

Supplemental Tables

Table S1. Site averages for age, climate, and environmental characteristics.
DOC denotes dissolved organic carbon, SOM denotes soil organic material

	A	B	C	D
Climate				
Mean Temp (C)	4.82	6.06	6.49	7.65
Mean Precipitation (cm)	91.87	93.28	92.81	86.63
Ambient N dep (kg/ha)	5.89	6.07	7.37	7.37
Environment				
Leaf Litter [C] (g/kg)	458	456	453	455
Leaf Litter C:N	63.68	57.06	52.91	43.41
Leaf Litter Mass (g)	412.7	396.3	591	550.2
Extractable DOC (mg/L)	5.5	2.79	5.85	9.95
Extractable NO ₃ - (mg/L)	0.08	0.55	0.86	0.92
SOM C:N	13.12	22.55	15.9	11.42
SOM [N] (mg/g)	1.84	1.36	1.83	1.73
pH	4.55	4.7	4.41	4.61
Moisture Content (%)	23	24	18	14

Table S2. List of fungal and actinobacterial genes chosen for analysis. Number gene variants is the number of probes representing this gene on the microarray. Substrate category as predefined on microarray. ECnumbers retrieved from BRENDa (<http://www.brenda-enzymes.info>).

Dikarya Fungi				Actinobacteria			
Enzyme (Gene) name	EC Number	# variants	Substrate category	Enzyme (Gene) name	EC Number	# variants	Substrate category
alpha-amylase (AmyA)	3.2.1.1	65	Starch	alpha-amylase (AmyA)	3.2.1.1	169	Starch
glucoamylase	3.2.1.3	49	Starch	cytidine deaminase (cda)	3.5.4.5	11	Starch
glucose oxidase	1.1.3.4	14	Starch	glucoamylase	3.2.1.3	4	Starch
alpha galactosidase	3.2.1.22	30	Hemicellulose	neopullulanase (npIT)	3.2.1.135	3	Starch
alpha-L-arabinofuranosidase (ara)	3.2.1.55	63	Hemicellulose	pullulanase (pulA)	3.2.1.41	36	Starch
endopolysaccharide-4-lyase	3.2.1.15	28	Hemicellulose	alpha-L-arabinofuranosidase (ara)	3.2.1.55	64	Hemicellulose
exopolysaccharide-4-lyase	3.2.1.67	33	Hemicellulose	mannanase	3.2.1.25	10	Hemicellulose
pectin lyase (pec)	4.2.2.10	67	Hemicellulose	xylose isomerase (xla)	5.3.1.5	34	Hemicellulose
pectinesterase (pme)	3.1.11	20	Hemicellulose	xylanase	3.2.1.8	8	Hemicellulose
rhamnogalacturonan hydrolase (rgh)	3.2.1.171	36	Hemicellulose	cellobiase	3.2.1.21	35	Cellulose
xylanase	3.2.1.8	39	Hemicellulose	endoglucanase	3.2.1.4	5	Cellulose
mannanase	3.2.1.25	26	Hemicellulose	exoglucanase	3.2.1.91	12	Cellulose
cellobiase	3.2.1.21	86	Cellulose	acetylglucosaminidase	3.2.1.50	54	Chitin
endoglucanase	3.2.1.4	45	Cellulose	endochitinase	3.2.1.14	84	Chitin
exoglucanase	3.2.1.91	92	Cellulose	exochitinase	3.2.1.52	19	Chitin
exopolysaccharide-4-lyase	3.2.1.67	33	Cellulose	glyoxal oxidase (glx)	1.4.3.11	6	Lignin
acetylglucosaminidase	3.2.1.50	13	Chitin	phenol oxidase	1.10.3.2	2	Lignin
chitin deacetylase	3.5.1.41	16	Chitin	peroxidase	1.11.1.1	7	Lignin
cutinase	3.1.1.74	52	Chitin	Muconate lactonizing enzyme (mdIA)	5.5.1.1	26	Lignin
endochitinase	3.2.1.14	127	Chitin	cellobiose dehydrogenase (CDH)	1.1.99.18	46	Lignin
exochitinase	3.2.1.52	7	Chitin				
glyoxal oxidase (glx)	1.4.3.11	40	Lignin				
lignin peroxidase (lip)	1.11.1.14	32	Lignin				
manganese peroxidase (mnp)	1.11.1.13	33	Lignin				
peroxidase	1.11.1.1	86	Lignin				
phenol oxidase	1.10.3.2	162	Lignin				

Table S3. Pearson correlation of fungal and actinobacterial genes to the first PCO axis. Italicized genes/enzymes have the strongest correlation values

