**Appendix S1.** Character descriptions, GenBank accession numbers, phylogenetic statistics, extant *Melia* fruit anatomy, and phylogenetic tree from morphology only analysis.

**Character descriptions**

1. Carpel fusion: 0, syncarpous; 1, apocarpous/weakly syncarpous
2. Fruit type: 0, fully dehiscent; 1, indehiscent
   1. Fully dehiscent fruits are always dehiscent with clear sutures exposed along the epicarp exterior surface at maturity. Indehiscent fruits lack clear sutures along the meso- and epicarp. Note some indehiscent fruit may have loculicidal sutures restricted to their endocarps.
3. Mericarpy: 0, present; 1, absent
   1. This is only appropriate for syncarpous fruits in which a mature drupaceous or berry-like fruit splits apart.
4. Exocarp consistency: 0, woody; 1, fleshy/succulent/leathery
5. Conspicuous endocarp: 0, present; 1, absent
   1. Although endocarp data is limited, if the Meliaceae monographs state that the fruits are drupes, they were scored as having conspicuous endocarps.
6. Center of fruit: 0, solid; 1, hollow
7. Fruit dehiscence: 0, loculicidal; 1, septifragal
8. Columella length: 0, full length; 1, extending only halfway up fruit
   1. Only appropriate for taxa with septifragal dehiscence.
9. Endocarp consistency: 0, thick and woody/corky; 1, cartilaginous
10. Number of locules: 0, one to five; 1, more than five
11. Number of mature seeds per locule: 0, one to two; 1, three or more
12. Seed wings: 0, present; 1, absent
13. Wing attachment to seeds: 0, terminal; 1, entire
14. Wings attached to collumella/central axis: 0, seed body end; 1, wing end
15. Sarcotesta or fleshy/corky/woody seed coat: 0, present; 1, absent
    1. Because the seed coat near the hila of *Melia* and *Manchestercarpa* seeds are fleshy, a fleshy sarcotesta was coded as being present for these taxa (see Pennington and Styles, 1975 for *Melia*).
16. Arillode: 0, present; 1, absent
17. Endosperm: 0, present; 1, absent
18. Amount of endosperm: 0, abundant; 1, residual

Table S1. GenBank accession numbers

|  |  |  |  |
| --- | --- | --- | --- |
| Taxa | *rbcL* | *matK* | *trnL* |
| *Carapa guianensis* | AY128219 | AY128181 | EU853781 |
| *Khaya anthotheca* | AY128231 | JX517573 |  |
| *Capuronianthus mahafalensis* | AY128218 |  |  |
| *Lovoa swynnertonii* | AY128233 |  |  |
| *Toona* sp. | AY128243 |  |  |
| *Chukrasia tabularis* | AY128223 |  | KY430183 |
| *Owenia vernicosa* | DQ238063 |  | KU939120 |
| *Schmardaea microphylla* | AY128240 | AY128199 |  |
| *Quivisianthe papinae* | AY128239 |  |  |
| *Ekebergia capensis* | AY128228 | JF270756 | KU939116 |
| *Sandoricum* cf. *koetjape* | DQ238068 |  | KU939123 |
| *Lansium domesticum* | AY128232 | AY128191 | KY430167 |
| *Heckeldora staudtii* | AY128230 | AY128189 | KU939117 |
| *Dysoxylum gaudichaudianum* | AY128227 | AY128187 |  |
| *Ruagea pubescens* | DQ238057 | AY128198 |  |
| *Chisocheton macrophyllus* | AY128221 | AY128183 | AB057519 |
| *Pseudoclausena chrysogyne* | DQ238054 |  | KU939121 |
| *Turraea sericea* | AY128245 | AY128203 | KX163285 |
| *Walsura tubulata* | AY128246 | AY128204 | KU939126 |
| *Nymania capensis* | AY128238 | AY128197 | KU939134 |
| *Calodecaryia crassifolia* | AY128216 |  | KU939113 |
| *Pseudobersama mossambicensis* | DQ238064 | JX517407 |  |
| *Xylocarpus mekongensis* | KJ784654 |  | MH215776 |
| *Cabralea canjerana* | DQ238055 |  | KU939112 |
| *Humbertioturraea sp.* | DQ238058 |  |  |
| *Malleastrum mandenense* | DQ238062 | AY128192 |  |
| *Lepidotrichilia volkensii* | DQ238061 |  | KU939119 |
| *Melia azedarach* | KP088694 | EF489117 | AB817682 |
| *Astrotrichilia* sp. | DQ238060 |  |  |
| *Azadirachta indica* | KP675896 | AY128180 | KU939111 |
| *Munronia humilis* | EU621669 |  |  |
| *Aphanamixis polystachya* | KR528732 | AY128178 | KF211844 |
| *Aglaia elaeagnoidea* | KR528615 |  | KU939110 |
| *Cipadessa baccifera* | KR529007 | EF489116 | EF489264 |
| *Cedrela odorata* | GQ981695 | AY128182 | AB057455 |
| *Anthocarapa nitidula* | KF496421 |  |  |
| *Synoum glandulosum* | KM895969 |  |  |
| *Vavaea amicorum* | KF496432 |  |  |
| *Naregamia alata* | JF922886 | JF922888 | KX163284 |
| *Pseudocedrela kotschyi* | AH015484 |  |  |
| *Guarea glabra* | KJ082336 |  | AB057533 |
| *Trichilia emetica* | JF265636 | AY128202 | JX307333 |
| *Swietenia macrophylla* | [U39080](https://www.ncbi.nlm.nih.gov/nucleotide/U39080.2?report=genbank&log$=nucltop&blast_rank=19&RID=N6HEE2J4014) | EF489114 | KU939124 |
| *Ailanthus altissima* | KX702280 | FM179922 |  |
| *Quassia amara* | EU043017 | AY128207 |  |
| *Simarouba glauca* | EU043038 | EF489113 |  |

Table S2. Character information for datasets

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Number of taxa | Number of characters | Number of variable characters | Number of informative characters |
| *matK* | 25 | 975 | 299 | 134 |
| *rbcL* | 48 | 1387 | 1353 | 1287 |
| *trnL* | 28 | 1229 | 394 | 126 |
| Morphology | 51 | 18 | 17 | 15 |



Figure S1. Morphology of extant *Melia azederach* fruits. A. Cross section of fruit showing mesocarp and endocarp. B. Longitudinal section of fruits showing hollow axis. C. Endocarp fibers. D. Shriveled mesocarp cells.



Figure S2. Majority-rules consensus tree from Bayesian inference morphology only analysis showing relationships within Meliaceae. Numbers above branches indicate support values (posterior probabilities). Arrowhead marks position of *Manchestercarpa vancouverensis* and † denotes extinct taxa.