Supplementary data

Title

Is the fine root tensile strength predictable with their structure and morphology traits across mycorrhizal types in cool-temperate woody species?

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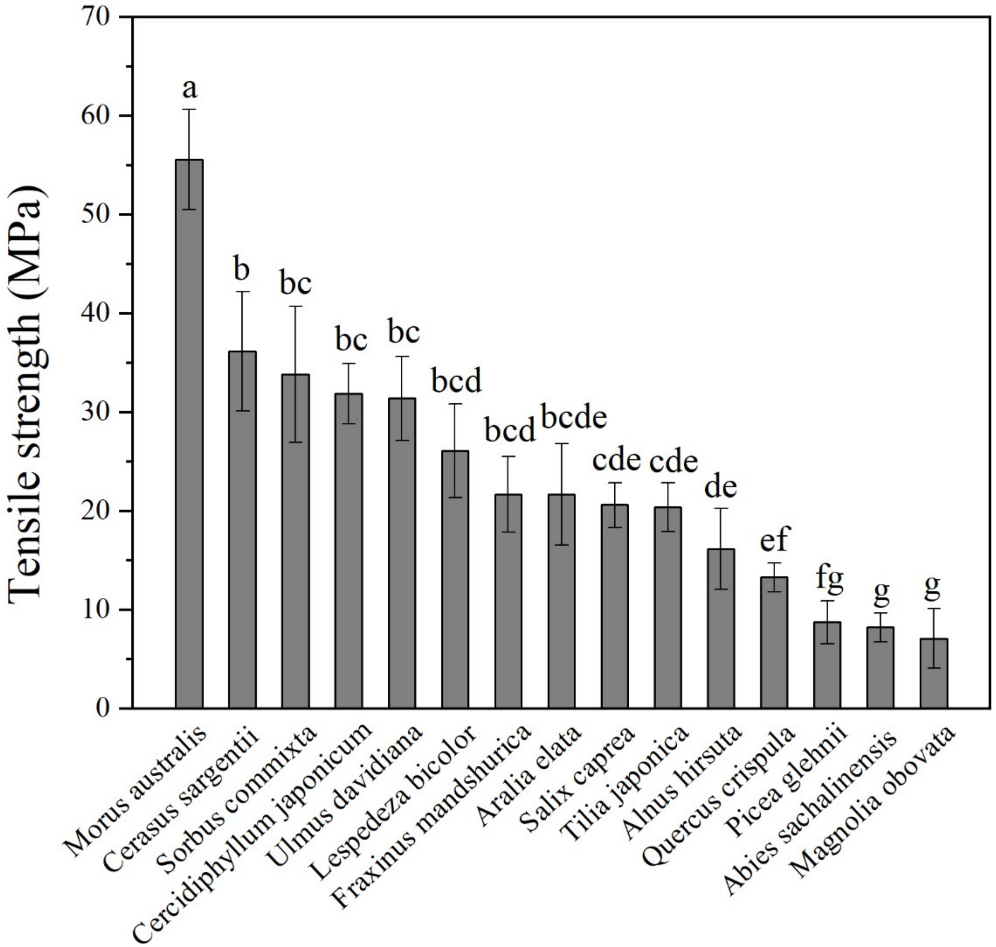

Figure S1. Fine root Tr (MPa) for 15 cool-temperate woody species in Hokkaido. Values are means ± SEM. Different letters show statistically significant differences among the species (Duncan tests, $P < 0.05$).

