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### Supplementary Material

#### **From mallees to mountain ash, specific leaf area is coordinated with eucalypt tree stature, resprouting, stem construction, and fruit size**

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## Supplementary Materials

**Table S1.** List of the taxa for which maximum height was inferred and description of how this was done.

Taxon in Trait Datasets	Max Height Inferred	Method of inference
<i>E. costata</i> subsp. <i>murrayana</i>	8m	Height of <i>E. incrassata</i> to which the former taxon now belongs
<i>E. silvestris</i>	7m	Height of <i>E. odorata</i> to which the former taxon now belongs
<i>E. wimmerensis</i>	8m	Height of the taxa from which the former taxon is poorly resolved and for which data is available
<i>E. ovata</i> subsp. <i>ovata</i>	6m	Height of <i>E. ovata</i> var. <i>ovata</i> , likely an obsolete form of the name.
<i>Lophostemon confertus</i>	40m	(Kooyman <i>et al.</i> 2011) via AusTraits database (Falster <i>et al.</i> 2021)

**Supplement 2:** Discussion and justification for the placement of variable taxa, treatment of the stem-only resprouter category, and assignment of resprouting category to taxa not mentioned in Nicolle’s census (2006).

11 taxa considered by Nicolle (2006) to resprout in a ‘variable’ manner (i.e. they showed some epicormic resprouting after fire but not reliably). Their exclusion from the combination resprouter category was found to have little effect on trait differences between different fire-response strategies compared with when they were included (**Tables S2.1-2.2**), it was decided that they should be included in the because showing any degree of epicormic resprouting ability was deemed more relevant to the definition combination sprouting than whether or not that ability was reliably demonstrated.

**Table S2.1.** Summary of comparing basal-only resprouters and combination resprouters (using: Trait ~ 1+BasalResprouter) when variably resprouting taxa were included as ‘combination resprouters’.

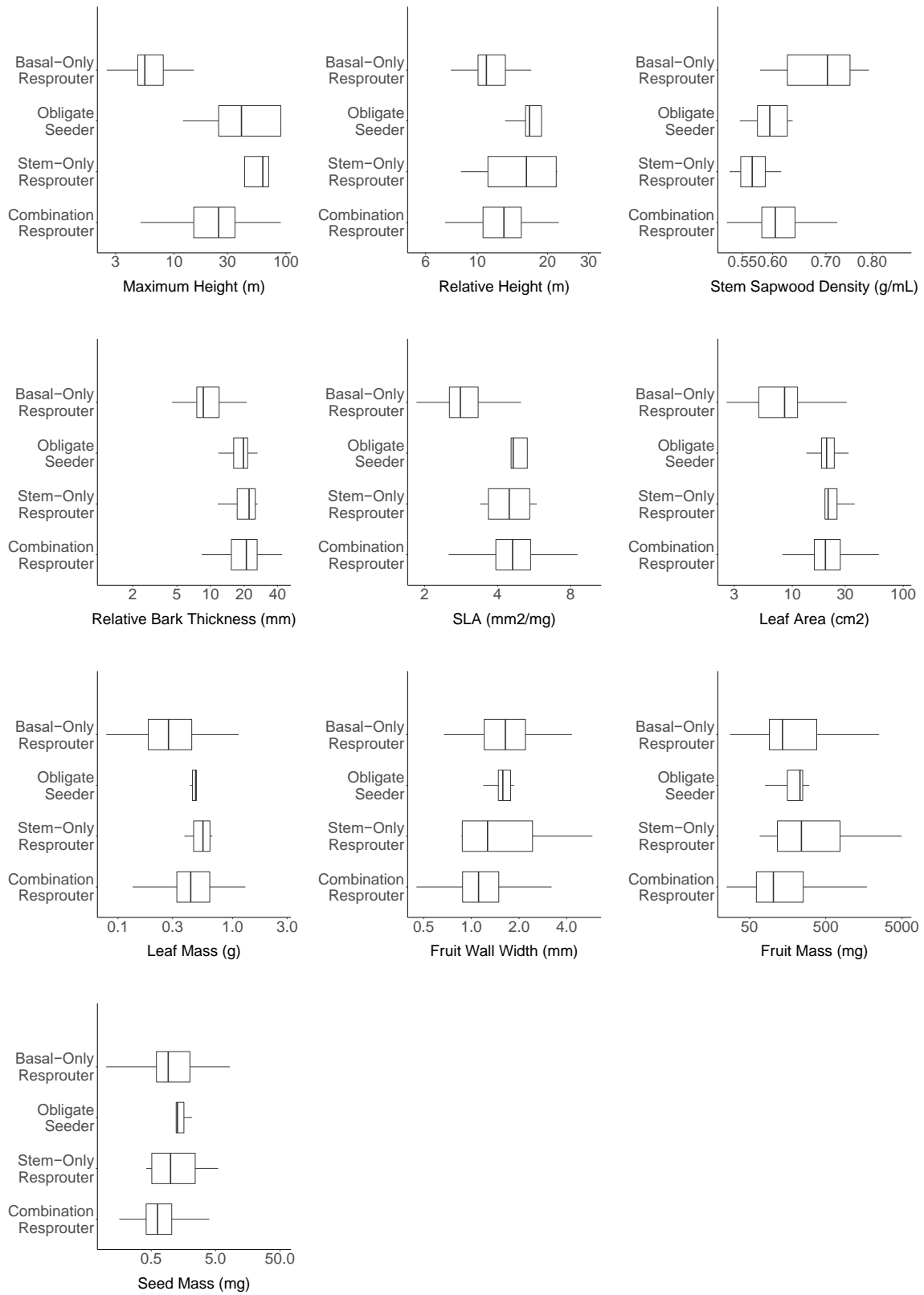
Values rounded to three decimal places

Trait	Slope	R <sup>2</sup>	n	P
Maximum Height	-1.520 ± 0.160	0.399	152	< 0.001
Relative Height	-0.378 ± 0.177	0.098	141	0.033
Stem Density	0.648 ± 0.211	0.069	141	0.003
Relative Bark Thickness	-1.125 ± 0.182	0.220	140	< 0.001
Specific Leaf Area	-0.912 ± 0.190	0.135	151	< 0.001
Leaf Area	-1.153 ± 0.190	0.202	151	< 0.001
Leaf Mass	-0.713 ± 0.210	0.076	151	0.001
Fruit Wall Width	0.540 ± 0.230	0.041	140	0.020
Fruit Mass	0.140 ± 0.214	0.010	151	0.515
Seed Mass	0.132 ± 0.200	0.009	150	0.509

**Table S2.2.** Summary of comparing basal-only resprouters and combination resprouters (using: Trait ~ 1+BasalResprouter) when variably resprouting taxa were excluded from ‘combination resprouters’.

Values rounded to three decimal places

Traits	Slope	R <sup>2</sup>	n	P
Maximum Height	-1.233 ± 0.145	0.347	156	< 0.001
Relative Height	-0.439 ± 0.159	0.117	145	0.007
Stem Density	0.332 ± 0.187	0.028	145	0.079
Relative Bark Thickness	-1.159 ± 0.156	0.287	144	< 0.001
Specific Leaf Area	-0.784 ± 0.161	0.139	155	< 0.001
Leaf Area	-0.772 ± 0.177	0.116	155	< 0.001
LM	-0.460 ± 0.195	0.040	155	0.020
Fruit Wall Width	0.480 ± 0.193	0.046	144	0.014
Fruit Mass	0.218 ± 0.180	0.017	155	0.227
Seed Mass	0.135 ± 0.166	0.011	154	0.418



**Figure S2.** Comparison of traits of each of the four post-fire regeneration strategies.

Regarding stem-only resprouters their trait values were generally similar to those of combination resprouters and obligate seeders for most traits as is shown above (**Fig. S2**). Though, it is worth mentioning that there was very little difference between the trait distribution for the obligate seeders and the combination sprouters. For most traits, absolute epicormic resprouting ability and consistent stem-sprouting appeared to give very similar results when used to define the categorical variable (from the paragraph above), hence the former was chosen as it was more likely to reflect the fact that initially categorising species as ‘variable’ has been later revoked to full combination resprouters upon further observation. Hence, variable sprouting could indicate combination resprouting. See table below for references for individual species whose post-fire regeneration strategy was determined with other sources than Nicolle (2006).

**Table S2.3.** Taxa for which fire-response strategy was inferred using other sources than Nicolle (2006) along with method and source of inference.

