Table S1. General information on forest stand and soil of the sample plots

Plots	Tree species	Mean DBH (cm)	Mean height (m)	Density (stems/hm^2)	Soil total N (g/kg)	Soil total P (g/kg)	Soil total K (g/kg)	pH
Plot 1	*Pinus massoniana*	24.5	17.5	1100	0.33	0.20	46.63	4.34
Plot 2	*Pinus massoniana*	26.1	18	1100	0.24	0.19	48.26	4.82
Plot 3	*Pinus massoniana*	22.9	17.1	1100	0.31	0.20	40.06	4.69
Plot 4	*Pinus massoniana*	23.7	17.6	1100	0.39	0.20	42.34	4.43

Table S2. Initial litter physical and chemical characteristics of seven tree species.

Parameters	*Pinus massoniana*	*Liquidambar formosana*	*Schima superba*	*Quercus glauca*	*Quercus rubra*	*Castanopsis sclerophylla*	*Phoebe bournei*
C (g/kg)	490.46	433.24	462.95	466.70	439.93	460.74	466.06
N (g/kg)	17.88	16.11	11.89	10.95	10.23	10.50	9.07
P (g/kg)	1.37	0.67	0.64	0.50	0.57	0.64	0.71
K (g/kg)	13.41	26.03	17.04	15.42	9.06	14.27	12.48
Cu (mg/kg)	5.33	5.31	5.18	3.91	6.72	5.38	6.26
Mg (mg/kg)	1519	3057	3746	1046	1832	1995	1342
Mn (mg/kg)	1128	2904	7173	1424	3515	1702	647
Fe (mg/kg)	270	351	342	164	683	531	943
Zn (mg/kg)	35	27	11	16	44	34	32
Ca (mg/kg)	16948	22411	20454	18800	15952	19559	15756

Cellulose (%DM)	15.93	14.25	17.40	13.00	10.56	20.02	11.64
Lignin (%DM)	34.57	40.85	31.47	35.41	35.39	30.68	37.89
SLA (cm^2/g)	86.20	145.47	109.95	86.04	177.05	78.78	84.61
LT (mm)	0.41	0.21	0.27	0.26	0.14	0.26	0.24
W_{std} (%DM)	26.85	68.35	42.24	14.55	62.18	18.94	19.55
W_{max} (%DM)	134.56	148.28	154.03	74.12	153.22	101.09	83.60
TH (N/mm)	8.81	0.42	0.49	0.96	0.29	0.88	1.08
TS (N/mm2)	0.76	0.19	0.17	0.43	0.17	0.58	0.43
C/N	27.43	26.90	38.94	42.62	43.00	43.88	51.38
C/P	358.86	644.27	720.07	935.15	772.06	720.75	652.23
N/P	13.08	23.95	18.49	21.94	17.95	16.43	12.69
Lignin/N	19.34	25.36	26.47	32.33	34.60	29.22	41.78
Lignin/P	116.57	211.97	270.68	260.53	185.37	313.20	162.86
Soluble fraction (%DM)	23.66	30.94	19.92	19.23	16.04	19.71	18.77
Cellulose fraction (%DM)	36.20	34.76	44.73	43.02	45.54	54.58	41.41
Lignin fraction (%DM)	40.13	34.30	35.34	37.75	38.42	25.71	39.82

C: carbon, N: nitrogen; P: phosphorus; K: potassium; copper (Cu), magnesium (Mg), manganese (Mn), iron (Fe), zinc (Zn), calcium (Ca); SLA: specific leaf area; LT: leaf thickness; TH: leaf toughness; TS: tensile strength (TS), W_{std}: standard holding capacity; W_{max}: saturated holding capacity.

Table S3. The relative mixing effects for mass and each carbon fraction of 32 litter mixtures. Mean RME and 90% confidence intervals are given in units of years-1. When a given mixture's confidence interval does not include 0, its RME is non-additive. Non-additive RMEs indicate either a lower (antagonistic) or a higher

(synergistic) rate of decomposition than what is expected based on single-species bags (RME = 0). Mixtures that conform to expectations are considered to have decomposed additively.

