidones	chlorococcoid and other green			
<i>Cladonia coniocraea</i> (Flörke) Spreng.	Cla.con	5		6	4	3		fruticose	Lecidea	1-celled	soredia	pycnidia	ascomata without carbonized structures	spores not pigmented	β -orcinol depsidones	chlorococcoid and other green	0,785	2,888888889	137,7686
<i>Cladonia cornuta</i> (L.) Hoffm.	Cla.cor							fruticose	absent	absent	soredia	absent	absent	absent	β -orcinol depsidones	chlorococcoid and other green			
<i>Cladonia crispata</i> (Ach.) Flot.	Cla.cri							fruticose	absent	absent	absent	absent	absent	absent	β -orcinol depsides	chlorococcoid and other green			
<i>Cladonia deformis</i> (L.) Hoffm.	Cla.def	7	4	6	5	2	1	fruticose	absent	absent	soredia	pycnidia	absent	absent	usnic acid derivative + terpenoids	chlorococcoid and other green			
<i>Cladonia digitata</i> (L.) Hoffm.	Cla.dig	5	4	6		2	3	fruticose	Lecidea	1-celled	soredia	pycnidia	ascomata without carbonized structures	spores not pigmented	β -orcinol depsides+ naphthaquinones	chlorococcoid and other green	0,7862975	3,428571429	76,9913

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(Hoffm.) Hoffm.								d		carbonize d structures			green					
<i>Cladonia phyllophora</i> Hoffm.	Cla.phy							frutic ose	absen t	abse nt	absent	pycnidia	absent	absent	β-orcinol depsidone s	chlorococco id and other green		
<i>Cladonia rangiferina</i> (L.) F. H. Wigg.	Cla.ran	6	4	6	5	1	frutic ose	absen t	abse nt	absent	pycnidia	absent	absent	β-orcinol depsidone s+β- orcinol depsides	chlorococco id and other green			
<i>Cladonia squamosa</i> Hoffm.	Cla.squ	6	4	6	5	2	frutic ose	absen t	abse nt	absent	pycnidia	absent	absent	β-orcinol depsides	chlorococco id and other green			
<i>Cladonia subulata</i> (L.) F. H. Wigg.	Cla.sub	8		6		3	frutic ose	absen t	abse nt	soredia	absent	absent	absent	β-orcinol depsidone s	chlorococco id and other green			
<i>Coenogonium pineti</i> (Schr. ex Ach.) Lücking & Lumbsch	Coe.pin	3	5	3	4	4	crust ose	Lecid ea	2- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli</i> <i>a</i>	0,09621119	3,65079 4	59,7645
<i>Coniocarpon cinnabarinum</i> DC.	Con.cin	4	7	2	5	6	crust ose	artho nia	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	antraquin oses	<i>Trentepohli</i> <i>a</i>	0,17867793	2,90909 0909	855,5456
<i>Diarthonis spadicea</i> (Leight.) Frisch, Ertz, Coppins & P.F.Cannon	Dia.spa	2	6	3	4	4	crust ose	artho nia	2- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli</i> <i>a</i>	0,56744969	2,57142 8571	57,7434
<i>Evernia divaricata</i> (L.) Ach.	Eve.div	7	4	6	6	3	frutic ose	absen t	abse nt	soredia	absent	absent	absent	orcinol depsides+ usnic acid	chlorococco id and other green			

																derivative s			
<i>Evernia prunastri</i> (L.) Ach.	Eve.pru	7	5	6	4	3	4	fruticose	absent	absent	soredia	absent	absent	absent		orcinol depsides+ β-orcinol chlorococco depsides+ id usnic acid and other green derivative s			
<i>Felipes leucopellaeus</i> (Ach.) Frisch & G.Thor	Fel.leu	2	4	2	7	3	1	crustose	artho- nia	mult i- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	other substance s	<i>Trentepohli</i> <i>a</i>	1,76714437 5	2,94117 6471	118,2529
<i>Fellhanera gyrophorica</i> Sérus., Coppins, Diederich & Scheidegger	Flh.gyr							crustose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	orcinol tridepside s	chlorococco id and other green	0,19634937	7,63636 3636	83,178
<i>Flavoparmelia caperata</i> (L.) Hale	Fla.cap	6	7	3	4	5	4	foliose	absent	absent	soredia	absent	absent	absent		aliphatic acids+β- orcinol depsidone s+usnic acid derivative s	chlorococco id and other green		
<i>Graphis scripta</i> (L.) Ach. s.l.	Gra.scr	3	5	4	4	5	3	crustose	lirella	mult i- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	no substance s	<i>Trentepohli</i> <i>a</i>	1,47262031 3	4,88235 2941	1570,3989
<i>Gyalecta fagicola</i>	Gya.fag	5	5	4	7	6	2	crustose	Lecid	mult	absent	pycnidia	ascomata	spores not	no	<i>Trentepohli</i>	0,09621119	5,88235	236,5059

