

Table 1. Interspecific variability in needle structural and chemical characteristics: results of one-way analyses of co-variance (common slope model with species as main effect and irradiance as the covariate).¹ Means followed by the same letter within the same row are not significantly different (Bonferroni test, $P > 0.05$). Abbreviation: nd = not measured.

Variable ²	Mean \pm SD ³		
	<i>Pinus palustris</i>	<i>Pinus taeda</i>	<i>Pinus virginiana</i>
Central angle ³ (2α ; °)	73.8 \pm 4.6 a	65.2 \pm 4.2 b	nd
Density (D ; g cm ⁻³)	0.485 \pm 0.024 b	0.56 \pm 0.05 a	0.467 \pm 0.031 c
Dry to fresh mass ratio (P_D ; g g ⁻¹)	0.406 \pm 0.016 b	0.450 \pm 0.022 a	0.430 \pm 0.016 a
Length (L_n ; cm)	29.1 \pm 4.3 a	12.3 \pm 2.9 b	5.3 \pm 1.0 c
Nitrogen content (N_M ; %)	0.86 \pm 0.10 c	1.08 \pm 0.11 b	1.27 \pm 0.11 a
Side length ³ (L_s ; mm)	1.00 \pm 0.06 a	0.84 \pm 0.09 b	nd
Total area (A_T ; cm ²)	10.7 \pm 1.18 a	3.9 \pm 1.1 b	1.94 \pm 0.51 c
Total to projected area ratio (A_T/A_P)	2.344 \pm 0.027 b	2.279 \pm 0.038 c	2.477 \pm 0.029 a
Volume to total area ratio (V/A_T ; mm)	0.207 \pm 0.014 a	0.166 \pm 0.020 b	0.201 \pm 0.020 a
Width ³ (W ; mm)	1.57 \pm 0.09 a	1.38 \pm 0.15 c	1.46 \pm 0.18 b

¹ The interaction term ($Q_{int} \times$ species) was insignificant ($P > 0.05$) for all variables except N_M ($P < 0.05$) and A_T/A_P ($P < 0.001$). For these variables, *P. virginiana* had a lower slope than the other species (Figures 4D and 5C). Nevertheless, *P. virginiana* had larger values of N_M and A_T/A_P over the entire canopy light range.

² Characteristics of needle cross section are defined in Figure 1.

³ The data were compared over a finite range of Q_{int} of 10.0 to 42.2 mol m⁻² day⁻¹ (Materials and methods), and only data points with $Q_{int} \geq 10$ mol m⁻² day⁻¹ were included in the comparisons and used for calculation of means.