10.1071/FP12204_AC

Supplementary Material: *Functional Plant Biology*, 2013, 40(4), 400–408.

Supplementary Material

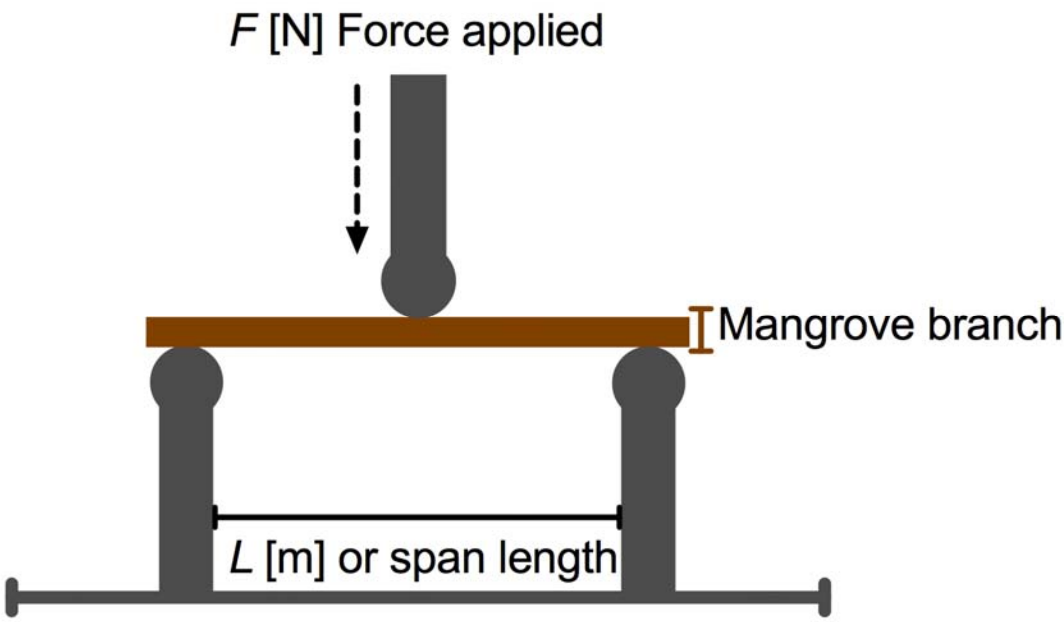

Fig. S1. Representation of a three point bending test using an Electromechanical Testing Machine.

