Supplementary Material

Using functional traits to improve estimates of height-diameter relationships in a temperate mixed forest

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Supplementary Tables

Table S1. Basic information of permanent sample plots in two zones.

Zone	Plot	Latitude	Longitude	D(cm)			H(m)			Elevation(m)	Aspect	Slope
				MaxD	MeanD	MinD	MaxH	MeanH	MinH			
Training dataset												
1	1	43°21′37″	130°9′49″	44.6	23.6	7.7	19.6	12.6	5.5	775	64	6
1	2	43°21′42″	130°10′16″	50.9	21.7	6.3	22.4	14.2	6.6	675	135	24
1	3	43°21′46″	130°10′16″	42.7	17.1	5.1	22.2	14.8	6.6	662	65	10

1	4	43°21′42″	130°10′21″	46.5	23	5.1	19.5	11.2	4	670	160	36
1	5	43°21′46″	130°10′21″	52.5	21.4	7.2	23.5	12.6	4.3	670	75	18
1	6	43°21′37″	130°10′25″	44	23.2	7.2	26.1	13.6	7.3	633	192	5
1	7	43°21′42″	130°10′25″	33.7	12.3	5	16.5	9.8	2.9	662	50	12
1	8	43°21′46″	130°10′25″	60.8	19.9	5.3	22.7	12.4	4	658	110	20
1	9	43°21′37″	130°10′29″	57.4	22.3	6.6	21.2	12.4	6	622	101	28
1	10	43°21′42″	130°10′29″	56.7	19.1	5.9	28.4	13.8	5.1	633	280	13
1	11	43°21′46″	130°10′29″	45.4	15.6	5.7	16.4	8.8	4.5	640	125	35
1	12	43°21′37″	130°9′54″	48.6	19.8	7.1	23.7	12.9	6.7	750	106	14
1	13	43°21′37″	130°9′58″	47.2	14	5	23.9	10.6	4.4	742	100	14
1	14	43°21′42″	130°9′58″	75	17.7	5.1	30.8	13.6	4.1	748	94	10
1	15	43°21′37″	130°10′03″	63.4	23.9	7.7	21.4	15.8	5.8	714	156	27
1	16	43°21′42″	130°10′03″	56.5	17.5	5.6	20.9	13.3	5.2	712	135	13
1	17	43°21′42″	130°10′07″	51.3	16.4	5.2	17.6	9.7	2.7	703	168	34
1	18	43°21′42″	130°10′12″	35.8	15.7	5.1	20.7	13.3	5.8	700	100	35

1	19	43°21′46″	130°10′12″	78.5	18.1	5.3	22.6	12.9	4	710	115	10
1	20	43°21′33″	130°9′49″	44.4	22.9	5.6	23.4	16.6	4.5	784	75	20
1	21	43°21′28″	130°10′12″	49.5	17	5.6	19.4	13.3	4.7	707	39	15
1	22	43°21′33″	130°10′12″	47.4	19.9	5.2	21.1	13.8	6.1	699	30	20
1	23	43°21′24″	130°10′16″	35.6	16.3	5.6	23.1	13.4	6.1	699	59	22
1	24	43°21′28″	130°10′16″	47.4	23	5.8	22.6	14.8	4.5	703	76	13
1	25	43°21′33″	130°10′16″	42.8	24	5.8	19.6	15	5.2	676	35	18
1	26	43°21′28″	130°10′21″	34.2	17.2	5.1	17.4	10.6	2.3	687	87	15
1	27	43°21′33″	130°10′21″	37.3	18.7	5.5	22.7	13.9	3.3	660	54	10
1	28	43°21′28″	130°10′25″	34.6	16.5	6.8	16.7	11.2	6.4	638	103	20
1	29	43°21′33″	130°10′25″	36.7	22.4	6.2	21.6	16.1	7.3	646	48	18
1	30	43°21′28″	130°10′29″	45.9	20.5	6.5	20.1	12.6	6.7	624	62	4
1	31	43°21′28″	130°9′54″	50.3	15.8	5.5	23.6	12.9	3.5	768	77	17
1	32	43°21′19″	130°10′29″	49.8	26.5	5.8	22.3	15.2	7.1	626	70	4
1	33	43°21′15″	130°10′25″	22.6	22.2	21.7	16.3	15.2	14.1	614	89	3

