

松属 song shu

Trees or rarely shrubs, evergreen, with regularly whorled branches; branchlets strongly dimorphic: long branchlets bearing scalelike leaves and spreading leaf bundles; short branchlets bearing leaves in bundles of 2–5(–7); winter buds large, with numerous scales. Leaves needlelike, slender or stout, straight or twisted, triangular, flabellate-triangular, or semiorbicular in cross section, stomatal lines several, on 1, 2, or all surfaces, vascular bundles 1 or 2, resin canals 2–10 or more, marginal or median, rarely internal, base enclosed by persistent or deciduous, membranous sheath. Pollen cones usually borne on spikelike clusters at base of 1st-year branchlets, sessile, cylindric or ovoid; pollen 2-saccate. Seed cones pedunculate or subsessile, erect or pendulous, cylindric or ovoid, maturing in 2nd or 3rd year. Seed scales spirally arranged, woody, exposed apex thickened and ridged (the apophysis), with a prominent protuberance (umbo), usually terminating in a spine or prickle, persistent. Bracts minute. Seeds variable in color, shape, and size, winged or not; wing adnate or articulated to seed. Cotyledons 3–18. Germination epigeal. 2n = 24*.

About 110 species: N Africa, Asia, Europe, North America; 39 species (seven endemic, 16 introduced) in China.

1a. Needles with basal sheath deciduous and basal scalelike leaves not decurrent, cross section with 1 vascular bundle; umbo terminal or dorsal.
   2a. Umbo dorsal; needles 3–5 per bundle.
      3a. Needles 4 or 5 per bundle; bark dark brown, flaking ......................................................... 25. P. squamata
      3b. Needles 3 per bundle; bark white, irregularly flaking.
         4a. Seed cones 12–20 cm; seeds cylindric, ca. 2.5 cm ......................................................... 26. P. gerardiana
         4b. Seed cones 5–7 cm; seeds ovoid, ca. 1 cm ................................................................. 27. P. bungeana
   2b. Umbo terminal; needles (2–)5 per bundle.
      5a. Seeds wingless or only shortly winged.
         6a. Seed cones dehiscent at maturity; branchlets glabrous.
            7a. Seeds wingless or ridged along abaxial margin; seed coat thick; apophyses not or slightly reflexed at margin .............................................................................................................................. 31. P. armandii
            7b. Seeds with a rudimentary wing 2–7 mm; seed coat thin; apophyses obviously reflexed at margin ........................................................................................................................................ 32. P. fenzeliana
         6b. Seed cones indehiscent or imperfectly dehiscent; branchlets densely pubescent.
            8a. Needles slender, 4–8 cm × 0.5–1 mm; resin canals 2, marginal; shrubs ......................... 28. P. pumila
            8b. Needles stout, 7–12 cm × 1–1.5 mm; resin canals 3, median; trees.
               9a. First-year branchlets with red-brown hairs; needles with 6–8 blue-gray stomatal lines along each abaxial surface; seed cones 9–14 cm; seed scales acuminate at apex, recurved 29. P. koraiensis
               9b. First-year branchlets with yellow-brown hairs; needles with 3–5 gray-white stomatal lines along each abaxial surface; seed cones 5–8 cm; seed scales rounded at apex, incurved 30. P. sibirica
         5b. Seeds long winged.
            10a. Needles 7–20 cm; seed cones cylindric to narrowly cylindric, 7–25 cm.
                11a. Needles not pendulous, 6–14 cm; seed cones 7–20 cm ................................. 38. P. strobus
                11b. Needles pendulous, (6–)11–24 cm; seed cones 10–30 cm.
                   12a. Needles dark green adaxially; 1st-year branchlets green with faint bloom, glabrous;
                       abaxial resin canal of needles always median .................. 34. P. wallichiana
                   12b. Needles grass green adaxially, conspicuously whitish bloomed on 2 abaxial surfaces;
                       1st-year branchlets conspicuously whitish bloomed, glandular pubescent; 1(or 2) abaxial resin canal(s) of needles always asymmetrically placed .................. 33. P. bhutanica
            10b. Needles less than 8 cm; seed cones ovoid, ovoid-ellipsoid, or ellipsoid-cylindric, usually less than 10 cm.
               13a. Needles less than 1 mm in diam.; seed cones sessile or shortly pedunculate.
14a. Branchlets densely pubescent; seed cones sessile; seeds as long as broad wing; needles 3.5–5.5 cm ......................................................... 39. *P. parviflora*

14b. Branchlets glabrous or puberulent; seed cones shortly pedunculate; seeds ca. 1/2 as long as narrow wing; needles 4–8 cm .............................................. 35. *P. morrisonicola*

13b. Needles 1–1.5 mm in diam.; seed cones distinctly pedunculate.

15a. Branchlets densely pubescent; resin canals 3, median ............................ 36. *P. wangii*

15b. Branchlets glabrous, rarely puberulent; resin canals 2, marginal, sometimes also 1 median ............................................................... 37. *P. kwangtungensis*

1b. Needles with basal sheath persistent and basal scalelike leaves decurrent, cross section with 2 vascular bundles; umbo dorsal.

16a. Wing adnate to seed; needles 3 per bundle; apophyses distinctly protruded, with transverse ridges and spiny umbo ................................................................. 1. *P. roxburghii*

16b. Wing articulated to seed; needles 2–5 per bundle; apophyses and umbo of different types.

17a. Needles (2 or)3(–5) per bundle.

18a. Trunk and branches usually with adventitious sprouts; needles mostly to 20 cm.

19a. Needles 2( or 3) per bundle, ca. 1 mm in diam.; winter buds 0.5–0.7(–1) cm in diam.; bark plates with evident resin pockets; adaxial surface of seed scales lacking contrasting border distally ................................................................. 11. *P. echinata*

19b. Needles 3(–5) per bundle, 1–1.5(–2) mm in diam.; winter buds 1–1.5(–2) cm in diam.; bark plates without evident resin pockets; adaxial surface of seed scales with dark red-brown border distally. 

20a. Needles (12–)15–21 cm, slightly twisted; branchlets initially orange or yellow-orange, often glaucous; seed cones late dehiscent after maturity .......... 12. *P. serotina*

20b. Needles 5–10(–15) cm, twisted; branchlets initially orange-brown, not glaucous; seed cones dehiscent at maturity ............................................. 13. *P. rigida*

18b. Trunk and branches usually without adventitious sprouts; needles mostly 15–45 cm.

21a. Needles slender, 10–30 cm × 0.7–1.2 mm (except *P. yunnanensis* var. *pygmaea* with stout needles 5–13 cm).

22a. Umbo blunt or shortly mucronate in apical part of cone; needles 2( or 3) per bundle, 12–20 cm, slightly twisted ................................................. 2. *P. massoniana*

22b. Umbo shortly mucronate; needles (2 or)3 per bundle, 10–30 cm, not twisted.

23a. Needles slender and pliant, less than 1 mm in diam.; resin canals marginal; apophyses ± pyramidal, distinctly cross keeled ........................................... 3. *P. kesiya*

23b. Needles relatively stout and stiff (slender and pliant in plants growing in dry, hot valleys), 1–1.2 mm in diam.; resin canals marginal and median; apophyses swollen, usually not pyramidal, not or slightly cross keeled 4. *P. yunnanensis*

21b. Needles ± stout, 12–45 cm × 1.5–2 mm.

24a. Winter buds 3–4 cm, silvery white; seed cones 15–25 cm ............... 14. *P. palustris*

24b. Winter buds to 2 cm, reddish, chestnut, orange, or silvery brown; seed cones usually 5–15 cm.

25a. Seed cones pedunculate.