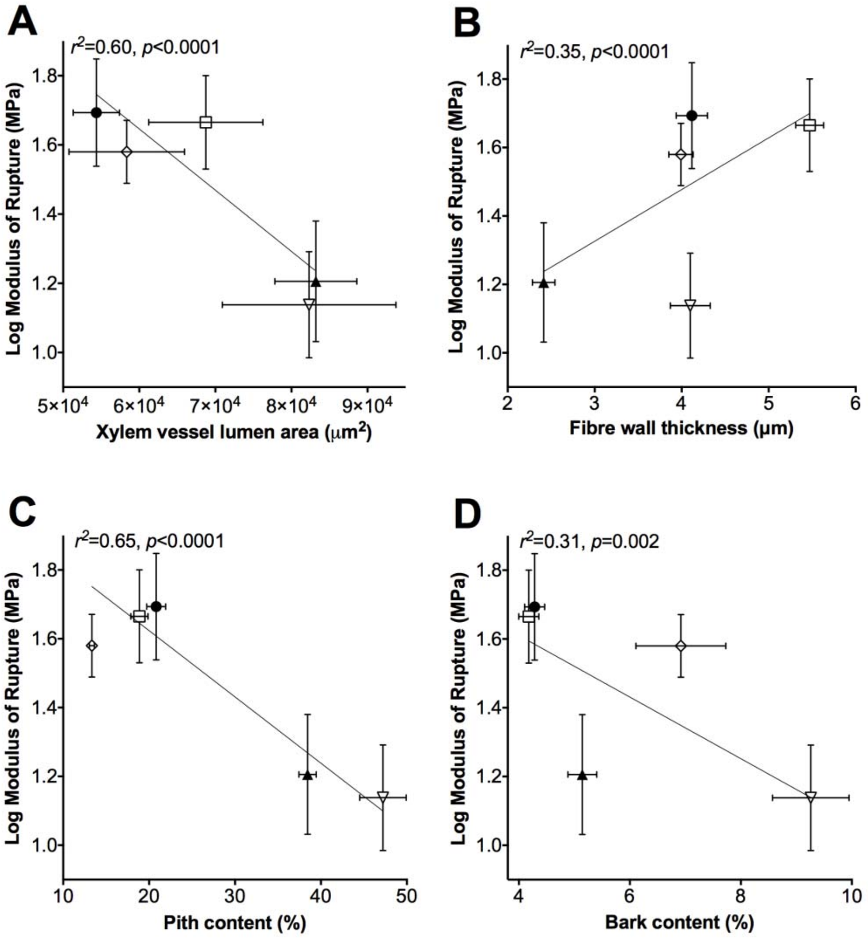

Fig. S2. Relationship between (A) Log Modulus of Rupture (MOR) and Xylem vessel lumen area, (B) Log MOR and Fibre wall thickness, (C) Log MOR and Pith content (expressed as total %) and (D) Log MOR and Bark content (expressed as total %) of mangrove intact branches. The lines represent the linear regressions where (A) Log MOR = -1.77×10^{-5} Xylem vessel lumen area + 2.70, (B) Log MOR = 0.15 Fibre wall thickness + 0.90, (C) Log MOR = -1.93×10^{-2} Pith content + 2.0, and (D) Log MOR = -8.95×10^{-2} Bark content + 1.96. Symbols represent species, *A. marina* from the low and the high intertidal (filled circles), *A. corniculatum* (open diamonds), *B. gymnorrhiza* (open upside down triangles), *C. australis* (squares) and *R. stylosa* (filled triangles). Each point represents mean ± standard error of n = 4–10.

