Local diversity in heterogeneous landscapes: quantitative assessment with a height-structured forest metacommunity model. *Theoretical Ecology*

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Appendix 2: Parameter values for early- and late-successional species

Table A2. Parameter values for early- and late-successional species.

symbol	description (units)	early	late
G_u	diameter growth rate in understory (cm yr^{-1})	0.2	0.1
G_c	diameter growth rate in canopy (cm yr^{-1})	0.5	0.3
μ_u	mortality rate in understory (yr^{-1})	0.1	0.05
μ_c	mortality rate in canopy (yr^{-1})	0.025	0.005
F	reproduction per unit crown area (individuals ha^{-1} yr^{-1})	300	300
a_1	canopy area (A) coefficient (ha cm$^{-a_2}$): $A = a_1 D^{a_2}$	2.5×10^{-5}	2.5×10^{-5}
a_2	canopy-area allometric exponent (unitless)	1.5	1.5
h_1	height (z) coefficient (m cm$^{-h_2}$) : $z = h_1 D^{h_2}$	2.5	2.5
h_2	height allometric exponent (unitless)	0.5	0.5

Values in Table A2 are similar to the Purves et al. (2008) estimates for the most common species on mesic soils in the USA Lake States: *Populus tremuloides* (early-successional) and *Acer saccharum* (late-successional). Table A2 contains the 'baseline' values for the five performance rates (G_u, G_c, μ_u, μ_c, and F) from which we calculated rates for the locally dominant and subordinate species in our metacommunity model; e.g., early-successional G_u values are $(1 \pm \varepsilon/2) \times 0.2$. For simplicity, we did not allow for species differences in canopy-area and height allometries. Values in Table A2 differ somewhat from Purves et al. (2008), but the differences are not central to our main points. The main differences are: (i) Purves et al. (2008) assumed $a_2 = 2$ and fit a_1 as a free parameter. Subsequent analyses (Dybzinski et al., in review) suggest that the values in Table A2 are more typical for temperate trees. (ii) Our baseline value for F (300) is larger than the Purves et al. (2008) estimate of 71. This parameter was tuned by Purves et al. (2008) to fit sapling density, rather than estimated from direct observations of seed or seedling production. The value $F = 71$ yielded unrealistically long times to canopy closure following disturbance in our model, so we tuned F to yield more reasonable rates of canopy closure. This tuning does not affect our main results. Tuning of F will likely be necessary in versions of the PPA model, including ours, that ignore size-dependent growth of small trees (e.g., Pacala et al. 1994).

Literature cited

Pacala SW, Canham CD, Silander JA, Kobe RK (1994) Sapling growth as a function of resources in a north temperate forest. Can. J. For. Res. 24:2172-2183

Purves DW, Lichstein JW, Strigul N, Pacala SW (2008) Predicting and understanding forest dynamics using a simple tractable model. Proc. Natl. Acad. Sci. U. S. A. 105:17018-17022