**Supplemental Table 1**

Sampled species: Geographic origin and infrageneric group belongings.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Species** | **Infrageneric**  **group** | **Country (State)** | **Latitude** | **Longitude** |
| *Quercus suber* | Cerris | France | 44°38'N | 1°10'W |
| *Quercus libani* | Cerris | Iran | 36°38'N | 45°08'E |
| *Quercus chenii* | Cerris | China | 32°04'N | 118°50'E |
| *Quercus trojana* | Cerris | Italy | 40°37'N | 17°10'E |
| *Quercus castaneifolia* | Cerris | Iran | 36°34'N | 52°03'E |
| *Quercus brantii* | Cerris | Israel | 32°44’N | 35°11’E |
| *Quercus variabilis* | Cerris | China | 32°04'N | 118°50'E |
| *Quercus afares* | Cerris | Algeria | 36°46'N | 3°40'E |
| *Quercus ithaburensis* | Cerris | Turkey | 38°58'N | 29°24'E |
| *Quercus acutissima* | Cerris | China | 32°04'N | 118°05'E |
| *Quercus vestita* | Cyclobalanopsis | Thailand | 18°48'N | 98°54'E |
| *Quercus stenophylloides* | Cyclobalanopsis | Taiwan | 24°10'51"N | 121°24'03"E |
| *Quercus semiserrata* | Cyclobalanopsis | Thailand | 18°48'N | 98°54'E |
| *Quercus morii* | Cyclobalanopsis | Taiwan | 23°30’N | 121°00’E |
| *Quercus salicina* | Cyclobalanopsis | Japan | 34°45'N | 133°45'E |
| *Quercus schottkyana* | Cyclobalanopsis | China | 25°00'N | 102°02'E |
| *Quercus argyrotricha* | Cyclobalanopsis | China | Near Kunming (Yunnan) | |
| *Quercus multinervis* | Cyclobalanopsis | China | 27°16’39"N | 112°40’24"E |
| *Quercus augustinii* | Cyclobalanopsis | China | 25°00'N | 102°02'E |
| *Quercus dolicholepis* | Ilex | China | 24°36'N | 103°33'E. |
| *Quercus franchetii* | Ilex | China | 25°05'N | 102°26'E |
| *Quercus coccifera* | Ilex | Turkey | 37°00'N | 30°30’E |
| *Quercus coccifera* subps*. calliprinos* | Ilex | Israel | 32°40'N | 35°05'E |
| *Quercus ilex* | Ilex | France | 44°38'N | 1°10'W |
| *Quercus castanea* | Lobatae | Mexico | 20º38’N | 98º36’W |
| *Quercus shumardii* | Lobatae | USA (Arkansas) | 33°05'N | 93°30'W |
| *Quercus sideroxyla* | Lobatae | Mexico | 19º45’N | 101º15’W |
| *Quercus benthamii* | Lobatae | Mexico | 17°05’N | 93°2’W |
| *Quercus conzattii* | Lobatae | Mexico | 17º05’N | 96º33’W |
| *Quercus costaricensis* | Lobatae | Costa Rica | 9°32’N | 83°35’W |
| *Quercus crispipilis* | Lobatae | Mexico | 16°47’N | 92°5’W |
| *Quercus falcata* | Lobatae | USA (Louisiana) | 32°30'N | 92°40'W |
| *Quercus laurina* | Lobatae | Mexico | 17º25’N | 96º35’W |
| *Quercus sapotifolia* | Lobatae | Mexico | 16°06’N | 91°40’W |
| *Quercus wislizeni* | Lobatae | USA (California) | 33°42'N | 117°25'W |
| *Quercus affinis* | Lobatae | Mexico | 20º40’N | 98º38’W |
| *Quercus candicans* | Lobatae | Mexico | 16°06’N | 91°40’W |
| *Quercus georgiana* | Lobatae | USA (Georgia) | Near Gainesville (Georgia) | |
| *Quercus hypoleucoides* | Lobatae | USA (New Mexico) | 33°19'14''N | 108°50'19''W |