1	34	43°21′15″	130°10′29″	34.7	20	8	19.2	13.3	8.3	614	93	3
1	35	43°21′24″	130°10′29″	55.4	18.1	5.1	21.4	10.7	5.1	607	110	3
1	36	43°21′33″	130°9′54″	39.5	13.9	5.2	27.8	15.3	4.2	760	83	16
1	37	43°21′28″	130°9′58″	42	22.4	6.3	28.4	21	9.1	752	54	10
1	38	43°21′33″	130°9′58″	33.2	10.9	5.4	18.7	8.9	4.3	748	100	13
1	39	43°21′28″	130°10′03″	37.2	15.1	5.4	23.2	12.7	3.1	711	56	11
1	40	43°21′33″	130°10′03″	45	19.3	5.2	22.1	13.1	6.5	722	35	20
1	41	43°21′28″	130°10′07″	48.7	18.2	8	21.6	12.6	6.7	719	84	18
1	42	43°21′33″	130°10′07″	59.8	20.8	5.2	21.9	14.5	4	715	35	21
1	43	43°20′48″	130°9′41″	43	16.6	5.1	18.5	11.4	6	763	80	7
1	44	43°20′57″	130°9′45″	38.9	18.7	6.9	18.3	11.4	5.5	738	77	16
1	45	43°20′48″	130°9′49″	59	19.4	6.5	18.8	12	5.8	720	93	9
1	46	43°20′53″	130°9′49″	51.2	16.9	5.9	19	9.9	4	732	163	39
1	47	43°21′02″	130°9′49″	39.1	17.9	6.4	16	12.4	6.6	685	85	15
1	48	43°20′57″	130°9′49′	52.5	24.3	7.1	26.2	16.8	6.2	720	65	12

1	49	43°20′48″	130°9′54″	47.8	21.6	5.5	17.4	11.5	6.3	691	30	6
1	50	43°20′53″	130°9′54″	18.6	15.2	13.2	12.1	8.6	4.7	709	67	14
1	51	43°20′57″	130°9′54″	44.5	20.3	9.2	21.3	12.5	5.9	700	75	11
1	52	43°20′53″	130°9′41″	55.2	14.9	5.4	22.1	9.2	4.2	760	103	3
1	53	43°20′48″	130°9′58″	48.5	14.7	5.3	19.3	12	6.6	684	165	23
1	54	43°20′57″	130°9′41″	51.6	20.7	5.8	16.1	11.3	4.6	751	83	15
1	55	43°21′02″	130°9′41″	35.7	16.2	5	21.7	13.5	4.3	758	68	5
1	56	43°21′06″	130°9′41″	37	16.4	6	23.1	13.7	4.1	760	76	21
1	57	43°20′48″	130°9′45″	42.6	19.1	6.2	18.3	11.7	4.9	736	80	11
1	58	43°20′53″	130°9′45″	52.6	24.8	7.9	20.9	14.2	6.1	743	152	14
1	59	43°21′02″	130°9′45″	63.9	18.3	5.7	16.4	9.9	3.1	744	84	11
1	60	43°21′06″	130°9′45″	49.7	18.9	6.7	23.2	12.8	3.6	736	23	11
1	61	43°20′44″	130°9′23″	30.1	15.3	6.1	18.9	10.2	4.6	749	85	14
1	62	43°20′39″	130°9′33″	54.7	22.7	5.3	18.9	11.2	6.6	698	262	14
1	63	43°20′35″	130°9′33″	54.2	26.2	7	19.1	14	7.7	628	106	10