Mixtures	Total mass			Soluble			Cellulose			Lignin		
	RME	RMEs+/-1SE	Additivity?	RME	RMEs+/-1SE	Additivity?	RME	RMEs+/-1SE	Non-Additivity?	RME	RMEs+/-1SE	Additivity?
M1	23.37	(19.84, 26.89)	Synergistic	-34.91	(-36.77, -33.06)	Antagonistic	9.23	(6.14, 12.33)	Synergistic	86.60	(81.22, 91.98)	Synergistic
M2	27.85	(21.97, 33.73)	Synergistic	-46.24	(-48.71, -43.76)	Antagonistic	12.10	(6.95, 17.26)	Synergistic	126.68	(116.96, 136.41)	Synergistic
M3	6.38	(5.70, 7.06)	Synergistic	-50.64	(-50.96, -50.32)	Antagonistic	-15.66	(-16.20, -15.12)	Antagonistic	129.46	(127.97, 130.94)	Synergistic
M4	57.37	(46.35, 68.38)	Synergistic	-24.41	(-29.71, -19.12)	Antagonistic	12.46	(4.57, 20.34)	Synergistic	203.24	(182.40, 224.08)	Synergistic
M5	-9.58	(-15.77, -3.40)	Antagonistic	-19.09	(-24.63, -13.55)	Antagonistic	-15.88	(-21.67, -10.09)	Antagonistic	-25.71	(-30.70, -20.71)	Antagonistic
M6	-4.35	(-11.25, 2.55)	Additive	-36.51	(-41.10, -31.92)	Antagonistic	-33.85	(-38.64, -29.05)	Antagonistic	93.61	(79.88, 107.34)	Synergistic
M7	11.64	(4.22, 19.06)	Synergistic	-42.04	(-45.90, -38.19)	Antagonistic	-17.36	(-22.85, -11.87)	Antagonistic	104.68	(91.47, 117.89)	Synergistic
M8	34.16	(26.43, 41.89)	Synergistic	-19.49	(-24.13, -14.85)	Antagonistic	1.59	(-4.26, 7.45)	Additive	165.26	(150.23, 180.29)	Synergistic
M9	10.12	(6.67, 13.57)	Synergistic	-36.12	(-38.13, -34.12)	Antagonistic	-16.08	(-18.71, -13.45)	Antagonistic	118.44	(111.22, 125.67)	Synergistic
M10	25.23	(7.37, 43.10)	Synergistic	-37.83	(-46.71, -28.95)	Antagonistic	-1.59	(-15.65, 12.47)	Additive	139.45	(105.76, 173.15)	Synergistic
M11	-7.68	(-13.81, -1.56)	Antagonistic	-38.16	(-42.27, -34.05)	Antagonistic	-9.84	(-15.83, -3.84)	Antagonistic	29.93	(21.32, 38.54)	Synergistic
M12	36.88	(28.73, 45.03)	Synergistic	-32.01	(-36.09, -27.92)	Antagonistic	22.55	(15.20, 29.90)	Synergistic	106.54	(94.46, 118.61)	Synergistic
M13	0.48	(-6.62, 7.58)	Additive	-46.06	(-49.88, -42.25)	Antagonistic	-7.80	(-14.31, -1.28)	Antagonistic	56.70	(46.17, 67.23)	Synergistic
M14	14.42	(10.06, 18.78)	Synergistic	-37.00	(-39.40, -34.60)	Antagonistic	9.63	(5.45, 13.81)	Synergistic	56.97	(51.00, 62.93)	Synergistic
M15	3.45	(-3.66, 10.56)	Additive	-69.56	(-71.66, -67.46)	Antagonistic	-7.70	(-14.04, -1.35)	Antagonistic	168.89	(150.63, 187.15)	Synergistic
M16	2.33	(-4.52, 9.17)	Additive	-47.83	(-51.34, -44.33)	Antagonistic	-8.55	(-14.69, -2.41)	Antagonistic	52.43	(42.62, 62.24)	Synergistic
M17	20.10	(12.76, 27.44)	Synergistic	-35.29	(-39.26, -31.32)	Antagonistic	11.69	(4.83, 18.54)	Synergistic	60.54	(50.79, 70.30)	Synergistic
M18	5.41	(3.86, 6.95)	Synergistic	-38.30	(-39.19, -37.40)	Antagonistic	-2.56	(-3.98, -1.14)	Antagonistic	51.41	(49.22, 53.61)	Synergistic
M19	4.93	(0.26, 9.60)	Synergistic	-50.91	(-53.09, -48.72)	Antagonistic	0.69	(-3.78, 5.16)	Additive	72.57	(65.16, 79.97)	Synergistic
M20	31.38	(23.18, 39.58)	Synergistic	-38.97	(-42.77, -35.16)	Antagonistic	12.33	(5.31, 19.35)	Synergistic	104.16	(91.84, 116.48)	Synergistic
M21	14.23	(4.80, 23.65)	Synergistic	-50.11	(-54.24, -45.98)	Antagonistic	3.25	(-5.28, 11.78)	Additive	97.38	(81.91, 112.85)	Synergistic
M22	-3.48	(-7.01, 0.06)	Additive	-53.77	(-55.47, -52.07)	Antagonistic	-6.64	(-10.07, -3.21)	Antagonistic	53.67	(48.10, 59.23)	Synergistic