<b>Taxon</b>	<b>Notes</b>
<i>Eucalyptus megacarpa</i>	Inferred as Stem-Only Resprouter: - Shows epicormic, but not basal resprouting after fire (Grant <i>et al.</i> 1997)
<i>Eucalyptus nitens</i>	Inferred as Stem-Only Resprouter: - No lignotuber (Nicolle 2006) - Survives high intensity fire and shows epicormic/stem resprouting (Benyon and Lane 2013)
<i>Eucalyptus pilularis</i>	Inferred as Stem-Only Resprouter: - Resprouter of unknown type (Nicolle 2006) - Resprouts from epicormic buds after high intensity fire (Benson and McDougall 1998)
<i>Eucalyptus punctata</i>	Inferred as Combination Resprouter: - Shows mostly epicormic resprouting (Bendal <i>et al.</i> 2022) but, - Shows resprouting from both branches and base after high intensity fire (Benson and McDougall 1998)
<i>Eucalyptus saligna</i>	Inferred as Stem-Only Resprouter: - Shows epicormic but not basal resprouting (Benson and McDougall 1998; Grant <i>et al.</i> 1997)
<i>Eucalyptus sieberi</i>	Inferred as Combination Resprouter: - Listed as stem-only resprouter (Nicolle 2006), however, - Epicormic resprouting is more common in older trees, but basal resprouting in younger trees (Gill and Moore 1992)
<i>Lophostemon confertus</i>	Inferred as Basal-Only Resprouter: - Some resprouting from based observed (Benson and McDougall 1998)
<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>	Inferred as Combination Resprouter based: - Able to resprout from lignotuber and epicormic buds (Benson and McDougall 1998)

**Table S3.1. Effect of changing phylogenetic position of various extreme-valued taxa on the overall phylogenetic signal calculated for each of the continuous traits.**

Values used in the final tree also shown for comparison (final 4 rows). We used 17 different possible trees and calculated lambda (1-17) for each trait for each of them; then compared the range of point values to the smallest 95% confidence interval (min\_CI\_range) for that trait across all trees (lines 18-19), and also compared that to the values and error for the final tree we used (lines 20-23).

#		Max. height	Relative Height	Stem Density	Relative Bark Thickness	Specific Leaf Area	Leaf Area	Leaf Mass	Fruit Mass	Fruit Wall Width	Seed Mass
1	Lambda1	0.796	0.446	0.483	0.384	0.813	0.606	0.388	0.782	0.701	0.776
2	Lambda2	0.811	0.448	0.483	0.384	0.821	0.652	0.427	0.784	0.701	0.776
3	Lambda3	0.8	0.452	0.486	0.384	0.814	0.601	0.381	0.783	0.698	0.776
4	Lambda4	0.815	0.454	0.487	0.384	0.821	0.63	0.399	0.785	0.699	0.776
5	Lambda5	0.809	0.404	0.486	0.384	0.807	0.621	0.397	0.779	0.697	0.774
6	Lambda6	0.802	0.448	0.485	0.384	0.816	0.609	0.39	0.786	0.698	0.776
7	Lambda7	0.797	0.401	0.483	0.383	0.807	0.605	0.387	0.785	0.702	0.776
8	Lambda8	0.798	0.451	0.476	0.387	0.813	0.609	0.393	0.788	0.705	0.779
9	Lambda9	0.802	0.406	0.486	0.384	0.808	0.601	0.38	0.785	0.699	0.775
10	Lambda10	0.802	0.457	0.479	0.388	0.814	0.604	0.386	0.788	0.702	0.778
11	Lambda11	0.804	0.397	0.479	0.385	0.801	0.627	0.412	0.77	0.69	0.77
12	Lambda12	0.804	0.44	0.484	0.371	0.807	0.616	0.426	0.764	0.684	0.771
13	Lambda13	0.8	0.446	0.47	0.381	0.807	0.622	0.395	0.771	0.692	0.774
14	Lambda14	0.799	0.4	0.48	0.382	0.805	0.618	0.404	0.784	0.696	0.774
15	Lambda_15 (all uncertain taxa excluded)	0.802	0.447	0.481	0.386	0.808	0.63	0.415	0.769	0.691	0.772
16	Lambda_16 (Lophostemon as root)	0.804	0.483	0.485	0.368	0.825	0.613	0.428	0.784	0.673	0.761
17	Lambda_17 (Syncarpia as root)	0.807	0.359	0.486	0.381	0.818	0.576	0.4	0.795	0.706	0.782
18	Range (point estimates)	0.019	0.124	0.017	0.02	0.024	0.076	0.048	0.031	0.032	0.021
19	Range_CI_min	0.255	0.745	0.426	0.483	0.286	0.397	0.619	0.297	0.385	0.235
20	Lambda	0.802	0.446	0.478	0.372	0.816	0.604	0.412	0.788	0.699	0.779
21	lower_CI	0.631	0	0.259	0.127	0.627	0.381	0.096	0.599	0.465	0.639
22	upper_CI	0.903	0.788	0.69	0.62	0.922	0.787	0.715	0.9	0.852	0.875
23	range_CI	0.272	0.788	0.431	0.493	0.295	0.405	0.619	0.302	0.387	0.236

**Table S3.2. Description and justification of how taxa with ambiguous position in the phylogeny were eventually placed on the phylogeny.**

Trait Dataset Taxon	Note
<i>Eucalyptus falciformis</i>	Basionym: <i>E. willisii</i> subsp. <i>falciformis</i> ( <i>E. willisii</i> already on the tree). Also note that this species has no other obsolete subspecies, i.e. the obsolete version of the taxonomy where the subspecies of <i>E. willisii</i> were distinct had no other spp. So, we don't need to worry about the species complex having other members of the former umbrella term 'E. willisii' being on the Thornhill et al. 2019 tree ('Thornhill tree' henceforth) and causing problems through non-monophyly and hence no knowing which member to use to position this taxon.
<i>E. sabulosa</i>	Synonym: <i>E. aromaphloia</i> subsp. <i>sabulosa</i> ( <i>E. aromaphloia</i> already on the tree). The third ssp. of <i>E. aromaphloia</i> is not on the Thornhill tree, so don't need to worry about non-monophyly of this species either.
<i>E. rossii</i>	Synonym: <i>E. racemosa</i> subsp. <i>rossii</i> ( <i>E. racemosa</i> already on tree). This sp. had only these two spp. in the former taxonomy. Hence, they can be sister species.
<i>E. ovata</i> subsp. <i>ovata</i>	Synonym: <i>E. ovata</i> var. <i>ovata</i> according to Nicolle (2019), though this older name is still considered the current form on APC (Council of Heads of Australasian Herbaria 2021)
<i>E. imitans</i>	Placed as sister to <i>E. baxteri</i> based on EUCLID's assessment of its closest relative (Slee et al. 2015)
<i>E. arenicola</i>	Was once considered to have an affinity for <i>E. willisii</i> (VicFlora 2021) so is being placed in trichotomy with <i>E. willisii</i> and <i>E. falciformis</i> , which was once a ssp. of <i>E. willisii</i> (Nicolle 2019; VicFlora 2021) and are its close relatives.
<i>E. wimmerensis</i>	Resolved using tree from Fahey et al. (2022) (of Section Adnataria ser. Buxales) as more related to <i>E. polybractea</i> than <i>E. viridis</i> .
<i>E. silvestris</i>	From Fahey et al. (2022): considered hybrid between <i>E. wimmerensis</i> and grey boxes (elsewhere often <i>E. microcarpa</i> ), and, given the positioning of <i>E. wimmerensis</i> as sister to <i>E. polybractea</i> , which is already sister to <i>E. microcarpa</i> , this taxon can be placed in a trichotomy with both <i>E. wimmerensis</i> and <i>E. microcarpa</i> ( <i>E. polybractea</i> not in trait dataset and so will be pruned anyway).
<i>E. behriana</i>	From Fahey et al. (2022), it can be seen to be most closely related to <i>E. largiflorens</i> , though the relationship of <i>E. largiflorens</i> to other surrounding and more basal taxa is different on the Fahey tree to the Thornhill tree. We are using the Thornhill tree as our method EXCEPT where taxa are missing then other sources can be used but we will ignore conflict in our sources about taxa we have already resolved.
<i>E. punctata</i>	According to Jones et al. (2016), it seems far more related to <i>E. canaliculata</i> and <i>E. grisea</i> than <i>E. propinqua</i> or <i>E. major</i> , hence this taxon was placed as sister to <i>E. canaliculata</i> before the latter was pruned.
<i>E. strzeleckii</i>	According to Jones et al. (2016), it is closest to <i>E. yarraensis</i> , which is nicely monophyletic. <i>E. strzeleckii</i> itself is paraphyletic with respect to <i>E. cadens</i> , but this latter taxon is not in our dataset, so <i>E. strzeleckii</i> is still 'effectively monophyletic' for our purposes.
<i>E. chapmaniana</i>	According to Jones et al. (2016), it is closest to <i>E. smithii</i> (polyphyletic but relatively not spread too far across the tree) and then <i>E. glaucescens</i> (monophyletic) if certain polyphyletic taxa in between but not in the traits dataset are ignored or pruned out. Though the relative position of <i>E. smithii</i> and <i>E. glaucescens</i> is different to that on the Thornhill tree, similarly to the case with the tree in Fahey et al. (2022) mentioned above, we're only interested in the relations of taxa not already on the Thornhill tree and so