1	64	43°20′31″	130°9′33″	45.1	21.6	6.2	20.1	11.3	4.6	640	91	7
1	65	43°20′44″	130°9′36″	37.8	17	6	21.2	11	4.9	650	111	16
1	66	43°20′39″	130°9′36″	45	23.7	7.4	19.9	15.5	5.3	660	108	35
1	67	43°20′35″	130°9′36″	33.9	14.4	5.2	20.2	12.2	4.1	672	108	11
1	68	43°20′31″	130°9′36″	35.2	18.7	6.9	24.7	15.7	6.2	613	92	6
1	69	43°20′44″	130°9′41″	50.4	20.2	7.8	23.3	15.5	9.5	627	129	10
1	70	43°20′39″	130°9′41″	29	13.5	5.6	19.9	11.5	5.3	627	125	9
1	71	43°20′35″	130°9′41″	39	18.8	6.2	26.2	14.9	5.7	638	158	7
1	72	43°20′39″	130°9′23″	45.4	13.4	5.1	20.9	10.7	5.2	763	90	13
1	73	43°20′31″	130°9′41″	52	15.5	5.5	22.3	11.3	5.1	648	82	18
1	74	43°20′35″	130°9′45″	36.9	17.3	6.5	20.5	11.9	6.3	609	127	30
1	75	43°20′31″	130°9′45″	32	20	5.7	23.8	17.8	3.2	609	122	9
1	76	43°20′36″	130°9′23″	43.6	16.7	6.5	17.4	11.5	5.3	699	123	28
1	77	43°20′31″	130°9′23″	39.2	18.8	7.7	19.4	13	5.7	708	23	20
1	78	43°20′44″	130°9′27″	28.6	20.9	11	20.3	14.7	8	736	135	21

1	79	43°20′39″	130°9′27″	38	15.7	5.4	21.7	12.1	6.1	717	100	19
1	80	43°20′35″	130°9′27″	46.8	19.9	6.3	20.6	12.3	4.7	654	112	22
1	81	43°20′31″	130°9′27″	42.6	12.3	5.5	17.5	9.1	4.1	670	105	23
1	82	43°20′44″	130°9′32″	13.3	13.3	13.3	8.2	8.2	8.2	697	86	25
1	83	43°20′48″	130°10′03″	49.1	19.7	5.5	25.1	12.4	2	657	15	37
1	84	43°20′53″	130°10′12″	56.2	20.9	5.1	20.7	13.7	4.9	633	110	6
1	85	43°20′57″	130°10′12″	27.5	18.4	10.6	15.8	13.1	8.9	636	35	12
1	86	43°21′11″	130°10′12″	39.7	19.3	7.8	20.6	12.3	3.8	667	133	11
1	87	43°20′48″	130°10′16″	55	25.4	8.9	22.9	17.2	8.5	623	120	4
1	88	43°20′53″	130°10′16″	52.6	23.1	5.1	22.1	15.7	4.4	621	150	7
1	89	43°20′57″	130°10′16″	38.8	14.9	5.1	18.2	10.9	4.7	630	45	11
1	90	43°21′02″	130°10′16″	65	15.9	5.1	20.7	11	4.7	641	25	24
1	91	43°20′53″	130°10′21″	22.7	12.5	5.2	22.6	11.6	5.7	628	165	4
1	92	43°20′53″	130°10′03″	44.4	18.9	6.2	22.3	12.5	6.2	672	77	11
1	93	43°20′57″	130°10′21″	52.4	18.5	5.6	18.6	12	4.1	613	33	6