| *Quercus pinnativenulosa* | Lobatae | Mexico | Near San Cristobal (Hidalgo) | |
| *Quercus rhysophylla* | Lobatae | Mexico | 25°36'55''N | 100°21'54''W |
| *Quercus sartorii* | Lobatae | Mexico | 20º38’N | 98º36’W |
| *Quercus acherdophylla* | Lobatae | Mexico | 20°14'N | 98°12'W |
| *Quercus crassipes* | Lobatae | Mexico | 19°35'N | 102°05'W |
| *Quercus depressa* | Lobatae | Mexico | 20°05'N | 98°33'W |
| *Quercus hirtifolia* | Lobatae | Mexico | 19°50'N | 97°35'W |
| *Quercus myrtifolia* | Lobatae | USA (Florida) | 29°53'15"N | 84°22'19"W |
| *Quercus rubra* | Lobatae | USA (Kentucky) | 37°10'N | 88°20'W |
| *Quercus agrifolia* | Lobatae | USA (California) | 33°42'N | 117°25'W |
| *Quercus eugeniifolia* | Lobatae | Mexico | 20°10'N | 98°14'W |
| *Quercus kelloggii* | Lobatae | USA (California) | 37°36'N | 120°02'W |
| *Quercus mexicana* | Lobatae | Mexico | 20°07'N | 98°18'W |
| *Quercus phellos* | Lobatae | USA (Louisiana) | 32°30'N | 92°40'W |
| *Quercus dysophylla* | Lobatae | Mexico | 19°44'N | 98°03'W |
| *Quercus palustris* | Lobatae | USA (Connecticut) | 41°35'N | 72°20'W |
| *Quercus palmeri* | Protobalanus | USA (California) | 33°35'41"N | 116°36'32"W |
| *Quercus tomentella* | Protobalanus | USA (California ) | 34°02'17"N | 119°36'34"W |
| *Quercus chrysolepis* | Protobalanus | USA (California) | 37°10'N | 121°25'W |
| *Quercus vacciniifolia* | Protobalanus | USA (California) | 39°43'08''N | 122°53'03''W |
| *Quercus faginea* | Quercus | Spain | 42°34'N | 0°34'W |
| *Quercus lobata* | Quercus | USA (California) | 34°27'N | 118°20'W |
| *Quercus malacotricha* | Quercus | China | 25°05'N | 102°26'E |
| *Quercus pyrenaica* | Quercus | France | 44°44'N | 0°45'W |
| *Quercus dentata* | Quercus | China | 32°04'N | 118°50'E |
| *Quercus excelsa* | Quercus | Mexico | 20º38’N | 98º36’W |
| *Quercus serrata* | Quercus | China | 32°04'N | 118°50'E |
| *Quercus laeta* | Quercus | Mexico | 17º25’N | 96º35’W |
| *Quercus macrocarpa* | Quercus | USA (Kansas) | 38°03'N | 95°10'W |
| *Quercus peduncularis* | Quercus | Mexico | 16°06’N | 91°40’W |
| *Quercus pubescens* | Quercus | France | 45°18'N | 0°54'W |
| *Quercus oleoides* | Quercus | Cuba | 22°37'N | 83°39'W |
| *Quercus alba* | Quercus | USA (Arkansas) | 33°05'N | 93°30'W |
| *Quercus berberidifolia* | Quercus | USA (California) | 33°18'N | 116°38’W |
| *Quercus canariensis* | Quercus | Algeria | 36°47'N | 5°46'E |
| *Quercus cornelius-mulleri* | Quercus | USA (California) | 33°12'N | 116°30'W |
| *Quercus germana* | Quercus | Mexico | 19°30’43"N | 96°56’40"W |
| *Quercus glabrescens* | Quercus | Mexico | 20°07'N | 98°37'W |
| *Quercus leiophylla* | Quercus | Mexico | 20º38’N | 98º36’W |
| *Quercus muehlenbergii* | Quercus | USA(Mississipi) | 33°20'N | 88°47'W |
| *Quercus montana* | Quercus | USA (New York) | 43°16'N | 77°37'W |
