

**Table S1a.** Cross-sectional position-based mensurational metrics for the 610 jack pine disk samples.

Metric	Relative height class <sup>a</sup> (%)	Number of disks	Mean	Median	Minimum	Maximum	CV <sup>b</sup> (%)
Cambial age (yr)	1 (SH)	61	62	54	47	74	15.5
	6 (BH)	61	59	51	47	71	15.8
	10	61	57	50	45	69	15.9
	20	61	55	49	43	65	14.5
	30	61	50	43	40	62	17.4
	40	61	47	41	37	58	15.5
	50	61	42	36	31	54	18.5
	60	61	38	34	28	50	17.7
	70	61	31	26	19	46	24.2
	80	61	25	23	12	42	31.4
Stem height (m)	1 (SH)	61	0.19	0.20	0.02	0.29	25.7
	6 (BH)	61	1.30	1.30	1.30	1.30	0.0
	10	61	2.35	2.34	1.93	2.72	7.9
	20	61	4.50	4.53	3.71	5.22	7.7
	30	61	6.64	6.72	5.45	7.56	7.6
	40	61	8.78	8.90	7.19	10.00	7.5
	50	61	10.92	11.09	8.89	12.46	7.6
	60	61	13.06	13.28	10.47	14.91	7.6
	70	61	15.20	15.48	12.07	17.36	7.7
	80	61	17.33	17.62	13.65	19.80	7.8
Relative stem height (%)	1 (SH)	61	0.88	0.89	0.07	1.32	25.0
	6 (BH)	61	6.04	5.96	5.29	7.09	7.0
	10	61	10.86	10.90	9.75	13.01	3.9
	20	61	20.80	20.78	18.18	24.96	3.4
	30	61	30.70	30.74	26.68	34.45	2.7
	40	61	40.59	40.71	35.18	43.87	2.4
	50	61	50.49	50.64	43.68	53.60	2.3
	60	61	60.41	60.60	52.26	63.01	2.3
	70	61	70.26	70.54	60.77	72.80	2.4
	80	61	80.11	80.48	69.34	83.28	2.5
Cross-sectional diameter (cm)	1 (SH)	61	23.21	22.61	15.71	31.88	13.6
	6 (BH)	61	20.49	20.37	14.73	26.97	14.3
	10	61	19.47	19.39	13.70	26.89	14.1
	20	61	18.93	19.03	13.07	24.42	13.2

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30	61	16.95	17.03	10.89	21.74	14.4
40	61	16.64	16.59	11.81	20.86	12.9
50	61	14.37	14.56	9.41	19.22	15.4
60	61	13.87	13.88	9.99	18.67	14.0
70	61	11.29	11.03	7.54	15.69	17.3
80	61	8.61	8.45	4.64	13.60	21.3

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<sup>a</sup> Relative stem height position where SH and BH refer to stump height and breast-height, respectively. <sup>b</sup>  
Coefficient of variation.

**Table S1b.** Cross-sectional position-based mensurational metrics for the 223 red pine disk samples.

Metric	Relative height class mid-point <sup>a</sup> (%)	Number of disks	Mean	Median	Minimum	Maximum	CV <sup>b</sup> (%)
Cambial age (yr)	7.5	54	77	77	73	81	3.0
	22.5	55	61	62	53	67	4.5
	37.5	24	53	53	45	58	5.4
	52.5	24	40	40	30	46	8.8
	67.5	39	31	32	24	39	12.8
	82.5	27	20	19	14	27	19.1
Stem height (m)	7.5	54	0.25	0.30	0.12	0.30	22.4
	22.5	55	5.25	5.15	5.10	8.06	7.5
	37.5	24	10.33	10.31	10.12	10.71	1.3
	52.5	24	15.03	15.29	13.14	16.19	5.1
	67.5	39	18.74	18.20	15.14	21.91	8.3
	82.5	27	22.35	22.52	19.51	24.62	6.2
Relative stem height (%)	7.5	54	0.91	1.02	0.48	1.12	21.1
	22.5	55	18.93	18.73	17.17	28.57	8.6
	37.5	24	38.00	37.48	34.45	43.32	5.0
	52.5	24	54.98	54.97	47.12	59.59	5.7
	67.5	39	68.41	68.05	60.04	75.00	6.7
	82.5	27	82.54	82.60	76.27	90.65	4.4
Cross-sectional diameter (cm)	7.5	54	35.98	35.14	30.53	42.96	9.7
	22.5	55	28.71	28.11	19.01	35.87	13.5
	37.5	24	24.95	24.45	19.02	35.31	16.7
	52.5	24	21.24	21.14	13.34	30.11	18.7
	67.5	39	17.76	17.55	13.34	23.78	15.1
	82.5	27	9.74	9.39	5.18	14.63	27.8

<sup>a,b</sup> as defined in Table S1a.