	conflict between other trees and the Thornhill tree concerning taxa already placed is not relevant.
<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i> More eucalypt-like so may prevent the quirk of how phylogenetic signal is measured	According to Thornhill <i>et al.</i> (2019), it is in the closest tribe, Syncarpiae, to Eucalypteae (after Leptospermeae and Chameliauciae) and so is closest non-eucalypt taxon we have to the eucalypt group.
<i>Lophostemon confertus</i>	Furthest outgroup to eucalypt group (not one of the three tribes mentioned above) but <i>L. confertus</i> used instead due to there being more complete data for it. Regardless, both taxa occupy the same position relative to <i>Syncarpia</i> + ( <i>Angophora</i> + <i>Corymbia</i> + <i>Eucalyptus</i> ).
<i>E. lehmannii</i>	Miss-spelt on the Thornhill tree as <i>E. lehmanii</i> subsp. <i>lehmanii</i> so can use this Thornhill tree tip instead.
<i>E. doratoxylon</i>	Miss-spelt on the Thornhill tree as <i>E. dorotoxylon</i> so can use this tip on the Thornhill tree instead.
<i>E. dendromorpha</i>	Omitted due to only having two individuals measured and no reproductive trait data along with no clear position on the tree.
<i>E. robusta</i>	Omitted due to only 4 individuals measured and lack of reproductive trait measurements along with no clear position on the tree.
<i>E. carolaniae</i>	Kevin Rule taxon, intergrade between <i>E. cypellocarpa</i> and <i>E. goninocalyx</i> subsp. <i>goninocalyx</i> . Not enough information to resolve its position, since it is not considered distinct enough in other sources to be included in other trees, and its closest relatives are in disparate locations on the combined Thornhill-Bayly tree. Hence, this taxon will be omitted.
<i>E. bunyip</i>	Kevin Rule taxon, considered intergrade between <i>E. camphora</i> subsp. <i>humeana</i> and <i>E. strzeleckii</i> by Nicolle (2019). Little further information could be found to resolve its position for similar reason as those mentioned above. Hence, this taxon will be omitted from our analysis for the moment.

**Supplement 4:** Alphabetised list of all taxa included in this analysis and on the phylogeny.

*Angophora costata* subsp. *costata*  
*Angophora floribunda*  
*Corymbia calophylla*  
*Corymbia eximia*  
*Corymbia gummifera*  
*Corymbia intermedia*  
*Corymbia maculata*  
*Eucalyptus agglomerata*  
*Eucalyptus alaticaulis*  
*Eucalyptus albens*  
*Eucalyptus alligatrix* subsp. *limaensis*  
*Eucalyptus amplifolia* subsp. *amplifolia*  
*Eucalyptus angophoroides*  
*Eucalyptus angulosa*  
*Eucalyptus arenacea*  
*Eucalyptus arenicola*  
*Eucalyptus aromaphloia*  
*Eucalyptus baueriana* subsp. *baueriana*  
*Eucalyptus baueriana* subsp. *thalassina*  
*Eucalyptus baxteri*  
*Eucalyptus behriana*  
*Eucalyptus beyeriana*  
*Eucalyptus blakelyi*  
*Eucalyptus bosistoana*  
*Eucalyptus botryoides*  
*Eucalyptus bridgesiana*  
*Eucalyptus buprestium*  
*Eucalyptus calycogona* subsp. *trachybasis*  
*Eucalyptus camaldulensis* subsp. *camaldulensis*  
*Eucalyptus camphora* subsp. *humeana*  
*Eucalyptus capitellata*  
*Eucalyptus cephalocarpa*  
*Eucalyptus chapmaniana*  
*Eucalyptus cinerea* subsp. *cinerea*  
*Eucalyptus cinerea* subsp. *victoriensis*<sup>A</sup>  
*Eucalyptus conglobata* subsp. *perata*  
*Eucalyptus consideriana*  
*Eucalyptus conspicua*  
*Eucalyptus cornuta*  
*Eucalyptus costata* subsp. *murrayana*<sup>B</sup>  
*Eucalyptus croajingolensis*  
*Eucalyptus cyanophylla*  
*Eucalyptus cypellocarpa*  
*Eucalyptus dalrympleana* subsp. *dalrympleana*  
*Eucalyptus decipiens* subsp. *chalara*<sup>C</sup>  
*Eucalyptus decurva*  
*Eucalyptus delegatensis* subsp. *delegatensis*  
*Eucalyptus dives*  
*Eucalyptus doratoxylon*  
*Eucalyptus dumosa*  
*Eucalyptus elata*  
*Eucalyptus erectifolia*  
*Eucalyptus eugenioides*  
*Eucalyptus falcata*  
*Eucalyptus falciformis*  
*Eucalyptus fastigata*  
*Eucalyptus fibrosa* subsp. *fibrosa*  
*Eucalyptus flocktoniae* subsp. *flocktoniae*  
*Eucalyptus fraxinoides*  
*Eucalyptus fulgens*  
*Eucalyptus glaucescens*  
*Eucalyptus globoidea*  
*Eucalyptus globulus* subsp. *bicostata*  
*Eucalyptus globulus* subsp. *globulus*  
*Eucalyptus globulus* subsp. *maidenii*  
*Eucalyptus globulus* subsp. *pseudoglobulus*  
*Eucalyptus goniocalyx* subsp. *goniocalyx*  
*Eucalyptus goniocalyx* subsp. *viridissima*  
*Eucalyptus gracilis*  
*Eucalyptus hebetifolia*  
*Eucalyptus ignorabilis*  
*Eucalyptus imitans*  
*Eucalyptus incrassata*  
*Eucalyptus kitsoniana*  
*Eucalyptus kybeanensis*  
*Eucalyptus lacrimans*  
*Eucalyptus largiflorens*  
*Eucalyptus lehmannii* subsp. *parallela*  
*Eucalyptus leptophylla*  
*Eucalyptus leucoxylon* subsp. *leucoxylon*  
*Eucalyptus leucoxylon* subsp. *pruinosa*  
*Eucalyptus leucoxylon* subsp. *stephaniae*  
*Eucalyptus ligulata* subsp. *stirlingica*  
*Eucalyptus longifolia*



*Eucalyptus loxophleba* subsp. *loxophleba*  
*Eucalyptus mackintii*  
*Eucalyptus macrorhyncha* subsp. *macrorhyncha*  
*Eucalyptus mannifera* subsp. *mannifera*  
*Eucalyptus marginata* subsp. *marginata*  
*Eucalyptus megacarpa*  
*Eucalyptus melliodora*  
*Eucalyptus microcarpa*  
*Eucalyptus microcorys*  
*Eucalyptus muelleriana*  
*Eucalyptus nitens*  
*Eucalyptus nortonii*  
*Eucalyptus obliqua*  
*Eucalyptus occidentalis*  
*Eucalyptus oleosa* subsp. *oleosa*  
*Eucalyptus ovata* subsp. *ovata*<sup>D</sup>  
*Eucalyptus pachyloma*  
*Eucalyptus paniculata*  
*Eucalyptus pauciflora* subsp. *acerina*  
*Eucalyptus pauciflora* subsp. *debeuzevillei*  
*Eucalyptus pauciflora* subsp. *hedraia*  
*Eucalyptus pauciflora* subsp. *niphophila*  
*Eucalyptus pauciflora* subsp. *parvifructa*  
*Eucalyptus pauciflora* subsp. *pauciflora*  
*Eucalyptus perriniana*  
*Eucalyptus phaenophylla* subsp. *phaenophylla*  
*Eucalyptus phenax* subsp. *phenax*  
*Eucalyptus pilularis*  
*Eucalyptus piperita*  
*Eucalyptus pleurocarpa*  
*Eucalyptus pluricaulis* subsp. *porphyrea*  
*Eucalyptus polyanthemus* subsp. *vestita*  
*Eucalyptus porosa*  
*Eucalyptus preissiana* subsp. *preissiana*  
*Eucalyptus propinqua*  
*Eucalyptus punctata*  
*Eucalyptus quadrangulata*  
*Eucalyptus racemosa*  
*Eucalyptus radiata* subsp. *radiata*  
*Eucalyptus radiata* subsp. *robertsonii*  
*Eucalyptus regnans*  
*Eucalyptus rossii*  
*Eucalyptus rubida* subsp. *rubida*  
*Eucalyptus rudis* subsp. *rudis*  
*Eucalyptus sabulosa*  
*Eucalyptus saligna*  
*Eucalyptus scias* subsp. *scias*  
*Eucalyptus serraensis*  
*Eucalyptus sideroxylon* subsp. *sideroxylon*  
*Eucalyptus sieberi*  
*Eucalyptus silvestris*  
*Eucalyptus smithii*  
*Eucalyptus socialis*  
*Eucalyptus staeri*  
*Eucalyptus stellulata*  
*Eucalyptus stenostoma*  
*Eucalyptus stricta*  
*Eucalyptus strzeleckii*  
*Eucalyptus talyuberlup*  
*Eucalyptus tenella*  
*Eucalyptus tereticornis* subsp. *mediana*  
*Eucalyptus tereticornis* subsp. *tereticornis*  
*Eucalyptus thamnoides* subsp. *thamnoides*  
*Eucalyptus tricarpa* subsp. *tricarpa*  
*Eucalyptus triflora*  
*Eucalyptus uncinata*  
*Eucalyptus vegrandis* subsp. *vegrandis*  
*Eucalyptus verrucata*  
*Eucalyptus victoriana*  
*Eucalyptus viminalis* subsp. *cygnetensis*  
*Eucalyptus viminalis* subsp. *pryoriana*  
*Eucalyptus viminalis* subsp. *viminalis*  
*Eucalyptus viridis*  
*Eucalyptus wandoo* subsp. *wandoo*  
*Eucalyptus willisii*  
*Eucalyptus wimmerensis*  
*Eucalyptus xanthonema* subsp. *apposita*  
*Eucalyptus yarraensis*  
*Lophostemon confertus*  
*Syncarpia glomulifera* subsp. *glomulifera*