(Arnold) Kremp.										ose	ea	i-celled			with carbonized structures	pigmented	substances	<i>a</i>	4	2941		
<i>Gyalecta flotowii</i> Körb.	Gya.flo								crustose	Lecidea	muriiform	absent	absent	ascomata without carbonized structures	spores not pigmented	no substances	<i>Trentepohlia</i>	0,070685775	1,533333333	338,8009		
<i>Gyalecta truncigena</i> (Ach.) Hepp	Gya.tru								crustose	Lecidea	muriiform	absent	absent	ascomata without carbonized structures	spores not pigmented	no substances	<i>Trentepohlia</i>	0,096211194	3	538,9388		
<i>Gyalecta ulmi</i> (Sw.) Zahlbr.	Gya.ulm	5	5	5	5	6	1	crustose	Lecidea	muriiform	absent	absent	ascomata without carbonized structures	spores not pigmented	no substances	<i>Trentepohlia</i>	0,5026544	2,916666667	329,9625			
<i>Hazslinszkya gibberulosa</i> (Ach.) Körb	Haz.gib								crustose	Lecidea	1-celled	absent	absent	ascomata with carbonized structures	spores not pigmented	no substances	<i>Trentepohlia</i>	0,1256	2,2666666	169,5735		
<i>Hypocenomyce scalaris</i> (Ach.) M. Choisy	Hyp.sca	6	5	6	3	2	2	crustose	absent	absent	soredia	pycnidia	absent	absent	orcinol depsides	chlorococcoid and other green						
<i>Hypogymnia farinacea</i> Zopf	Hpg.far	6	4	6	7	3	2	foliose	absent	absent	soredia	absent	absent	absent	orcinol depsidone s+β-orcinol depsides	chlorococcoid and other green						
<i>Hypogymnia physodes</i> (L.) Nyl.	Hpg.phy	7		6	3	3	3	foliose	absent	absent	soredia	pycnidia	absent	absent	orcinol depsidone s+β-orcinol depsidone s+β-	chlorococcoid and other green						

<i>Lecidea turgidula</i> (Hoffm.) Ach	Lcd.tur							crust ose	Lecid ea	1- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	usnic acid derivatives	chlorococco id and other green	0,1256636	2,28571 4286	51,3275
<i>Lecidella elaechroma</i> (Ach.) M. Choisy	Lcl.ela	6	5	6	3	6	5	crust ose	Lecid ea	1- celle d	absent	absent	ascomata with carbonize d structures	spores not pigmented	xanthones	chlorococco id and other green	1,32732177 5	1,8	397,7227
<i>Lepra albescens</i> (Huds.) Hafellner	Lpr.alb	6		6	3	6	6	crust ose	absen t	abse nt	soredia	absent	absent	absent	aliphatic acids	chlorococco id and other green			
<i>Lepra amara</i> (Ach.) Hafellner	Lpr.ama	6		6	4	3	2	crust ose	absen t	abse nt	soredia	absent	absent	absent	other substance s+β- orcinol depsidone s	chlorococco id and other green			
<i>Lepra ophthalmiza</i> (Nyl.) Hafellner	Lpr.opht							crust ose	Lecan ora	1- celle d	soredia	absent	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	aliphatic acids	chlorococco id and other green	0,19634937 5	2,33333 3333	263970
<i>Lepraria finkii</i> (B. de Lesd.) R.C. Harris s.l.	Lep.fin	4	5	5	4	6	3	lepro se	absen t	abse nt	soredia	absent	absent	absent	β-orcinol depsidone s+β- orcinol depsides+ terpenoids	chlorococco id and other green			
<i>Lepraria incana</i> (L.) Ach.s.l.	Lep.inc	4	5	6	3	3	5	lepro se	absen t	abse nt	soredia	absent	absent	absent	orcinol depsides+ terpenoids	chlorococco id and other green			

<i>Lobaria pulmonaria</i> (L.) Hoffm.	Lob.pul	5	4	4	7	5	2	folio se	Lecanora	mult i-celled	soredia	pycnidia	ascomata without carbonized structures	spores not pigmented	β-orcinol depsidones	chlorococcoid and other green	7,0685775	3,428571429	615,93
<i>Lobarina scrobiculata</i> (Scop.) Nyl.	Lbr.scr	7	4	3	7	5	1	folio se	Lecanora	mult i-celled	soredia	absent	ascomata without carbonized structures	spores not pigmented	β-orcinol depsidone s+usnic acid derivative	chlorococcoid and other green	1,76625	3,7272727	324,5579
<i>Loxospora elatina</i> (Ach.) A.Massal.	Lox.ela	5	4	2	6	3	2	crustose	absent	absent	soredia	absent	absent	absent	β-orcinol depsides	chlorococcoid and other green			
<i>Melanelixia glabrata</i> (Lamy) Sandler & Arup	Mel.gla							folio se	absent	absent	isidia	pycnidia	absent	absent	orcinol depsides	chlorococcoid and other green			
<i>Melanelixia subaurifera</i> (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch	Mel.sub	6	5	5	5	6	5	folio se	absent	absent	soredia	pycnidia	absent	absent	orcinol depsides	chlorococcoid and other green			
<i>Melanohalea exasperatula</i> (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch	Mlh.exa	7	5	6	3	5	6	folio se	absent	absent	isidia	pycnidia	absent	absent	no substance	chlorococcoid and other green			
<i>Menegazzia terebrata</i> (Hoffm.) A. Massal.	Men.ter	5	4	3	7	4	1	folio se	absent	absent	soredia	pycnidia	absent	absent	aliphatic acids+β-orcinol depsidone s+β-orcinol depsides	chlorococcoid and other green			
<i>Micarea denigrata</i>	Mic.den	8		6	3	3	7	crust	Lecid	2-	absent	pycnidia	ascomata	spores not	orcinol	chlorococco	0,08295761	4,71698	45,9754