**Table S2a.** Descriptive statistical summary of the jack pine fibre attributes by cross-sectional relative height sampling position.

Attribute	Relative height <sup>a</sup> position (%)	Mean	Median	Minimum	Maximum	CV <sup>b</sup> (%)
Wood density ( $W_d$ ; kg/m <sup>3</sup> )	1 (SH)	446.86	450.30	371.80	532.95	7.8
	6 (BH)	437.94	440.91	358.11	509.42	7.1
	10	430.36	421.61	372.88	489.66	6.5
	20	428.20	424.58	347.91	494.99	6.6
	30	416.45	418.68	337.88	481.99	6.6
	40	414.45	414.90	347.95	475.42	6.7
	50	407.46	405.88	359.76	467.79	6.0
	60	403.67	399.50	353.55	462.54	5.7
	70	394.67	391.74	356.95	442.25	5.1
	80	388.91	388.85	349.14	465.64	5.7
Microfibril angle ( $M_a$ ; °)	1 (SH)	20.07	19.53	9.99	32.32	24.0
	6 (BH)	13.90	13.54	8.09	20.69	20.9
	10	12.98	12.79	7.49	19.71	21.1
	20	12.96	12.73	6.71	21.36	25.3
	30	11.47	10.95	6.33	19.23	22.7
	40	11.62	11.18	6.94	20.33	21.4
	50	11.25	10.92	6.24	17.84	22.6
	60	12.47	12.04	6.97	18.66	22.6
	70	12.54	12.25	6.84	20.23	22.6
	80	14.11	13.92	8.91	20.95	21.6
Modulus of elasticity ( $M_e$ ; GPa)	1 (SH)	10.68	10.44	5.77	17.62	21.3
	6 (BH)	12.54	12.47	8.25	16.27	14.9
	10	12.71	12.68	8.59	16.73	15.0
	20	13.04	13.24	8.43	17.23	13.9
	30	12.80	12.95	8.24	16.16	14.2
	40	13.00	13.03	8.95	16.44	11.0
	50	12.38	12.82	7.93	15.88	13.6
	60	12.09	12.12	8.72	15.64	11.5
	70	11.32	11.55	7.14	14.57	12.6
	80	10.53	10.58	6.82	13.94	14.7
Fiber coarseness ( $C_o$ ; µg/m)	1 (SH)	423.40	422.80	359.73	515.78	8.0
	6 (BH)	412.12	411.11	366.38	481.86	6.8
	10	406.00	406.57	360.34	471.14	6.8
	20	408.73	410.31	355.61	481.33	7.0

	30	395.21	394.97	339.39	447.80	7.1
	40	389.41	386.08	330.61	443.90	7.1
	50	383.32	383.70	328.30	455.34	7.2
	60	377.47	376.88	326.04	437.06	6.5
	70	364.59	365.13	311.38	420.67	6.3
	80	348.45	351.52	306.33	407.55	6.8
Tracheid wall thickness ( $W_t$ ; $\mu\text{m}$ )	1 (SH)	2.82	2.82	2.32	3.57	9.4
	6 (BH)	2.75	2.73	2.24	3.27	8.0
	10	2.70	2.66	2.35	3.16	7.6
	20	2.70	2.66	2.21	3.17	7.8
	30	2.60	2.60	2.08	3.01	7.8
	40	2.57	2.55	2.18	2.98	7.8
	50	2.52	2.49	2.22	2.92	7.3
	60	2.48	2.46	2.14	2.82	6.6
	70	2.40	2.37	2.17	2.77	5.9
	80	2.32	2.30	2.05	2.77	6.5
Tracheid radial diameter ( $D_r$ ; $\mu\text{m}$ )	1 (SH)	31.08	31.20	28.54	34.04	3.9
	6 (BH)	30.80	30.76	28.29	33.53	4.0
	10	30.80	30.90	28.51	33.00	3.7
	20	30.78	30.85	28.32	33.59	3.7
	30	30.75	30.95	28.69	32.74	3.5
	40	30.56	30.67	28.14	33.32	3.9
	50	30.52	30.68	27.99	32.79	3.7
	60	30.26	30.31	27.68	32.43	3.7
	70	30.02	30.18	26.44	31.97	4.1
	80	29.30	29.51	26.21	31.72	4.3
Tracheid tangential diameter ( $D_t$ ; $\mu\text{m}$ )	1 (SH)	27.14	27.12	25.91	28.98	2.4
	6 (BH)	27.68	27.65	26.23	29.72	2.5
	10	27.87	27.93	26.41	29.88	2.4
	20	28.17	28.14	26.30	29.66	2.6
	30	28.12	28.13	26.89	30.25	2.5
	40	28.07	28.17	26.27	29.65	2.4
	50	28.10	28.16	26.53	29.72	2.5
	60	28.10	28.25	26.19	29.68	2.6
	70	27.95	27.98	26.37	29.63	2.6
	80	27.61	27.51	26.07	29.19	2.7
	1 (SH)	296.75	295.00	248.26	348.17	7.6
	6 (BH)	308.75	307.59	263.87	355.27	6.6