26a. Seed cones (7–)9–18(–20) cm, all deciduous; umbo central, depressed-pyramidal, with a stout, short prickle; needles 2 or 3 per bundle ....................................................... 15. *P. elliottii*

26b. Seed cones 5–10(–12) cm, often a few basal cones persistent; umbo slightly projecting, ending in a straight, minute prickle; needles (2 or)3(–5) per bundle ................................................................. 16. *P. caribaea*
25b. Seed cones sessile or subsessile.
   27a. Branchlets ca. 1 cm in diam.; terminal bud lanceolate-cylindric,
       mostly less than 1 cm wide, slightly resinous; seed cones mostly dull
       yellow-brown, narrowly ovoid when open ......................................... 17. P. taeda
   27b. Branchlets 1–2 cm in diam.; terminal bud ovoid, ca. 1 cm wide, very
       resinous; seed cones mostly reddish brown, broadly ovoid when
       open ........................................................................................................ 18. P. ponderosa
17b. Needles 2(or 3) per bundle.
28a. Needles mostly 20–30 cm or more.
   29a. Umbo blunt or with sunken, short mucro.
      30a. Needle with 2 resin canals; seed cones red-brown at maturity ................ 6. P. latteri
      30b. Needle with up to 9 resin canals; seed cones pale brown at maturity .... 19. P. tropicalis
   29b. Umbo ± spiny or pointed at apex.
      31a. Seed cones borne on stalks to 3 cm, chocolate brown; apophyses lustrous 15. P. elliottii
      31b. Seed cones sessile or subsessile, brown, yellow-, or red-brown; apophyses
          rarely lustrous.
   32a. Branchlets ca. 1 cm in diam.; terminal bud lanceolate-cylindric, usually
       less than
       1 cm wide, slightly resinous; seed cones usually dull yellow-brown,
       narrowly
       ovoid when open ................................................................................... 17. P. taeda
   32b. Branchlets 1–2 cm in diam.; terminal bud ovoid, ca. 1 cm wide, very
       resinous;
       seed cones usually reddish brown, broadly ovoid when open ........18. P. ponderosa
28b. Needles mostly less than 20 cm.
   33a. Seed cones 9–18 cm ..................................................................................... 20. P. pinaster
   33b. Seed cones usually not more than 8 cm.
   34a. Needles slender and pliant, ca. 1 mm in diam.; apophyses relatively thin, flat
        or slightly raised.
   35a. Trunk and branches usually with adventitious sprouts; umbo with a stout,
        sharp prickle ................................................................. 11. P. echinata
   35b. Trunk and branches usually without adventitious sprouts; umbo flat or
        blunt.
      36a. Needles 12–20 cm, slightly twisted ................................. 2. P. massoniana
      36b. Needles 5–12 cm, straight ..................................................... 7. P. densiflora
   34b. Needles stout, 1–2 mm in diam.; apophyses ± swollen or pyramidal.
   37a. Needles shorter, longest ones not more than 8 cm, strongly twisted.
   38a. Seed cones strongly asymmetric, curved forward on branches;
       needles
       2–5 cm ........................................................................................................ 23. P. banksiana
   38b. Seed cones symmetric or nearly so; needles usually longer.
      39a. Bark on distal sections of trunk orange, plated; needles blue-,
           gray-,
           or yellow-green, stomatal lines conspicuous; branchlets initially
           dull green or orange-brown, not glaucous; adaxial surface of
           seed scales lacking contrasting border distally .......... 10. P. sylvestris
      39b. Bark on distal sections of trunk reddish, scaly; needles deep to
           pale yellow-green, stomatal lines inconspicuous; branchlets
           initially red
           or purple tinged, often glaucous; adaxial surface of seed scales
           with strong purple-red or -brown border distally .......... 24. P. virginiana
   37b. Needles (5–)9–16 cm, straight or rarely slightly twisted.
   40a. Seed cones deciduous.
      41a. Winter buds silvery white, cylindric-ellipsoid or cylindric 21. P. thunbergii
      41b. Winter buds brown, ovoid or oblong-ovoid ....................... 22. P. nigra
40b. Seed cones persistent.
42a. Needle with resin canals median, rarely also marginal; needles 4.5–17 cm; seed cones 3–6 cm ............................. 8. *P. taiwanensis*
42b. Needle with resin canals marginal, occasionally 1 or 2 median; needles 6–15 cm; seed cones 2.5–9 cm.
43a. Bark initially reddish brown, becoming dark grayish brown; 1st-year branchlets shiny yellowish brown; needle sheaths initially 0.5–1 cm; resin canals 3 or 4; pollen cones 1–1.8 cm; seed cones shiny chocolate brown at maturity ..................... 5. *P. densata*
43b. Bark dull grayish brown or dark gray; 1st-year branchlets light grayish brown, light brown, or yellowish brown; needle sheaths initially 1–2 cm; resin canals 5–9; pollen cones 0.5–0.9 cm; seed cones yellowish brown to brown at maturity 9. *P. tabuliformis*

须弥长叶松  xu mi chang ye song
Trees to 55 m tall; trunk to over 1 m d.b.h.; bark dark red-brown, thick, deeply and longitudinally fissured, scaly; winter buds brown, small, ovoid, not resinous. Needles 3 per bundle, slender, flabellate-triangular in cross section, 20–30 cm × ca. 1.5 mm, resin canals 2, median, base with persistent sheath 2–3 cm. Seed cones shortly pedunculate, ovoid, 10–20 × 6–9 cm. Seed scales oblong, thick, stiff; apophyses strongly swollen, conspicuously transversely ridged; umbo triangular, protruding. Seeds 8–12 mm; wing ca. 2.5 cm. Seed maturity Oct–Nov.
Mountains; 2100–2200 m. S Xizang [Bhutan, N India, Kashmir, Nepal, Pakistan, Sikkim]. A rare plant in China. The timber is used for construction, railway sleepers, mine timber, furniture, wood pulp, etc., and the trunk as a source of resin and tannin, and for cultivating fungi.

1a. Umbo spiny ........................... 2c. var. *shaxianensis*
1b. Umbo usually flattened or obtuse.
2a. Seed cones ovoid or conical-ovoid; bark gray-brown toward base of trunk, irregularly scaly and flaking 2a. var. *massoniana*
2b. Seed cones ovoid-cylindric; bark red-brown, irregularly flaking 2b. var. *hainanensis*

2a. *Pinus massoniana* var. *massoniana*
马尾松 (原变种) ma wei song (yuan bian zhong)

An important tree for afforestation in S China. The timber is used for construction, railway sleepers, mine timber, furniture, wood pulp, etc., and the trunk as a source of resin and tannin, and for cultivating fungi.

2b. *Pinus massoniana* var. *hainanensis*
马尾松 (变种) ma wei song (bian zhong)

Bark gray-brown toward base of trunk, irregularly scaly and flaking. Branches of 1st order spreading horizontally or ascending. Needles slender, 12–20 cm, pliant. Seed cones ovoid or conical-ovoid, 4–7 × 2.5–4 cm.
• Plains, hills, mountains; near sea level to 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, W Henan, Hubei, Hunan, S Jiangsu, Jiangxi, SE Shaanxi, Sichuan, Taiwan, E Yunnan, Zhejiang.


雅加松 ya jia song

Bark red-brown toward base of trunk, irregularly flaking. Branches of 1st order spreading horizontally; branchlets ascending. Needles slender, 12–20 cm, pliant. Seed cones ovoid-cylindric, 4–7 × 2.5–5 cm.
• Hills. Hainan.

An endangered plant.
1a. Shrubs; seed cones indehiscent at maturity; needles 7–13 cm ................. 4c. var. pygmaea
1b. Trees; seed cones dehiscent at maturity; needles to 30 cm.
   2a. Needles not or slightly pendulous, ca. 1.2 mm in diam. ............ 4a. var. yunnanensis
   2b. Needles pendulous, less than 1 mm in diam. ....................... 4b. var. tenuifolia


卡西松 ka xi song
Pinus insularis Endlicher var. khasyana (Griffith) Silba; P. insularis var. langbianensis (A. Chevalier) Silba; P. kesiya var. langbianensis (A. Chevalier) Gaussen ex Bui; P. langbianensis A. Chevalier.

Trees to 30 m tall; trunk to 60 cm d.b.h.; bark brown, irregularly flaking; crown broadly domed; branchlets yellowish brown, shiny, aging to orange-brown, initially covered with scale bases (which are shed in 2nd or 3rd year), producing 2 or more nodes each year; winter buds red-brown, conical, slightly resinous. Needles 3 per bundle, slender, triangular in cross section, 10–22 cm × 0.7–1 mm, pliant, resin canals 3–6, marginal, base with persistent sheath 1–2 cm. Seed cones usually solitary or paired, ovoid, 5–6 × ca. 3.5 cm, persistent for many years. Seed scales narrowly suboblong, 2.5–3 × 1.5 cm; apophyses ± pyramidal, obviously transversely ridged; umbo small, ellipsoid, slightly protruded into a tiny recurved spine. Seeds black-brown, slightly appressed, ellipsoid, 5–6 × 3–4 mm.

Plateaus; 700–1200 m. SE Xizang, Yunnan [NE India, Laos, Myanmar, Philippines, Thailand, Vietnam].


云南松 (原变种) yun nan song (yuan bian zhong)
Pinus insularis Endlicher var. yunnanensis (Franchet) Silba; P. sinensis D. Don var. yunnanensis (Franchet) Shaw; P. tabuliformis Carrière var. yunnanensis (Franchet) Dallimore & A. B. Jackson.

Trees to 30 m. Needles not or slightly pendulous, 10–30 cm × ca. 1.2 mm. Seed cones dehiscent at maturity.

• Mountains, river basins; 600–3100 m. Guangxi, Guizhou, SE Xizang, Yunnn.


细叶云南松 xi ye yun nan song
Trees to 30 m. Needles pendulous, 20–30 cm × less than 1 mm. Seed cones dehiscent at maturity.

• River basins; 400–1200 m. Guangxi, Guizhou.


地盘松 di pan song

Shrubs to 2 m, branched from base. Needles 7–13 cm, stiff, resin canals 2, marginal or 1 median. Seed cones clustered, 4–5 cm, persistent, indehiscent at maturity.