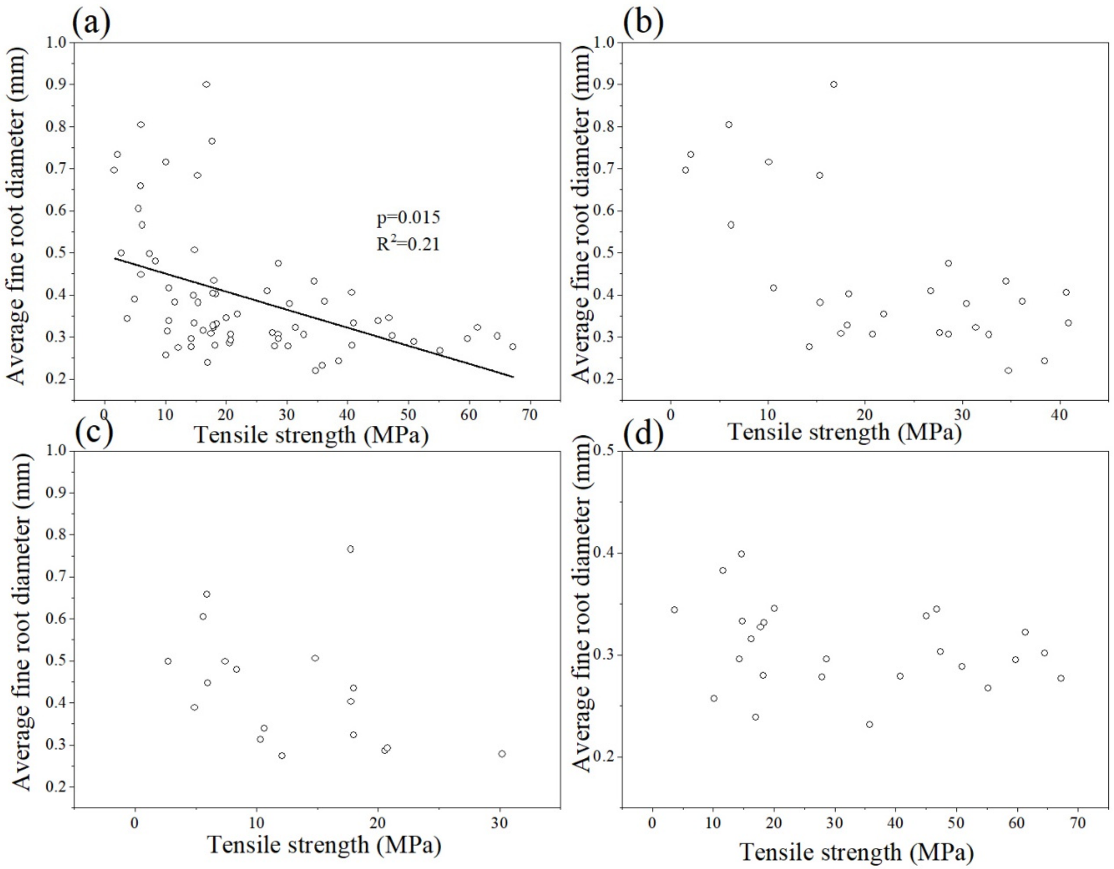

Figure S2. Relationships between fine root Tr and average fine root diameter of 15 species (**a**), AM species (**b**), EM species (**c**), and AEM species (**d**). The statistical significance for the relationship between the two parameters is shown as the p value based on the GLMM analysis.

Table S1. The values for functional traits of the 15 species studied. Values are mean. When letters differ, differences are significant between groups using a Duncan test (*p*<0.05).

	Tensile strength (MPa)	**Average fine root diameter (mm)**	**Root tissue density (g/cm³)**	**Total fine root biomass(g)**	**Maximum Root depth (cm)**	**Specific root length (cm/g)**
AM species group	22.37a	.42a	.24b	1.32a	8.61a	4102.65a
EM species group	12.88b	.42a	.29b	.52b	8.65a	4817.84a
AEM species group	32.32a	.31b	.36a	.87a	8.64a	4178.7a