<sup>A</sup> *E. cinerea* subsp. *victoriensis* included within *E. cinerea* subsp. *triplex* in current taxonomy (Nicolle 2019)

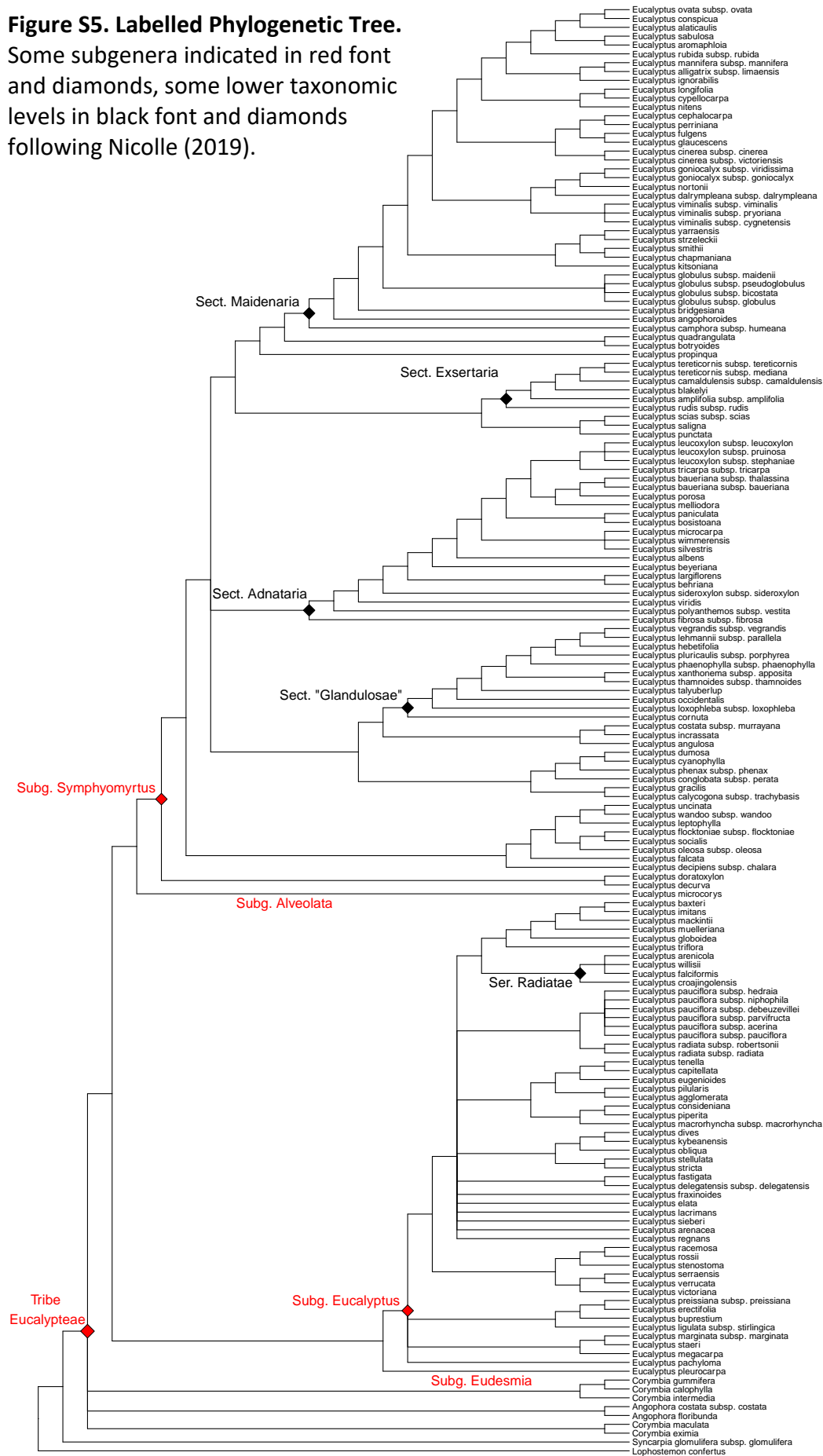
<sup>B</sup> *E. costata* subsp. *murrayana* included within *E. incrassata* in most current taxonomy (Nicolle 2019)

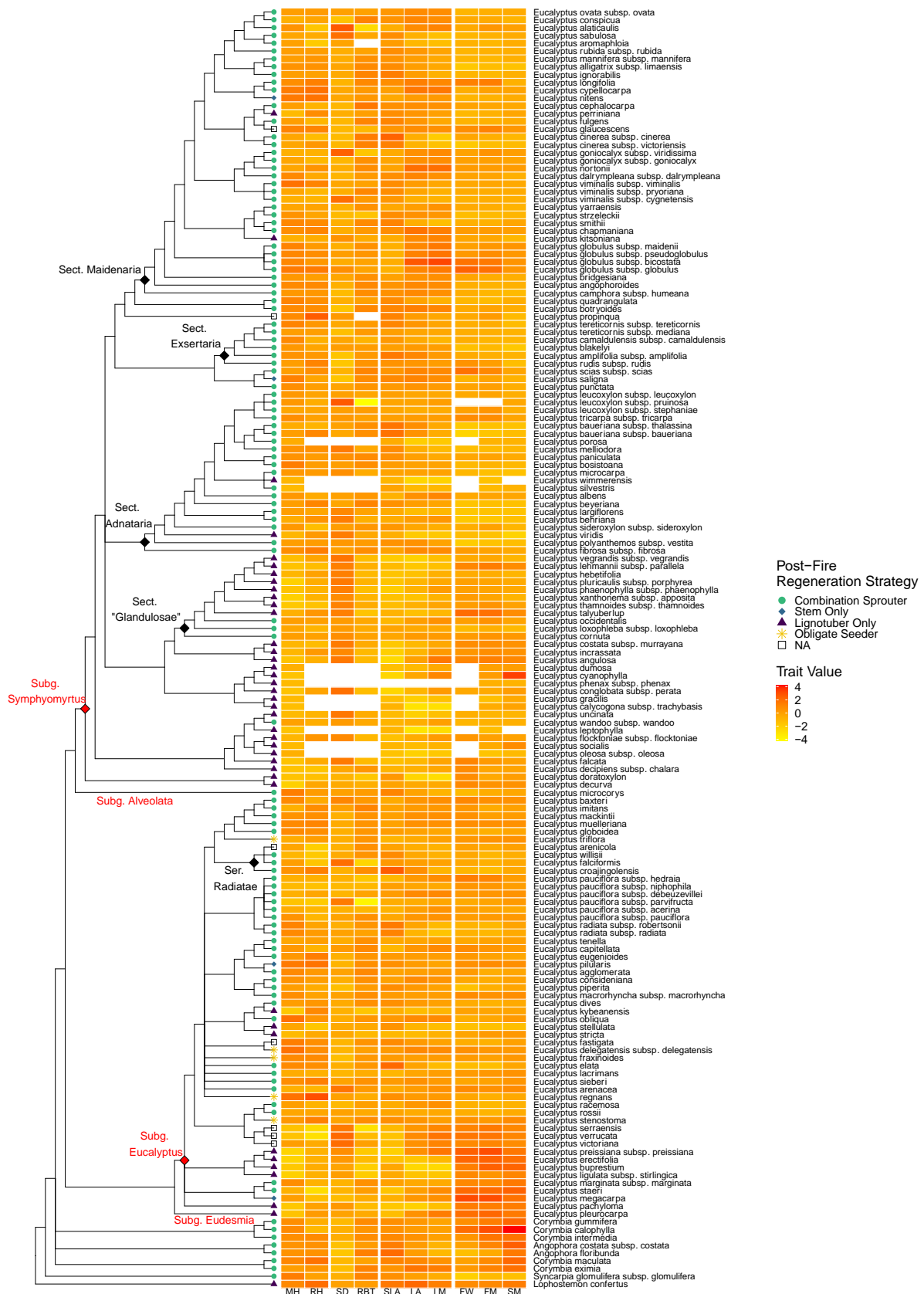
<sup>C</sup> *E. decipiens* subsp. *chalara* not considered distinct, instead an intergrade between *E. adesmophloia* and *E. decipiens* (Nicolle 2019)

