Modelling individual tree maximum basal area growth rates of five tall eucalypt species growing in even-aged forests

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Model for individual tree growth rate

$$\Delta G = G_{max}(G) \cdot f_1(S) \cdot f_2(C)$$

where

ΔG **= tree growth rate**

$G_{max}(G)$ **= function relating maximum possible growth rate to size(G)**

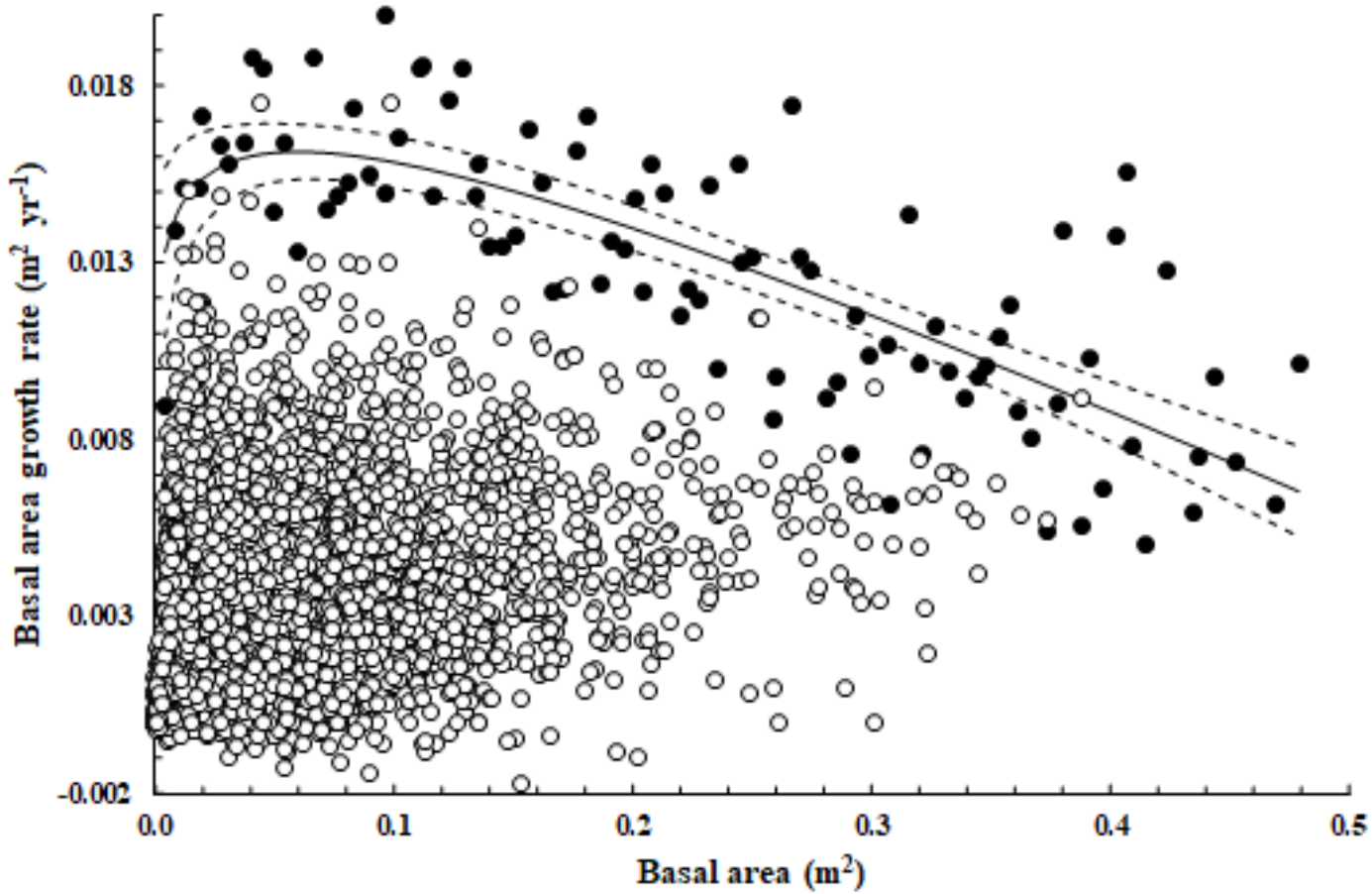
$f_1(S)$ **= function reducing growth rate from maximum due to limitation in the availability of resources required for growth from site (S)**