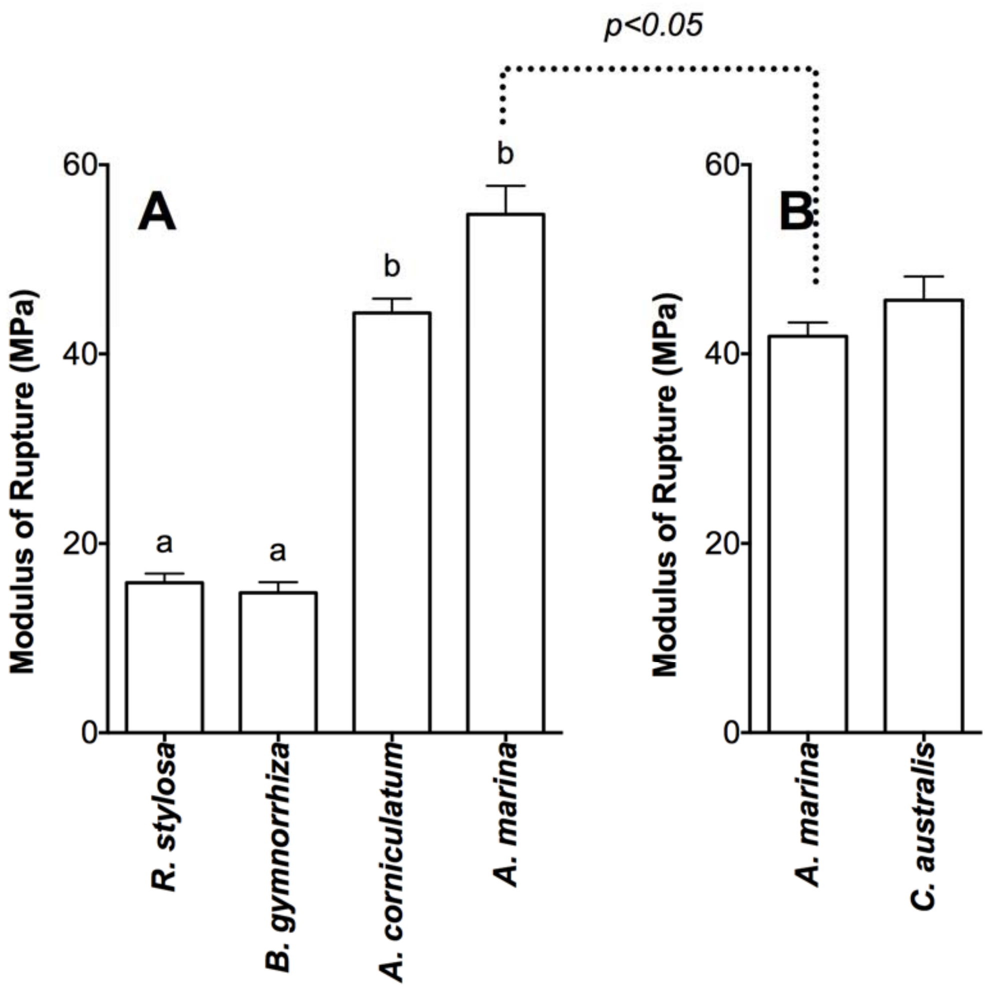

Fig. S3. (A) Modulus of Rupture (MOR) of intact branches from the dominant mangrove species in South East Queensland from the low intertidal and the (B) high intertidal. Values are means and standard errors (n = 30–36). Different letters indicate that the means were significantly different ($P < 0.05$). The pointed line indicates an additional *t*-test between MOR of *A. marina* branches from the low and the high intertidal, $P < 0.05$ indicates that the means (of n = 31–41) were significantly different.