<sup>Ⓛ</sup> *E. ovata* subsp. *ovata* is current according to Nicolle (2019), but *E. ovata* var. *ovata* considered current by APC

**Figure S5. Labelled Phylogenetic Tree.**

Some subgenera indicated in red font and diamonds, some lower taxonomic levels in black font and diamonds following Nicolle (2019).





**Figure S6.** Complete summary of distribution of all trait values across the fully labelled phylogeny including taxon names. Infrageneric labels follow Nicolle (2019) and all trait values are scaled for comparison.

**Supplement 7:** Summaries of continuous trait relationships including regression parameters and correlation plot.

**Table S7.1. Detailed regression parameters for the cross-species analysis rounded to three decimal places.**

Effect size is shown (Slope) along with its standard error as well as R-squared, the sample size (n), the unadjusted p-value for the slope, along with the p-value adjusted using the Holm method (Holm 1979). This is a sequential method of adjustment and was only applied to the models included in the networks to avoid redundancy (i.e. only one model per pair of traits hence excluding duplicates where the dependent and independent variable were merely swapped). While the estimation of slope coefficients was liable to change depending on which trait was the dependent or independent variable (D.V. or I.V.), for most bivariate comparisons this difference was not greater in magnitude than the standard errors reported. We mark exceptions, where differences in slope magnitude exceeded the standard error of the model (change in slope of 0.077, 0.079, and 0.088), with <sup>D</sup>, <sup>E</sup>, and <sup>F</sup> respectively. In each case the model that was included in the analysis (i.e. shown by non-missing value in Holm's P column) represented the smaller, more conservative assessment of effect strength compared to when axes were swapped. The remaining parameters were not affected by which variable of a given pair of traits was designated the (in)dependent variable.

D.V.	I.V.	Slope	R <sup>2</sup>	N	P	Holm's P
MH	RH	0.538 ± 0.068	0.293	153	< 0.001	< 0.001
	SD	-0.386 ± 0.075	0.151	153	< 0.001	< 0.001
	RBT	0.497 ± 0.071	0.248	151	< 0.001	< 0.001
	SLA	0.613 ± 0.062	0.376	163	< 0.001	-
	LA	0.577 ± 0.064	0.334	163	< 0.001	< 0.001
	LM	0.29 ± 0.075	0.084	163	< 0.001	0.005
	FWW	-0.266 ± 0.078	0.071	152	0.001	0.021
	FM	-0.133 ± 0.078	0.018	163	0.090	1.000
	SM	-0.129 ± 0.078	0.017	162	0.100	1.000
	BOS	-0.726 ± 0.054	0.541	157	< 0.001	< 0.001
RH	MH	0.545 ± 0.069	0.293	153	< 0.001	-
	SD	-0.284 ± 0.078	0.08	153	< 0.001	-
	RBT	0.355 ± 0.074	0.133	151	< 0.001	-
	SLA	0.385 ± 0.077	0.143	153	< 0.001	-
	LA	0.38 ± 0.086	0.115	153	< 0.001	-
	LM	0.159 ± 0.087	0.022	153	0.069	-
	FWW	-0.164 ± 0.081	0.027	152	0.044	-
	FM	-0.138 ± 0.081	0.019	152	0.091	-
	SM	-0.11 ± 0.083	0.012	153	0.183	-
	BOS	-0.194 ± 0.08	0.039	146	0.016	0.294
SD	MH	-0.391 ± 0.075	0.151	153	< 0.001	-
	RH	-0.284 ± 0.078	0.08	153	< 0.001	0.010
	RBT	-0.581 ± 0.067	0.334	151	< 0.001	0.000
	SLA	-0.556 ± 0.069	0.299	153	< 0.001	-
	LA	-0.389 ± 0.085	0.12	153	< 0.001	-
	LM	-0.042 ± 0.088	0.002	153	0.634	1.000
	FWW	0.071 ± 0.08	0.005	152	0.372	-
	FM	0.064 ± 0.08	0.004	152	0.421	-

	SM	$-0.067 \pm 0.083$	0.004	153	0.422	-
	BOS	$0.404 \pm 0.079$	0.154	146	< 0.001	< 0.001
<b>RBT</b>	MH	$0.5 \pm 0.071$	0.248	151	< 0.001	-
	RH	$0.375 \pm 0.078$	0.133	151	< 0.001	< 0.001
	SD	$-0.574 \pm 0.066$	0.334	151	< 0.001	-
	SLA	$0.531 \pm 0.071$	0.274	151	< 0.001	-
	LA <sup>F</sup>	$0.442 \pm 0.084$	0.156	151	< 0.001	-
	LM	$0.103 \pm 0.088$	0.009	151	0.242	-
	FWW	$-0.242 \pm 0.074$	0.067	150	0.001	-
	FM	$-0.244 \pm 0.074$	0.068	150	0.001	-
	SM	$-0.146 \pm 0.083$	0.02	151	0.080	-
	BOS	$-0.494 \pm 0.076$	0.228	145	< 0.001	< 0.001
<b>SLA</b>	MH	$0.614 \pm 0.062$	0.376	163	< 0.001	< 0.001
	RH	$0.373 \pm 0.074$	0.143	153	< 0.001	< 0.001
	SD	$-0.538 \pm 0.067$	0.299	153	< 0.001	< 0.001
	RBT	$0.515 \pm 0.069$	0.274	151	< 0.001	< 0.001
	LA	$0.397 \pm 0.072$	0.158	163	< 0.001	< 0.001
	LM	$-0.129 \pm 0.078$	0.017	163	0.102	1.000
	FWW	$-0.467 \pm 0.071$	0.224	152	< 0.001	< 0.001
	FM	$-0.338 \pm 0.074$	0.114	162	< 0.001	< 0.001
	SM	$-0.237 \pm 0.077$	0.056	161	< 0.001	-
	BOS	$-0.605 \pm 0.064$	0.369	156	< 0.001	< 0.001
<b>LA</b>	MH	$0.578 \pm 0.064$	0.334	163	< 0.001	-
	RH <sup>D</sup>	$0.303 \pm 0.068$	0.115	153	< 0.001	0.001
	SD <sup>E</sup>	$-0.31 \pm 0.068$	0.12	153	< 0.001	< 0.001
	RBT <sup>F</sup>	$0.354 \pm 0.067$	0.156	151	< 0.001	< 0.001
	SLA	$0.397 \pm 0.072$	0.158	163	< 0.001	-
	LM	$0.851 \pm 0.041$	0.724	163	< 0.001	< 0.001
	FWW	$0.04 \pm 0.073$	0.002	152	0.588	-
	FM	$0.204 \pm 0.077$	0.042	162	0.009	-
	SM	$0.076 \pm 0.076$	0.006	161	0.318	-
	BOS	$-0.61 \pm 0.065$	0.363	156	< 0.001	< 0.001
<b>LM</b>	MH	$0.29 \pm 0.075$	0.084	163	< 0.001	-
	RH	$0.137 \pm 0.075$	0.022	153	0.069	1.000
	SD	$-0.036 \pm 0.075$	0.002	153	0.634	-
	RBT	$0.089 \pm 0.076$	0.009	151	0.242	1.000
	SLA	$-0.129 \pm 0.078$	0.017	163	0.102	-
	LA	$0.851 \pm 0.041$	0.724	163	< 0.001	-
	FWW	$0.309 \pm 0.072$	0.11	152	< 0.001	-
	FM	$0.407 \pm 0.072$	0.165	162	< 0.001	-
	SM	$0.212 \pm 0.075$	0.048	161	0.005	-
	BOS	$-0.327 \pm 0.076$	0.108	156	< 0.001	0.001
<b>FWW</b>	MH	$-0.268 \pm 0.079$	0.071	152	0.001	-
	RH	$-0.163 \pm 0.08$	0.027	152	0.044	0.699
	SD	$0.074 \pm 0.083$	0.005	152	0.372	1.000
	RBT	$-0.276 \pm 0.085$	0.067	150	0.001	0.031