(Fr.) Hedl.								ose	ea	celle d				without carbonize d structures	pigmented	tridepside s	id and other green	1	1132	
<i>Micarea elachista</i> (Körb.) Coppins & R. Sant.	Mic.ela							crust ose	Lecid ea	1- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	no substance s	chlorococco id and other green	0,05309287 1	4,72727 2727	51,4912	
<i>Micarea melaena</i> (Nyl.) Hedl.	Mic.mel		4	3	6	2	1	crust ose	Lecid ea	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures	spores not pigmented	orcinol tridepside s	chlorococco id and other green	0,04908734 4	3,47368 4211	194,9823	
<i>Micarea prasina</i> Fr. s.l.	Mic.pra	3	4	4	4	4	4	crust ose	Lecid ea	2- celle d	absent	pycnidia	ascomata without carbonize d structures	spores not pigmented	diphenyl ethers	chlorococco id and other green	0,07068577 5	2,85714 2857	64,1594	
<i>Microcalicium disseminatum</i> (Ach.) Vainio	Mcr.dis							crust ose	stalke d	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	no substance s	algae absent	0,0314159	3,42857 1429	76,9913	
<i>Myriolecis hagenii</i> (Ach.) Śliwa, Zhao Xin & Lumbsch	Myr.hag	6		6	3	8	7	crust ose	Lecan ora	1- celle d	absent	absent	ascomata with carbonize d structures +ascomat a with pruina	spores not pigmented	no substance s	chlorococco id and other green	0,15904299 4	2	151,5766	
<i>Normandina pulchella</i> (Borrer) Nyl.	Nor.pul	6	5	3	5	5	4	folio se	absen t	absen t	soredia	absent	absent	absent	no substance s	chlorococco id and other green				
<i>Ochrolechia androgyna</i> (Hoffm.) Arnold	Och.and	5	4	6	7	3	3	crust ose	absen t	absen t	soredia	absent	absent	absent	orcinol depsides+ orcinol	chlorococco id and other green				

s.l.																tridepsides				
<i>Ochrolechia arborea</i> (Kreyer) Almb.	Och.arb	6	5	4	6	4	3	crustose	absent	absent	soredia	absent	absent	absent		orcinol depsides+ orcinol tridepsides+xanthon	chlorococcoid and other green			
<i>Ochrolechia turneri</i> (Sm.) Hasselrot	Och.tur							crustose	absent	absent	soredia	absent	absent	absent		orcinol depsidone s+orcinol depsides	chlorococcoid and other green			
<i>Opegrapha niveoatra</i> (Borrer) J. R. Laundon	Ope.niv							crustose	lirella	multicelled	absent	pycnidia	ascomata with carbonized structures	spores not pigmented		no substances	<i>Trentepohlia</i>	0,076576256	7,692307692	138,3027
<i>Opegrapha vermicellifera</i> (Kunze) J. R. Laundon	Ope.ver	3	8	2	4	5	3	crustose	lirella	multicelled	absent	pycnidia	ascomata with carbonized structures	spores not pigmented		no substances	<i>Trentepohlia</i>	0,08482293	5,857142857	131,5267
<i>Parmelia saxatilis</i> (L.) Ach. s.l.	Par.sax	6		6	5	3	3	foliose	absent	absent	isidia	pycnidia	absent	absent		orcinol depsidone s+β-orcinol depsidone s+β-orcinol depsides	chlorococcoid and other green			
<i>Parmelia sulcata</i> Taylor s.l.	Par.sul	7		6	3	5	7	foliose	absent	absent	soredia	pycnidia	absent	absent		β-orcinol depsidone s+β-orcinol depsides	chlorococcoid and other green			
<i>Parmeliopsis ambigua</i> (Wulfen) Nyl.	Prm.amb	6	4	6	5	2	2	foliose	absent	absent	soredia	absent	absent	absent		orcinol depsides+ β-orcinol	chlorococcoid and other green			

														d structures													
<i>Phaeophyscia nigricans</i> (Flörke) Moberg	Pha.nig	8		6		8	9	folio se	absen t	abse nt	isidia	absent	absent	absent	no substance s	chlorococco id and other green											
<i>Phaeophyscia orbicularis</i> (Neck.) Moberg	Pha.orb	7		6		7	9	folio se	absen t	abse nt	soredia	pycnidia	absent	absent	no substance s	chlorococco id and other green											
<i>Phlyctis agelaea</i> (Ach.) Flot.	Phl.age	5	6	3	4	6	1	crust ose	Lecan ora	muri form	soredia	absent	ascomata without carbonize d	spores not pigmented	β-orcinol depsidone s	chlorococco id and other green	0,0961625	3,51351 3514	11642,2968								
<i>Phlyctis argena</i> (Spreng.) Flot.	Phl.arg	5		5	4	3	4	5	crust ose	absen t	abse nt	soredia	absent	absent	absent	β-orcinol depsidone s	chlorococco id and other green										
<i>Physcia adscendens</i> (Fr.) H. Olivier	Psc.ads	7		6	3	7	8	folio se	Lecan ora	2- celle d	soredia	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	β-orcinol depsides	chlorococco id and other green	1,2265625	2,29411 7647	737,3171								
<i>Physcia aipolia</i> (Ehrh. ex Humb.) Fűrnr.	Psc.aip	7		6	3	7	5	folio se	Lecan ora	2- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat a with pruina	spores pigmented	β-orcinol depsides+ terpenoids	chlorococco id and other green	2,40527984 4	2,47058 8235	794,6597								
<i>Physcia stellaris</i> (L.) Nyl.	Psc.ste	7	4	6	3	6	6	folio se	Lecan ora	2- celle d	absent	pycnidia	ascomata with carbonize d structures +ascomat	spores pigmented	β-orcinol depsides	chlorococco id and other green	3,14159	2,05555 5556	784,8394								

