

Supporting Information Figs S1-S3, Table S1 & Notes S1

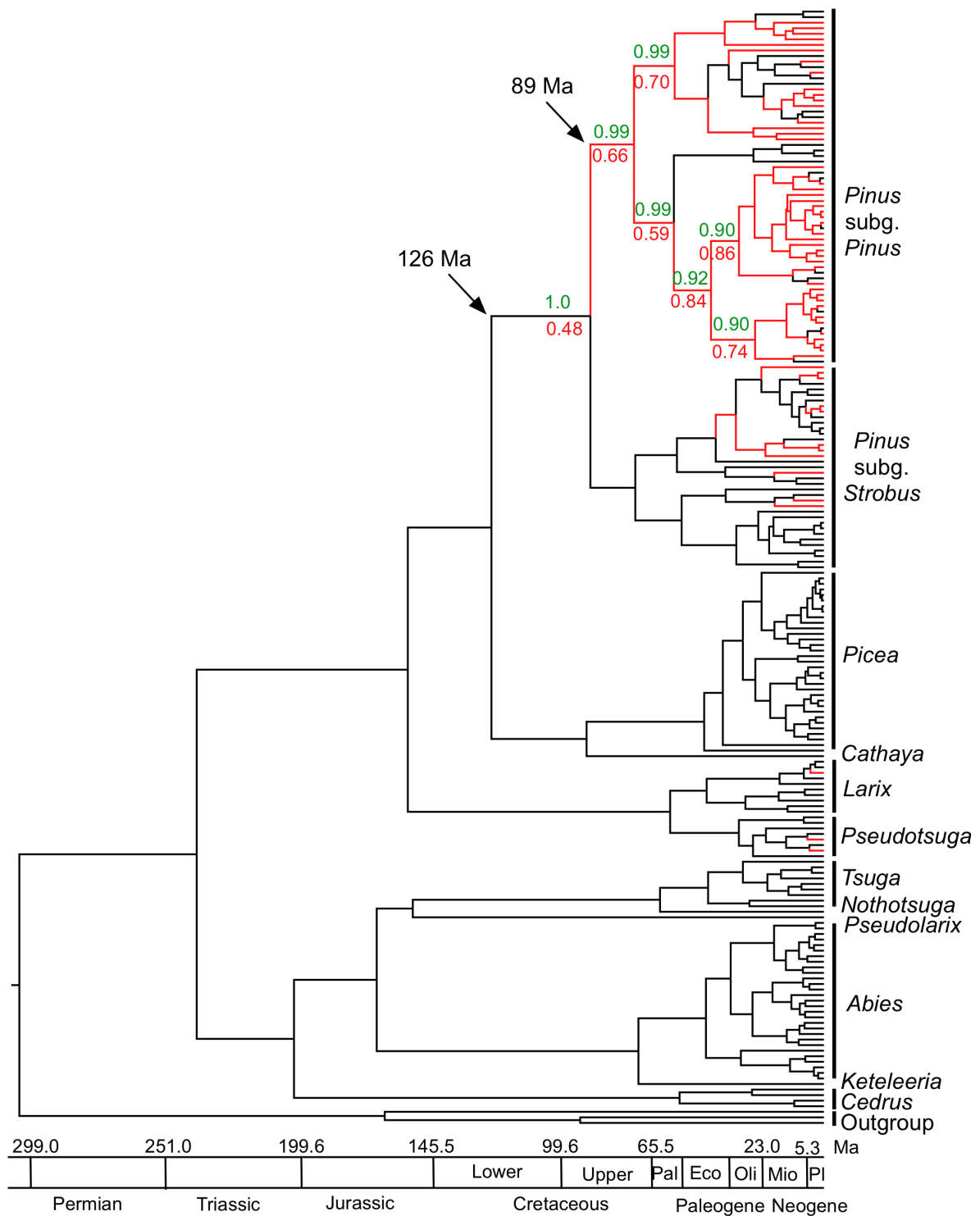


Fig. S1 Ancestral state reconstruction of very thick bark (> 30 mm). Green values are the posterior probability of phylogenetic certainty at the corresponding node. Red values are the posterior probability of the reconstructed state at the corresponding node. Red lines represent evolutionary pathways (extant species/internal node/stem) for bark thickness > 30 mm. Pal, Paleocene; Eco, Eocene; Oli, Oligocene; Mio, Miocene; Pl, Pliocene.

