

River-oak casuarina

Casuarina cunninghamiana Miq.

Casuarina family (Casuarinaceae)

Post-Cook introduction

Three of the 11 species of *Casuarina* introduced from Australia and Pacific islands for forestry and other purposes are described here. These evergreen trees are known by the many drooping, very slender green twigs like pine needles or wires, each with many joints bearing tiny scalelike pointed gray or brown leaves in a ring, and by the rounded hard warty fruits like a ball or cone with many minute winged seeds. The green twigs manufacture food in the absence of leaves and are shed gradually when old. The trees are important nitrogen fixers in a symbiotic relationship with fungi (actinomycetes) of the genus *Frankia*, analogous to that of legumes with *Rhizobia*. They are thus able to thrive on depleted, very eroded sites where other plants cannot survive.

The name is from the Malay word *kasuari*, casowary, because of the fancied resemblance of the twigs to the plumage of that bird. Trees of this genus have been known also as beefwood from the reddish color of the wood. The term “she-oak,” widely applied in Australia, according to Maiden (1907) refers to the wood being like oak (with broad rays) but not as strong. Other common names are “Australian-pine,” from the foliage and fruits, and in Hawaii “ironwood,” from the hard wood. The last names are not recommended, because this family is not related to pines or other conifers and because “ironwood” has been applied to many different trees with confusion.

Three common species are described and illustrated here. River-oak casuarina, *Casuarina cunninghamiana* Miq., has the shortest and thinnest drooping wirelike twigs, mostly 3–7 inches (7.5–18 cm) long and less than $\frac{1}{32}$ inch (1 mm) wide, with scale leaves 8–10 in a ring, and small conelike fruits about $\frac{3}{8}$ inch (10 mm) in diameter. Horsetail casuarina, *Casuarina equisetifolia* L. ex J. R. & G. Forst., has longer twigs about $\frac{1}{32}$ inch (1 mm) wide, with scale leaves 6–8 in a ring, and larger fruits $\frac{1}{2}$ – $\frac{3}{4}$ inch (13–19 mm) in diameter. Longleaf casuarina, *Casuarina glauca* Sieber ex Spreng., has long thicker twigs nearly $\frac{1}{16}$ inch (1.5 mm) wide, with scale leaves 12–16 in a ring, and fruits about $\frac{1}{2}$ inch (13 mm) in diameter. Although the three species described here can be recognized in Hawaii, many if not most trees

show characteristics of more than one species and are believed to be hybrids.

River-oak casuarina is a medium-sized evergreen tree to 80 ft (24 m) high and 2 ft (0.6 m) in trunk diameter, with thin irregular crown of drooping twigs. Bark gray brown, smoothish but becoming rough, thick, and furrowed into narrow ridges. Inner bark brown and dark red within, gritty or slightly bitter. Wiry gray green drooping twigs mostly 3–7 inches (7.5–18 cm) long and less than $\frac{1}{32}$ inch (1 mm) wide, with 8–10 long fine lines or ridges ending in scale leaves, shedding gradually. A few main twigs, finely hairy and pale green when young, develop into rough or smooth brownish branches.