<i>furfuracea</i> (L.) Zopf								ose	t	nt						depsides+ β-orcinol depsides	id and other green			
<i>Pseudoschismatom ma rufescens</i> (Pers.) Ertz & Tehler	Peu.ruf	3	6	3	4	6	5	crust ose	lirella	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures	spores not pigmented	no substance s	<i>Trentepohli a</i>	0,03864155 7	5,5	92,18	
<i>Pyrenula laevigata</i> (Pers.) Arnold	Pyr.lae							crust ose	perith ecia	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	xanthones	<i>Trentepohli a</i>	0,24192206 5	2,29411 7647	737,8983	
<i>Pyrenula nitida</i> (Weigel) Ach.	Pyr.nit	3	7	3	4	5	2	crust ose	perith ecia	mult i- celle d	absent	pycnidia	ascomata with carbonize d structures	spores pigmented	antraquin oses	<i>Trentepohli a</i>	0,38484477 5	3,07142 8571	551,7706	
<i>Pyrenula nitidella</i> (Flörke ex Schaer.) Müll. Arg.	Pyr.ntd	3	7	2	4	5	1	crust ose	perith ecia	mult i- celle d	absent	absent	ascomata with carbonize d structures	spores pigmented	antraquin oses	<i>Trentepohli a</i>	0,04908734 4	2,46153 8462	1194,9356	
<i>Ramalina farinacea</i> (L.) Ach.	Ram.far	6	5	6	4	5	4	frutic ose	Lecan ora	2- celle d	soredia	absent	ascomata without carbonize d structures	spores not pigmented	β-orcinol depsidone s+usnic acid derivative s	chlorococco id and other green	12,56	1,91666 6667	216,6617	
<i>Ramalina pollinaria</i> (Westr.) Ach.	Ram.pol	7		5	5	4	5	frutic ose	Lecan ora	2- celle d	soredia	absent	ascomata without carbonize d structures	spores not pigmented	orcinol depsides+ usnic acid derivative s	chlorococco id and other green	12,56	2,5	163,5429	
<i>Ramalina thrausta</i> (Ach.) Nyl.	Ram.thr							frutic ose	absen t	abse nt	soredia	absent	absent	absent	usnic acid derivative s	chlorococco id and other green				
<i>Reichlingia</i>	Rei.leo							lepro	absen	abse	soredia	sporodoc	absent	absent	orcinol	<i>Trentepohli</i>				

<i>leopoldii</i> Diederich & Scheid.										se	t	nt	hia		depsides		<i>a</i>		
<i>Rinodina pyrina</i> (Ach.) Arnold	Rin.pyr	7	4	6	5	7	3	crustose	Lecanora	2-celled	absent	absent	ascomata without carbonized structures	spores pigmented	no substance	chlorococcoid and other green	0,07068577	2,153846154	309,7981
<i>Schismatomma pericleum</i> (Ach.) Branth & Rostrup	Sch.per	3	4	4	6	3	1	crustose	Lecanora	multicelled	absent	absent	ascomata with carbonized structures	spores not pigmented	aliphatic acids	<i>Trentepohlia</i>	0,096211194	10,30769231	185,3257
<i>Scoliciosporum chlorococcum</i> (Stenh.) Vězda s.l.	Sco.chl	6	5	3	3	3	6	crustose	Lecidea	multicelled	absent	absent	ascomata without carbonized structures	spores not pigmented	no substance	chlorococcoid and other green	0,070685775	6,666666666	318,1781
<i>Thelotrema lepadinum</i> (Ach.) Ach.	The.lep	4	6	3	7	4	1	crustose	Lecanora	multicelled	absent	absent	ascomata without carbonized structures	spores not pigmented	no substance	<i>Trentepohlia</i>	1,767144375	4,875	20426,25
<i>Trapeliopsis flexuosa</i> (Fr.) Coppins & P. James	Tra.fle	7		6	3	2	5	crustose	Lecidea	1-celled	soredia	absent	ascomata without carbonized structures	spores not pigmented	orcinol tripeptides	chlorococcoid and other green	0,159042994	2,538461538	45,6399
<i>Trapeliopsis granulosa</i> (Hoffm.) Lumbsch	Tra.gla	8		6		1	2	crustose	Lecidea	1-celled	soredia	absent	ascomata without carbonized structures	spores not pigmented	orcinol tripeptides	chlorococcoid and other green	0,331830444	2,3	150,5781
<i>Tuckermanopsis chlorophylla</i> (Willd.) Hale	Tuc.chl	6	4	6	6	3	3	foliose	absent	absent	soredia	pycnidia	absent	absent	aliphatic acids	chlorococcoid and other green			
<i>Usnea ceratina</i> Ach.	Usn.cer							fruticose	absent	absent	isidia	absent	absent	absent	β-orcinol depsides+ usnic acid	chlorococcoid and other green			