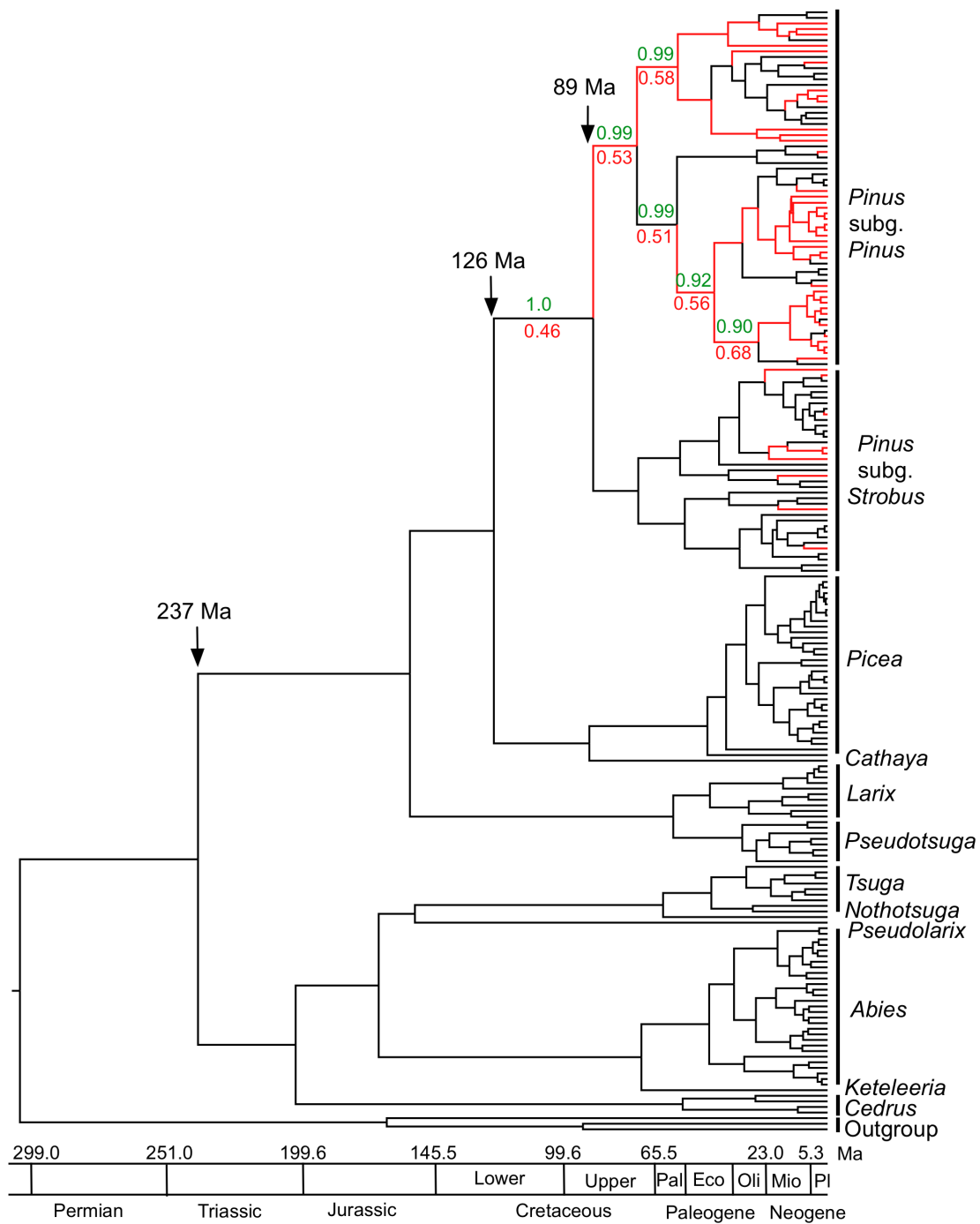


Fig. S2 Ancestral state reconstruction of capacity for branch shedding. Green values are the posterior probability of phylogenetic certainty at the corresponding node. Red values are the posterior probability of the reconstructed state at the corresponding node. Red lines represent evolutionary pathways (extant species/internal node/stem) for branch shedding. Pal, Paleocene; Eco, Eocene; Oli, Oligocene; Mio, Miocene; Pl, Pliocene.