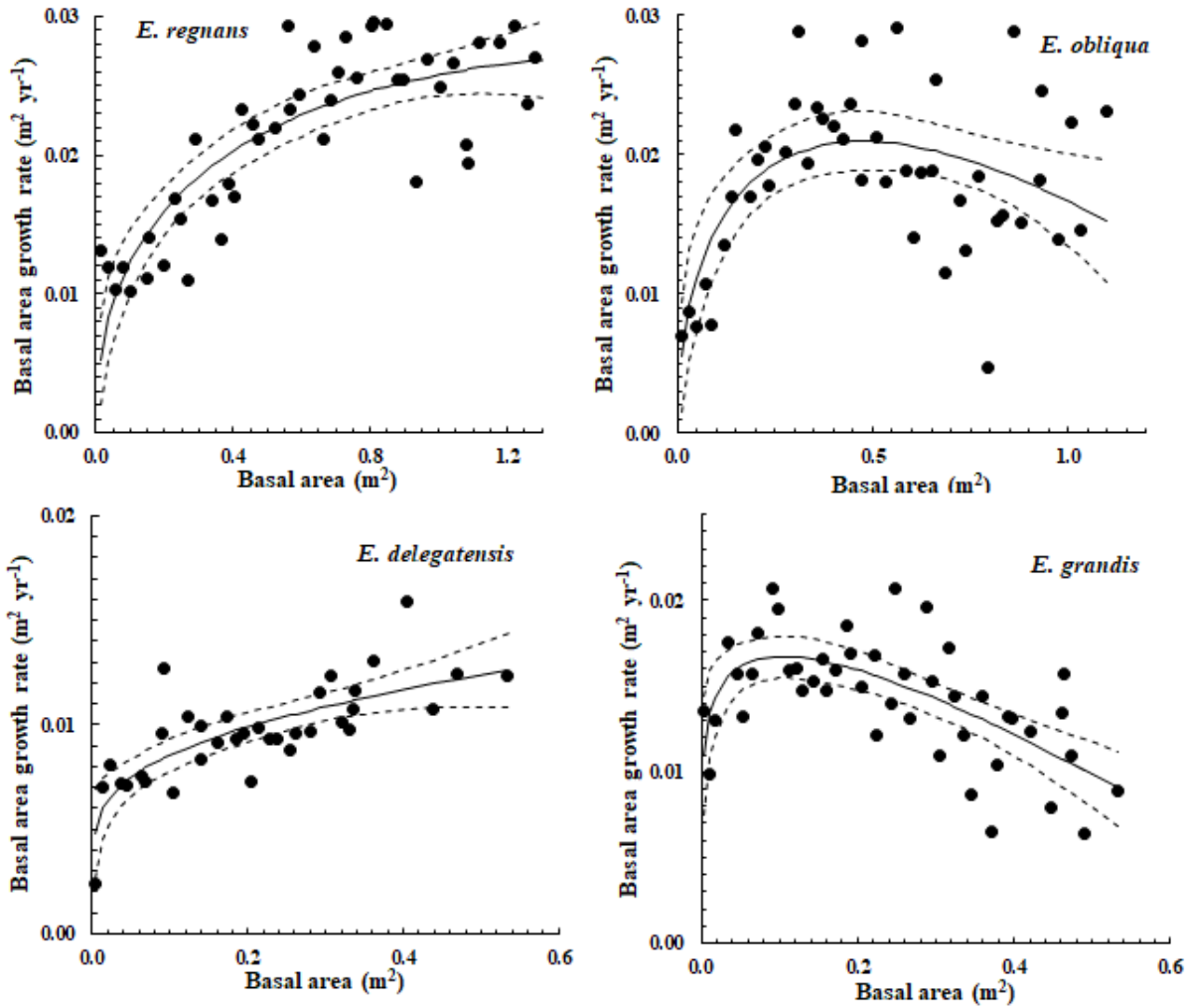
$f_2(C)$ **= function reducing growth rate from maximum due to competition from neighbouring trees for resources required for growth from site (C)**