| *Quercus pungens* | Quercus | USA (Texas) | 32°0'13"N | 104°47'19"W |
| *Quercus sebifera* | Quercus | Mexico | 16°05’N | 92°00'W |
| *Quercus segoviensis* | Quercus | Mexico | 16°47’N | 92°05’W |
| *Quercus stellata* | Quercus | USA (Texas) | 30°19'N | 94°41'W |
| *Quercus ajoensis* | Quercus | USA (Arizona) | Near Ajo (Arizona) | |
| *Quercus chapmanii* | Quercus | USA (Georgia) | 31°22'15"N | 82°10'05"W |
| *Quercus copeyensis* | Quercus | Costa Rica | 9°32’N | 83°35’W |
| *Quercus durata* | Quercus | USA (California) | 38°59'20"N | 123°05'07"W |
| *Quercus infectoria* | Quercus | Iran | 36°38'N | 45°08'E |
| *Quercus pontica* | Quercus | France | Arboretum des Barres | |
| *Quercus rugosa* | Quercus | Mexico | 17º25’N | 99º35’W |
| *Quercus similis* | Quercus | USA (South Carolina) | 32°51'38"N | 79°54'08"W |
| *Quercus aliena* | Quercus | China | 32°04'N | 118°50'E |
| *Quercus arizonica* | Quercus | USA (Texas) | 31°59'17"N | 104°46'48"W |
| *Quercus infectoria* subsp. *boissieri* | Quercus | Israel | 32°40'N | 35°05'E |
| *Quercus corrugata* | Quercus | Mexico | 20°00'N | 97°22'W |
| *Quercus dumosa* | Quercus | USA (California) | 33°42'N | 117°25'W |
| *Quercus geminata* | Quercus | USA (Georgia) | 32°0'32"N | 81°46'07"W |
| *Quercus greggii* | Quercus | Mexico | 19°44'N | 98°03'W |
| *Quercus pacifica* | Quercus | USA (California ) | 33°59' N | 119°43'W |
| *Quercus douglasii* | Quercus | USA (California) | 38°43'N | 120°48'W |
| *Quercus garryana* | Quercus | USA (Oregon) | 44°59'N | 123°02'W |
| *Quercus griffithii* | Quercus | Bhutan | Near Wangdue Zhong | |
| *Quercus insignis* | Quercus | Mexico | 19º 55’N | 96°58'W |
| *Quercus john-tuckeri* | Quercus | USA | 33°12'N | 116°30'W |
| *Quercus petraea* | Quercus | France | 47°55'N | 1°54'E |
| *Quercus robur* | Quercus | France | 44°44'N | 0°42'W |
| *Quercus sadleriana* | Quercus | USA (California) | 41°59'N | 123°31'W |
| *Castanea mollissima* |  | China | Near Beijing | |
| *Notholithocarpus densiflorus var densiflorus* |  | USA (California) | 41°58'N | 123°30'W |
| *Notholithocarpus densiflorus var echinoides* |  | USA (California) | 41°58'N | 123°30'W |

**Supplemental Table 2**

Accession number of the consensus sequences

<http://www.ebi.ac.uk/ena/>

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **CL1155** | **CL5191** | **CL8461** | **CL8561** | **CL8745** | **CL9715** |
| *Quercus acherdophylla* | HF563080 |  | HF563285 | HF563161 | HF563348 | HF563434 |
| *Quercus acutissima* | HF563081 | HF563238 | HF563286 | HF563162 | HF563349 | HF563435 |
| *Quercus afares* | HF563082 | HF563239 | HF563287 | HF563163 |  | HF563436 |
| *Quercus affinis* |  | HF563240 |  | HF563164 | HF563350 | HF563437 |
| *Quercus agrifolia* | HF563083 |  | HF563288 | HF563165 | HF563351 | HF563438 |