• High mountains, dry and sunny slopes; 2200–3100 m. SW Sichuan, Yunnan.


高山松 gao shan song
Pinus prominens Masters; P. sinensis D. Don var. densata (Masters) Shaw; P. tabuliformis Carrière var. densata (Masters) Rehder; P. wilsonii Shaw (1911), not Roezl (1857).

Trees to 30 m tall; trunk to 1.3 m d.b.h.; bark reddish brown, scaly and plated when young, finally dark grayish brown, forming irregular, square, thick plates; crown ovoid-conical, broadly ovoid in old trees; branches spreading; 1st-year branchlets shiny yellowish
brown, stout; 2nd- and 3rd-year branchlets reddish brown; winter buds dull brown, ovoid-conical, ca. 15 × 6 mm, slightly resinous, scales white fringed at margin, acuminate at apex. Needles persisting for 3 years, usually 2(or 3) per bundle, straight, slightly twisted, 8–14 cm × 1–1.5 mm, stomatal lines present on all surfaces, resin canals 3 or 4, marginal, occasionally 1 or 2 median, base with persistent sheath initially 5–10 mm, margin finely serrulate, apex acute. Pollen cones yellowish brown, cylindric, 10–18 × 3–4.5 mm. Seed cones solitary or in pairs, pendulous, sessile or very shortly pedunculate, shiny chocolate brown at maturity, narrowly ovoid before opening, ovoid or broadly ovoid when open, 4–6 × 4–7 cm, persistent. Seed scales with apophyses prominent, rhombic, 4–7 mm thick, sharply transversely keeled; umbo dorsal, with a short prickle. Seeds light grayish brown, ellipsoid-ovoid, 4–6 mm; wing 1.5–2 cm. Pollination May, seed maturity Oct of 2nd year.

- Open forests in high mountains, forming pure stands or (below 3000 m) mixed with Pinus armandii and P. yunnanensis; 2600–3500 (~4200) m. S Qinghai, W Sichuan, SE Xizang, Yunnan.

Morphologically intermediate between Pinus yunnanensis of lower elevations and P. tabuliformis of more northerly latitudes.

Molecular evidence supports the hypothesis that P. densata originated as a Tertiary natural hybrid involving the former two species and a third, unknown species.

Can be used for afforestation in the alpine zones of W Sichuan and E Xizang.


Pinus ikedae Yamamoto; P. merkusii Junghuhn & de Vriese subsp. latteri (Mason) D. Z. Li; P. merkusii var. latteri (Mason) Silba; P. merkusii var. tonkinensis (A. Chevalier) Gaussen ex Bui; P. tonkinensis A. Chevalier. Trees to 30 m tall; trunk to 2 m d.b.h.: bark gray-brown, thick, scaly; crown globose or umbrella-like; branchlets dark brown, glabrous; winter buds brown, cylindric. Needles 2 per bundle, semiorbicular in cross section, 15–27 cm × ca. 1.5 mm, stomatal lines present on all surfaces, resin canals 2, median, base with persistent sheath 1–2 cm. Seed cones pedunculate (peduncle ca. 1 cm), green, turning red-brown at maturity, conical or ovoid-cylindric, 5–10 cm. Seed scales oblong, ca. 3 × 1.2–1.5 cm; apophyses subrhombic or pentagonal-rhombic, slightly swollen, shiny, slightly recurved toward apex, flat toward base, obviously radially ridged; umbo usually slightly sunken. Seeds gray-brown, slightly appressed, ellipsoid-ovoid, 5–8 × ca. 4 mm; wing 1.7–2 cm. Pollination May–Apr, seed maturity Oct of 2nd year.

Hills, terraces; below 1200 m. SW Guangdong, S Guangxi, Hainan [Cambodia, Laos, SE Myanmar, Thailand, Vietnam].

The timber is used for construction, bridge building, and making poles and instruments. The trunk can be used as a source of resin, the bark for tannin, and the needles for turpentine.


Trees to 30 m tall; trunk to 1.5 m d.b.h.: bark orange-red, red-brown, or brown-yellow, flaking and scaly; crown umbrella-like; 1st-year branchlets pale yellow or red-yellow, slightly glaucous, glabrous, white powdery or not; vegetative buds dark red-brown, obovoid-ovoid, slightly resinous; scales slightly reflexed at apex. Needles 2 per bundle, twisted or not, semi-ellipsoid in cross section, 5–15 cm × ca. 1 mm, vascular bundles 2, resin canals 3–9, marginal, margin inflexed or not. Seed cones erect or pendulous, shortly pedunculate, dark yellow-brown or brownish yellow, ovoid or ovoid-conical, 3–5.5 × 2.5–4.5 cm, dehiscent at maturity. Seed scales usually thin; apophyses usually appressed, broadly rhombic, flat or recurved at apex, rarely pyramidal and slightly ridged; umbo flat or slightly protruding into a minute spine. Seeds obvoid-ellipsoid or ovoid, 3–7 × ca. 3 mm; wing 1–2 cm × 5–7 mm. Pollination Apr–Jun, seed maturity Sep–Oct of 2nd year.

Coastal regions to mountains, lakesides, rocky hillsides; near sea level to 900 m. E and S Heilongjiang, NE Jiangsu, SE Jilin, Liaoning, E and N Shandong [Japan, Korea, E Russia].

The timber is used for construction, poles, and furniture; the trunk can be used as a source of resin.

1a. First-year branchlets not white powdery; needles not or only slightly twisted, 13–15 cm, margin usually inflexed 7c. var. zhangwuensis

1b. First-year branchlets white powdery; needles twisted, 5–12 cm, margin usually not inflexed.

2a. Seed cones erect; apophyses flat .................................... 7a. var. densiflora

2b. Seed cones pendulous; apophyses ± pyramidal, apex recurved in apophyses toward base of cones .......... 7b. var. ussuriensis

7a. Pinus densiflora var. densiflora

赤松 (原变种) chi song (yuany bian zhong)

Pinus densiflora var. brevifolia Liou & Q. L. Wang; P. densiflora var. funebris (Komarov) Liou & Q. L. Wang ex Silba; P. densiflora f. liaotungensis (Liou & Q. L. Wang) Kitagawa; P. densiflora var. liaotungensis Liou & Q. L. Wang; P. funebris Komarov; P. scopifera Miquel.

Bark orange-red or red-brown. First-year branchlets white powdery. Needles twisted, 5–12 cm, resin canals 4–6, margin usually not inflexed. Seed cones erect. Apophyses usually flat. Seeds obvoid-ellipsoid or ovoid, 3–7 mm; wing 1.5–2 cm. Pollination Apr, seed maturity Sep–Oct of 2nd year.

Coastal regions to mountains; near sea level to 900 m. E Heilongjiang, NE Jiangsu, SE Jilin, C and S Liaoning, E and N Shandong [Japan, Korea, E Russia].

兴凯赤松  xing kai chi song

*Pinus densiflora* f. *usuraiensis* (Liou & Q. L. Wang) Kitagawa; *P. takahasii* Nakai.

Trees to 20 m tall; bark red-brown or yellow-brown. First-year branchlets white powdery. Needles twisted, 5–12 cm, resin canals 8, margin usually not inflexed. Seed cones pendulous. Apophyses ± pyramidal, obviously ridged, apex recurved in apophyses toward base of cones. Seeds pale brown with black spots, obviously ridged, apex recurved in apophyses toward middle part of margin; umbos depressed or flat, with a minute but tannin, and the needles for medicine.

1a. Seed cones ovoid-globose, 2.5–9 × 4–9 cm, usually persistent for a few years. Seed scales suboblong-ovobate, 1.6–2 × ca. 1.4 cm; apophyses swollen, broadly or irregularly rhombic, ridged or not, cross keeled; umbo protruding into a spine. Seeds pale brown, mottled, ovoid or narrowly so, 6–8 × 4–5 mm (1.5–1.8 cm including wing). Pollination Apr–May, seed maturity Oct of 2nd year.

1b. Seed cones ovoid, 4–9 cm; apophyses obviously swollen; needles stout, 6–15 cm × 1.2–1.5 mm, stiff; 1st-year branchlets not


油松  you song

Trees to 25 m tall; trunk to over 1 m d.b.h.; bark grayish brown or dark gray, scaly; crown flat topped; 1-st year branchlets light grayish brown, light brown, or yellowish brown, thick, glabrous; winter buds oblong, slightly resinous. Needles 2(or 3) per bundle, dark green, semiobicular in cross section, 6–15 cm × 1–1.5 mm, resin canals 5–9, marginal, rarely 1 or 2 median, base with persistent sheath initially 1–2 cm. Pollen cones 5–9 mm. Seed cones shortly pedunculate, initially green, turning yellowish brown to brown at maturity, ovoid to ovoid-globose, 2.5–9 × 4–9 cm, usually persistent for a few years. Seed scales suboblong-ovobate, 1.6–2 × ca. 1.4 cm; apophyses swollen, broadly or irregularly rhombic, ridged or not, cross keeled; umbo protruding into a spine. Seeds pale brown, mottled, ovoid or narrowly so, 6–8 × 4–5 mm (1.5–1.8 cm including wing). Pollination Apr–May, seed maturity Oct of 2nd year.