1	94	43°21′02″	130°10′21″	56.4	15.3	5.1	18.7	9.5	3.5	651	55	2
1	95	43°21′06″	130°10′21″	39.9	16	6.4	21.4	11.5	5.1	636	47	12
1	96	43°21′11″	130°10′21″	58.4	23.3	9.7	23.1	13.5	7.6	662	141	10
1	97	43°21′02″	130°10′25″	67.1	20.9	5.6	21.4	10.9	4.1	602	59	7
1	98	43°20′57″	130°10′03″	66.5	14.5	5.2	21.7	11.3	4.7	674	60	11
1	99	43°20′44″	130°10′07″	50.7	18.5	5.6	25.1	13.5	4.7	635	100	7
1	100	43°20′48″	130°10′07″	53.4	20.3	5.6	24	14	4.2	637	104	12
1	101	43°20′53″	130°10′07″	57.3	19.2	6.9	23.1	12.9	5.6	644	134	10
1	102	43°20′57″	130°10′07″	40.1	23.7	14.2	18.1	13.3	10.8	633	131	8
1	103	43°20′44″	130°10′12″	45.2	20.9	6.1	25.4	14.7	3.4	619	125	6
1	104	43°20′48″	130°10′12″	47.8	18.7	5.7	20.9	13	5.3	616	145	6
2	1	43°20′08″	130°8′47″	31.7	20.2	5.6	22.2	15.4	4.3	722	28	5
2	2	43°19′59″	130°8′38″	42.8	14.2	5.1	24.8	11.9	4.9	742	350	5
2	3	43°19′55″	130°8′38″	56.5	26.1	6	20.4	13	4.1	749	49	7
2	4	43°20′08″	130°8′34″	42.1	19.4	6.3	22.4	13.1	5.2	717	303	5

2	5	43°20′04″	130°8′34″	48.9	23.7	7.4	22.7	13.9	6.4	725	353	14
2	6	43°19′59″	130°8′34″	41.1	19.1	6.8	23.1	12.4	4.7	748	140	9
2	7	43°19′55″	130°8′34″	53.3	20	7	24.6	10.9	5.2	756	14	8
2	8	43°20′08″	130°8′29″	48.2	21.8	5.5	20.8	12.2	3.2	720	11	13
2	9	43°20′04″	130°8′29″	54.4	24.6	5.1	22.1	12.2	4.4	739	24	9
2	10	43°19′59″	130°8′29″	36	20.2	5.9	23.1	12.6	3	743	205	9
2	11	43°19′55″	130°8′29″	44.6	22.9	6.5	21.8	12.4	5.4	757	289	11
2	12	43°20′04″	130°8′47″	41.7	21.9	11	19.6	13.2	7.2	724	77	4
2	13	43°20′13″	130°8′25″	31.7	15.2	6.8	18.6	10.6	5.4	698	339	12
2	14	43°20′08″	130°8′25″	62.7	21	6.7	22.9	14.8	8.5	717	352	15
2	15	43°20′04″	130°8′25″	48.9	19.3	6.3	20.2	13.4	5	735	347	9
2	16	43°19′59″	130°8′25″	60.3	20.1	6.8	22.3	14.8	8.2	743	353	8
2	17	43°20′12″	130°8′21″	42.8	18.3	6.9	28.3	17.2	7.2	700	12	21
2	18	43°20′08″	130°8′21″	43.5	19.7	9.4	23.8	13.8	6.6	726	13	13
2	19	43°20′04″	130°8′21″	41.2	18.8	6.8	22.8	12.9	5.1	735	7	8

2	20	43°19′59″	130°8′21″	43	20.1	6.8	19.3	14.7	8.2	747	3	10
2	21	43°20′08″	130°8′16″	30.7	14.7	6	17.8	10.4	4.2	720	330	16
2	22	43°19′59″	130°8′47″	35.7	21	8.4	23.2	17.7	5.5	726	57	7
2	23	43°20′08″	130°8′43″	38.7	21.1	5.6	21.3	14.1	4.7	722	331	5
2	24	43°20′04″	130°8′43″	47.4	24.2	7.6	22.8	16.2	5.6	727	47	4
2	25	43°19′59″	130°8′43″	50.8	23.6	7	25.1	17.2	4.8	735	49	8
2	26	43°19′55″	130°8′43″	16.9	12.2	7.5	6.4	5.8	5.2	738	101	8
2	27	43°20′08″	130°8′38″	36.5	21.6	5.5	21.4	12.8	4.7	722	118	4
2	28	43°20′04″	130°8′38″	46.8	20.6	7	25.6	16	5.1	730	309	9

Table S2. Biomass equations and carbon content coefficients for ten species. The equations from two researches on logging down wood: (1) Li H.K.; Lei Y.C.,2010. Estimation and Evaluation of Forest Biomass Carbon Storage in China; China Forestry Publishing House: Beijing. (2) He H.J., 2018. Effects of Thinning Disturbance on Carbon Storage and Carbon Balance in Coniferous and Broad-leaved Mixed Forest in Jiaohe, Jilin Province. Beijing Forestry University.