	SLA	-0.48 ± 0.073	0.224	152	< 0.001	-
	LA	0.049 ± 0.091	0.002	152	0.588	1.000
	LM	0.356 ± 0.083	0.11	152	< 0.001	0.001
	FM	0.906 ± 0.034	0.822	152	< 0.001	-
	SM	0.735 ± 0.058	0.52	152	< 0.001	-
	BOS	0.308 ± 0.084	0.085	145	< 0.001	0.010
<b>FM</b>	MH	-0.133 ± 0.078	0.018	163	0.090	-
	RH	-0.137 ± 0.081	0.019	152	0.091	1.000
	SD	0.067 ± 0.083	0.004	152	0.421	1.000
	RBT	-0.278 ± 0.085	0.068	150	0.001	0.030
	SLA	-0.338 ± 0.074	0.114	162	< 0.001	-
	LA	0.204 ± 0.077	0.042	162	0.009	0.175
	LM	0.406 ± 0.072	0.165	162	< 0.001	< 0.001
	FWW	0.908 ± 0.034	0.822	152	< 0.001	< 0.001
	SM	0.793 ± 0.047	0.639	161	< 0.001	-
	BOS	0.133 ± 0.078	0.018	156	0.091	1.000
<b>SM</b>	MH	-0.13 ± 0.079	0.017	162	0.100	-
	RH	-0.106 ± 0.079	0.012	153	0.183	1.000
	SD	-0.064 ± 0.079	0.004	153	0.422	1.000
	RBT	-0.14 ± 0.08	0.02	151	0.080	1.000
	SLA	-0.237 ± 0.077	0.056	161	0.002	0.052
	LA	0.083 ± 0.082	0.006	161	0.318	1.000
	LM	0.227 ± 0.08	0.048	161	0.005	0.104
	FWW	0.708 ± 0.056	0.52	152	< 0.001	< 0.001
	FM	0.806 ± 0.048	0.639	161	< 0.001	< 0.001
	BOS	0.168 ± 0.081	0.028	155	0.039	0.665
<b>BOS</b>	MH	-0.726 ± 0.054	0.541	157	< 0.001	-
	RH	-0.194 ± 0.08	0.039	146	0.016	-
	SD	0.404 ± 0.079	0.154	146	< 0.001	-
	RBT	-0.494 ± 0.076	0.228	145	< 0.001	-
	SLA	-0.605 ± 0.064	0.369	156	< 0.001	-
	LA	-0.61 ± 0.065	0.363	156	< 0.001	-
	LM	-0.327 ± 0.076	0.108	156	< 0.001	-
	FWW	0.308 ± 0.084	0.085	145	< 0.001	-
	FM	0.133 ± 0.078	0.018	156	0.091	-
	SM	0.168 ± 0.081	0.028	155	0.039	-

**Table S7.2. Full details of phylogenetic generalised least squares regression parameters rounded to three decimal places.**

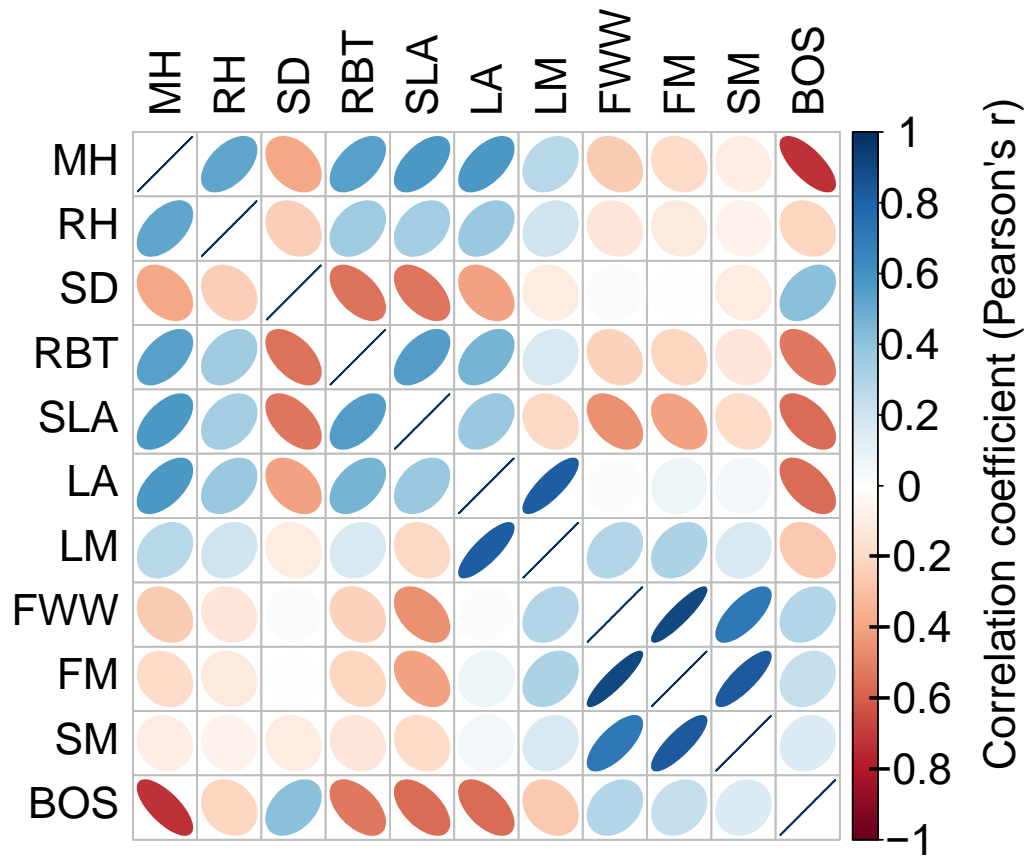
Since the regression parameters can be quite different depending on which variables (dependent or independent, D.V. or I.V.) are on which axes, the models for which the arrangement of axes gave the highest lambda value for a given pair of traits and were used subsequently in networks are shown in bold here. These models were the ones to which the Holm adjustment to the p-values was applied to avoid redundancy.

D.V.	I.V.	Lambda	Slope	R_square	N	P_value	Holm_P
<b>MH</b>	<b>RH</b>	<b>0.704</b>	<b>0.391 ± 0.069</b>	<b>0.216</b>	<b>153</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>SD</b>	<b>0.756</b>	<b>-0.185 ± 0.081</b>	<b>0.041</b>	<b>153</b>	<b>0.012</b>	<b>0.269</b>
	<b>RBT</b>	<b>0.691</b>	<b>0.239 ± 0.071</b>	<b>0.078</b>	<b>151</b>	<b>0.001</b>	<b>0.016</b>
	SLA	0.749	0.446 ± 0.067	0.177	163	< 0.001	-
	<b>LA</b>	<b>0.671</b>	<b>0.327 ± 0.071</b>	<b>0.113</b>	<b>163</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>LM</b>	<b>0.779</b>	<b>0.094 ± 0.083</b>	<b>0.013</b>	<b>163</b>	<b>0.148</b>	<b>1.000</b>
	<b>FWW</b>	<b>0.776</b>	<b>-0.126 ± 0.084</b>	<b>0.017</b>	<b>152</b>	<b>0.104</b>	<b>1.000</b>
	<b>FM</b>	<b>0.794</b>	<b>-0.069 ± 0.081</b>	<b>0.005</b>	<b>163</b>	<b>0.369</b>	<b>1.000</b>
	<b>SM</b>	<b>0.794</b>	<b>-0.044 ± 0.069</b>	<b>0.001</b>	<b>162</b>	<b>0.628</b>	<b>1.000</b>
	<b>BOS</b>	<b>0.539</b>	<b>-0.672 ± 0.072</b>	<b>0.358</b>	<b>157</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
<b>RH</b>	MH	0.000	0.545 ± 0.061	0.293	153	< 0.001	-
	SD	0.046	-0.29 ± 0.072	0.078	153	< 0.001	-
	RBT	0.000	0.355 ± 0.078	0.133	151	< 0.001	-
	SLA	0.000	0.385 ± 0.06	0.143	153	< 0.001	-
	LA	0.000	0.38 ± 0.063	0.115	153	< 0.001	-
	LM	0.367	0.112 ± 0.075	0.011	153	0.201	-
	FWW	0.363	-0.086 ± 0.072	0.006	152	0.340	-
	FM	0.391	-0.086 ± 0.07	0.006	152	0.347	-
	SM	0.425	-0.086 ± 0.051	0.004	153	0.454	-
	<b>BOS</b>	<b>0.000</b>	<b>-0.194 ± 0.08</b>	<b>0.039</b>	<b>146</b>	<b>0.016</b>	<b>0.343</b>
<b>SD</b>	MH	0.384	-0.267 ± 0.073	0.067	153	0.001	-
	<b>RH</b>	<b>0.453</b>	<b>-0.217 ± 0.081</b>	<b>0.057</b>	<b>153</b>	<b>0.003</b>	<b>0.081</b>
	<b>RBT</b>	<b>0.504</b>	<b>-0.523 ± 0.072</b>	<b>0.314</b>	<b>151</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	SLA	0.274	-0.488 ± 0.064	0.208	153	< 0.001	-
	LA	0.439	-0.224 ± 0.07	0.039	153	0.014	-
	<b>LM</b>	<b>0.478</b>	<b>0.029 ± 0.083</b>	<b>0.001</b>	<b>153</b>	<b>0.718</b>	<b>1.000</b>
	FWW	0.497	0.1 ± 0.081	0.010	152	0.216	-
	FM	0.511	0.129 ± 0.077	0.017	152	0.114	-
	SM	0.505	0.119 ± 0.054	0.008	153	0.263	-
	<b>BOS</b>	<b>0.389</b>	<b>0.293 ± 0.091</b>	<b>0.068</b>	<b>146</b>	<b>0.002</b>	<b>0.045</b>
<b>RBT</b>	MH	0.000	0.5 ± 0.067	0.248	151	< 0.001	-
	<b>RH</b>	<b>0.252</b>	<b>0.301 ± 0.074</b>	<b>0.090</b>	<b>151</b>	<b>&lt; 0.001</b>	<b>0.006</b>
	SD	0.374	-0.595 ± 0.063	0.312	151	< 0.001	-
	SLA	0.000	0.531 ± 0.059	0.274	151	< 0.001	-
	LA	0.000	0.442 ± 0.064	0.156	151	< 0.001	-
	LM	0.366	0.021 ± 0.078	0.000	151	0.804	-
	FWW	0.413	-0.157 ± 0.081	0.026	150	0.051	-

