**Supporting information**

**Table S1** Correlation matrix showing the relationship among climatic factors and plant functional traits. Definitions are given in Table 1. P-values of correlation are indicated by different symbols. \*\*\*, p<0.001; \*\*, p<0.01; \*, p<0.05.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MAT | AI | MAP | P12 | P50 | P88 | Ks | Pgs50 | Pgs90 | HSM | TLP | Cbranch | A | gsmax | SLA | WD |
| MAT | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AI | -0.66\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MAP | -0.24 | 0.87\*\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P12 | 0.38 | -0.78\*\* | -0.82\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| P50 | 0.49 | -0.86\*\*\* | -0.87\*\*\* | 0.95\*\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |
| P88 | 0.55 | -0.87\*\*\* | -0.84\*\*\* | 0.86\*\*\* | 0.98\*\*\* | 1 |  |  |  |  |  |  |  |  |  |  |
| Ks | -0.45 | 0.47 | 0.38 | -0.64\* | -0.58\* | -0.52 | 1 |  |  |  |  |  |  |  |  |  |
| Pgs50 | 0.12 | -0.56 | -0.68\* | 0.75\*\* | 0.76\*\* | 0.71\*\* | -0.17 | 1 |  |  |  |  |  |  |  |  |
| Pgs90 | 0.49 | -0.85\*\*\* | -0.85\*\*\* | 0.94\*\*\* | 0.96\*\*\* | 0.91\*\*\* | -0.55 | 0.81\*\* | 1 |  |  |  |  |  |  |  |
| HSM | 0.46 | -0.82\*\* | -0.83\*\*\* | 0.90\*\*\* | 0.97\*\*\* | 0.97\*\*\* | -0.56 | 0.66\* | 0.86\*\*\* | 1 |  |  |  |  |  |  |
| TLP | 0.38 | -0.5 | -0.42 | 0.53 | 0.48 | 0.42 | -0.43 | 0.57 | 0.61\* | 0.35 | 1 |  |  |  |  |  |
| Cbranch | -0.29 | 0.56 | 0.56 | -0.68\* | -0.61\* | -0.53 | 0.83\*\*\* | -0.37 | -0.67\* | -0.51 | -0.69\* | 1 |  |  |  |  |
| A | 0.55 | -0.79\*\* | -0.74\*\* | 0.60\* | 0.75\*\* | 0.80\*\* | -0.21 | 0.41 | 0.67\* | 0.77\*\* | 0.25 | -0.26 | 1 |  |  |  |
| gsmax | 0.43 | -0.84\*\*\* | -0.87\*\*\* | 0.75\*\* | 0.89\*\*\* | 0.93\*\*\* | -0.24 | 0.73\*\* | 0.84\*\*\* | 0.87\*\*\* | 0.38 | -0.36 | 0.90\*\*\* | 1 |  |  |
| SLA | -0.64\* | 0.57 | 0.32 | -0.44 | -0.46 | -0.46 | 0.77\*\* | -0.02 | -0.41 | -0.46 | -0.3 | 0.64\* | -0.23 | -0.23 | 1 |  |
| WD | 0.44 | -0.80\*\* | -0.76\*\* | 0.86\*\*\* | 0.80\*\* | 0.71\* | -0.66\* | 0.60\* | 0.83\*\*\* | 0.72\*\* | 0.75\*\* | -0.82\*\*\* | 0.43 | 0.58 | -0.60\* | 1 |
| VIGR | -0.41 | 0.65\* | 0.59\* | -0.70\* | -0.64\* | -0.57 | 0.82\*\* | -0.39 | -0.70\* | -0.54 | -0.64\* | 0.93\*\*\* | -0.24 | -0.39 | 0.80\*\* | -0.86\*\*\* |

**Table S2** Summary of seed source information for 12 species from five vegetation types (rainforest (RF), wet sclerophyll forest (WSF), dry sclerophyll forest (DSF), grass woodland (GW), and semi-arid woodland (SAW)).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Family | Species | Abbreviation | Vegetation type | Description |
| Myrtaceae | *Acmena smithii* | Asm | RF | AUSTRALIA, NSW, Brogers Creek, Kangaroo Valley (34.73S, 150.42E ) |
| Myrtaceae | *Eucalyptus grandis* | Egr | WSF | AUSTRALIA, NSW, North Coast, Edge of Myall River, Bulahdelah (south side of river, west side of Pacific Highway (32.24S, 152.12E) |
| Myrtaceae | *Eucalyptus viminalis* | Evi | WSF | AUSTRALIA, NSW, Central Coast, Belgenny Reserve, Belgenny Reserve, Camden. Near bicycle track (34.41S, 150.42E) |
| Myrtaceae | *Angophora costata* | Aco | DSF | AUSTRALIA, NSW, Central Coast, Rear of property number 16 Park Road, Woodford (33.45S, 150.29E) |
| Myrtaceae | *Corymbia gummifera* | Cgu | DSF | AUSTRALIA, NSW, North Coast, Fortis Creek National Park, 1.2 km north of Chapman's Creek crossing on Grafton to Coaldale road (29.28S, 152.52E) |
| Myrtaceae | *Eucalyptus sideroxylon* | Esi | DSF | AUSTRALIA, NSW, Central Tablelands, 23.3 km from Rylstone towards Glen Davis at entrance to property no. 2334 (32.57S, 150.55E) |
| Myrtaceae | *Eucalyptus blakelyi* | Ebl | GW | AUSTRALIA, NSW, Central Tablelands, 13.5 km E along Glen Davis road from Capertee (33.81S, 150.45E) |
| Myrtaceae | *Eucalyptus macrorhyncha* | Ema | GW | AUSTRALIA, NSW, South Western Slopes, 3.8 km E of Talmalmo on road towards Jingellic (35.37S, 147.32E) |
| Myrtaceae | *Eucalyptus melliodora* | Eme | GW | AUSTRALIA, NSW, Central Coast, 800 m towards Glen Alice from intersection of Capertee to Glen Davis road (33.54S, 150.13E) |
| Fabaceae | *Acacia aneura* | Aan | SAW | AUSTRALIA, NSW, North Western Plains, Gundabooka National Park, Near Belah Homestead (30.34S, 145.35E) |
| Myrtaceae | *Eucalyptus largiflorens* | Ela | SAW | AUSTRALIA, NSW, North Western Plains, 10.9 km W of Walgett on Kamilaroi Highway (30.01S, 148.12E) |
| Myrtaceae | *Eucalyptus populnea* | Epo | SAW | AUSTRALIA, NSW, North Western Slopes, ca. 1 km N of "centre" of Terry Hie Hie (29.46S, 150.86E) |

**Figure S1** Natural distributional range of 12 woody species across Australia (panel a-e) and seed source location (panel f). Species coordination data were obtained from Atlas of Living Australia using *ALA4R* package in R. Vegetation types are coloured differently and are abbreviated using initials in panel f.

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**Figure S2** Relationship between species maximum photosynthetic rate (Amax, μmol m-2 s-1) and hydraulic safety margin (HSM, -MPa). Regression lines and corresponding adjusted R2 are given. Asterisk stands for P<0.01.

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