Species	Equation for Aboveground biomass	References	Carbon Content
A. fabri	$AGB = 0.067732 \times (D^2 \times H)^{0.865949}$	Li and Lei., 2010	0.4999
A. pictum	$AGB = 0.033474 \times (D^2 \times H)^{0.976}$	He, 2018	0.4834
B. costata	$AGB = 0.022846 \times (D^2 \times H)^{1.004}$	He, 2018	0.4914
B. platyphylla	$AGB = 0.022846 \times (D^2 \times H)^{1.004}$	He, 2018	0.4914
F. mandshurica	$AGB = 0.044 \times (D^2 \times H)^{0.9169} + 0.023 \times (D^2 \times H)^{0.7115} + 0.0104 \times (D^2 \times H)^{0.9994} + 0.0188 \times (D^2 \times H)^{0.8024}$	Li and Lei., 2010	0.4956
L. gmelinii	$AGB = 0.046238 \times (D^2 \times H)^{0.905002}$	Li and Lei., 2010	0.5211
P. asperata	$AGB = 0.067732 \times (D^2 \times H)^{0.865949}$	Li and Lei., 2010	0.5208
P. koraiensis	$AGB = 0.027847 \times (D^2 \times H)^{0.956544}$	Li and Lei., 2010	0.5113
T. amurensis	$AGB = 0.0072121 \times (D^2 \times H)^{1.022}$	He, 2018	0.4392
U. davidiana	$AGB = 0.044 \times (D^2 \times H)^{0.9169} + 0.023 \times (D^2 \times H)^{0.7115} + 0.0104 \times (D^2 \times H)^{0.9994} + 0.0188 \times (D^2 \times H)^{0.8024}$	Li and Lei., 2010	0.4834

Table S3. Fitting result of modeling base equation for single tree species.

Species	Model	RMSE	NMSE	AIC	BIC
A. fabri	BM.1	2.2049	2.2073	3038.45	3052.05
	BM.2	2.2333	2.2359	3056.65	3070.25
	BM.3	**2.2040**	**2.2064**	**3037.63**	**3051.23**
	BM.4	2.2321	2.2348	3054.30	3067.90
	BM.5	2.3020	2.3048	3098.46	3112.05
	BM.6	2.2223	2.2248	3049.73	3063.33
	BM.7	2.3177	2.3210	3105.78	3119.37
	BM.8	2.2448	2.2476	3062.16	3075.76
	BM.9	2.2136	2.2161	3044.19	3057.79
	BM.10	2.4005	2.4042	3153.67	3167.27
A. pictum	BM.1	2.7131	2.7178	1472.08	1483.23
	BM.2	2.7333	2.7380	1476.64	1487.79
	BM.3	2.7075	2.7121	1470.77	1481.93
	BM.4	**2.6994**	**2.7033**	**1468.85**	**1480.00**
	BM.5	2.8690	2.8770	1505.77	1516.92
	BM.6	2.7248	2.7294	1474.74	1485.89
	BM.7	2.7710	2.7721	1483.84	1494.99
	BM.8	2.7068	2.7110	1470.55	1481.70
	BM.9	2.7177	2.7221	1473.13	1484.28
	BM.10	2.8653	2.8696	1504.19	1515.34