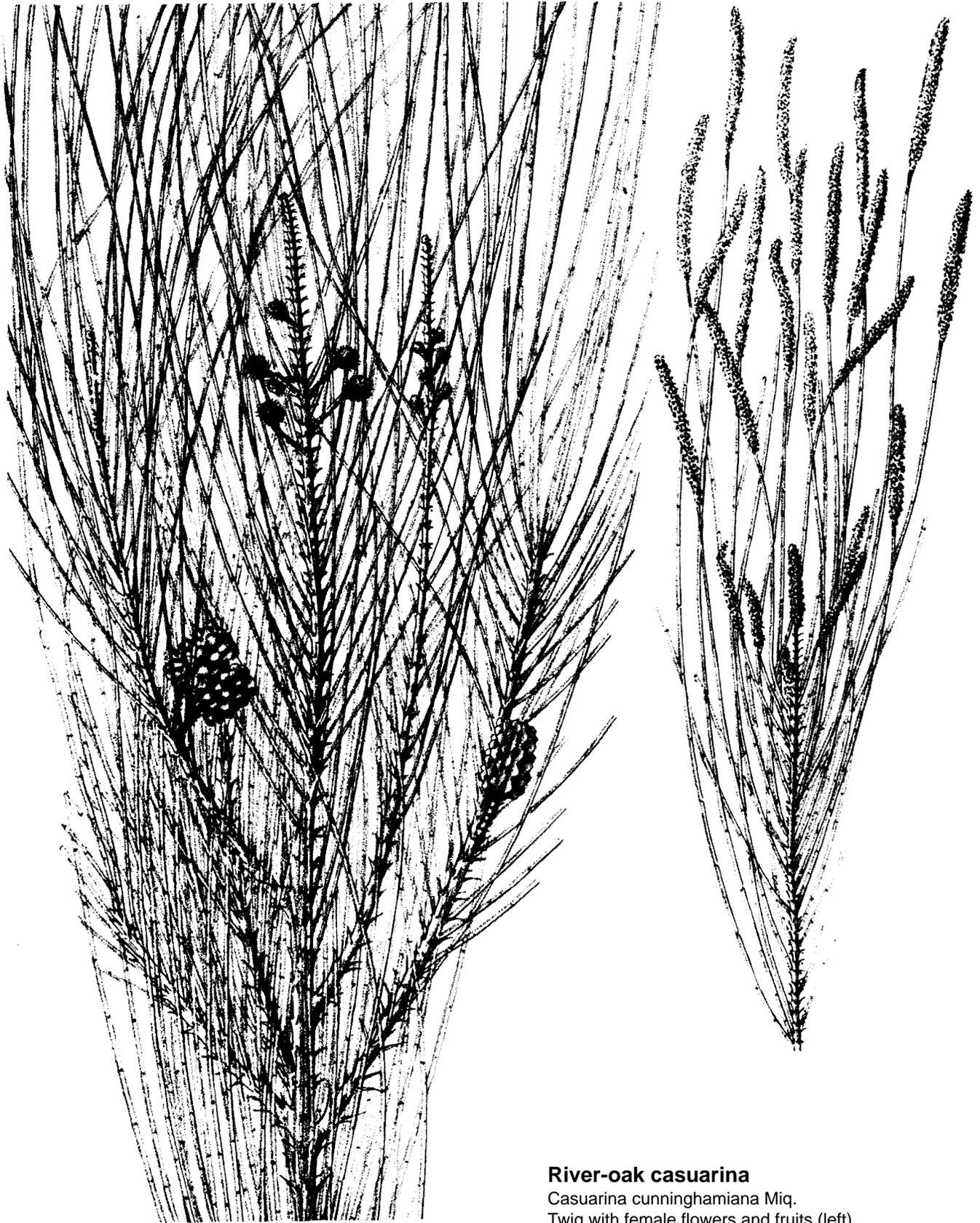
Scale leaves less than $\frac{1}{64}$ inch (0.4 mm) long, 8–10 in a ring (whorled) at joints or nodes less than $\frac{1}{4}$ inch (6 mm) apart. Leaves on main twigs in rings as close as $\frac{1}{16}$ inch (1.5 mm), to $\frac{1}{8}$ inch (3 mm) long and curved back.

Flower clusters inconspicuous, light brown, male and female on different trees (dioecious). Male flower clusters (like spikes or catkins) terminal, narrowly cylindrical, $\frac{1}{4}$ – $\frac{3}{4}$ inch (6–19 mm) long and less than $\frac{1}{8}$ inch (3 mm) wide. Tiny male flowers crowded in rings within grayish scales consist of one exposed brown stamen less than $\frac{1}{8}$ inch (3 mm) long with two tiny brown sepal scales at base. Female flower clusters are short-stalked lateral balls (heads) more than $\frac{1}{4}$ inch (6 mm) across spreading styles, consisting of pistil less than $\frac{1}{4}$ inch (6 mm) long with small ovary and long threadlike dark red style.

The multiple fruit is a small brown or gray hard warty ball about $\frac{3}{8}$ inch (10 mm) in diameter, often longer than broad and slightly cylindrical, composed of long broad hard points of $\frac{1}{8}$ inch (3 mm) long and broad, each from a flower. An individual fruit nearly $\frac{1}{4}$ inch (6 mm) long splits open in two pans at maturity to release 1 winged light brown seed (nutlet) less than $\frac{1}{4}$ inch (6 mm) long.

The hard heavy wood is composed of light brown sapwood and reddish-brown heartwood. The wood has broad rays which form a pronounced ray fleck similar to oak on radial surfaces—thus the common name. It is heavy (sp. gr. 0.58) with a relatively large shrinkage in drying. It could be used for turnery, but at present, at least in Hawaii, is used only for fuelwood.

This species has been tested in windbreaks but is suitable also for ornament and shade, having very fast growth. It may be better adapted to mountains than the coast, but in Hawaii it has been planted mostly at lower elevations. Altogether, 13,000 trees are recorded as having been planted in the Forest Reserves. Most of these



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Twig with female flowers and fruits (left),
twig with male flowers (right) 1 X (Maiden).

were planted on Oahu at the Honouliuli and Waimanalo Reserves. The trees may be seen at many locations. There are some among other casuarinas on Kalakaua Avenue near the Aquarium in Waikiki. Others are at Ualakaa Park (Round Top) on Oahu and Waiakea Arboretum near Hilo and Kalopa State Park, both on the island of Hawaii.

In Australia, this species attains the largest size in the genus and is also the most cold hardy. This species is adapted to subtropical mountains and is planted north to Florida, southern Arizona, and California, in the interior plateaus of Mexico, through the northern Andes, and south to Argentina and Chile. In central and south Florida, it is recommended for shade, shelter, and wind-breaks, but not in cities, because of the large disruptive root systems.

Champion

Height 80 ft (24.4 m), c.b.h. 6.8 ft (2.1 m), spread 42 ft (12.8 m). Kohala Forest Reserve, Aamakao, Hawaii (1968).

Range

Native of Australia, but planted and naturalized in various tropical and subtropical regions.

Other common names

Cunningham casuarina, "ironwood," "Australian-pine," river she-oak, pino australiano, pino de Australia (Puerto Rico, Spanish)