Hills, mountains; 100–2600 m. Gansu, Hebei, Henan, Hubei, Hunan, S Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Korea].

The timber is used for construction, poles, mine timber, ship building, and furniture. The trunk can be used as a source of resin, the bark for tannin, and the needles for medicine.

1a. Seed cones ovoid-globose, 2.5–5 cm; apophyses slightly swollen; needles slender, 7–12 cm × ca. 1 mm, pliant; 1-st year branchlets usually glaucous ........................................ 9d. var. *henryi*

1b. Seed cones ovoid, 4–9 cm; apophyses obviously swollen; needles stout, 6–15 cm × 1.2–1.5 mm, stiff; 1-st year branchlets not


台湾松  tai wan song

*Pinus brevissica* Hayata; *P. hwangshanensis* W. Y. Hsia; *P. luchuensis* Mayr subsp. *hwangshanensis* (W. Y. Hsia) D. Z. Li; *P. luchuensis* var. *hwangshanensis* (W. Y. Hsia) C. L. Wu; *P. luchuensis* subsp. *taiwanensis* (Hayata) D. Z. Li; *P. taiwanensis* var. *damingshanensis* W. C. Cheng & L. K. Fu.

Trees to 50 m tall; trunk straight or ± tortuous, to 1 m d.b.h.; bark dark gray or grayish brown; crown broadly ovoid, finally umbrella-like; branches spreading or spreading-ascending; 1-st year branchlets brown to yellowish brown, slender; winter buds pinkish brown or reddish brown, cylindric, ovoid-ellipsoid, or ovoid, 1–1.5 cm × 5–6 mm, ± resinous, scales white or long white fringed at margin. Needles 2 per bundle, not or only slightly twisted, 13–15 cm, resin canals 3–9, margin usually inflexed. Seed cones pendulous when immature. Seeds 5–7 mm; wing ca. 1.5 cm.

- About 230 m. N Liaoning (N of Zhangwu).


彰武赤松  zhang wu chi song

First-year branchlets not white powdery. Needles not or only slightly twisted, 13–15 cm, resin canals 3–9, margin usually inflexed. Seed cones pendulous when immature. Seeds 5–7 mm; wing ca. 1.5 cm.

- About 230 m. N Liaoning (N of Zhangwu).


油松  you song

Trees to 25 m tall; trunk to over 1 m d.b.h.; bark grayish brown or dark gray, scaly; crown flat topped; 1-st year branchlets light grayish brown, light brown, or yellowish brown, thick, glabrous; winter buds oblong, slightly resinous. Needles 2(or 3) per bundle, dark green, semiobicular in cross section, 6–15 cm × 1–1.5 mm, resin canals 5–9, marginal, rarely 1 or 2 median, base with persistent sheath initially 1–2 cm. Pollen cones 5–9 mm. Seed cones shortly pedunculate, initially green, turning yellowish brown to brown at maturity, ovoid to ovoid-globose, 2.5–9 × 4–9 cm, usually persistent for a few years. Seed scales suboblong-ovobate, 1.6–2 × ca. 1.4 cm; apophyses swollen, broadly or irregularly rhombic, ridged or not, cross keeled; umbo protruding into a spine. Seeds pale brown, mottled, ovoid or narrowly so, 6–8 × 4–5 mm (1.5–1.8 cm including wing). Pollination Apr–May, seed maturity Oct of 2nd year.

- Mixed warm-temperate and montane forests, open areas and sunny ridges on sandy, acidic mountains, co-dominant with species of Fagaceae; 600–3400 m. Anhui, Fujian, C Guangxi, Guizhou, S Henan, Hunan, Jiangsu, Jiangxi, Taiwan, SE Yunnan, Zhejiang.
Pinus tabuliformis var. tabuliformis

油松 (原变种)  you song (yuan bian zhong)

Trees to 40 m tall; bark red-brown, flaking; branchlets dark gray-brown; winter buds red-brown or pale to yellowish brown, ovoid to oblong-ovoid, resinous. Needles 2 per bundle, blue-green, semioblong in cross section, (0.5–)3–14 cm × 1–2 mm, stiff, stomatal lines present on all surfaces, vascular bundles 2, resin canals 6–8, marginal, base usually twisted, with persistent sheath. Seed cones dull yellow-brown at maturity, conical-ovoid, 3–6 cm. Apophyses broadly rhombic, flat or shortly pyramidal; umbo small, blunt or mucronate.

Mountains, river basins, dry rocky slopes; 400–800(–900) m. Heilongjiang, Jilin, NE Nei Mongol; cultivated in Beijing Shi, Liaoning (Gai Xian) [Kazakstan, N Mongolia, Russia; SW Asia, Europe].

The timber is used for construction, railway sleepers, ship building, and making poles and furniture. The trunk can be used as a source of resin, and the bark for tannin.

1a. Winter buds brown or pale yellowish brown; needles 4–12 cm .......... 10c. var. mongolica

1b. Winter buds red-brown; needles (0.5–)3–8 cm.

2a. Needles stout, (0.5–)3–7 cm × ca. 2 mm; winter buds oblong-ovoid 10a. var. sylvestris

2b. Needles slender, 5–8 cm × 1–1.5 mm; winter buds ovoid ...... 10b. var. sylvestriformis

10a. Pinus sylvestris var. sylvestriformis

欧洲赤松 ou zhou chi song

Trees 2 to 40 m tall; bark brownish red; branches and branchlets dark brown; winter buds red-brown to yellowish brown. Needles 1–3 per bundle, blue-green, semioblong, 3–6 cm × 1–2 mm, stiff, stomatal lines present on all surfaces, vascular bundles 2, resin canals 6–8, marginal, base usually twisted, with persistent sheath. Seed cones dull yellow-brown at maturity, conical-ovoid, 3–6 cm. Apophyses broadly rhombic, flat or shortly pyramidal; umbo small, blunt or mucronate.

Mountains, river basins, dry rocky slopes; 400–800(–900) m. Heilongjiang, Jilin, NE Nei Mongol; cultivated in Beijing Shi, Liaoning (Gai Xian) [Kazakstan, Mongolia, Russia; SW Asia, Europe].

The timber is used for construction, railway sleepers, ship building, and making poles and furniture. The trunk can be used as a source of resin, and the bark for tannin.

10b. Pinus sylvestris var. sylvestriformis

欧洲赤松 (原变种) ou zhou chi song (yuan bian zhong)

Trees 2 to 40 m tall; bark brownish red; branches and branchlets dark brown; winter buds red-brown to yellowish brown. Needles 1–3 per bundle, blue-green, semioblong, 3–6 cm × 1–2 mm, stiff, stomatal lines present on all surfaces, vascular bundles 2, resin canals 6–8, marginal, base usually twisted, with persistent sheath. Seed cones dull yellow-brown at maturity, conical-ovoid, 3–6 cm. Apophyses broadly rhombic, flat or shortly pyramidal; umbo small, blunt or mucronate.

Mountains, river basins, dry rocky slopes; 400–800(–900) m. Heilongjiang, Jilin, NE Nei Mongol; cultivated in Beijing Shi, Liaoning (Gai Xian) [Kazakstan, Mongolia, Russia; SW Asia, Europe].

The timber is used for construction, railway sleepers, ship building, and making poles and furniture. The trunk can be used as a source of resin, and the bark for tannin.

10b. Pinus sylvestris var. sylvestriformis

Winter buds red-brown, ovoid. Needles slender, 5–8 cm × 1–1.5 mm.

- Mountains, river basins; 800–1600 m. SE Jilin.

A vulnerable plant.


Winter buds brown or pale yellowish brown. Needles 4–12 cm × 0.5–2 mm.

- Sandy mountains; 400–900 m. NW Heilongjiang, N Nei Mongol (N Da Hinggan Ling) [N Mongolia, E Russia].

A vulnerable plant in China.


Trees to 40 m tall; trunk to 1.2 m d.b.h. in native range, usually with adventitious sprouts; bark red-brown, plates scaly with evident resin pockets; crown rounded-conical; 2nd-year branchlets greenish brown or red-brown, aging red-brown or gray, slender, to 5 mm in diam., roughened and cracking below leafy portion; winter buds red-brown, ovoid or cylindrical, resinous. Needles 2 (or 3) per bundle, gray- or yellow-green, straight, slightly twisted, (5–)7–11 (–13) cm × ca. 1 mm, stomatal lines present on all surfaces, base with persistent sheath 0.5–1 (–1.5) cm. Seed cones solitary or clustered, subseissile or shortly pedunculate (peduncle to 1 cm), red-brown, aging gray, ovoid-conical when open, 4–7 cm, maturing in 2 years. Seed scales lacking contrasting dark border adaxially distally; umbo with a short, weak prickle, sometimes unarmed. Seeds pale brown, mottled darker or nearly black, somewhat compressed, ellipsoid, 5–6 mm, apex oblique; wing to 2 cm.