| *Quercus ajoensis* | HF563085 |  | HF563290 | HF563166 | HF563353 | HF563440 |
| *Quercus alba* | HF563086 | HF563242 |  |  |  | HF563441 |
| *Quercus aliena* | HF563087 | HF563243 |  | HF563167 | HF563354 | HF563442 |
| *Quercus argyrotricha* | HF563084 | HF563241 | HF563289 |  | HF563352 | HF563439 |
| *Quercus arizonica* | HF563088 |  | HF563291 | HF563168 | HF563355 | HF563443 |
| *Quercus augustinii* | HF563089 | HF563244 | HF563292 |  | HF563356 | HF563444 |
| *Quercus benthamii* |  |  |  | HF563169 |  | HF563445 |
| *Quercus berberidifolia* | HF563090 | HF563245 | HF563293 |  | HF563357 |  |
| *Quercus brantii* | HF563092 |  |  | HF563171 | HF563359 | HF563447 |
| *Quercus canariensis* | HF563094 |  |  | HF563173 | HF563361 | HF563449 |
| *Quercus candicans* |  |  |  | HF563174 | HF563362 | HF563450 |
| *Quercus castanea* |  |  |  | HF563175 |  | HF563451 |
| *Quercus castaneifolia* | HF563095 | HF563247 | HF563296 |  |  | HF563452 |
| *Quercus chapmanii* | HF563096 |  | HF563297 |  | HF563363 | HF563453 |
| *Quercus chenii* | HF563097 |  |  | HF563176 | HF563364 | HF563454 |
| *Quercus chrysolepis* | HF563098 | HF563248 |  | HF563177 | HF563365 | HF563455 |
| *Quercus coccifera* | HF563099 | HF563249 | HF563298 |  | HF563366 | HF563456 |
| *Quercus coccifera* subsp. *calliprinos* | HF563093 | HF563246 | HF563295 | HF563172 | HF563360 | HF563448 |
| *Quercus conzattii* |  |  |  | HF563178 | HF563367 | HF563457 |
| *Quercus copeyensis* |  | HF563250 |  | HF563179 | HF563368 | HF563458 |
| *Quercus cornelius-mulleri* | HF563100 |  | HF563299 |  |  | HF563459 |
| *Quercus corrugata* | HF563101 |  | HF563300 | HF563180 | HF563369 | HF563460 |
| *Quercus costaricensis* |  |  |  | HF563181 | HF563370 | HF563461 |
| *Quercus crassipes* | HF563102 |  | HF563301 | HF563182 | HF563371 | HF563462 |
| *Quercus crispipilis* |  |  |  | HF563183 | HF563372 |  |
| *Quercus dentata* | HF563103 |  |  |  | HF563373 | HF563463 |
| *Quercus depressa* | HF563104 |  | HF563302 | HF563184 | HF563374 |  |
| *Quercus dolicholepis* | HF563105 |  | HF563303 |  |  | HF563464 |
| *Quercus douglasii* | HF563106 | HF563251 | HF563304 |  | HF563375 | HF563465 |
| *Quercus dumosa* | HF563107 | HF563252 | HF563305 |  | HF563376 | HF563466 |
| *Quercus durata* | HF563108 | HF563253 | HF563306 |  | HF563377 |  |
| *Quercus dysophylla* | HF563109 | HF563254 | HF563307 | HF563185 | HF563378 | HF563467 |
| *Quercus eugeniifolia* | HF563110 |  | HF563308 | HF563186 | HF563379 | HF563468 |
| *Quercus excelsa* |  |  |  |  | HF563380 | HF563469 |
| *Quercus faginea* | HF563111 |  |  | HF563187 |  | HF563470 |
| *Quercus falcata* | HF563112 |  |  |  |  | HF563471 |
| *Quercus franchetii* |  |  |  | HF563188 | HF563381 | HF563472 |
| *Quercus garryana* | HF563113 | HF563255 | HF563309 | HF563189 | HF563382 | HF563473 |
