

## *Roystonea* O.F. Cook

### royal palm

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**Growth habit, occurrence, and use.** There are 2 noteworthy species of *Roystonea* palms grown in the United States and its territories (table 1). Puerto Rican royal palm is native to Puerto Rico and Vieques, St. Croix in the U.S. Virgin Islands, and possibly Tortola in the British Virgin Islands (Francis 1992; Little and Wadsworth 1964) and has possibly naturalized in the British Virgin Islands and in St. Thomas and St. John in the U.S. Virgin Islands (Francis 1992). The smooth gray trunk with its swollen base and the gracefully drooping fronds are a common sight in the island cities. Its ability to withstand a polluted atmosphere and to grow well on either moist, well-drained soils or nutrient-deprived fill dirt enhances its value as a landscape plant. Francis (1992) reports heights of 26.4 m and diameters of 25 to 70 cm in Puerto Rico. Maximum age is 80 to 110 years, and flowering can begin as early as the seventh year. Little and Wadsworth (1964) and Braun (1983) note heights reaching only 18 m and diameters of 30 to 61 cm for the species, whereas LHBH (1977) reports heights reaching at least 15 m. Because of its ability to withstand hurricane-force winds, it is able to become dominant in the forest canopy despite its short stature (Francis 1992). In addition to its importance as an ornamental, the palm's lumber is widely used in rural construction, the leaves as a roof thatch, the flowers as an important nectar source for honey bees (*Apis mellifera* L.), and the fruits as a fat-rich food source for birds (Francis 1992; Little and Wadsworth 1964). The tree apparently has no serious insect pests, but the lumber is susceptible to attack by the dry-wood termite *Cryptotermes brevis* (Walker) (Francis 1992; Little and Wadsworth 1964; Wolcott 1946).

Cuban royal palm is a native of Cuba that is now naturalized in Hawaii (Neal 1965) and in Collier, Dade, and Monroe Counties in Florida (Little 1979; West and Arnold 1952). Like its relative, it too is a widely planted ornamental. There is some variation in reported height growth for the species: Neal (1965) noted heights reaching only 15 to 21 m in Hawaii, but West and Arnold (1952) reported heights of 24 to 34.5 m and diameters up to 61 cm in Florida. LHBH (1977) lists maximum heights of at least 23 m.

Both species grow in the subtropical moist and subtropical wet life zones (Holdridge 1967). Moore (1973) describes other species of royal palm growing on the eastern coast of Mexico, Guatemala, and Honduras, and in Venezuela. Their upper trunks are encased in a green column of leaf sheaths 1 to 3 m long. The pinnate leaves have short petioles, and a sheath and blade 2.4 to 3.7 m long. In Puerto Rican royal palm, the youngest leaflet projects as a spire above the others (Little and Wadsworth 1964), and pinnae grow from the rachis in 2 planes (LHBH 1977). Pinnae grow in several planes along the rachis of each Cuban royal palm leaf. Little and

Wadsworth (1964) contend that another characteristic distinguishing Puerto Rican royal palm from Cuban royal palm is that the latter lacks the swollen trunk of the former; however, both West and Arnold (1952) and Neal (1965) report the swollen base—and Neal (1965) and Braun (1983) the swollen middle trunk—in Cuban royal palm.

**Flowers and fruits.** Flowers of both species develop from buds formed at the base of the leaves. Whitish male and female flowers form on the same panicle, with male flowers of each tree opening and falling before the female flowers to prevent self fertilization. Generally, each female flower forms between 2 male flowers on the panicle (Francis 1992; Little and Wadsworth 1964). The male flowers have 3 small broad sepals and 3 blunt-pointed petals; the females have 3 small broad sepals and a tubular corolla (Little and Wadsworth 1964).