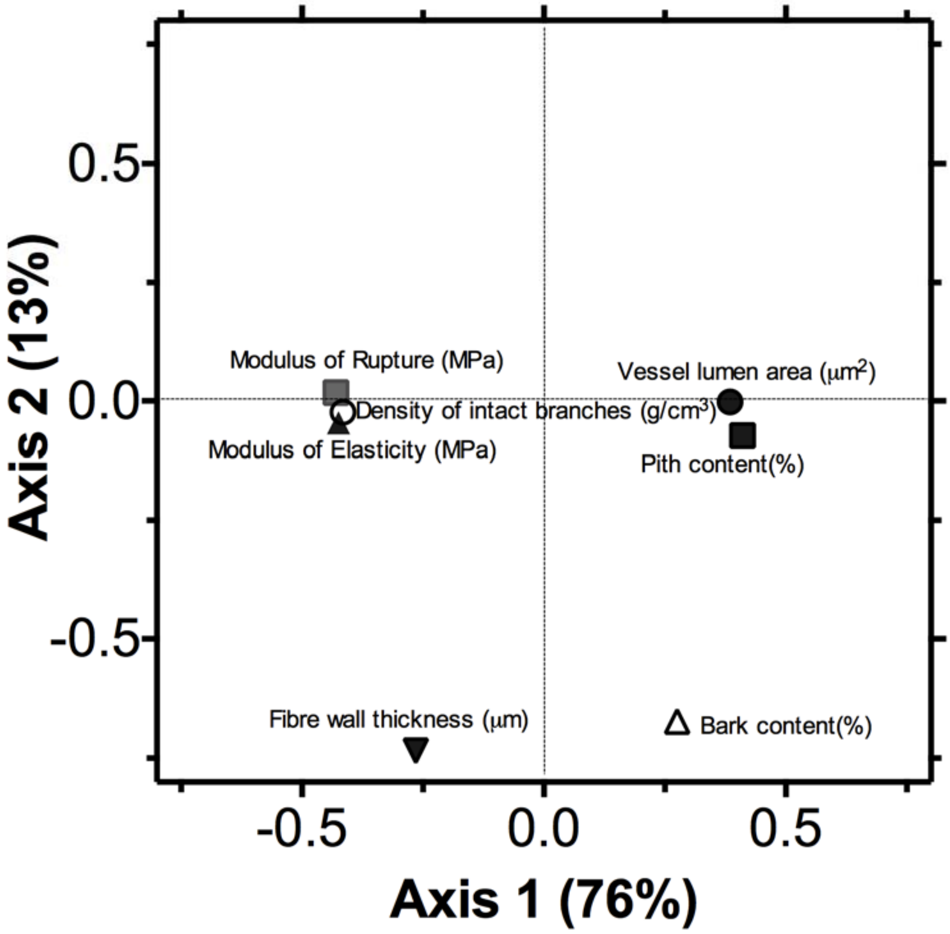

Fig. S4. Relationship among Modulus of Rupture, Modulus of Elasticity, Density of intact branches, xylem characteristics and branch characteristics of the studied mangrove species along two axes determined by principal component analyses (PCA).

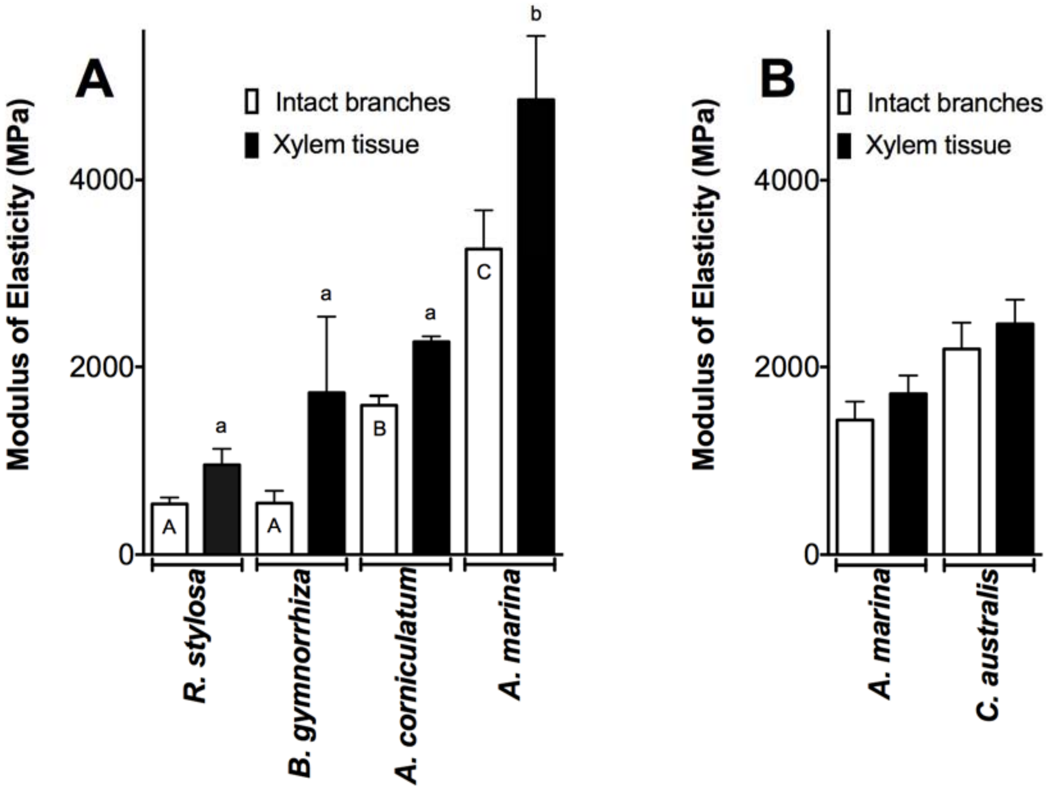

Fig. S5. (A) Modulus of Elasticity of intact branches and xylem tissue from the dominant mangrove species in South East Queensland from the low intertidal and the (B) high intertidal. Values are means and standard errors (n = 4–10). Different capital letters indicate that the means of intact branches were significantly different. Different lower case letters indicate that the means of xylem tissue were significantly different ($P < 0.05$).