| *Quercus geminata* | HF563114 | HF563256 | HF563310 |  | HF563383 | HF563474 |
| *Quercus georgiana* | HF563115 |  | HF563311 |  |  | HF563475 |
| *Quercus germana* | HF563116 |  | HF563312 |  | HF563384 | HF563476 |
| *Quercus glabrescens* | HF563117 |  | HF563313 |  | HF563385 |  |
| *Quercus greggii* | HF563120 |  | HF563314 | HF563192 | HF563387 | HF563477 |
| *Quercus griffithii* | HF563121 | HF563259 | HF563315 | HF563193 | HF563388 | HF563478 |
| *Quercus hirtifolia* | HF563122 |  | HF563316 | HF563194 |  | HF563479 |
| *Quercus hypoleucoides* | HF563123 |  |  | HF563195 | HF563389 | HF563480 |
| *Quercus ilex* | HF563124 | HF563260 | HF563317 | HF563196 | HF563390 | HF563481 |
| *Quercus infectoria* | HF563125 |  | HF563318 | HF563197 | HF563391 | HF563482 |
| *Quercus infectoria* subsp. *boissieri* | HF563091 |  | HF563294 | HF563170 | HF563358 | HF563446 |
| *Quercus insignis* | HF563126 | HF563261 | HF563319 | HF563198 | HF563392 | HF563483 |
| *Quercus ithaburensis* | HF563127 | HF563262 | HF563320 | HF563199 | HF563393 | HF563484 |
| *Quercus john-tuckeri* | HF563128 | HF563263 | HF563321 | HF563200 | HF563394 | HF563485 |
| *Quercus kelloggii* | HF563129 |  | HF563322 | HF563201 | HF563395 | HF563486 |
| *Quercus laeta* |  | HF563264 |  | HF563202 | HF563396 |  |
| *Quercus laurina* |  |  |  | HF563203 | HF563397 | HF563487 |
| *Quercus leiophylla* |  |  |  | HF563204 | HF563398 | HF563488 |
| *Quercus libani* | HF563130 |  | HF563323 |  |  | HF563489 |
| *Quercus lobata* |  |  |  | HF563205 |  | HF563490 |
| *Quercus macrocarpa* | HF563131 |  |  |  | HF563399 | HF563491 |
| *Quercus malacotricha* |  |  |  | HF563206 | HF563400 |  |
| *Quercus mexicana* | HF563132 |  | HF563324 | HF563207 | HF563401 | HF563492 |
| *Quercus montana* |  | HF563271 |  | HF563217 | HF563414 | HF563505 |
| *Quercus morii* |  |  | HF563327 |  | HF563402 | HF563495 |
| *Quercus muehlenbergii* | HF563135 |  |  | HF563209 | HF563403 | HF563496 |
| *Quercus multinervis* |  |  | HF563328 | HF563210 | HF563404 | HF563497 |
| *Quercus myrtifolia* | HF563136 |  | HF563329 | HF563211 | HF563405 |  |
| *Quercus oleoides* |  |  |  | HF563212 | HF563406 | HF563498 |
| *Quercus pacifica* | HF563137 | HF563266 | HF563330 |  | HF563407 | HF563499 |
| *Quercus palmeri* | HF563138 |  |  |  | HF563408 | HF563500 |
| *Quercus palustris* | HF563139 | HF563267 | HF563331 | HF563213 | HF563409 | HF563501 |
| *Quercus peduncularis* |  | HF563268 |  | HF563214 |  |  |
| *Quercus petraea* | HF563140 | HF563269 | HF563332 | HF563215 | HF563410 | HF563502 |
| *Quercus phellos* | HF563141 |  | HF563333 | HF563216 | HF563411 | HF563503 |
| *Quercus pinnativenulosa* | HF563142 |  | HF563334 |  | HF563412 |  |
| *Quercus pontica* | HF563143 | HF563270 |  |  | HF563413 | HF563504 |
| *Quercus pubescens* | HF563144 | HF563272 |  | HF563218 | HF563415 |  |