Cultivated. Fujian, Jiangxi, Zhejiang [native to SE United States].


Trees to 30 m tall; trunk straight or crooked, to 0.9 m d.b.h. in native range, usually with adventitious sprouts; bark red-brown, with deeply and irregularly oblong, flat, scaly ridges; crown rounded or irregular; 2nd-year branchlets orange-brown, aging darker brown, stout, mostly more than 5 mm wide, rough; winter buds red-brown, ovoid or ovoid-cylindric, resinous, scales fringed at margin. Needles 3–5 per bundle, deep or pale yellow-green, twisted, 5–10 (–15) cm × 1–1.5 (–2) mm, stomatal lines present on all surfaces, base with persistent sheath 0.9–1.2 cm. Seed cones often clustered, sessile or shortly pedunculate, dull brown or pale red-brown, conical or ovoid before opening, broadly ovoid with flat or slightly convex base when open, 3–9 cm, maturing in 2 years, dehiscent. Seed scales with dark red-brown border adaxially distally; apophyses rhombic, slightly raised, strongly cross keeled; umbo low pyramidal, with a slender, reflexed prickle. Seeds dark brown, mottled darker or nearly black, broadly obliquely obovoid-deltoid, 4–6 mm; wing 1.5–2 cm.

Cultivated. Fujian, Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning, Shandong (Qingdao Shi) [native to SE Canada, E United States].


Trees to 45 m tall; trunk to 0.9 m d.b.h. in native range, usually with adventitious sprouts; bark red-brown, with deeply and irregularly oblong, flat, scaly plates; crown rounded; branches spreading-descending, upcurved at tips; branchlets orange-brown, aging darker brown, stout, rough; winter buds silvery white, ovoid, 3–4 cm, scales fringed at margin. Needles spreading-recurved, (2 or) 3 per bundle, yellow-green, slightly twisted, 20–45 cm × ca. 1.5 mm, stomatal lines present on all surfaces, base with persistent sheath 2–2.5 (–3) cm, margin finely serrulate. Seed cones solitary or paired toward branchlets tips, sessile or rarely shortly pedunculate, dark brown, ovoid-cylindric when opened or nearly black, somewhat compressed, ellipsoid, 5–6 mm, apex oblique; wing to 2 cm.

Cultivated. Jiangsu, Jiangxi, Zhejiang [native to SE United States].


Trees to 45 m tall; trunk to 1.2 m d.b.h. in native range; bark orange-brown, with coarse, oblong, scaly plates; crown rounded; branches spreading-descending, upcurved at tips; branchlets orange-brown, aging darker brown, stout, rough; winter buds silvery white, ovoid, 3–4 cm, scales fringed at margin. Needles spreading-recurved, (2 or) 3 per bundle, yellow-green, slightly twisted, 20–45 cm × ca. 1.5 mm, stomatal lines present on all surfaces, base with persistent sheath 2–2.5 (–3) cm, margin finely serrulate. Seed cones solitary or paired toward branchlets tips, sessile or rarely shortly pedunculate, dark brown, ovoid-cylindric when opened.
open, 15–25 cm, maturing in 2 years, then quickly shedding seeds and falling. Apophyses dull, nearly rhombic, slightly thickened and raised, strongly cross keeled; umbo broadly triangular, with a short, stiff, reflexed prickle. Seeds pale brown, mottled darker, truncate-obovoid, ca. 1 cm; wing 3–4 cm.

Cultivated. Fujian, Jiangsu, Jiangxi (Lu Shan), Shandong (Qingdao Shi), Zhejiang [native to SE United States].


湿地松  shì dì sōng
Trees to 30 m tall; trunk to 0.8 m d.b.h. in native range; bark orange- or purple-brown, furrowed into irregularly oblong, large, papery, scaly plates; crown conical, becoming rounded or flat topped; branchlets orange-brown, aging darker brown, stout, roughly scaly, producing 3 or 4 nodes each year; winter buds silvery brown, cylindric, scales fringed at margin. Needles 2 or 3 per bundle, slightly twisted, yellow- or blue-green, 15–20 (–24) cm × 0.2–1.5 mm, stomatal lines present on all surfaces, base with persistent sheath 1–2 cm, margin finely serrulate. Seed cones solitary or paired, pedunculate (peduncle to 3 cm), pale brown, ovoid or ovoid-cylindric when open, 15–25 (–30) cm, maturing in 2 years, then falling the year after seeds shed. Apophyses lustrous, slightly raised, strongly cross keeled; umbo depressed-pyramidal, with a short, stout prickle. Seeds dark brown, ellipsoid, 6–7 mm, apex keeled; umbo depressed-pyramidal, with a short, stout shed. Apophyses lustrous, slightly raised, strongly cross keeled; umbo slightly pyramidal or truncate.

Cultivated. Fujian, Guangdong, Guangxi, Jiangsu, Jiangxi [native to Caribbean region, Central America].


火炬松  huò jué sōng
Trees to 45 m tall; trunk to 1.6 m d.b.h. in native range; bark red-brown, forming square or irregularly oblong, scaly plates; crown broadly conical or rounded; branchlets orangish or yellow-brown, aging darker brown, ca. 1 cm in diam., rough; winter buds pale red-brown, conical-cylindric, slightly resinous, scales white fringed at margin. Needles ascending or spreading, dark yellow-green, slightly twisted, (10–)12–18 (–23) cm × 1–2 mm, pliant, stomatal lines present on all surfaces, base with persistent sheath 1–2.5 cm, margin finely serrulate. Seed cones nearly terminal, solitary or in small clusters, sessile or subsessile, mostly dull yellow-brown, narrowly ovoid when open, 6–12 cm, maturing in 2 years, then soon shedding seeds. Seed scales without dark border adaxially distally; apophyses dull, rhombic, slightly thickened, variously raised but more so toward base of cone, strongly cross keeled; umbo strongly pyramidal, recurved, tapering to a stoutly based, sharp prickle. Seeds red-brown, obdeltoid, 5–6 mm; wing to 2 cm.

Cultivated. Anhui, Fujian, Guangdong (Guangzhou Shi), Guangxi, Henan, Hubei (Wuhan Shi), Hunan, Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Taiwan, Zhejiang [native to SE United States].


西黄松  xī huáng sōng
Trees to 70 m tall; trunk to 2.5 m d.b.h. in native range; bark yellow- to red-brown, deeply and irregularly furrowed into broadly oblong, scaly plates; crown broadly conical to rounded; branchlets orange-brown, aging darker, stout, rough; winter buds red-brown, ovoid, very resinous, scales white fringed at margin. Needles tufted at apex of branchlets, spreading to erect, (2 or)3(–5) per bundle, deep yellow-green, slightly twisted, 7–25 (–30) cm × (1–)1.2–2 mm, pliant, stomatal lines present on all surfaces, base with persistent sheath 1.5–3 cm, margin serrulate. Seed cones solitary or rarely paired, sessile or subsessile, mostly reddish brown, broadly ovoid when open, symmetric or asymmetric, 5–15 cm, maturing in 2 years, then soon shedding seeds, leaving rosettes of scales on branchlets. Apophyses dull or lustrous, thickened, variously raised, cross keeled; umbo usually pyramidal or truncate, rarely depressed or with a reflected prickle. Seeds brown or yellow-brown, often mottled darker, ellipsoid-obovoid, 3–9 mm; wing 1.5–2.5 cm.

Cultivated. Henan (Jigong Shan), Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning [native to W North America].

This species is economically important and is grown for its fine timber.


热带松  rè dài sōng
Trees to 20 m tall; trunk to 1.8 m d.b.h. in native range; bark grayish red, irregularly furrowed into large, oblong plates; crown broadly rounded; branchlets orange-brown initially, aging gray-brown or gray, stout, rough; winter buds stout, scales reflexed. Needles very erect, 2(or 3) per bundle, stiff, 10–30 cm × ca. 1 mm, resin canals 2–9, large, touching both endodermis and hypodermis and forming a septum, margin serrulate. Seed cones erect or spreading, shortly pedunculate, pale brown, ovoid-conical, 5–8 cm. Apophyses orange-brown, pyramidal, cross ridged; umbo not spinose. Cultivated. Guangdong (Zhanjiang Shi) [native to W Cuba].


Trees to 30 m in native range; bark brown, deeply and irregularly longitudinally furrowed; branches sometimes pendulous, forming a pyramidal crown; branchlets pale reddish brown, producing 1–few nodes each year; winter buds brown, oblong, resinous. Needles 2 per bundle, bright green, usually twisted, 10–20 cm × ca. 2 mm, stiff, resin canals 6, median. Seed cones clustered, shortly pedunculate, conical- or ellipsoid-ovoid, symmetric or asymmetric, 9–18 cm. Apophyses brown, lustrous, conspicuously pyramidal; umbo slightly projecting and pungent. Cultivated. Jiangsu, Jiangxi (Lu Shan) [native to N Africa, S Europe].