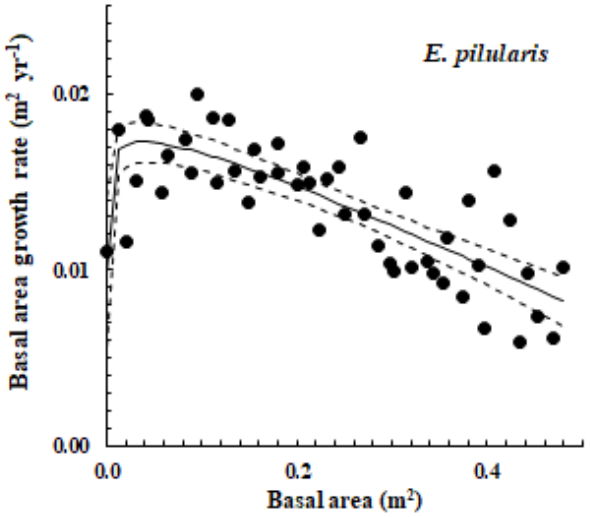
Data

Variable	*E. regnans*	*E. obliqua*	*E. delegatensis*	*E. grandis*	*E. pilularis*	Total
Number of plots	31	102	26	25	96	280
Age (yr)	10–85	6–118	9–83	2–52	2–63	2–118
Number of trees	12,422	24,060	4,608	10,123	35,876	87,089
DBH (cm)	1–131	1–118	1–82	1–82	1–78	1–131