Fungal Genes				Actinobacterial Genes					
	Ave	Corel	Count	StErr		Ave	Corel	Count	Sterr
Starch		-0.46	112	0.02	Starch		-0.38	160	0.02
amyA	-0.48	55	0.03		amyA	-0.38	115	0.03	
glucoamylase	-0.49	15	0.05		cda	-0.39	8	0.09	
Glucose_oxidase	-0.45	12	0.05		glucoamylase	-0.18	4	0.27	
glucoamylase	-0.41	30	0.05		nplT	-0.30	2	0.43	
Hemicellulose		-0.44	279	0.02	pulA	-0.42	31	0.04	
alpha_galactosidase	-0.43	28	0.05		Hemicellulose		-0.43	92	0.03
ara	-0.38	55	0.04		ara	-0.46	49	0.04	
endopolygalacturonase	-0.40	27	0.06		mannanase	-0.25	9	0.09	
exopolygalacturonase	-0.47	24	0.04		xylA	-0.45	28	0.05	
pec	-0.49	58	0.03		xylanase	-0.40	6	0.09	
pme	-0.44	15	0.09		Cellulose		-0.45	40	0.04
rgh	-0.47	35	0.04		cellobiase	-0.44	28	0.06	
xylanase	-0.45	36	0.04		<i>endoglucanase</i>	-0.65	4	0.12	
Cellulose		-0.44	200	0.02	exoglucanase	-0.38	8	0.06	
cellobiase	-0.49	79	0.02		Chitin		-0.43	126	0.03
endoglucanase	-0.38	37	0.05		acetylglucosaminidase	-0.46	39	0.04	
exoglucanase	-0.42	78	0.03		endochitinase	-0.45	69	0.03	
exopolygalacturonase	-0.42	6	0.11		exochitinase	-0.25	18	0.10	
Chitin		-0.39	214	0.02	lignin		-0.44	64	0.03
acetylglucosaminidase	-0.33	13	0.10		CDH	-0.44	32	0.05	
chitin_deacetylase	-0.42	16	0.04		<i>glx</i>	-0.56	4	0.11	
cutinase	-0.39	40	0.04		mdlA	-0.44	18	0.05	
endochitinase	-0.39	115	0.03		<i>per_bac</i>	-0.33	6	0.12	
<i>exochitinase</i>	-0.61	7	0.06		<i>phenol_oxidase</i>	-0.68	2	0.15	
mannanase	-0.30	23	0.05						
Lignin		-0.41	311	0.02					
glx	-0.38	35	0.06						
lip	-0.39	26	0.06						
mnp	-0.39	29	0.05						
peroxidase	-0.40	73	0.03						
<i>phenol_oxidase</i>	-0.42	148	0.02						

Table S4: SIMPER results displaying the contribution of genes to the dissimilarity between ambient and N deposition communities

Dikarya. Total dissimilarity 11.5%					Actinobacteria . Total dissimilarity 14.2				
Gene	Substrate	Response	Diss/SD	Contrib%	Gene	Substrate	Response	Diss/SD	Contrib%
exochitinase	Chitin	-	1.66	8.14	phenol oxidase	Lignin	-	0.69	10.6
rgh	Hemicellulose	+	1.34	4.98	glucoamylase	Starch	+	1.25	8.92
acetylglucosaminidase	Chitin	-	1.19	4.77	endoglucanase	Cellulose	-	0.93	7.38
cellobiase	Cellulose	-	1.45	4.51	per bac	Lignin	+	1.49*	6.43
chitin deacetylase	Chitin	-	1.07	4.48	cda	Starch	-	1.11	5.36
endopolygalacturonase	Cellulose	-	1.46	4.24	mdlA	Lignin	-	1.03	4.95
pec	Hemicellulose	-	1.36	4.09	pulA	Starch	-	1.37*	4.72
xylanase	Hemicellulose	-	1.25	4.08	endochitinase	Chitin	-	1.23	4.71
glucoamylase	starch	-	1.44	4.07	glx	Lignin	-	0.73	4.68
AmyA	starch	-	1.45	3.89	acetylglucosaminidase	Chitin	-	1.1	4.56
pme	Hemicellulose	-	1.38	3.87	mannanase	Hemicellulose	-	1.19	4.42
alpha galactosidase	Hemicellulose	-	1.31	3.81	xylanase	Hemicellulose	-	1.15	4.31
exopolygalacturonase	Hemicellulose	-	1.18	3.68	exochitinase	Chitin	-	1.21	4.2
mnp	lignin	-	1.2	3.44	cellobiase	Cellulose	-	1.14	4.17
phenol oxidase	lignin	-	1.21	3.42	ara	Hemicellulose	-	0.96	4.1
exopolygalacturonase	Cellulose	-	1.35	3.41	exoglucanase	Cellulose	+	1.3	4.01
glx	lignin	-	1.41	3.4	xla	Hemicellulose	-	1.22	3.97
endochitinase	Chitin	-	1.28	3.33					
exoglucanase	Cellulose	-	1.33	3.26					
endoglucanase	Cellulose	-	1.38	3.2					
glucose_oxidase	starch	-	1.22	3.18					
peroxidase	lignin	-	1.2	3.04					
lip	lignin	-	1.07	3.03					