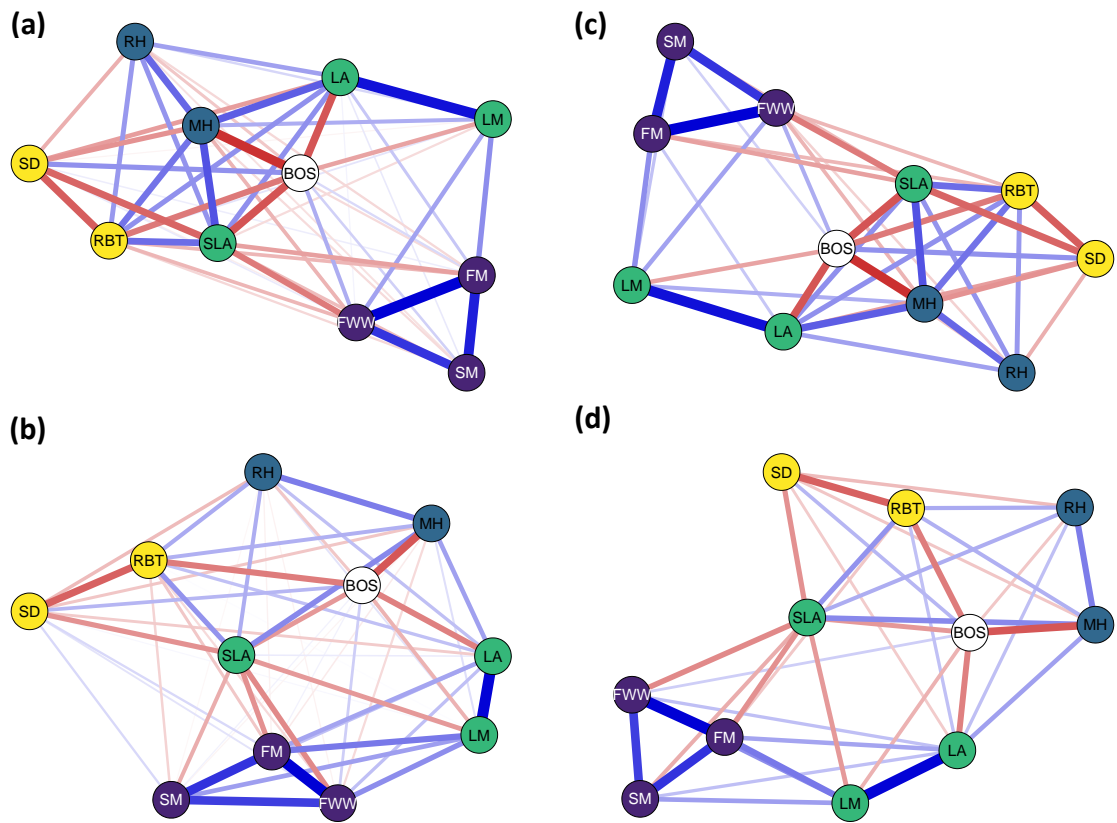


	FM	0.436	-0.213 ± 0.077	0.045	150	0.009	-
	SM	0.387	-0.205 ± 0.05	0.023	151	0.062	-
	<b>BOS</b>	<b>0.020</b>	<b>-0.488 ± 0.078</b>	<b>0.216</b>	<b>145</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
<b>SLA</b>	<b>MH</b>	<b>0.753</b>	<b>0.397 ± 0.076</b>	<b>0.177</b>	<b>163</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>RH</b>	<b>0.852</b>	<b>0.225 ± 0.077</b>	<b>0.085</b>	<b>153</b>	<b>&lt; 0.001</b>	<b>0.008</b>
	<b>SD</b>	<b>0.788</b>	<b>-0.331 ± 0.078</b>	<b>0.152</b>	<b>153</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>RBT</b>	<b>0.795</b>	<b>0.299 ± 0.071</b>	<b>0.147</b>	<b>151</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>LA</b>	<b>0.811</b>	<b>0.064 ± 0.084</b>	<b>0.005</b>	<b>163</b>	<b>0.363</b>	<b>1.000</b>
	<b>LM</b>	<b>0.813</b>	<b>-0.281 ± 0.091</b>	<b>0.131</b>	<b>163</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>FWW</b>	<b>0.711</b>	<b>-0.375 ± 0.081</b>	<b>0.174</b>	<b>152</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>FM</b>	<b>0.754</b>	<b>-0.363 ± 0.079</b>	<b>0.156</b>	<b>162</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	SM	0.774	-0.321 ± 0.069	0.085	161	< 0.001	-
	<b>BOS</b>	<b>0.751</b>	<b>-0.396 ± 0.082</b>	<b>0.132</b>	<b>156</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>LA</b>	MH	0.323	0.42 ± 0.072	0.178	163	< 0.001
<b>RH</b>		<b>0.570</b>	<b>0.18 ± 0.086</b>	<b>0.052</b>	<b>153</b>	<b>0.005</b>	<b>0.124</b>
<b>SD</b>		<b>0.609</b>	<b>-0.161 ± 0.091</b>	<b>0.034</b>	<b>153</b>	<b>0.022</b>	<b>0.435</b>
<b>RBT</b>		<b>0.566</b>	<b>0.179 ± 0.084</b>	<b>0.050</b>	<b>151</b>	<b>0.006</b>	<b>0.144</b>
SLA		0.567	0.112 ± 0.07	0.011	163	0.186	-
<b>LM</b>		<b>0.779</b>	<b>0.774 ± 0.041</b>	<b>0.795</b>	<b>163</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
FWW		0.670	0.196 ± 0.089	0.048	152	0.007	-
FM		0.653	0.314 ± 0.073	0.098	162	< 0.001	-
SM		0.647	0.246 ± 0.065	0.046	161	0.006	-
<b>BOS</b>		<b>0.361</b>	<b>-0.504 ± 0.081</b>	<b>0.202</b>	<b>156</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
<b>LM</b>	MH	0.190	0.237 ± 0.065	0.048	163	0.005	-
	<b>RH</b>	<b>0.417</b>	<b>0.092 ± 0.087</b>	<b>0.010</b>	<b>153</b>	<b>0.220</b>	<b>1.000</b>
	SD	0.472	0.03 ± 0.08	0.001	153	0.718	-
	<b>RBT</b>	<b>0.477</b>	<b>0.009 ± 0.086</b>	<b>0.000</b>	<b>151</b>	<b>0.907</b>	<b>1.000</b>
	SLA	0.576	-0.431 ± 0.057	0.122	163	< 0.001	-
	LA	0.767	1.027 ± 0.031	0.794	163	< 0.001	-
	FWW	0.543	0.42 ± 0.071	0.163	152	< 0.001	-
	FM	0.557	0.538 ± 0.059	0.225	162	< 0.001	-
	SM	0.566	0.438 ± 0.054	0.112	161	< 0.001	-
	<b>BOS</b>	<b>0.178</b>	<b>-0.316 ± 0.09</b>	<b>0.074</b>	<b>156</b>	<b>0.001</b>	<b>0.017</b>
<b>FWW</b>	MH	0.670	-0.151 ± 0.077	0.021	152	0.075	-
	<b>RH</b>	<b>0.694</b>	<b>-0.041 ± 0.09</b>	<b>0.002</b>	<b>152</b>	<b>0.565</b>	<b>1.000</b>
	<b>SD</b>	<b>0.698</b>	<b>0.099 ± 0.08</b>	<b>0.010</b>	<b>152</b>	<b>0.224</b>	<b>1.000</b>
	<b>RBT</b>	<b>0.676</b>	<b>-0.129 ± 0.08</b>	<b>0.017</b>	<b>150</b>	<b>0.112</b>	<b>1.000</b>
	SLA	0.572	-0.48 ± 0.067	0.190	152	< 0.001	-
	<b>LA</b>	<b>0.731</b>	<b>0.252 ± 0.071</b>	<b>0.051</b>	<b>152</b>	<b>0.005</b>	<b>0.130</b>
	<b>LM</b>	<b>0.690</b>	<b>0.386 ± 0.078</b>	<b>0.164</b>	<b>152</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	FM	0.551	0.921 ± 0.034	0.819	152	< 0.001	-
	SM	0.574	0.92 ± 0.043	0.490	152	< 0.001	-
	<b>BOS</b>	<b>0.692</b>	<b>0.215 ± 0.101</b>	<b>0.031</b>	<b>145</b>	<b>0.035</b>	<b>0.673</b>
<b>FM</b>	MH	0.781	-0.074 ± 0.076	0.005	163	0.361	-
	<b>RH</b>	<b>0.757</b>	<b>-0.044 ± 0.091</b>	<b>0.003</b>	<b>152</b>	<b>0.529</b>	<b>1.000</b>
	<b>SD</b>	<b>0.768</b>	<b>0.134 ± 0.081</b>	<b>0.020</b>	<b>152</b>	<b>0.086</b>	<b>1.000</b>