Trees to 30 m in native range; bark dull gray when young, aging gray-brown, rough and thick, scaly and deciduous; crown broadly conical or umbrellalike; 1st-year branchlets pale brown-yellow, glabrous; winter buds silvery white, cylindric-ellipsoid or cylindric, scales fringed at margin. Needles 2 per bundle, dull green, shiny, 6–12 cm × 0.5–2 mm, rigid; stomatal lines present on all surfaces, resin canals 6–11, median, base with persistent sheath, margin serrulate. Seed cones solitary or 2 or 3 together, shortly pedunculate, brown, conical-ovoid or ovoid, 4–6 × 3–4 cm, deciduous. Seed scales ovate-elliptic; apophyses slightly swollen, obviously cross keeled; umbo slightly concave, apex blunt. Seeds obovoid-ellipsoid, 5–7 × 2–3.5 mm; wing gray-brown, 1–1.1 cm. Pollination Apr–May, seed maturity Oct of 2nd year. Cultivated in cities, used for afforestation on mountain slopes; to 1400 m. Beijing Shi, Heilongjiang (Harbin Shi), Henan (Jigong Shan), Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning, Shandong, Zhejiang [native to Japan, Korea].


Trees to 50 m in native range; bark gray or dark brown; branchlets pale brown or orange-brown, glabrous; winter buds ovoid or cylindric-ovoid, slightly resinous. Needles 2 per bundle, pale or dark green, straight or curved, 4–19 cm × 1–2 mm, somewhat rigid, resin canals 3–17, median, base with persistent sheath. Seed cones subsessile, yellowish or pale brown, shiny, 3–8 × 2–4 cm, deciduous. Apophyses slightly or obtusely keeled; umbo mucronate. Widely cultivated. Beijing Shi, Hubei (Wuhan Shi), Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning, Shandong, Zhejiang [native to N Africa, SW Asia, S Europe].


Trees to 25 m tall; trunk straight or crooked, to 0.6 m d.b.h. in native range; bark orange- or red-brown, scaly; crown irregularly rounded or flat topped; branchlets orange-red or red-brown, aging gray-brown, slender, rough; winter buds red-brown, ovoid, resinous. Needles 2 per bundle, yellow-green, twisted, 2–5 cm × 1–1.5(–2) mm, stomatal lines present on all surfaces, fine, base with semipersistent sheath 3–6 mm, margin finely serrulate. Seed cones upcurved, nearly sessile or shortly pedunculate, tan to pale brown or greenish yellow, ovoid when open, asymmetric, 3–5.5 cm, maturing in 2 years, then soon shedding seeds or often long serotinous and shedding seeds only with age or after fire. Apophyses mostly depressed but increasingly mammillate toward outer part, basal of cone; umbo depressed, sunken centrally, small, unarmed or with a small, reflexed apicula. Seeds brown or nearly black, compressed obovoid, oblique, 4–5 mm; wing 1–1.2 cm. Cultivated. Beijing Shi, Heilongjiang (Harbin Shi), Henan (Jigong Shan), Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning, Shandong [native to N North America].


Trees to 20 m tall; trunk to 0.5 m d.b.h. in native range; bark gray-brown, with irregular, scaly, plated ridges, reddish and scaly toward apex of trunk; crown irregularly rounded or flattened; branchlets red or purple tinged, often glaucous, aging red-brown or gray, slender, rough; winter buds red-brown, ovoid or cylindric, resinous or not, scales white fringed at margin. Needles 2 per bundle, deep to pale yellow-green, strongly twisted, 2–8 cm × 1–1.5 mm, stomatal lines present on all surfaces, inconspicuous, base with persistent sheath 4–10 mm, margin serrulate. Seed cones subsessile or shortly pedunculate (peduncle to 1 cm), dull red-brown, ovoid when open, symmetric, 3–7(–8) cm, maturing in 2 years, then soon shedding seeds. Seed scales with strong purple-red or purple-brown border adaxially distally, rigid; apophyses slightly elongated and thickened; umbo low pyramidal, with a slender, stiff prickle. Seeds pale brown, mottled darker, compressed obovoid, 4–7 mm, apex oblique; wing to 2 cm, narrow.

Cultivated. Jiangsu (Nanjing Shi), Jiangxi (Lu Shan) [native to E United States].


巧家五针松 qiao jia wu zhen song
Trees; bark gray-green, aging dark brown, flaking, smooth when young, inner bark pale; branchlets red-brown, densely yellow- or gray-brown pubescent or glabrous; winter buds red-brown, ovoid, resinous, scales triangular-lanceolate. Needles 4 or 5 per bundle, 9–17 cm × ca. 0.8 mm, stomatal lines present on all surfaces, vascular bundle 1, resin canals 3–5, marginal, base with sheath shed, margin serrulate. Seed cones pedunculate (peduncle 1.5–2 cm), conical-ovoid, ca. 9 × 6 cm, dehiscent at maturity. Seed scales oblong-elliptic, ca. 2.7 × 1.8 cm; apophyses swollen, obviously transversely ridged; umbo dorsal, sunken, not spiny. Seeds black, longitudinally striate, oblong or obovate; wing ca. 1.6 cm, black striate, articulate. Pollination Apr–May, seed maturity Sep–Oct of 2nd year.

- NE Yunnan (Qiaojia Xian).

A highly endangered species known only from a population of little more than 20 trees.


须弥白皮松 xu mi bai pi song
Trees; bark white, fissured into irregular, thin plates; 1st-year branchlets pale green-yellow, glabrous, with projected leaf scars. Needles 3 per bundle, triangular-flabellate in cross section, 6–10 cm, stiff, vascular bundle 1, resin canals 5–7, marginal, base with sheath shed. Seed cones shortly pedunculate, almost brown at maturity, oblong or ovoid, 12–20 × 9–11 cm. Seed scales 4–5 cm; apophyses broad, swollen, ± recurved, obviously ridged; umbo dorsal, apex rounded. Seeds cylindrical, ca. 2.5 cm; wing rudimentary, usually adhering to adjacent scale.

Mountains; ca. 2700 m. S Xizang [E Afghanistan, N India, Kashmir, N Pakistan].


白皮松 bai pi song
Trees to 30 m tall; trunk monopodial or forked near base, to 3 m d.b.h.; bark irregularly flaking, inner bark pale, exfoliating in irregular, thin, scaly patches; crown broadly pyramidal or umbrella-like; 1st-year branchlets gray-green, glabrous; winter buds red-brown, ovoid, not resinous. Needles 3 per bundle, triangular-flabellate in cross section, 5–10 cm × 0.5–2 mm, stiff, vascular bundle 1, resin canals 6 or 7, marginal, rarely 1 or 2 median, base with sheath shed. Seed cones solitary, short pedunculate or sub sessile, usually pale green, yellowish brown at maturity, ovoid or conical-ovoid, 5–7 × 4–6 cm. Seed scales broadly oblong-cuneate, apex thickened; apophyses subhombic, obviously transversely ridged; umbo dorsal, triangular, protruding, usually terminating in a recurved spine. Seeds gray-brown, subobovoid, ca. 10 × 5–6 mm; wing loosely attached, ca. 5 mm. Pollination Apr–May, seed maturity Oct–Nov of 2nd year.

- Mountains, hills; 500–1800 m. S Gansu, W Henan, W Hubei (Badong Xian), S Shaanxi, Shandong, Shanxi, N Sichuan.


偃松 yan song
Pinus cembra Linnaeus var. pumila Pallas, Fl. Ross. 1(1): 5. 1784; P. cembra var. pygmaea Loudon.

Shrubs to 6 m tall, usually with creeping branches to 10 m; bark gray-brown, flaking; branchlets initially brown, dark red-brown in 2nd or 3rd year, densely pubescent; winter buds red-brown, conical-ovoid, slightly resinous. Needles 5 per bundle, trapeziform in cross section, 4–6 (–8.3) cm × ca. 1 mm, stiff, vascular bundle 1, resin canals (1 or)2, marginal, base with sheath shed. Seed cones erect, maturing to pale purple- or red-brown, conical-ovoid or ovoid, 3–4.5 × 2.5–3 cm, indehiscent or imperfectly dehiscent at maturity. Seed scales broadly subhombic or rhombic-obovate; apophyses broadly triangular, thick, swollen, margin slightly recurved; umbo purple-black, distinct, ending in a slightly recurved protuberance. Seeds dark brown, triangular-ovoid, 7–10 × 5–7 mm, wingless, abaxial margin ridged.

Mountains; 1000–2300 m. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, N Mongolia, E Russia].