In Puerto Rican royal palm, the twice-branched drooping panicles develop from large narrow buds. The panicles develop inside a dark brown sheath that is 0.9 to 1.5 m long (Francis 1992; Little and Wadsworth 1964). According to LHBH (1977) and Braun (1983), one feature that distinguishes this species from the Cuban royal palm is the presence of scales on the axes bearing the flowers (rachillae). The length of the inflorescence also seems to differ, with that of Puerto Rican royal palm reaching up to 1 m (Little and Wadsworth 1964) and that of Cuban royal palm reaching only 60 to 80 cm (Braun 1983; West and Arnold 1952). The panicle of Puerto Rican royal palm bears stalkless male flowers measuring 13 mm across, smaller female flowers, and, eventually, greenish yellow fruits that are 13 mm long and about 10 mm in diameter (Little and Wadsworth 1964). Fruits ripen to a brownish purple color and contain 1 light brown elliptic seed that is 8 mm long, hard, and oily. Flowers can occur throughout the year.

The Cuban royal palm bears white, fragrant flowers on a many-branched panicle. Male flowers measure 6 mm across and the violet-purple fruits are smooth, ovate, and measure 13 mm in length. Each fruit bears a single light brown, thin seed that is embedded in brown fibrous flesh (Neal 1965; West and Arnold 1952). The seeds contain oil that may be sold commercially (Moscoso 1945).

**Collection, storage, and germination.** Francis (1992) reports that, in a survey of 100 Puerto Rican royal palm trees, 35% bore no fruit whereas others produced massive quantities of fruit and seeds (6,000 to 12,000/tree). Seeds are commonly dispersed by water, birds, rodents, and domestic animals but are easily collected for propagation on the ground beneath open-grown trees. Francis and Rodriguez (1993) estimate an average of 2,980 seeds/kg (1,352/lb). Seeds can be stored for 1 to 2 months in sealed containers at room temperature and for longer periods of time under refrigeration. Seeds sown in trays of sand with no pretreatment and kept at ambient temperatures (24 to 30 EC) averaged 80% germination after 14 days. Germination is hypogeous (Francis 1992) and may take up to 2 months after sowing. The radicle emerges first, the shoot about 3 weeks later. Under natural conditions, germination of both species may not begin for 50 to 60 days and may not be completed for an additional 100 days (Braun 1983). Broschat and Donselman (1988) found that soaking Cuban royal palm seeds in 1,000 ppm GA<sub>3</sub> solution for 48 hours slightly increased the rate of germination but also resulted in abnormally elongated seedlings. The best results were obtained if seeds were cleaned and then germinated at temperatures between 30 to 35 EC. They also determined that the best method for long-term storage for Cuban royal palm was to place clean, half-ripe to ripe seeds (air-dried at 80 to 90% relative humidity and treated with a fungicide (for example, thiram) in tightly sealed

polyethylene containers held at room temperature (23 EC). The seeds of royal palm may be intermediate in their storage behavior. Ellis and others (1991) put forth the idea that seeds of the Cuban royal palm are not truly orthodox nor recalcitrant. Apparently, drying the seeds to a low moisture content or storing them below 0 EC may result in damage.

**Nursery practices.** Puerto Rican royal palm seedlings kept in full sunlight averaged 30 cm (12 in) in height after 6 months and 90 cm (36 in) after 15 months; they can be grown to heights of 1.5 m (60 in) or more in 4-liter (1-gal) containers (Francis 1992). Even large trees can be dug up with a backhoe and transplanted. Survival is high as long as they are braced and watered frequently. High mortality results if young trees with only a few basal leaves or short trunks are moved without a protective ball of earth and left without shade and water (Francis 1992).

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**Table 1**— *Roystonea*, royal palm: nomenclature and occurrence

Scientific name & synonyms	Common name	Occurrence
<b><i>R. borinquena</i> O.F. Cook</b>	<b>Puerto Rican royal palm</b>	Puerto Rico & Vieques; St. Croix, U.S. Virgin Islands; Tortola, British Virgin Islands
<b><i>R. elata</i> (Bartr.) F. Harper</b> <i>R. regia</i> (H.B.K.) O.F. Cook <i>Oreodoxa regia</i> (H.B.K.)	<b>Cuban royal palm,</b> Florida royal palm	Cuba; naturalized in S Florida & Hawaii

**Sources:** Francis (1992), Little (1979), Little and Wadsworth (1964), Neal (1965), West and Arnold (1952).

**Figure 1**—*Roystonea borinquena*, Puerto Rican royal palm: fruit, H0.7.

**Figure 2**—*Roystonea borinquena*, Puerto Rican royal palm: seeds, H0.7.