| *Quercus pungens* |  |  | HF563335 | HF563219 |  | HF563506 |
| *Quercus pyrenaica* | HF563155 |  |  |  |  | HF563521 |
| *Quercus rhysophylla* | HF563147 |  | HF563337 | HF563222 | HF563419 | HF563510 |
| *Quercus robur* | HF563145 | HF563273 | HF563336 | HF563220 | HF563416 | HF563507 |
| *Quercus rubra* | HF563146 | HF563274 |  |  | HF563417 | HF563508 |
| *Quercus rugosa* |  | HF563275 |  | HF563221 | HF563418 | HF563509 |
| *Quercus sadleriana* | HF563148 | HF563276 | HF563338 | HF563223 | HF563420 | HF563511 |
| *Quercus salicina* |  | HF563277 | HF563339 | HF563224 | HF563421 | HF563512 |
| *Quercus sapotifolia* |  |  |  | HF563225 | HF563422 |  |
| *Quercus sartorii* | HF563149 |  | HF563340 |  | HF563423 | HF563513 |
| *Quercus schottkyana* | HF563119 | HF563258 |  | HF563191 | HF563386 |  |
| *Quercus sebifera* |  | HF563278 |  | HF563226 | HF563424 |  |
| *Quercus segoviensis* |  |  |  | HF563227 | HF563425 | HF563514 |
| *Quercus semiserrata* | HF563150 | HF563279 | HF563341 | HF563228 | HF563426 | HF563515 |
| *Quercus serrata* | HF563118 | HF563257 |  | HF563190 |  |  |
| *Quercus shumardii* | HF563151 |  |  | HF563229 | HF563427 |  |
| *Quercus sideroxyla* |  |  |  | HF563230 | HF563428 | HF563516 |
| *Quercus similis* | HF563152 |  | HF563342 |  | HF563429 | HF563517 |
| *Quercus stellata* | HF563153 | HF563280 |  |  |  | HF563518 |
| *Quercus stenophylloides* |  |  | HF563343 |  |  | HF563519 |
| *Quercus suber* |  | HF563281 |  | HF563231 |  | HF563520 |
| *Quercus tomentella* | HF563154 |  | HF563344 | HF563232 | HF563430 |  |
| *Quercus trojana* | HF563156 | HF563282 | HF563345 | HF563233 |  |  |
| *Quercus vacciniifolia* | HF563157 |  | HF563346 | HF563234 | HF563431 | HF563522 |
| *Quercus variabilis* | HF563158 | HF563283 |  | HF563235 | HF563432 | HF563523 |
| *Quercus vestita* | HF563159 | HF563284 | HF563347 | HF563236 | HF563433 |  |
| *Quercus wislizeni* | HF563160 |  |  | HF563237 |  | HF563524 |
| *Castanea mollissima* | HF563134 | HF563265 | HF563326 | HF563208 |  | HF563494 |
| *Castanea mollissima* | HF563133 |  | HF563325 |  |  | HF563493 |
| *Notholithocarpus densiflorus*  var *densiflorus* | HF680263 | HF680265 | HF680266 |  |  | HF680269 |
| *Notholithocarpus densiflorus*  var *echinoides* | HF680262 | HF680264 |  | HF680267 |  | HF680268 |

Supplemental Table 3. Results of dating analysis of the 8-gene strict consensus sequence matrix.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Ingroup root age | | | Cyclo+Cerris+Ilex= cons 1 et 2 | | | Cerris + Ilex Asia = cons 3a et b | | | Proto + Quercus = cons 4 | | | Lobatae + Protob + Quercus = cons 5 | | | Split Cerris WEA-EAS | | | Split Lobatae W/SNA-ENA | | | Crown split Quercus | | |
|  | Constrained min. age | Mean diff. |  | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max | **Opt.** | Min | Max |