红松 hong song
Apinus koraiensis (Siebold & Zuccarini) Moldenke; Pinus mandschurica Ruprecht; P. prokoraiensis Y. T. Zhao & al.; Strobus koraiensis (Siebold & Zuccarini) Moldenke.

Trees to 50 m tall; trunk to 1 m d.b.h.; bark gray-brown or gray, fissured longitudinally into irregularly oblong plates, inner bark red-brown; branchlets densely red-brown, occasionally yellow pubescent; winter buds reddish brown, oblong-ovoid, slightly resinous. Needles 5 per bundle, dark green, straight, almost triangular in cross section, 6–12 cm, stomatal lines 6–8 along each abaxial surface, blue-gray, vascular bundle 1, resin canals 3, median, base with sheath shed, margin serrulate. Seed cones solitary or several clustered near apex of 1st-year branchlets, erect, pedunculate (peduncle 1–1.5 cm), conical-ovoid or ovoid-oblong, 9–14 × 6–8 cm, indehiscent or slightly dehiscent at maturity, with seeds exposed but not shed. Seed scales reflexed at apex. Seeds triangular-ovoid, 1.2–1.6 cm, wingless.

Mountains; 200–1800 m. Heilongjiang, Jilin [Japan, Korea, E Russia]. The timber is used for construction, bridge building, vehicles, furniture, and wood pulp. The seeds are edible, medicinal, and used as a...
source of soap and lubricating oil. Turpentine is obtained from the timber and roots, and the bark yields tannin.


Pinus cembra Linnaeus subsp. sibirica (Du Tour) Krylov; P. cembra var. sibirica (Du Tour) G. Don; P. hingganensis H. J. Zhang; P. sibirica var. hingganensis (H. J. Zhang) Silba.

Trees to 35 m tall; trunk to 1.8 m d.b.h.; bark pale brown or gray-brown; branchlets yellow or brownish yellow, thick, densely pale yellow pubescent; winter buds red-brown, conical. Needles 5 per bundle, slightly curved, almost triangular in cross section, 6–11 cm × 0.5–1.7 mm, stiff, stomatal lines 3–5 along each abaxial surface, gray-white, vascular bundle 1, resin canals 3, median, base with sheath shed, margin serrulate. Seed cones erect, conical-ovoid, 5–8 × 3–5.5 cm, indehiscent or slightly dehiscent at maturity. Seed scales widely cuneate proximally, thickened distally; apophyses purple-brown, broadly rhombic or broadly triangular-semiobovate, densely pilose; umbo yellow-brown, obvious. Seeds yellow-brown, obovoid, ca. 10 × 5–6 mm, slightly ridged, wingless. Pollination Apr, seed maturity Sep–Oct of 2nd year.

Mountains, river basins; 800–2400 m. Heilongjiang (Tuqiang), Nei Mongol, Xinjiang [Kazakhstan, Mongolia, E Russia]. A vulnerable species in China. Plants named as Pinus hingganensis represent the E limits of P. sibirica; they are considerably disjunct from the main distribution center, and grow at lower elevations (800–1300 m), but are nevertheless indistinguishable from P. sibirica.

The timber is used for construction and furniture.


华山松 (原变种) huashansong (yuanyuanbianzhong)

Pinus excelsa Wallich ex D. Don var. chinesis Patschke; P. levis Lemée & H. Léveillé; P. scipioniformis Masters.

Branchlets green or gray-green, drying brown. Pollen cones erect, stout, ovoid-ellipsoid. Apophyses yellow or brown-yellow when mature, rhombic, not recurved distally or recurved only at umbo. 31a. var. armandii

1a. Pollen cones erect, stout, ovoid-ellipsoid; branchlets green or gray-green, drying brown; apophyses yellow or brown-yellow when mature, rhombic, not recurved distally or recurved only at umbo ....... 31a. var. armandii

1b. Pollen cones drooping, slender, cylindrical; branchlets brown-gray; apophyses brown or reddish brown when mature, triangular, usually slightly recurved distally 31b. var. mastersiana

31a. Pinus armandii var. armandii

华山松(原变种) huashansong (yuanyuanbianzhong)

Pinus excelsa Wallich ex D. Don var. chinesis Patschke; P. levis Lemée & H. Léveillé; P. scipioniformis Masters.

Branchlets green or gray-green, drying brown. Pollen cones erect, stout, ovoid-ellipsoid. Apophyses yellow or brown-yellow when mature, rhombic, not recurved distally or recurved only at umbo. 31b. var. mastersiana


台湾果松 taiwanguosong


Branchlets gray-brown. Pollen cones drooping, slender, cylindrical. Apophyses brown or reddish brown when mature, triangular, usually slightly recurved distally.

Mountains, on well-drained, acidic soils; 1800–3300 m. C Taiwan.


海南五针松 haiwanzhensong


Branchlets gray-brown. Pollen cones drooping, slender, cylindrical. Apophyses brown or reddish brown when mature, triangular, usually slightly recurved distally.

- Mountains, on well-drained, acidic soils; 1800–3300 m. C Taiwan.
pale brown, obovoid-ellipsoid, 0.8–1.5 cm × 5–8 mm; seed coat thin; wing rudimentary, 2–4(–7) mm or much shorter. Pollination Apr, seed maturity Oct–Nov of 2nd year.

Mountains, usually scattered on ridges, rocks, or cliffs; 900–1600 m. SW Anhui, Guangxi, C and N Guizhou, Hainan, SE Henan, E Hubei, SE Sichuan [Vietnam].

The timber is used for construction and producing turpentine.

1a. Needles 10–18 cm; seed cones narrowly ovoid or ovoid-ellipsoid, 6–9 cm; seeds chestnut brown; wing 2–4(–7) mm  32a. var. fenzeliana

1b. Needles 5–14 cm; seed cones cylindric-ellipsoid, ca. 14 cm; seeds pale brown, wing very short, woody ...  32b. var. dabeshanensis

32a. Pinus fenzeliana var. fenzeliana

海南五针松(原变种) hai nan wu zhen song (yu bian zhong)

*Pinus parviflora* Siebold & Zuccarini var. *fenzeliana* (Handel-Mazzetti) C. L. Wu.

Needles 10–18 cm. Seed cones narrowly ovoid or ovoid-ellipsoid, 6–9 cm. Seeds chestnut brown; wing 2–4(–7) mm.

Mountains, usually scattered on ridges and rocks; 1000–1600 m. Guangxi, C and N Guizhou, Hainan, SE Sichuan [Wulong Xian] [Vietnam].


大别五针松 da bie wu zhen song


Needles 5–14 cm. Seed cones cylindric-ellipsoid, ca. 14 cm. Seeds pale brown; wing very short, woody.

- Mountains, sometimes on cliffs or rocks; 900–1400 m. SW Anhui (Jinzhai Xian, Yuezixi), SE Henan (Shangcheng Xian), E Hubei (Luotian Xian, Yingshan Xian).

An endangered plant.


不丹松 bu dan song

Trees to 25 m or more; crown moderately open, not twiggy; branches spreading, drooping, sinuous; 1st-year branchlets conspicuously whitish bloomed, glandular pubescent; 2nd-year branchlets with thin, pale gray-green bark. Needles shed in 2nd year, 5 per bundle, pendulous, very slender, curved, triangular in cross section, 15–24 cm, adaxial surface grass green with no stomata, 2 abaxial surfaces conspicuously whitish bloomed, each with 4–7 stomatal lines, resin canals 3(or 4), adaxial 2 marginal or submarginal, abaxial 1(or 2) marginal or submarginal and always asymmetrically placed. Seed cones pedunculate (peduncle (1–) 4.5–6 cm), elongate-cylindric, 12–20 × 3–4 cm (5–7 cm wide when open). Seed scales rather elongate, thinly woody, base cuneate; apophyses rhombic, 1–1.5 × 1.5–2.5 cm, keeled, apex subacute. Seeds brown, obovoid, compressed, 6–8 × 4–5 mm; wing persistent, ca. 2 × 0.7–1 cm.

SE Xizang [Bhutan].


乔松 qiao song

*Pinus excelsa* Wallich ex D. Don (1828), not Lamarck (1778); *P. griffithii* M’Clelland (1854), not J. D. Hooker) Parlatore (1868); *P. nepalensis* Chambray (1845), not J. Forbes (1839).

Trees to 70 m tall; trunk to 1 m or more d.b.h.; bark dark gray-brown, minutely scaly and flaking; crown broadly pyramidal; 1st-year branchlets green (drying red-brown), shiny, faintly whitish bloomed, glabrous; winter buds red-brown, cylindric-obovoid or cylindric-conical, slightly resinous. Needles 5 per bundle, pendulous, slender, triangular in cross section, (6–)11–18(–20) cm × ca. 1 mm, soft, adaxial surface dark green, vascular bundle 1, resin canals 3, adaxial 2 marginal, abaxial 1 always median. Seed cones pendulous, pedunculate (peduncle 2.5–4 cm), cylindric, straight or curved, 10–30 × 3–4 cm (5–9 cm wide when open), resinous. Seed scales cuneate-obovate, 3–5 × 2–3 cm at middle of cone; apophyses shiny, often glaucous, rhombic, slightly thickened; umbo dark brown, slightly projecting, apex obtuse, obviously incurved. Seeds brown or black-brown, ellipsoid-obovoid, 3–9 × 4–5 mm; wing 1–3 cm × 8–9 mm. Pollination Apr–May, seed maturity autumn of 2nd year.