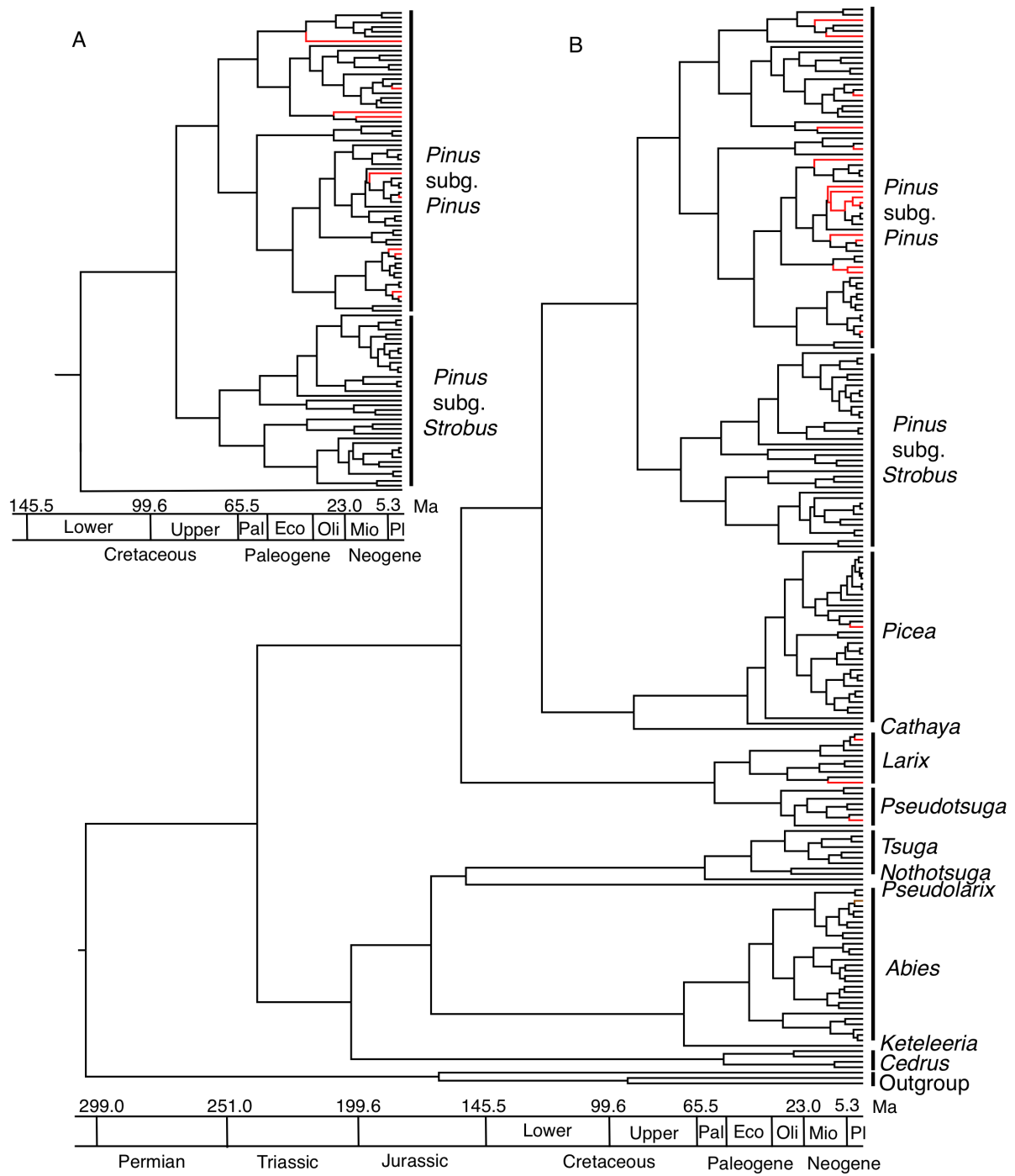


Fig. S3 Ancestral state reconstruction for presence of a grass-stage (A) and resprouting ability (B). Red lines represent evolutionary pathways (extant species/internal node/stem) for grass-stage or resprouting. Pal, Paleocene; Eco, Eocene; Oli, Oligocene; Mio, Miocene; Pl, Pliocene.

Table S1 Species, trait data and fire regime for Pinaceae analyses

	Serotiny	Thick bark (>30 mm)	Thick bark (>15 mm)	Resprout capacity	Grass stage	Branch shedding	Fire regime
<i>Pinus albicaulis</i>	No	Yes	Yes	No	No	No	No
<i>Pinus aristata</i>	No	Yes	Yes	No	No	No	No
<i>Pinus armandii</i>	No	No	No	No	No	No	No
<i>Pinus attenuata</i>	Yes	No	No	No	No	No	Crown fire
<i>Pinus ayacahuite</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus balfouriana</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus banksiana</i>	Yes	No	No	No	No	No	Crown fire
<i>Pinus bhutanica</i>	No	No	No	No	No	No	No
<i>Pinus brutia</i>	Yes	No	Yes	No	No	No	Crown fire
<i>Pinus bungeana</i>	No	No	No	No	No	No	No
<i>Pinus canariensis</i>	Yes	Yes	Yes	Yes	No	No	Crown fire/Surface fire
<i>Pinus caribaea</i>	No	Yes	Yes	Yes	No	Yes	Surface fire
<i>Pinus cembra</i>	No	No	No	No	No	No	No
<i>Pinus cembroides</i>	No	No	No	No	No	Yes	Surface fire
<i>Pinus chiapensis</i>	No	No	Yes	No	No	No	No
<i>Pinus clausa</i>	Yes	No	No	No	No	No	Crown fire
<i>Pinus contorta</i>	Yes	No	Yes	No	No	No	Crown fire
<i>Pinus cooperi</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus coulteri</i>	Yes	Yes	Yes	No	No	No	Crown fire/Surface fire
<i>Pinus cubensis</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus culminicola</i>	No	No	No	No	No	No	No
<i>Pinus densata</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus densiflora</i>	No	No	No	No	No	No	No
<i>Pinus devoniana</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus discolor</i>	No	No	No	No	No	No	No
<i>Pinus douglasiana</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus durangensis</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus echinata</i>	No	Yes	Yes	Yes	No	Yes	Surface fire