	<b>RBT</b>	<b>0.754</b>	<b>-0.19 ± 0.08</b>	<b>0.040</b>	<b>150</b>	<b>0.014</b>	<b>0.314</b>
	SLA	0.732	-0.431 ± 0.067	0.157	162	< 0.001	-
	<b>LA</b>	<b>0.797</b>	<b>0.316 ± 0.075</b>	<b>0.105</b>	<b>162</b>	<b>&lt; 0.001</b>	<b>0.001</b>
	<b>LM</b>	<b>0.770</b>	<b>0.409 ± 0.079</b>	<b>0.230</b>	<b>162</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>FWW</b>	<b>0.607</b>	<b>0.886 ± 0.035</b>	<b>0.817</b>	<b>152</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	SM	0.492	0.863 ± 0.046	0.546	161	< 0.001	-
	<b>BOS</b>	<b>0.819</b>	<b>0.053 ± 0.094</b>	<b>0.002</b>	<b>156</b>	<b>0.576</b>	<b>1.000</b>
<b>SM</b>	MH	0.776	-0.035 ± 0.091	0.002	162	0.608	-
	<b>RH</b>	<b>0.858</b>	<b>-0.017 ± 0.114</b>	<b>0.001</b>	<b>153</b>	<b>0.744</b>	<b>1.000</b>
	<b>SD</b>	<b>0.864</b>	<b>0.092 ± 0.106</b>	<b>0.019</b>	<b>153</b>	<b>0.088</b>	<b>1.000</b>
	<b>RBT</b>	<b>0.857</b>	<b>-0.096 ± 0.109</b>	<b>0.025</b>	<b>151</b>	<b>0.055</b>	<b>0.982</b>
	<b>SLA</b>	<b>0.780</b>	<b>-0.263 ± 0.084</b>	<b>0.084</b>	<b>161</b>	<b>&lt; 0.001</b>	<b>0.006</b>
	<b>LA</b>	<b>0.803</b>	<b>0.191 ± 0.089</b>	<b>0.051</b>	<b>161</b>	<b>0.004</b>	<b>0.110</b>
	<b>LM</b>	<b>0.793</b>	<b>0.249 ± 0.098</b>	<b>0.118</b>	<b>161</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>FWW</b>	<b>0.782</b>	<b>0.497 ± 0.077</b>	<b>0.469</b>	<b>152</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>FM</b>	<b>0.648</b>	<b>0.614 ± 0.062</b>	<b>0.527</b>	<b>161</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>
	<b>BOS</b>	<b>0.777</b>	<b>0.05 ± 0.085</b>	<b>0.002</b>	<b>155</b>	<b>0.560</b>	<b>1.000</b>
<b>BOS</b>	MH	0.000	-0.672 ± 0.072	0.358	157	< 0.001	-
	RH	0.000	-0.194 ± 0.08	0.039	146	0.016	-
	SD	0.000	0.293 ± 0.091	0.068	146	0.002	-
	RBT	0.000	-0.488 ± 0.078	0.216	145	< 0.001	-
	SLA	0.000	-0.396 ± 0.082	0.132	156	< 0.001	-
	LA	0.000	-0.504 ± 0.081	0.202	156	< 0.001	-
	LM	0.000	-0.316 ± 0.09	0.074	156	0.001	-
	FWW	0.000	0.215 ± 0.101	0.031	145	0.035	-
	FM	0.000	0.053 ± 0.094	0.002	156	0.576	-
	SM	0.000	0.05 ± 0.085	0.002	155	0.560	-



**Figure S7.** Correlations between all continuous traits as measured by Pearson's  $r$ . The shapes of the ellipses become more linear with increasing correlation strength. All trait abbreviations follow **Table 1**.



**Figure S8.** Network diagrams showing: **(a)** all relationships strengths (regardless of significance) from cross-species results, **(b)** all relationships (regardless of significance) from the phylogenetic analyses, **(c)** only cross-species relationships with  $p < 0.05$  included in algorithm (others set to 0 rather than just being invisible), and **(d)** only phylogenetic relationships with  $p < 0.05$  (remaining relationships strengths set to zero and completely excluded from network rather than simply made invisible).

## Supplement 9: Discussion of Obligate seeders

Maximum Height (cross-species effect size  $\pm$  S.E.:  $-0.98 \pm 0.45$ ; phylogenetic effect size  $\pm$  S.E.:  $-0.73 \pm 0.36$ ) and Relative Height ( $-1.27 \pm 0.44$ ;  $-1.46 \pm 0.43$ ) were both found to be significantly shorter in resprouters as a whole compared to obligate seeders. There were almost no differences between combination resprouters and obligate seeders with only Relative Height significantly different between them, Maximum Height also in the phylogenetic analysis only.

On average, basal-only resprouters had significantly lower Maximum Height ( $-2.20 \pm 0.31$ ;  $-2.19 \pm 0.33$ ), lower Relative Height ( $-1.58 \pm 0.42$ ;  $-1.58 \pm 0.42$ ), greater Stem Density ( $1.26 \pm 0.43$ ;  $0.90 \pm 0.42$ ), and lower Relative Bark Thickness ( $-1.14 \pm 0.42$ ;  $-1.17 \pm 0.43$ ), Specific Leaf Area ( $-1.30 \pm 0.38$ ;  $-0.96 \pm 0.38$ ) and Leaf Area ( $-1.39 \pm 0.39$ ;  $-1.24 \pm 0.40$ ) than obligate seeders in both analyses. Significantly lower Leaf Mass ( $-0.94 \pm 0.46$ ) was also found but only in the cross-species analysis. This was very similar to the ways in which basal-only resprouters differed from combination resprouters.

Our conclusions regarding obligate seeders and comparing this group to other post-fire regeneration strategies are far less certain due to so few obligate seeder taxa in our dataset. Obligate seeders traits were encompassed by combination resprouters. Maximum Height and Relative Height were the only traits suggestive of difference between obligate seeders and resprouters and this could be due to obligate seeders lacking a lignotuber and therefore having more of their photosynthetic resources free to be invested in growth. Additionally, the nature of the simultaneous germination of obligate seeders following fire (Nicolle 2006; Gosper *et al.* 2018) and the significant selection pressure on seedlings during recruitment would naturally select for individuals with higher growth rates and subsequently taller maximum heights at maturity (Gibert *et al.* 2016). Regarding bark thickness, a thick bark skirt would be advantageous for surviving low intensity ground fires, despite being generally fire-killed.

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