														derivatives						
<i>Usnea dasopoga</i> (Ach.) Nyl.	Usn.das	7	4	6	6	3	2	fruticose	absent	absent	isidia	absent	absent	absent	β-orcinol depsidones+usnic acid derivatives	chlorococcoid and other green				
<i>Usnea florida</i> (L.) Weber ex F.H. Wigg.	Usn.flo	7	6	2	7	5	2	fruticose	absent	absent	soredia	absent	absent	absent	β-orcinol depsides+usnic acid derivatives	chlorococcoid and other green				
<i>Usnea hirta</i> (L.) F. H. Wigg.	Usn.hir	7	4	6	5	3	4	fruticose	absent	absent	isidia	absent	absent	absent	aliphatic acids+usnic acid derivatives	chlorococcoid and other green				
<i>Varicellaria hemisphaerica</i> (Flörke) Schmitt & Lumbsch	Var.hem	5	6	3	5	4	3	crustose	absent	absent	soredia	absent	absent	absent	orcinol depsides	chlorococcoid and other green				
<i>Vulpicida pinastri</i> (Scop.) J.-E. Mattson & M. J. Lai	Vul.pin	6	3	6	7	2	2	foliose	absent	absent	soredia	absent	absent	absent	pulvinic acid derivatives+usnic acid derivatives+terpenoids	chlorococcoid and other green				
<i>Xanthoria parietina</i> (L.) Th. Fr.	Xan.par	7				3	7	8	foliose	Lecanora	2-celled	absent	pycnidia	ascomata without carbonized structures	spores not pigmented	antraquinones	chlorococcoid and other green	4,908734375	1,75	469,28
<i>Xylopsora caradocensis</i> (Leight. ex Nyl.)	Xyl.car	5	5	2	6	2	1	crustose	Lecidea	2-celled	absent	pycnidia	ascomata with carbonize	spores not pigmented	no substances	chlorococcoid and other green	0,1256636	3,117647059	64,1782	

Bendiksby & Timdal														d structures					
														ascomata					
<i>Zwackhia viridis</i> (Ach.) Poetsch & Schied.	Zwa.vir	3	6	3	5	5	2	crustose	apothecia	multicelled	absent	pycnidia	carbonized structures	spores pigmented	no substances	<i>Trentepohlia</i>	0,110741045,53333333	1222,6289	

Table S2. Parameters of variables passively fitted to results of the PCA ordinations showing temporal shifts in composition of lichen species at forest community level. Determination coefficients R^2 and P-values were estimated using permutation tests with 999 iterations. Abbreviations: CWM – community weighted mean; WEIV – Wirth ecological indicator value. Significant results are in **bold**.

Parameter	Code	PC1	PC2	R^2	P
Coniferous forest communities:					
Functional richness	FRic	−0.993	−0.109	0.792	0.001
Functional evenness	FEve	0.075	0.997	0.335	0.001
Functional dispersion	FDis	−0.981	0.190	0.673	0.001
Functional divergence	FDiv	−0.866	−0.499	0.157	0.002
CWM of ascomata area	AscArea	−0.509	0.860	0.143	0.001
CWM of ascospore volume	SporVol	−0.957	0.286	0.495	0.001
CWM of ascospore shape	SporShp	−0.432	0.901	0.480	0.001
CWM of light WEIV	WEIV.L	0.778	−0.627	0.779	0.001
CWM of temperature WEIV	WEIV.T	−0.887	0.461	0.770	0.001
CWM of continentality WEIV	WEIV.C	0.847	−0.531	0.841	0.001
CWM of moisture WEIV	WEIV.M	0.823	0.566	0.193	0.001
CWM of nitrogen WEIV	WEIV.N	−0.967	−0.253	0.414	0.001
Shannon index	Shan	−0.930	−0.366	0.813	0.001
Species richness	Rich	−0.947	−0.319	0.836	0.001
Mixed deciduous forest communities:					
Functional richness	FRic	−0.99821	0.05981	0.6692	0.001
Functional evenness	FEve	0.97743	0.21126	0.1339	0.001
Functional dispersion	FDis	−0.628	−0.777	0.066	0.029
Functional divergence	FDiv	0.379	0.925	0.109	0.002
CWM of ascomata area	AscArea	−0.064	−0.997	0.153	0.001
CWM of ascospore volume	SporVol	−0.053	−0.998	0.207	0.001
CWM of ascospore shape	SporShp	0.343	−0.939	0.038	0.133
CWM of light WEIV	WEIV.L	−0.125	0.992	0.341	0.001
CWM of temperature WEIV	WEIV.T	0.087	−0.996	0.688	0.001
CWM of continentality WEIV	WEIV.C	0.053	0.998	0.641	0.001
CWM of moisture WEIV	WEIV.M	0.291	0.956	0.131	0.001
CWM of nitrogen WEIV	WEIV.N	−0.777	−0.629	0.369	0.001
Shannon index	Shan	−0.998	0.055	0.742	0.001
Species richness	Rich	−0.997	0.065	0.793	0.001
Wet forest communities:					
Functional richness	FRic	0.986	−0.160	0.829	0.001
Functional evenness	FEve	−0.972	0.234	0.140	0.004

Functional dispersion	FDis	0.326	-0.945	0.265	0.001
Functional divergence	FDiv	-0.083	0.996	0.037	0.216
CWM of ascomata area	AscArea	0.128	-0.991	0.156	0.002
CWM of ascospore volume	SporVol	0.466	-0.884	0.129	0.006
CWM of ascospore shape	SporShp	-0.570	-0.821	0.371	0.001
CWM of light WEIV	WEIV.L	0.635	0.772	0.347	0.001
CWM of temperature WEIV	WEIV.T	-0.125	-0.992	0.764	0.001
CWM of continentality WEIV	WEIV.C	0.224	0.974	0.543	0.001
CWM of moisture WEIV	WEIV.M	-0.808	0.588	0.162	0.001
CWM of nitrogen WEIV	WEIV.N	0.986	-0.162	0.412	0.001
Shannon index	Shan	0.993	-0.114	0.884	0.001
Species richness	Rich	0.992	-0.118	0.880	0.001

Table S3. Parameters of mixed effect models showing temporal shifts in lichen species' functional diversity components, community weighted means of functional traits, Shannon index and species richness regarding coniferous forest communities. For testing shifts in species richness over time, the generalized mixed effects model with Poisson distribution was employed, while regarding remaining parameters of lichen species composition the linear mixed models were used. Abbreviations: CWM – community weighted mean; WEIV – Wirth ecological indicator value. Significant results are in **bold**.