<i>Pinus edulis</i>	No	Yes	Yes	No	No	No	No
<i>Pinus elliottii</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus engelmannii</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus fenzeliana</i>	No	No	No	No	No	No	No
<i>Pinus fleilis</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus gerardiana</i>	No	No	No	No	No	No	No
<i>Pinus greggii</i>	Yes	Yes	Yes	No	No	No	Crown fire
<i>Pinus halepensis</i>	Yes	No	Yes	No	No	No	Crown fire
<i>Pinus hartwegii</i>	No	Yes	Yes	Yes	Yes	Yes	Surface fire
<i>Pinus heldreichii</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus herrerae</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus hwangshanensis</i>	No	No	No	No	No	No	No
<i>Pinus jeffreyi</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus johannis</i>	No	No	No	No	No	No	No
<i>Pinus kesiya</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus koraiensis</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus krempfii</i>	No	No	No	No	No	No	No
<i>Pinus lambertiana</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus lawsonii</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus leiophylla</i>	Yes	Yes	Yes	Yes	No	Yes	Crown fire/Surface fire
<i>Pinus longaeva</i>	No	No	No	No	No	No	No
<i>Pinus luchuensis</i>	No	Yes	Yes	No	No	No	No
<i>Pinus lumholtzii</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus massoniana</i>	No	Yes	Yes	Yes	No	Yes	Crown fire/Surface fire
<i>Pinus maimartinezii</i>	No	No	No	No	No	No	No
<i>Pinus maiminoi</i>	No	No	No	No	No	No	No
<i>Pinus merkusii</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus monophylla</i>	No	No	Yes	No	No	No	No
<i>Pinus montezumae</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus monticola</i>	No	Yes	Yes	No	No	Yes	Unknown
<i>Pinus morrisonicola</i>	No	No	No	No	No	No	No

<i>Pinus mugo</i>	No	No	No	No	No	No	Unknown
<i>Pinus muricata</i>	Yes	Yes	Yes	No	No	No	Crown fire
<i>Pinus nelsonii</i>	No	No	No	No	No	No	No
<i>Pinus nigra</i>	No	No	Yes	No	No	No	Surface fire
<i>Pinus occidentalis</i>	No	Yes	Yes	Yes	No	Yes	Surface fire
<i>Pinus oocarpa</i>	Yes	Yes	Yes	Yes	No	No	Crown fire
<i>Pinus palustris</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus parviflora</i>	No	No	No	No	No	No	No
<i>Pinus patula</i>	Yes	Yes	Yes	Yes	No	No	Crown fire
<i>Pinus peuce</i>	No	No	No	No	No	No	No
<i>Pinus pinaster</i>	Yes	Yes	Yes	No	No	Yes	Crown fire/Surface fire
<i>Pinus pinceana</i>	No	No	No	No	No	No	No
<i>Pinus pinea</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus ponderosa</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus pringlei</i>	Yes	Yes	Yes	Yes	No	Yes	Crown fire
<i>Pinus pseudostrobus</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus pumila</i>	No	No	No	No	No	No	No
<i>Pinus pungens</i>	Yes	No	Yes	No	No	No	Crown fire
<i>Pinus quadrifolia</i>	No	No	Yes	No	No	No	No
<i>Pinus radiata</i>	Yes	Yes	Yes	No	No	No	Crown fire
<i>Pinus remota</i>	No	No	Yes	No	No	No	No
<i>Pinus resinosa</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus rigida</i>	Yes	Yes	Yes	Yes	No	No	Crown fire
<i>Pinus roburghii</i>	Yes	Yes	Yes	Yes	No	No	Crown fire
<i>Pinus rzedowskii</i>	No	No	Yes	No	No	No	No
<i>Pinus sabineana</i>	No	Yes	Yes	No	No	Yes	No
<i>Pinus serotina</i>	Yes	No	Yes	Yes	No	No	Crown fire
<i>Pinus sibirica</i>	No	No	Yes	No	No	No	No
<i>Pinus squamata</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus strobus</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus sylvestris</i>	No	Yes	Yes	No	No	Yes	Surface fire