Eucalyptus pilularis – 35,876 observations



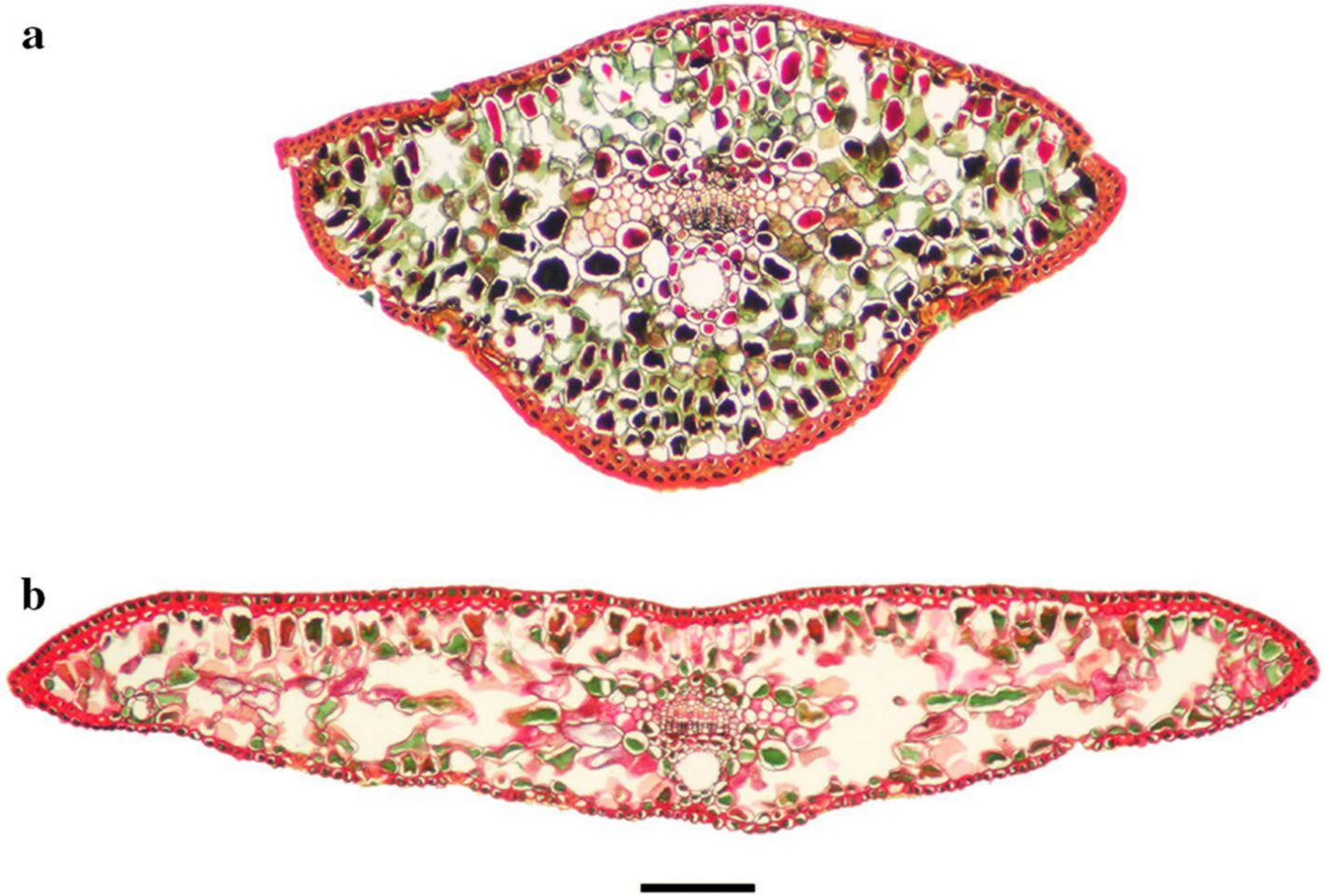




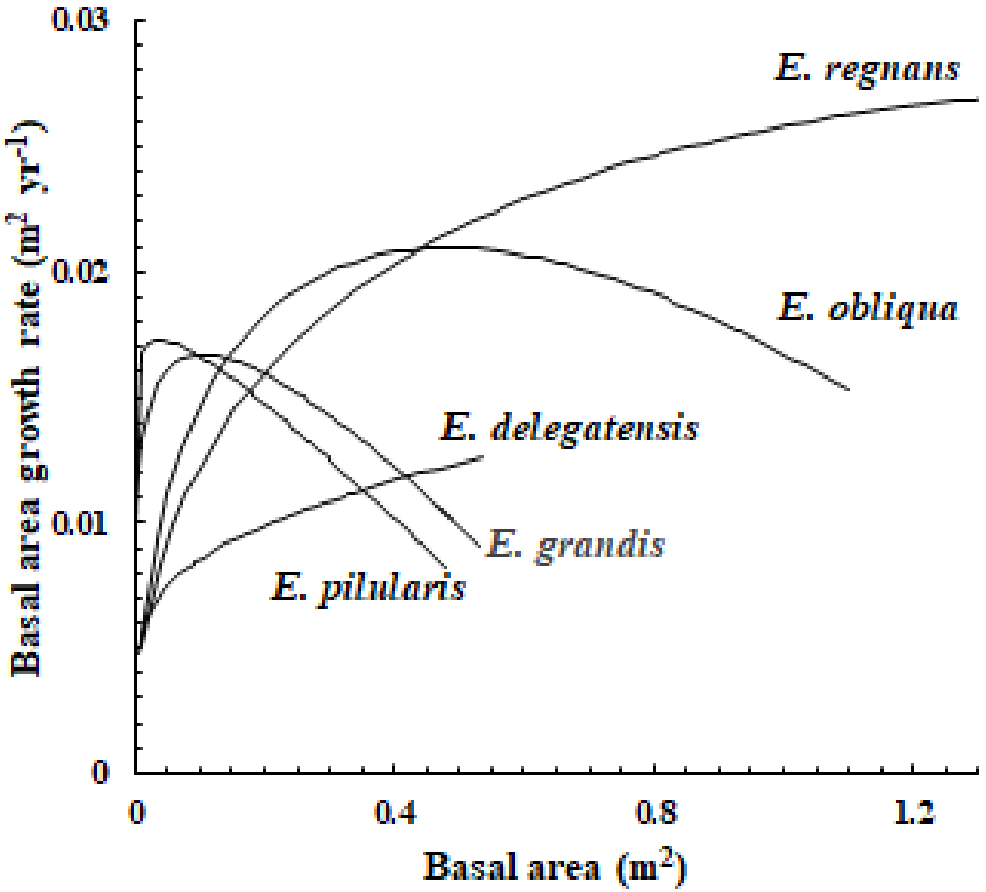
Chapman-Richards growth function

$\Delta B_m = aB^b - cB$

where ΔB_m is maximum basal area growth rate for a tree with basal area B and a, b and c are parameters



Microscopic cross sections of leaves of redwoods (*Sequoia sempervirens*) in California USA, collected from (a) 110 m and (b) 48 m above ground. Scale bar = 0.2 mm


0.03
0.02
0.01
0
Basal area growth rate (m² yr⁻¹)
E. regnans
E. obliqua
E. delegatensis
E. grandis
E. pilularis
0
0.4
0.8
1.2
Basal area (m²)