	Random effects	Variance	SD	Mixed model parameters	–
Functional richness	Plot id	4.039	2.010	R_m^2	0.259
	Residuals	1.944	1.394	R_c^2	0.759
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.464	0.345	12.910	<0.001
	Time	2.882	0.278	10.340	<0.001
Functional evenness	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	<0.001	0.005	R_m^2	0.202
	Residuals	<0.001	0.014	R_c^2	0.306
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.858	0.002	382.687	<0.001
Functional dispersion	Time	-0.015	0.002	-5.375	<0.001
	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	<0.001	0.020	R_m^2	0.094
	Residuals	<0.001	0.011	R_c^2	0.781
	Fixed effects	Estimate	SE	t	Pr(> t)
Functional divergence	(Intercept)	0.332	0.003	101.764	<0.001
	Time	0.014	0.002	6.539	0.001
	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	<0.001	0.004	R_m^2	0.104

	Residuals	<0.001	0.028	R_c^2	0.137	
	Fixed effects	Estimate	SE	t	Pr(> t)	
	(Intercept)	0.854	0.004	210.448	<0.001	
	Time	0.019	0.005	3.456	0.001	
	Random effects	Variance	SD	Mixed model parameters		–
CWM of ascomata area	Plot id	0.012	0.112	R_m^2	0.031	
	Residuals	0.135	0.368	R_c^2	0.113	
	Fixed effects	Estimate	SE	t	Pr(> t)	
	(Intercept)	0.972	0.054	17.867	<0.001	
	Time	-0.138	0.073	-1.875	0.076	
CWM of ascospore volume	Random effects	Variance	SD	Mixed model parameters		–
	Plot id	2416878.000	1555.000	R_m^2	0.041	
	Residuals	7150987.000	2674.000	R_c^2	0.283	
	Fixed effects	Estimate	SE	t	Pr(> t)	
	(Intercept)	1117.500	437.400	2.555	0.012	
CWM of ascospore shape	Time	1274.500	534.800	2.383	0.042	
	Random effects	Variance	SD	Mixed model parameters		–
	Plot id	0.042	0.206	R_m^2	0.106	
	Residuals	0.070	0.265	R_c^2	0.443	
	Fixed effects	Estimate	SE	t	Pr(> t)	
CWM of light WEIV	(Intercept)	3.207	0.047	67.427	<0.001	
	Time	-0.231	0.053	-4.352	<0.001	
	Random effects	Variance	SD	Mixed model parameters		–
	Plot id	0.103	0.322	R_m^2	0.002	
	Residuals	0.027	0.164	R_c^2	0.793	
CWM of temperature WEIV	Fixed effects	Estimate	SE	t	Pr(> t)	
	(Intercept)	5.526	0.051	108.076	<0.001	
	Time	0.031	0.032	0.969	0.660	
	Random effects	Variance	SD	Mixed model parameters		–
	Plot id	0.049	0.221	R_m^2	0.008	
CWM of continentality WEIV	Residuals	0.007	0.086	R_c^2	0.868	
	Fixed effects	Estimate	SE	t	Pr(> t)	
	(Intercept)	4.559	0.033	135.557	<0.001	
	Time	0.044	0.017	2.595	0.348	
	Random effects	Variance	SD	Mixed model parameters		–
	Plot id	0.076	0.276	R_m^2	0.001	
	Residuals	0.016	0.127	R_c^2	0.825	

	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	5.282	0.042	122.950	<0.001
	Time	-0.023	0.025	-0.918	0.702
CWM of moisture WEIV	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.003	0.058	R_m^2	0.208
	Residuals	0.023	0.153	R_c^2	0.309
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.304	0.023	185.158	<0.001
	Time	-0.168	0.030	-5.473	<0.001
CWM of nitrogen WEIV	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.017	0.130	R_m^2	0.234
	Residuals	0.030	0.175	R_c^2	0.508
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.00	0.030	97.079	<0.001
	Time	0.240	0.035	6.867	<0.001
Shannon index	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.034	0.186	R_m^2	0.412
	Residuals	0.028	0.169	R_c^2	0.733
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.418	0.035	95.940	<0.001
	Time	0.420	0.033	12.390	<0.001
Species richness	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.037	0.194	R_m^2	0.442
	Residuals			R_c^2	0.791
	Fixed effects	Estimate	SE	z	Pr(> z)
	(Intercept)	3.523	0.036	96.050	<0.001
	Time	0.436	0.030	14.180	<0.001

Table S4. Parameters of mixed effect models showing temporal shifts in lichen species' functional diversity components, community weighted means of functional traits, Shannon index and species richness regarding mixed deciduous forest communities. For testing shifts in species richness over time, the generalized mixed effects model with Poisson distribution was employed, while regarding remaining parameters of lichen species composition the linear mixed models were used. Note that regarding functional dispersion, the model assumptions were not met due to the very small variance of random effects. Abbreviations: CWM – community weighted mean; WEIV – Wirth ecological indicator value. Significant results are in **bold**.