B. costata	BM.1	3.3830	3.3415	1047.27	1057.15
	BM.2	**3.3725**	**3.3297**	**1045.91**	**1055.79**
	BM.3	3.3889	3.3481	1048.04	1057.92
	BM.4	3.3956	3.3561	1048.84	1058.72
	BM.5	3.3966	3.3533	1048.46	1058.34
	BM.6	3.3763	3.3340	1046.40	1056.28
	BM.7	3.4802	3.4488	1059.39	1069.27
	BM.8	3.4085	3.3704	1050.60	1060.48
	BM.9	3.3806	3.3387	1046.94	1056.82
	BM.10	3.5631	3.5375	1069.07	1078.95
B. platyphylla	BM.1	3.0123	3.0798	365.97	372.80
	BM.2	3.0106	3.0770	365.98	372.81
	BM.3	3.0137	3.0816	366.00	372.83
	BM.4	3.0191	3.1012	366.06	372.89
	BM.5	3.0438	3.1363	367.50	374.33
	BM.6	3.0107	3.0768	365.97	372.80
	BM.7	3.0448	3.1004	367.16	373.99
	BM.8	3.0201	3.0882	366.18	373.01
	BM.9	**3.0109**	**3.0768**	**365.97**	**372.80**
	BM.10	3.0792	3.1283	368.47	375.30
F. mandshurica	**BM.1**	**3.7752**	**3.7637**	**255.19**	**260.68**
	BM.2	3.7812	3.7760	255.39	260.88

	BM.3	3.7789	3.7641	255.24	260.73
	BM.4	3.8056	3.7847	255.68	261.16
	BM.5	3.8364	3.8597	256.82	262.31
	BM.6	3.7772	3.7706	255.30	260.79
	BM.7	3.8622	3.8247	256.93	262.41
	BM.8	3.8109	3.7851	255.84	261.32
	BM.9	3.7744	3.7664	255.24	260.73
	BM.10	3.9314	3.8854	258.32	263.81
L. gmelinii	BM.1	3.1670	3.0374	196.74	201.65
	BM.2	3.1729	3.0441	196.96	201.88
	BM.3	**3.1654**	**3.0356**	**196.66**	**201.57**
	BM.4	3.1781	3.0416	196.56	201.47
	BM.5	3.2915	3.1357	199.27	204.18
	BM.6	3.1700	3.0416	196.89	201.81
	BM.7	3.1790	3.0569	196.91	201.82
	BM.8	3.1664	3.0365	196.53	201.44
	BM.9	3.1674	3.0393	196.83	201.74
	BM.10	3.2196	3.1007	197.79	202.70
P. asperata	BM.1	2.8691	2.8667	1513.65	1524.82
	BM.2	2.8439	2.8397	1508.20	1519.37
	BM.3	2.8938	2.8921	1518.91	1530.08
	BM.4	2.9324	2.9317	1527.22	1538.39

	BM.5	**2.8463**	**2.8385**	**1508.04**	**1519.21**
	BM.6	2.8464	2.8426	1508.76	1519.93
	BM.7	3.2421	3.2413	1588.10	1599.27
	BM.8	2.9994	2.9985	1540.94	1552.12
	BM.9	2.8510	2.8477	1509.79	1520.96
	BM.10	3.5153	3.5143	1636.76	1647.93
P. koraiensis	**BM.1**	**2.4229**	**2.3969**	**1424.70**	**1435.91**
	BM.2	2.4376	2.4126	1428.66	1439.87
	BM.3	2.4259	2.3995	1425.41	1436.62
	BM.4	2.4327	2.4079	1427.10	1438.31
	BM.5	2.5830	2.5639	1466.31	1477.52
	BM.6	2.4301	2.4048	1426.70	1437.91
	BM.7	2.6398	2.6081	1477.83	1489.04
	BM.8	2.4663	2.4383	1435.56	1446.77
	BM.9	2.4250	2.3995	1425.37	1436.58
	BM.10	2.8651	2.8320	1528.57	1539.78
T. amurensis	BM.1	2.7669	2.7565	2594.35	2607.19
	BM.2	2.7883	2.7761	2602.12	2614.95
	BM.3	2.7615	2.7519	2592.50	2605.34
	BM.4	**2.7554**	**2.7471**	**2590.30**	**2603.14**
	BM.5	2.9096	2.8931	2645.39	2658.22
	BM.6	2.7798	2.7682	2599.03	2611.86