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	10	314.34	315.79	275.60	351.46	6.4
	20	313.91	312.87	266.20	364.80	6.4
	30	322.73	321.36	284.39	372.46	6.4
Specific	40	324.72	324.49	285.61	369.76	6.6
surface	50	328.17	327.71	287.81	366.30	6.4
area	60	330.90	331.12	292.30	375.38	5.7
( $S_a$ ; m <sup>2</sup> /kg)	70	338.00	341.89	297.18	369.33	5.0
	80	346.33	347.58	299.82	386.61	5.6

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<sup>a,b</sup> as defined in Table S1a.

**Table S2b.** Descriptive statistical summary of the red pine fiber attributes by cross-sectional relative height sampling position.

Attribute	Relative height class mid-point (%)	Mean	Median	Minimum	Maximum	CV <sup>a</sup> (%)
Wood density ( $W_d$ ; kg/m <sup>3</sup> )	7.5	427.74	426.27	387.88	472.31	3.9
	22.5	405.86	406.26	367.18	441.74	4.3
	37.5	387.58	385.92	363.70	418.75	4.1
	52.5	368.65	364.02	338.37	403.28	4.7
	67.5	349.69	346.52	328.99	384.40	4.0
	82.5	344.01	342.02	313.86	395.42	6.1
Microfibril angle ( $M_a$ ; °)	7.5	21.45	21.55	17.01	27.00	11.1
	22.5	11.76	11.74	7.55	17.24	17.3
	37.5	10.79	10.13	7.78	17.72	22.2
	52.5	12.44	11.89	9.02	19.53	21.0
	67.5	13.51	13.29	9.47	18.55	15.3
	82.5	15.79	14.99	11.64	29.06	21.5
Modulus of elasticity ( $M_e$ ; GPa)	7.5	10.13	10.17	7.12	12.30	10.4
	22.5	12.96	13.10	10.09	15.31	8.6
	37.5	12.33	12.41	9.73	14.24	10.1
	52.5	10.82	10.78	8.22	13.11	11.6
	67.5	9.63	9.38	7.84	11.62	10.7
	82.5	8.55	8.63	5.98	10.43	12.3
Fiber coarseness ( $C_o$ ; µg/m)	7.5	484.77	487.13	441.59	529.48	4.6
	22.5	491.44	485.82	450.32	548.12	5.0
	37.5	476.53	473.74	430.94	522.38	4.9
	52.5	449.24	442.10	399.27	514.74	6.3
	67.5	418.15	414.14	372.28	474.62	5.3
	82.5	368.53	363.30	310.74	452.23	9.2
Tracheid wall thickness ( $W_t$ ; µm)	7.5	2.89	2.89	2.58	3.22	4.6
	22.5	2.82	2.81	2.56	3.13	5.1
	37.5	2.69	2.65	2.51	2.97	4.9
	52.5	2.52	2.45	2.34	2.86	5.9
	67.5	2.35	2.34	2.16	2.65	5.0
	82.5	2.18	2.15	1.94	2.65	8.2
	7.5	34.40	34.28	31.94	36.03	2.7

	22.5	35.09	35.15	33.33	36.64	2.6
Tracheid radial diameter ( $D_r$ ; $\mu\text{m}$ )	37.5	35.58	35.65	34.14	37.39	2.5
	52.5	35.61	35.76	32.60	37.75	2.9
	67.5	35.44	35.39	33.74	37.52	2.3
	82.5	33.18	33.02	29.36	35.23	4.3
	7.5	29.33	29.37	27.67	30.62	1.8
	22.5	31.21	31.16	30.08	32.52	1.9
Tracheid tangential diameter ( $D_t$ ; $\mu\text{m}$ )	37.5	31.31	31.24	30.09	32.43	2.0
	52.5	30.88	31.05	29.55	32.30	2.3
	67.5	30.31	30.34	28.82	31.66	2.0
	82.5	28.70	28.96	27.14	29.64	2.5
	7.5	276.96	275.45	253.91	302.60	3.7
	22.5	287.89	287.87	263.54	311.61	4.1
Specific surface area ( $S_a$ ; $\text{m}^2/\text{kg}$ )	37.5	297.24	297.70	272.02	318.89	3.7
	52.5	309.08	315.19	275.58	328.68	4.6
	67.5	325.90	327.52	289.03	350.74	4.0
	82.5	347.37	351.86	295.36	386.12	6.5

<sup>a</sup> As defined in Table S1a.