| Using constraint 1  (Cyclo+Ilex+Cerris) | **48** | Opt. | Min-Max | **54** | 48 | 68 | **49** | 48 | 52 | **10** | 1 | 30 | **15** | 2 | 38 | **34** | 9 | 53 | **1** | 0 | 8 | **1** | 0 | 6 | **3** | 0 | 10 |
| -10 | -7 | **-1** | -7 | 13 | **Fixed** | | | **-10** | -19 | 11 | **-19** | -32 | 4 | **-12** | -36 | 8 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using constraint 2  (Cyclo+Ilex+Cerris) | **33** |  |  | **36** | 33 | 42 | **34** | 33 | 36 | **6** | 1 | 21 | **11** | 2 | 27 | **24** | 7 | 37 | **1** | 0 | 5 | **1** | 0 | 4 | **2** | 0 | 6 |
| -19 | -17 | **-20** | -22 | -13 | **Fixed** | | | **-13** | -19 | 1 | **-24** | -32 | -8 | **-21** | -38 | -8 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using constraint 3a  Cerris+ Ilex EAS | **16** |  |  | **20** | 17 | 26 | **19** | 16 | 23 | **16** | 16 | 18 | **7** | 1 | 16 | **13** | 4 | 22 | **1** | 0 | 5 | **1** | 0 | 3 | **1** | 0 | 4 |
| -31 | -30 | **-35** | -38 | -29 | **-29** | -32 | -25 | **Fixed** | | | **-27** | -33 | -18 | **-32** | -42 | -23 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using constraint 3b  Cerris+ Ilex EAS | **23** |  |  | **29** | 24 | 38 | **27** | 24 | 33 | **24** | 23 | 25 | **10** | 2 | 23 | **20** | 5 | 32 | **1** | 0 | 7 | **1** | 0 | 4 | **2** | 0 | 6 |
| -24 | -23 | **-26** | -31 | -17 | **-21** | -25 | -15 | **Fixed** | | | **-25** | -32 | -11 | **-25** | -40 | -13 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using constraint 4  (Proto+Quercus) | **34** |  |  | **40** | 35 | 49 | **18** | 4 | 40 | **6** | 0 | 18 | **35** | 34 | 37 | **37** | 34 | 44 | **1** | 0 | 5 | **1** | 0 | 5 | **2** | 0 | 8 |
| -17 | -14 | **-15** | -20 | -6 | **-30** | -44 | -8 | **-14** | -19 | -1 | **Fixed** | | | **-8** | -11 | -1 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using constraint 5  (Proto+Quercus+Lobatae) | **45** |  |  | **48** | 45 | 57 | **18** | 4 | 46 | **5** | 1 | 17 | **19** | 3 | 43 | **46** | 45 | 48 | **1** | 0 | 6 | **1** | 0 | 6 | **2** | 0 | 9 |
| -17 | -12 | **-7** | -10 | 2 | **-30** | -45 | -2 | **-14** | -19 | -3 | **-16** | -31 | 9 | **Fixed** | | |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Min age root (approx.) | **55** | based on the oldest unequivocal record of *Quercus* (C. Hofmann, unpubl. data) | | | | | | | | | | | | | | | | | | | | | | | | | |

Abbrev. in labels: cons = constraint; Cyclo = Cyclobalanopsis; EAS = East Asia; Proto = Protobalanus; WEA = western Eurasia; W/SNA = western and southern North America (western U.S. and Mexico)

Other abbrev.: Opt. = optimised node height (median inferred divergence age); Min, Max = upper and lower boundary of 95% HPD intervals.

Cell colour gradient: Red = too young compared to fossil record; green = good fit with other constraint(s); blue = too old.