	BM.7	2.8240	2.8171	2617.82	2630.65
	BM.8	2.7635	2.7556	2593.98	2606.81
	BM.9	2.7727	2.7616	2596.45	2609.29
	BM.10	2.9192	2.9118	2653.03	2665.87
U. davidiana	BM.1	3.2282	3.2895	449.80	457.17
	BM.2	3.2329	3.2972	450.26	457.63
	BM.3	**3.2288**	**3.2886**	**449.73**	**457.09**
	BM.4	3.2332	3.2909	449.60	456.97
	BM.5	3.3420	3.4126	455.79	463.16
	BM.6	3.2293	3.2931	450.04	457.40
	BM.7	3.3291	3.3764	453.71	461.07
	BM.8	3.2415	3.2971	450.02	457.39
	BM.9	3.2269	3.2903	449.87	457.23
	BM.10	3.4568	3.4935	458.90	466.26

Table S4. Fitting results of the generalized H-D models for all reparametrized form. n.c. indicates lack of convergence for model fitting. n.s. indicates that the parameters of the model were not significantly ($p < 0.05$).

Additional variables	Model	Parameter	RMSE	CV-MSE	AIC	BIC
Null	BM.9		2.8785	2.8635	12754.90	12772.47
Stand level	SIC (Topography)	β1	n.c.	n.c.	n.c.	n.c.
		β2	n.c.	n.c.	n.c.	n.c.
		β1 and β2	n.c.	n.c.	n.c.	n.c.
	CE (Topography)	β1	2.8559	2.8611	12752.70	12776.12
		β2	**2.8537**	**2.8588**	**12749.62**	**12773.04**
		β1 and β2	2.8569	2.8599	12751.14	12780.42
	BA (Competition)	β1	2.8373	2.8476	12730.71	12754.13
		β2	**2.8387**	**2.8424**	**12721.31**	**12744.74**
		β1 and β2	n.s.	n.s.	n.s.	n.s.
	DMH (Site quality)	β1	2.7245	2.7245	12501.81	12525.23
		β2	2.7722	2.7745	12595.60	12619.03
		β1 and β2	**2.7188**	**2.7208**	**12493.77**	**12523.05**
Species level	PC (Function Trait)	β1	2.8507	2.8563	12744.21	12767.64
		β2	2.8369	2.8438	12720.67	12744.09
		β1 and β2	**2.8304**	**2.8374**	**12709.06**	**12738.34**
	LA (Function Trait)	β1	2.8546	2.8604	12751.56	12774.98
		β2	2.8405	2.8474	12727.93	12751.36
		β1 and β2	**2.8386**	**2.8327**	**12701.33**	**12730.61**

	LT (Function Trait)	β1	2.8563	2.8606	12753.52	12776.95
		β2	**2.8555**	**2.8602**	**12752.62**	**12776.04**
		β1 and β2	n.s.	n.s.	n.s.	n.s.
	LDMC (Function Trait)	β1	2.8568	2.8622	12754.96	12778.39
		β2	2.8572	2.8633	12756.23	12779.65
		β1 and β2	**2.8461**	**2.8523**	**12737.25**	**12766.53**
	SLA (Function Trait)	β1	2.8555	2.8613	12753.48	12776.90
		β2	2.8432	2.8502	12733.08	12756.50
		β1 and β2	**2.8281**	**2.8348**	**12705.77**	**12735.05**
	LN (Function Trait)	β1	2.8471	2.8531	12737.95	12761.37
		β2	2.8315	2.8388	12710.99	12734.42
		β1 and β2	**2.8259**	**2.8332**	**12700.92**	**12730.20**
	WD (Function Trait)	β1	2.8209	2.8258	12689.90	12713.32
		β2	**2.8085**	**2.8147**	**12668.83**	**12692.25**
		β1 and β2	n.s.	n.s.	n.s.	n.s.
	Hmax (Function Trait)	β1	2.8130	2.8185	12676.18	12699.61
		β2	**2.8000**	**2.8048**	**12651.05**	**12674.47**
		β1 and β2	n.s.	n.s.	n.s.	n.s.
Individual level	BAL (Competition)	β1	2.8519	2.8560	12744.82	12768.24
		β2	**2.8488**	**2.8529**	**12739.78**	**12763.20**
		β1 and β2	n.s.	n.s.	n.s.	n.s.