Table S2. Summary of the traits of 15 cool-temperate woody species in Hokkaido

Species	**N**	**Average fine root diameter (mm)**			**Root tissue density(g/cm^3)**			**Total fine root biomass (g)**			**Maximum root depth(cm)**			**Specific root length(cm/g)**			**Tensile strength（MPa）**		
		Range	Mean	CV %[1]	Range	Mean	CV %[1]	Range	Mean	CV %[1]	Range	Mean	CV %[1]	Range	Mean	CV %[1]	Range	Mean	CV %[1]
EM species	23	.27-.77	.42	31.9	.2-.4	.29	36.03	.13-1.35	.52	65.81	5-23	8.65	48.11	1133.52-23286.17	4817.84	124.19	2.744-30.21	12.88	58.58
Abies sachalinensis	5	.4-.77	.57	22.93	.2-.45	.23	61.84	.31-.95	.56	50.04	5-14	8	42.57	1133.52-23286.17	5162.68	172.08	5.60-17.73	10.30	54.29
Picea glehnii	6	.39-.5	.44	9.56	.03-.37	.28	46.64	.13-1.35	.57	75.84	5-9	6.5	23.33	1515.38-23112.6	5583.71	154.00	2.74-17.78	7.85	85.96
Quercus crispula	6	.27-.48	.36	23.32	.26-.39	.35	12.49	.15-.36	.25	33.95	5-10	7.83	26.06	1942.07-4593.84	3222.95	32.32	8.35-20.79	13.36	36.70
Tilia japonica	6	.28-.32	.3	7.07	.25-.4	.32	20.69	.4-1.21	.75	44.42	7-23	11.83	53.82	3274.87-6373.83	4793.05	25.81	17.96-30.21	22.91	28.17

AM species	33	.22-.9	.42	42.05	.06-.44	.24	41.92	.10-2.89	1.32	70.96	4-12	8.61	26.46	1742.56-8791.45	4102.65	43.86	1.57-40.92	22.37	52.48
Aralia elata	3	.28-.9	.49	71.27	.06-.35	.25	65.53	.12-.34	.2	62.37	5-7	6	16.67	2617.43-4816.36	3856.7	29.19	14.27-16.78	17.28	19.03
Cercidiphyllum japonicum	6	.31-.43	.38	12.56	.16-.38	.27	30.19	1.52-2.89	2.07	28.59	8-12	9.33	16.13	2014.05-6623.45	3716.53	45.28	26.76-40.92	34.44	17.85
Fraxinus mandshurica var. Japonica	6	.33-.48	.4	12.27	.12-.23	.18	20.74	1.43-2.68	2.04	24.34	8-12	10.33	13.22	3185.42-5841.26	4639.66	19.75	10.62-30.42	20.24	30.09
Ulmus davidiana var. japonica	6	.22-.32	.28	13.53	.35-.44	.38	8.41	1.4-2.65	1.89	29.69	10-11	10.33	5.00	3382.66-7591.76	4481.27	35.53	28.55-38.48	30.80	22.83
Lespede	6	.24-	.31	12.	.17-	.25	24.	.21-	.85	94.	5-	8.1	28.	3727	579	36.	17.	28.	33.

za bicolor		.35		83	.33		93	2.34		06	12	7	37	.24-8791.45	9.91	23	62-34.74	33	24
Magnolia obovata	6	.57-0.8	.7	11.15	.11-.16	.13	15.49	.1-.64	.29	66.71	4-9	6.17	31.47	1742.56-2520.51	1998.86	15.27	1.57-15.30	6.88	75.05
AEM species	28	.23-.4	.31	14.02	.2-.53	.36	23.61	.17-3.06	.87	65.75	5-15	8.64	32.61	1765.89-7359.99	4178.7	38.52	3.68-67.23	32.32	61.18
Alnus hirsuta	6	.24-.4	.34	16.68	.29-.53	.38	26.31	.17-1.35	.61	68.18	8-14	10.5	22.34	2041.6-4696.05	3176.35	31.24	3.68-46.82	18.75	87.85
Cerasus sargentii	6	.26-.35	.29	10.3	.23-.43	.37	18.96	.54-1.11	.85	26.42	6-12	8.17	26.17	2604.84-7023.75	4333.19	34.14	10.09-67.23	35.61	63.82
Morus australis	6	.27-.3	.29	5.39	.27-.33	.3	8.67	.77-3.06	1.37	62.74	7-15	10.67	32.3	4161.85-6157.6	5248.05	17.22	40.76-64.58	51.77	17.2
Salix caprea	4	.23-.32	.28	12.82	.2-.33	.28	21.3	.22-.65	.4	46.51	6-7	6.25	8	4021.89-7359	6053.78	25.92	14.27-35.	21.11	46.90

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Sorbus commixta	6	.32-.4	.34	8.23	.31-.53	.42	19.66	.42-1.63	.99	47.6	5-10	6.83	25.2	1765.89-3645.21	2707.17	26.33	14.63-61.36	31.44	65.91

[1]CV%, the coefficient of variation.