<i>Pinus tabuliformis</i>	No	No	No	No	No	No	Surface fire
<i>Pinus taeda</i>	No	Yes	Yes	No	No	Yes	Surface fire
<i>Pinus taiwanensis</i>	No	No	No	No	No	No	Crown fire
<i>Pinus teocote</i>	No	Yes	Yes	Yes	No	Yes	Surface fire
<i>Pinus thunbergii</i>	No	Yes	Yes	No	No	No	No
<i>Pinus torreyana</i>	Yes	No	Yes	No	No	No	Crown fire
<i>Pinus tropicalis</i>	No	Yes	Yes	No	Yes	Yes	Surface fire
<i>Pinus uncinata</i>	No	No	No	No	No	No	No
<i>Pinus virginiana</i>	Yes	No	No	Yes	No	No	Crown fire
<i>Pinus wallichiana</i>	No	Yes	Yes	No	No	No	Crown fire/Surface fire
<i>Pinus yunnanensis</i>	Yes	Yes	Yes	Yes	Yes	Yes	Surface fire
<i>Picea abies</i>	No	No	No	No	No	No	No
<i>Picea alcoquiana</i>	No	No	No	No	No	No	No
<i>Picea asperata</i>	No	No	No	No	No	No	No
<i>Picea brachytyla</i>	No	No	No	No	No	No	No
<i>Picea breweriana</i>	No	No	No	No	No	No	No
<i>Picea chihuahuana</i>	No	No	No	No	No	No	No
<i>Picea crassifolia</i>	No	No	No	No	No	No	No
<i>Picea engelmannii</i>	No	No	No	No	No	No	No
<i>Picea farreri</i>	No	No	No	No	No	No	No
<i>Picea glauca</i>	No	No	No	No	No	No	No
<i>Picea glehnii</i>	No	No	No	No	No	No	No
<i>Picea jezoensis</i>	No	No	No	No	No	No	No
<i>Picea koraiensis</i>	No	No	No	No	No	No	No
<i>Picea koyamae</i>	No	No	No	No	No	No	No
<i>Picea likiangensis</i>	No	No	No	No	No	No	No
<i>Picea mariana</i>	Yes	No	No	Yes	No	No	Crown fire
<i>Picea maximowiczii</i>	No	No	No	No	No	No	No
<i>Picea meyeri</i>	No	No	No	No	No	No	No
<i>Picea morrisonicola</i>	No	No	No	No	No	No	No
<i>Picea eoveitchii</i>	No	No	No	No	No	No	No

<i>Picea bovata</i>	No	No	No	No	No	No	No
<i>Picea omorika</i>	No	No	No	No	No	No	No
<i>Picea orientalis</i>	No	No	No	No	No	No	No
<i>Picea pungens</i>	No	No	No	No	No	No	No
<i>Picea purpurea</i>	No	No	No	No	No	No	No
<i>Picea retroXexa</i>	No	No	No	No	No	No	No
<i>Picea rubens</i>	No	No	No	No	No	No	No
<i>Picea schrenkiana</i>	No	No	No	No	No	No	No
<i>Picea sitchensis</i>	No	No	No	No	No	No	No
<i>Picea smithiana</i>	No	No	No	No	No	No	No
<i>Picea torano</i>	No	No	No	No	No	No	No
<i>Picea wilsonii</i>	No	No	No	No	No	No	No
<i>Pseudotsuga brevifolia</i>	No	No	No	No	No	No	No
<i>Pseudotsuga forrestii</i>	No	No	No	No	No	No	No
<i>Pseudotsuga gaussenii</i>	No	No	No	No	No	No	No
<i>Pseudotsuga japonica</i>	No	No	No	No	No	No	No
<i>Pseudotsuga macrocarpa</i>	No	No	No	Yes	No	No	Crown fire/Surface fire
<i>Pseudotsuga menziesii</i>	No	Yes	Yes	No	No	No/Yes	Surface fire
<i>Pseudotsuga sinensis</i>	No	No	No	No	No	No	No
<i>Pseudotsuga wilsoniana</i>	No	Yes	Yes	No	No	No	No
<i>Larix decidua</i>	No	No	No	Yes	No	No	No
<i>Larix gmelinii</i>	Yes	Yes	Yes	No	No	No	Crown fire/Surface fire
<i>Larix griffithii</i>	No	No	No	No	No	No	No
<i>Larix himalaica</i>	No	No	No	No	No	No	No
<i>Larix kaempferi</i>	No	No	No	Yes	No	No	No
<i>Larix laricina</i>	No	No	No	No	No	No	No
<i>Larix mastersiana</i>	No	No	No	No	No	No	No
<i>Larix occidentalis</i>	No	Yes	Yes	Yes	No	No	Crown fire/Surface fire
<i>Larix olgensis</i>	No	No	No	No	No	No	No
<i>Larix potaninii</i>	No	No	No	No	No	No	No