Functional richness	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.104	0.323	R_m^2	0.530
	Residuals	1.708	1.307	R_c^2	0.557
	Fixed effects	Estimate	SE	t	Pr(> t)

	(Intercept)	6.743	0.181	37.140	<0.001
	Time	2.851	0.249	11.440	<0.001
Functional evenness	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	<0.001	0.003	R_m^2	0.128
	Residuals	<0.001	0.013	R_c^2	0.173
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.867	0.001	477.252	<0.001
	Time	-0.010	0.002	-4.114	<0.001
Functional dispersion	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0	0	R_m^2	0.004
	Residuals	<0.001	0.008	R_c^2	0.004
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.373	0.001	335.910	<0.001
	Time	0.001	0.001	0.681	0.497
Functional divergence	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	<0.001	0.001	R_m^2	0.026
	Residuals	0.001	0.014	R_c^2	0.038
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.875	0.001	456.672	<0.001
	Time	-0.004	0.002	-1.729	0.088
CWM of ascomata area	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.034	0.185	R_m^2	0.001
	Residuals	0.107	0.328	R_c^2	0.243
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	1.244	0.050	24.480	<0.001
	Time	0.024	0.062	0.386	0.737
CWM of ascospore volume	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	4885665.000	2210.000	R_m^2	0.001
	Residuals	37603159.000	6132.000	R_c^2	0.116
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	9142.800	878.900	10.402	<0.001
	Time	574.100	1169.400	0.491	0.645
CWM of ascospore shape	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.008	0.0090	R_m^2	0.005
	Residuals	0.065	0.255	R_c^2	0.115
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.579	0.036	97.940	<0.001

	Time	-0.038	0.048	-0.791	0.457
CWM of light WEIV	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.021	0.148	R_m^2	<0.001
	Residuals	0.033	0.182	R_c^2	0.396
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.838	0.031	152.533	<0.001
	Time	0.003	0.034	0.108	0.933
CWM of temperature WEIV	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.018	0.135	R_m^2	0.001
	Residuals	0.014	0.118	R_c^2	0.565
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	5.092	0.024	209.923	<0.001
	Time	0.011	0.022	0.527	0.729
CWM of continentality WEIV	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.021	0.146	R_m^2	0.011
	Residuals	0.019	0.139	R_c^2	0.529
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.624	0.027	169.119	<0.001
	Time	-0.042	0.026	-1.607	0.270
CWM of moisture WEIV	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.004	0.064	R_m^2	0.041
	Residuals	0.012	0.113	R_c^2	0.276
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.268	0.0174	241.923	<0.001
	Time	-0.053	0.021	-2.487	0.033
CWM of nitrogen WEIV	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.008	0.094	R_m^2	0.268
	Residuals	0.016	0.127	R_c^2	0.526
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.089	0.021	144.400	<0.001
	Time	0.191	0.024	7.870	<0.001
Shannon index	Random effects	Variance	SD	Mixed model parameters	–
	Plot id	0.003	0.054	R_m^2	0.573
	Residuals	0.027	0.166	R_c^2	0.614
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.623	0.023	153.570	<0.001
	Time	0.403	0.031	12.730	<0.001

	Random effects	Variance	SD	Mixed model parameters	–
Species richness	Plot id	0.004	0.068	R_m^2	0.638
				R_c^2	0.710
	Fixed effects	Estimate	SE	z	Pr(> z)
	(Intercept)	3.727	0.022	162.98	<0.001
	Time	0.409	0.026	15.190	<0.001

Table S5. Parameters of mixed effect models showing temporal shifts in lichen species' functional diversity components, community weighted means of functional traits, Shannon index and species richness regarding wet forest communities. For testing shifts in species richness over time, the generalized mixed effects model with Poisson distribution was employed, while regarding remaining parameters of lichen species composition the linear mixed models were used. Note that regarding functional evenness, functional divergence and spore volume, the model assumptions were not met due to the very small variance of random effects. Abbreviations: CWM – community weighted mean; WEIV – Wirth ecological indicator value. Significant results are in **bold**.

	Random effects	Variance	SD	Mixed model parameters	–
Functional richness	Plot id	0.321	0.567	R_m^2	0.743
	Residuals	0.829	0.206	R_c^2	0.815
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	6.301	0.171	36.670	<0.001
	Time	3.631	0.206	17.600	<0.001
	Random effects	Variance	SD	Mixed model parameters	–
Functional evenness	Plot id	0	0	R_m^2	0.127
	Residuals	<0.001	0.012	R_c^2	0.127
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.866	0.002	422.964	<0.001
	Time	-0.009	0.002	-3.357	0.001
	Random effects	Variance	SD	Mixed model parameters	–
Functional dispersion	Plot id	<0.001	0.007	R_m^2	0.017
	Residuals	<0.001	0.009	R_c^2	0.445
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.371	0.001	193.045	<0.001
	Time	0.003	0.002	1.577	0.240
	Random effects	Variance	SD	Mixed model parameters	–
Functional divergence	Plot id	0	0	R_m^2	<0.001
	Residuals	<0.001	0.014	R_c^2	<0.001
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	0.873	0.002	388.947	<0.001
	Time	<-0.001	0.003	-0.111	0.912
	Random effects	Variance	SD	Mixed model parameters	–
CWM of ascomata area	Plot id	0.041	0.203	R_m^2	0.004