M23	16.58	(7.61, 25.56)	Synergistic	-49.70	(-53.58, -45.81)	Antagonistic	-9.91	(-16.87, -2.94)	Antagonistic	158.14	(138.61, 177.67)	Synergistic
M24	7.76	(4.04, 11.48)	Synergistic	-40.00	(-42.07, -37.92)	Antagonistic	-0.81	(-4.25, 2.64)	Additive	50.85	(45.73, 55.97)	Synergistic
M25	12.71	(9.62, 15.81)	Synergistic	-50.36	(-51.73, -48.99)	Antagonistic	-12.81	(-15.23, -10.39)	Antagonistic	141.28	(134.80, 147.75)	Synergistic
M26	-1.60	(-8.55, 5.34)	Additive	-55.12	(-58.29, -51.95)	Antagonistic	-1.95	(-8.88, 4.98)	Additive	75.90	(63.72, 88.08)	Synergistic
M27	6.99	(3.38, 10.60)	Synergistic	-54.34	(-55.88, -52.80)	Antagonistic	7.63	(4.00, 11.25)	Synergistic	97.25	(90.90, 103.60)	Synergistic
M28	14.71	(10.77, 18.65)	Synergistic	-43.34	(-45.30, -41.39)	Antagonistic	-2.56	(-5.92, 0.80)	Additive	107.43	(100.70, 114.15)	Synergistic
M29	19.67	(10.41, 28.93)	Synergistic	-50.86	(-54.67, -47.04)	Antagonistic	21.82	(12.36, 31.29)	Synergistic	120.04	(104.00, 136.09)	Synergistic
M30	-7.77	(-12.15, -3.39)	Antagonistic	-71.66	(-73.01, -70.31)	Antagonistic	-11.98	(-16.16, -7.79)	Antagonistic	113.48	(103.40, 123.55)	Synergistic
M31	6.32	(2.70, 9.94)	Synergistic	-37.71	(-39.84, -35.57)	Antagonistic	0.47	(-2.97, 3.92)	Additive	51.30	(46.57, 56.02)	Synergistic
M32	6.94	(1.74, 12.13)	Synergistic	-38.34	(-41.33, -35.34)	Antagonistic	-3.63	(-8.31, 1.06)	Additive	66.74	(59.02, 74.46)	Synergistic

Table S4. Output of multiple linear regression between the variable (RMEs on total litter, soluble, cellulose, and lignin) (*k* constant) and the five first axes of the PCA of litter functional dissimilarity.

Relative mixing effects (RMEs)	Litter functional diversity	Estimate	Std. Error	*t* value	*P* value	
Total mass (*k* constant)	Intercept	11.94	1.78	6.71	<0.001	***
	PC1	-1.62	0.56	-2.87	<0.01	**
	PC2	-1.86	0.72	-2.57	<0.05	*
	PC3	**3.04**	**0.91**	**3.36**	**<0.01**	**
	PC4	2.58	0.88	2.93	<0.01	**
	PC5	-4.92	1.32	-3.73	<0.001	***
	Marginal r^2 = 40.10%					
Soluble (k constant)	Intercept	-42.98	1.87	-22.99	<0.001	***
	PC1	-0.67	0.51	-1.29	0.201	
	PC2	**-1.75**	**0.63**	**-2.79**	**<0.01**	**
	PC3	0.34	0.87	0.39	0.697	

	PC4	1.48	0.75	1.97	0.054	
	PC5	0.44	1.29	0.34	0.738	
	Marginal r^2 = 17.87%					
Cellulose (k constant)	Intercept	-2.01	1.96	-1.02	0.314	
	PC1	-0.33	0.59	-0.56	0.58	
	PC2	-0.19	0.75	-0.26	0.799	
	PC3	0.82	0.96	0.85	0.399	
	PC4	1.67	0.89	1.86	0.067	
	PC5	**-4.52**	**1.42**	**-3.18**	**<0.01**	**
	Marginal r^2 = 23.27%					
Lignin (k constant)	Intercept	97.63	7.27	13.02	<0.001	***
	PC1	-2.99	1.93	-1.56	0.126	
	PC2	-1.66	2.34	-0.71	0.48	
	PC3	**7.69**	**2.81**	**2.74**	**<0.01**	**
	PC4	8.83	3.29	2.68	<0.05	*
	PC5	-10.05	4.93	-2.04	<0.05	*
	Marginal r^2 = 27.97%					