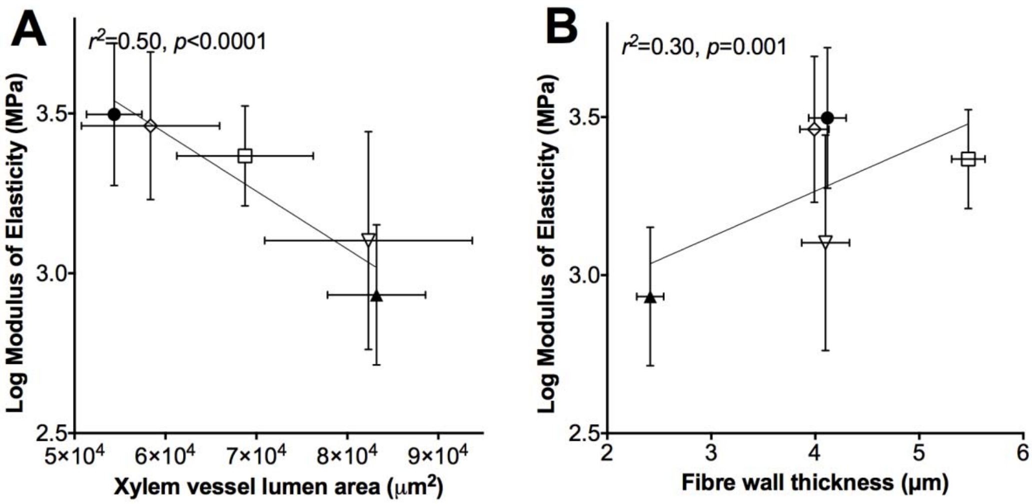

Fig. S6. Relationship between (A) Log Modulus of Elasticity (MOE) of xylem tissue and Xylem vessel lumen area and (B) Log MOE of xylem tissue and Fibre wall thickness. The lines represent the linear regressions where (A) Log MOE= -1.81×10^{-5} Xylem vessel lumen area + 4.53 and (B) Log MOE = 0.14 Fibre wall thickness + 2.68. Symbols represent species, *A. marina* from the low and the high intertidal (filled circles), *A. corniculatum* (open diamonds), *B. gymnorrhiza* (open upside down triangles), *C. australis* (squares) and *R. stylosa* (filled triangles). Each point represents mean ± standard error of n = 4–10.

Methods

Modulus of Elasticity of xylem tissue

We calculated the Modulus of Elasticity of the xylem tissue (excluding pith and bark). However, this can only be calculated under the assumption that pith and bark have a null contribution to the Modulus of Elasticity of the intact branch (that the intact branch is a hollow tube). By solving Eqn S1 for *m*, which is the slope of the stress-strain relationship,

$$EI = \frac{L^3}{48m} \qquad \text{(Eqn S1)}$$

Where *E* is the Modulus of Elasticity [MPa], *I* refers to the second moment of area [m^4] and *L* is the span length [m] (Gere and Goodno 2009).

After calculating *m*, it is possible to calculate $I_{\text{of branch}}$ by using the radius of the intact branch (and without considering the bark) and $I_{\text{of pith}}$ (Eqn S2, S3),

$$I = \frac{\pi R^4}{4} \qquad \text{(Eqn S2)}$$

Therefore,

$$I_{\text{of branch}} - I_{\text{of pith}} = I_{\text{of xylem}} \qquad \text{(Eqn S3)}$$

By solving Eqn S1 for *E* and by using $I_{\text{of xylem}}$ instead of $I_{\text{of branch}}$ it is possible to assess Modulus of Elasticity for the xylem tissue.