<i>Larix potaninii</i>	No	No	No	No	No	No	No
<i>Larix potaninii</i>	No	No	No	No	No	No	No
<i>Larix sibirica</i>	No	Yes	Yes	No	No	No	Crown fire
<i>Larix speciosa</i>	No	No	No	No	No	No	No
<i>Abies amabilis</i>	No	No	No	No	No	No	No
<i>Abies balsamea</i>	No	No	No	No	No	No	No
<i>Abies bracteata</i>	No	No	No	No	No	No	No
<i>Abies cephalonica</i>	No	No	No	No	No	No	No
<i>Abies chensiensis</i>	No	No	No	No	No	No	No
<i>Abies cilicica</i>	No	No	No	No	No	No	No
<i>Abies concolor</i>	No	No	No	Yes	No	No	Surface fire
<i>Abies delavayi</i>	No	No	No	No	No	No	No
<i>Abies densa</i>	No	No	No	No	No	No	No
<i>Abies durangensis</i>	No	No	No	No	No	No	No
<i>Abies flinckii</i>	No	No	No	No	No	No	No
<i>Abies forrestii</i>	No	No	No	No	No	No	No
<i>Abies fraseri</i>	No	No	No	No	No	No	No
<i>Abies grandis</i>	No	No	No	No	No	No	No
<i>Abies guatemalensis</i>	No	No	No	No	No	No	No
<i>Abies homolepis</i>	No	No	No	No	No	No	No
<i>Abies kawakamii</i>	No	No	No	No	No	No	No
<i>Abies lasiocarpa</i>	No	No	No	No	No	No	No
<i>Abies magnifica</i>	No	Yes	Yes	No	No	No	No
<i>Abies mariesii</i>	No	No	No	No	No	No	No
<i>Abies nephrolepis</i>	No	No	Yes	No	No	No	No
<i>Abies nordmanniana</i>	No	No	No	No	No	No	No
<i>Abies numidica</i>	No	No	No	No	No	No	No
<i>Abies pindrow</i>	No	No	No	No	No	No	No
<i>Abies pinsapo</i>	No	No	No	No	No	No	No
<i>Abies procera</i>	No	No	No	No	No	No	No
<i>Abies religiosa</i>	No	No	No	No	No	No	No

<i>Abies veitchii</i>	No	No	No	No	No	No	No
<i>Abies ziyuanensis</i>	No	No	No	No	No	No	No
<i>Tsuga canadensis</i>	No	No	No	No	No	No	No
<i>Tsuga caroliniana</i>	No	No	No	No	No	No	No
<i>Tsuga chinensis</i>	No	No	No	No	No	No	No
<i>Tsuga diversifolia</i>	No	No	No	No	No	No	No
<i>Tsuga dumosa</i>	No	No	No	No	No	No	No
<i>Tsuga forrestii</i>	No	No	No	No	No	No	No
<i>Tsuga heterophylla</i>	No	No	No	No	No	No	No
<i>Tsuga mertensiana</i>	No	No	No	No	No	No	No
<i>Tsuga sieboldii</i>	No	No	No	No	No	No	No
<i>Cedrus atlantica</i>	No	No	No	No	No	No	No
<i>Cedrus brevifolia</i>	No	No	No	No	No	No	No
<i>Cedrus deodara</i>	No	No	No	No	No	No	No
<i>Cedrus libani</i>	No	No	No	No	No	No	No
<i>Pseudolarix</i>	No	No	No	No	No	No	No
<i>Cathaya</i>	No	No	No	No	No	No	No
<i>Nothotsuga</i>	No	No	No	No	No	No	No
<i>Keteleeria hainanensis</i>	No	No	No	No	No	No	No

List of references from that data for fire regime and trait data in Table S1 were collated from

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Notes S1 List of genera and references from which original molecular phylogenies were reported.

Pinus:

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