	Residuals	0.228	0.477	R_c^2	0.156
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	1.502	0.083	18.079	<0.001
	Time	0.064	0.108	0.599	0.583
	Random effects	Variance	SD	Mixed model parameters	
CWM of ascospore volume	Plot id	0	0	R_m^2	0.030
	Residuals	26857179.000	5182.000	R_c^2	0.030
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4355.600	829.800	5.249	<0.001
	Time	1825.000	1173.600	1.555	0.124
CWM of ascospore shape	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.023	0.154	R_m^2	0.121
	Residuals	0.077	0.277	R_c^2	0.329
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.627	0.050	71.302	<0.001
CWM of light WEIV	Time	-0.234	0.062	-3.733	0.001
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.012	0.113	R_m^2	0.134
	Residuals	0.036	0.191	R_c^2	0.360
	Fixed effects	Estimate	SE	t	Pr(> t)
CWM of temperature WEIV	(Intercept)	4.828	0.035	135.469	<0.001
	Time	0.174	0.043	4.024	<0.001
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.028	0.168	R_m^2	0.015
	Residuals	0.012	0.110	R_c^2	0.705
CWM of continentality WEIV	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.981	0.032	154.604	<0.001
	Time	-0.050	0.024	-2.038	0.268
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.018	0.137	R_m^2	0.031
CWM of moisture WEIV	Residuals	0.023	0.154	R_c^2	0.460
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.671	0.033	141.318	<0.001
	Time	0.074	0.034	2.134	0.115
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	<0.001	0.031	R_m^2	0.105
	Residuals	0.015	0.125	R_c^2	0.158

CWM of nitrogen WEIV	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	4.336	0.020	209.450	< 0.001
	Time	-0.090	0.028	-3.106	0.003
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.003	0.056	R_m^2	0.433
	Residuals	0.019	0.139	R_c^2	0.511
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.065	0.024	126.983	< 0.001
	Time	0.262	0.031	8.267	< 0.001
	Random effects	Variance	SD	Mixed model parameters	
Shannon index	Plot id	0.005	0.075	R_m^2	0.788
	Residuals	0.012	0.110	R_c^2	0.856
	Fixed effects	Estimate	SE	t	Pr(> t)
	(Intercept)	3.577	0.021	166.720	< 0.001
	Time	0.514	0.025	0.025	< 0.001
	Random effects	Variance	SD	Mixed model parameters	
Species richness	Plot id	0.002	0.046	R_m^2 R_c^2	0.772 0.795
	Fixed effects	Estimate	SE	z	Pr(> z)
	(Intercept)	3.672	0.026	138.040	< 0.001
	Time	0.530	0.031	16.490	< 0.001
	Random effects	Variance	SD	Mixed model parameters	
	Plot id	0.002	0.046	R_m^2 R_c^2	0.772 0.795

Table S6. Parameters of variables passively fitted to results of the DCA ordinations showing temporal shifts in composition of lichen species at tree phorophyte and substrate levels. Determination coefficients R^2 and P-values were estimated using permutation tests with 999 iterations. Note the presence-absence data transformation prior to DCAs. Abbreviations: CWM – community weighted mean; WEIV – Wirth ecological indicator value. Significant results are in **bold**.

Parameter	Code	DCA1	DCA2	R^2	P
Tree phoropytes:					
Functional richness	FRic	-0.567	-0.823	0.536	0.001
Functional evenness	FEve	-0.332	0.943	0.070	0.470
Functional dispersion	FDis	-0.972	-0.234	0.624	0.001
Functional divergence	FDiv	-0.979	-0.201	0.301	0.027
CWM of ascomata area	AscArea	-0.167	-0.985	0.406	0.006
CWM of ascospore volume	SporVol	-0.896	-0.442	0.363	0.012
CWM of ascospore shape	SporShp	-0.992	-0.124	0.177	0.123
CWM of light WEIV	WEIV.L	0.999	-0.037	0.466	0.001
CWM of temperature WEIV	WEIV.T	-0.977	0.211	0.765	0.001
CWM of continentality WEIV	WEIV.C	0.993	-0.110	0.827	0.001
CWM of moisture WEIV	WEIV.M	-0.641	-0.767	0.042	0.631

CWM of nitrogen WEIV	WEIV.N	-0.831	-0.554	0.200	0.100
Shannon index	Shan	-0.441	-0.897	0.388	0.005
Species richness	Rich	-0.372	-0.928	0.510	0.001
Substrates:					
Functional richness	FRic	-0.773	-0.634	0.511	0.009
Functional evenness	FEve	0.997	0.068	0.345	0.074
Functional dispersion	FDis	-0.504	-0.863	0.513	0.008
Functional divergence	FDiv	-0.984	0.177	0.150	0.338
CWM of ascomata area	AscArea	-0.409	0.912	0.298	0.111
CWM of ascospore volume	SporVol	-0.907	-0.419	0.553	0.005
CWM of ascospore shape	SporShp	-0.682	-0.730	0.260	0.128
CWM of light WEIV	WEIV.L	0.109	0.993	0.608	0.004
CWM of temperature WEIV	WEIV.T	-0.811	-0.584	0.633	0.001
CWM of continentality WEIV	WEIV.C	0.691	0.721	0.685	0.001
CWM of moisture WEIV	WEIV.M	-0.096	-0.995	0.245	0.171
CWM of nitrogen WEIV	WEIV.N	-0.340	0.940	0.779	0.001
Shannon index	Shan	-0.990	-0.139	0.422	0.037
Species richness	Rich	-0.998	-0.051	0.377	0.050