Mountains, temperate rainforests; 1600–3300 m. S Xizang, NW Yunnan [Afghanistan, Bhutan, N India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim].

*Pinus wallichiana* var. *parva* K. C. Sahni (Indian J. Forest. 12(1): 40. 1989) was described from SE Xizang, where it apparently grows in temperate rainforests with species of *Rhododendron* at ca. 3000 m. It is an insufficiently understood taxon, known only from the type, which was not seen by the authors. It is said to differ from typical *P. wallichiana* as follows: needles mostly less than 11 cm; seed cones straight (not curved), smaller (ca. 10 cm); seeds smaller (ca. 3 mm); wing shorter (ca. 10 mm).

The timber is used for construction, furniture, and for producing turpentine.


台湾五针松 tai wan wu zhen song

*Pinus formosana* Hayata; *P. parviflora* Siebold & Zuccarini var. *morrisonicola* (Hayata) C. L. Wu; *P. uyematsui* Hayata.
Trees to 30 m tall; trunk to 1.2 m d.b.h.; bark dark gray, flaking; crown conical; 1st-year branchlets red-brown, initially yellowish pubescent, glabrescent; winter buds pale brown, ovoid, not resinous. Needles 5 per bundle, triangular in cross section, 4–9 cm × 0.6–1 mm, vascular bundle 1, resin canals 2, marginal, base with sheath shed. Seed cones usually solitary, pedunculate (peduncle 0.5–1 cm), conical-ellipsoid or ovoid-ellipsoid, 7–11 × 5–7 cm, resinous, dehiscent. Seed scales cuneate-elliptic, 3–3.5 × 1.5–2 cm; apophyses brown, shiny, broadly rhombic, middle portion thickened, apex recurved. Seed ellipsoid-ovoid or narrowly ovoid, 8–10 × 5–6 mm; wing pale brown, 1.5–2 cm × 5–8 mm.

• Mountain slopes, ridges; 300–2300 m. Taiwan.

The timber is used for construction, bridge building, and making poles and furniture.


毛枝五针松  mao zhi wu zhen song
Trees to 20 m tall; trunk to 60 cm d.b.h. branchlets slender, dark red-brown, turning dark gray-brown, initially densely brown pubescent, glabrous in 2nd or 3rd year; winter buds brown, not resinous. Needles 5 per bundle, thick, slightly incurved, triangular in cross section, 2.5–6 cm × 1–1.5 mm, stiff, vascular bundle 1, resin canals 3, median, base with sheath shed. Seed cones solitary or 2 or 3 clustered at base of branchlets, pedunculate (peduncle 1.5–2 cm), yellowish brown, brown, or dark gray-brown at maturity, oblong-ellipsoid or cylindric-ovoid, 4.5–9 × 2–4.5 cm. Seed scales subovobovate, 2–3 × 1.5–2 cm; apophyses transversely rhombic, margin thin, slightly incurved, rarely slightly recurved on middle or basal seed scales; umbo sunken, not swollen. Seeds pale brown, ellipsoid-ovoid, 8–10 × ca. 6 mm; wing ca. 16 × 7 mm. Scattered in evergreen broad-leaved forests on limestone hillsides, where only fragmented populations remain on inaccessible cliffs; 500–1800 m. SE Yunnan (Malipo Xian, Xichou Xian) [Vietnam].

An endangered species in China. The Vietnamese plants may represent a different taxon, perhaps better placed within Pinus dalatensis Ferré, which is endemic to Vietnam.

The timber is used for construction, bridge building, and making poles and furniture.


华南五针松  hua nan wu zhen song
Trees to 30 m tall; trunk to 1.5 m d.b.h.; bark brown, scaly; 1st-year branchlets pale brown; old branchlets grayish brown or yellow-brown, glabrous, rarely puberulent; winter buds black-brown, slightly resinous. Needles 2–5 per bundle, triangular in cross section, 3.5–7 cm × 1–1.5 mm, vascular bundle 1, resin canals 2, marginal, sometimes also 1 median, base with sheath shed. Seed cones usually solitary, pedunculate (peduncle 0.7–2 cm), reddish brown at maturity, cylindric-oblong or cylindric-ovoid, 3–9(–17) × 1.5–7 cm, slightly resinous. Seed scales cuneate-ovobovate, 2.5–3.5 × 1.5–2.3 cm; apophyses rhombic, apex thin, straight or slightly incurved. Seeds ellipsoid or obovoid, 0.8–1.2 cm, together with wing subequal to seed scales. Pollination Apr–May, seed maturity Oct of 2nd year.

Hills, slopes, mountain ridges, summits; 500–1600 m. N Guangdong, SW Guangxi, S Guizhou, Hainan, S Hunan [Vietnam].

A vulnerable species in China. It has often been confused, and even united, with Pinus fenzeliana (to which the records from Hainan might belong); however, the two species are not considered here to be conspecific.

1a. Needles usually 5 per bundle, with white stomatal bands abaxially; seed cones 5–9(–17) × 3–7 cm .... 37a. var. kwuangtungensis

1b. Needles 2 or 3(–5) per bundle, with inconspicuous stomatal bands abaxially; seed cones 3–4 × 1.5–2 cm .... 37b. var. varifolia

37a. Pinus kwangtungensis var. kwuangtungensis

华南五针松(原变种) hua nan wu zhen song (yuan bian zhong)

Pinus wangii Hu & W. C. Cheng var. kwuangtungensis (Chun & Tsiang) Silba.

Needles usually 5 per bundle, with white stomatal bands abaxially. Seed cones 5–9(–17) × 3–7 cm.

Hills, slopes, mountain ridges; 700–1600 m. N Guangdong, S Guizhou, Hainan, S Hunan [Vietnam].

37b. Pinus kwangtungensis var. varifolia

变叶华南五针松 bian ye hua nan wu zhen song

Needles 2 or 3(–5) per bundle, with inconspicuous stomatal bands abaxially. Seed cones 3–4 × 1.5–2 cm.

Summits of limestone mountains; ca. 500 m. SW Guangxi (Longlin Gezu Zizhixian, Tiandeng Xian) [Vietnam].

Perhaps not a distinct taxon; the lower number of leaves per bundle may be the result of poor growth.


北美乔松 bei mei qiao song
Trees to 65 m tall; trunk to 1.8 m d.b.h.; bark gray-brown, deeply furrowed, with irregularly oblong, long, scaly plates; crown conical, becoming rounded or flattened on top; winter buds light red-brown, ovoid-cylindric, slightly resinous. Needles 5 per bundle, not pendulous, deep green to blue-green, slightly twisted, 6–14 cm × 0.7–1 mm, pliant, stomatal lines present on all surfaces, base with early shed sheath 1–1.5 cm, margin finely serrulate. Seed cones clustered, pedunculate (peduncle 2–3 cm), gray-brown or pale brown with purple or gray tints, cylindric, ellipsoid, or lanceolate-cylindric when open, 7–20 cm, maturing in 2
years, then soon shedding seeds and falling. Apophyses slightly raised, apex resinous; umbo terminal. Seeds red-brown, black mottled, broadly and obliquely obovoid, compressed, 5–6 mm; wing pale brown, 1.8–2.5 cm.

Cultivated. Beijing Shi, Jiangsu (Nanjing Shi), Jiangxi (Lu Shan), Liaoning [native to E Canada, Guatemala, S Mexico, E United States].


日本五针松  ri ben wu zhen song

Trees to 25 m tall; trunk to 1 m d.b.h.; bark pale gray, aging dull gray, smooth when young, furrowed with age into scaly plates; crown conical; 1st-year branchlets initially green, aging yellow-brown, densely pale yellow pubescent; winter buds ovoid, not resinous. Needles 5 per bundle, slightly curved, triangular in cross section, 3.5–5.5 cm × 0.7–0.9 mm, stomatal lines present along abaxial surfaces, white, vascular bundle 1, base with sheath shed. Seed cones subsessile, ovoid or ovoid-ellipsoid, 4–7.5 × 3.5–4.5 cm. Seed scales obovate-rhombic or oblance-obovate, 2–3 × 1.8–2 cm; apophyses pale brown or dull gray-brown, almost rhombic; umbo terminal, sunken, margin recurved distally. Seeds nearly brown, mottled with black, irregularly obovoid, 8–10 × ca. 7 mm; wing ca. 1 cm.

Widely cultivated in cities in the Chang Jiang basin and Shandong [native to Japan].

Commonly used as a garden tree or for bonsai.