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Species Profiles for Pacific Island Agroforestry
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# *Samanea saman* (rain tree)

Fabaceae (legume family)

***filinganga*** **(Northern Marianas);** ***gouannegoul, saman*** **(French);** ***gumorni spanis*** **(Yap);** ***kasia kula, mohemohe*** **(Tonga);** ***marmar*** **(New Guinea);** ***'ohai*** **(Hawai'i); rain tree, monkey pod,** saman **(English);** ***tamalini, tamaligi*** **(Samoa);** ***trongkon-mames*** **(Guam);** ***vaivai ni vavalangi, sirsa*** **(Fiji)**

George W. Staples and Craig R. Elevitch

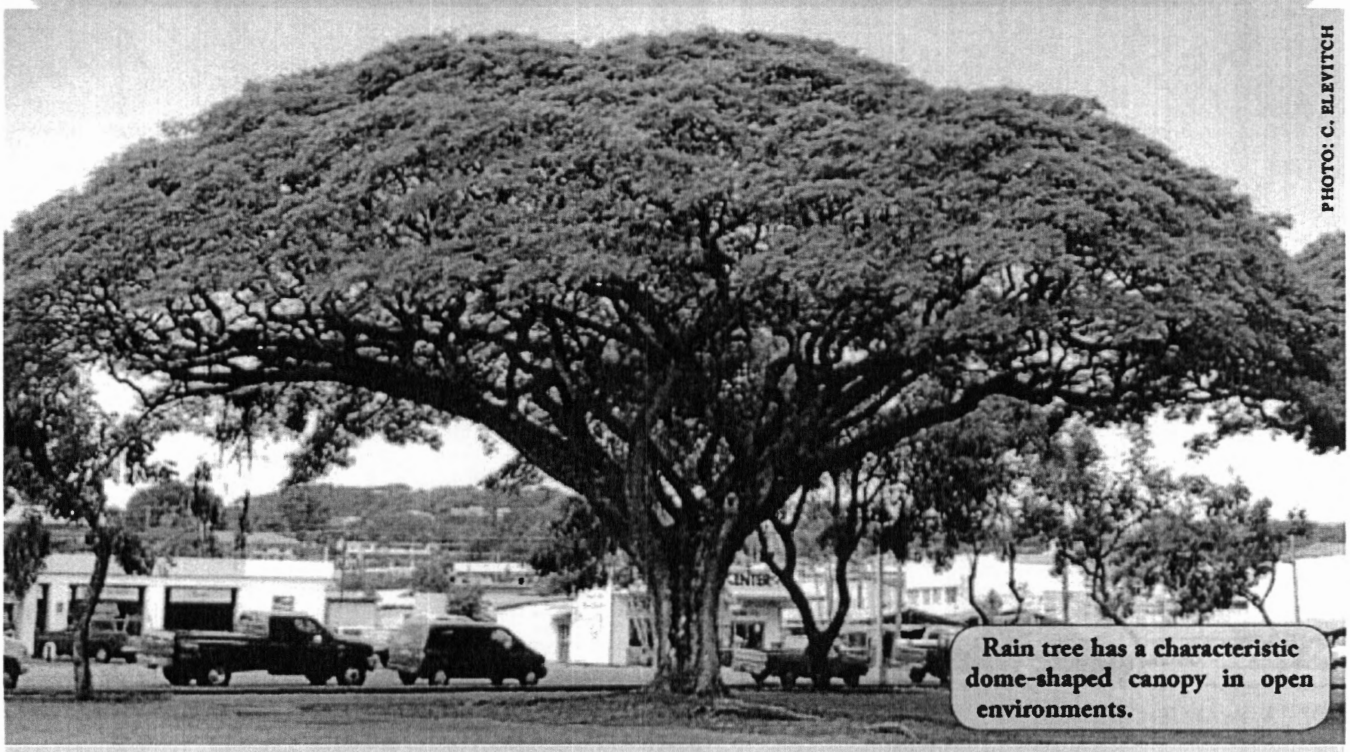

PHOTO: C. ELEVITCH

Rain tree has a characteristic dome-shaped canopy in open environments.

## IN BRIEF

**Distribution** Native to northern South America, and now naturalized throughout the tropics.

**Size** Typically reaches 15–25 m (50–80 ft) tall with a broad crown typically 30 m (100 ft) in diameter.

**Habitat** Grows best in the lowlands from sea level to 300 m (1000 ft) with rainfall 600–3000 mm (24–120 in).

**Vegetation** Naturally occurs on savannahs (grasslands) and in deciduous forests and riparian corridors.

**Soils** Adapts to a wide range of soil types and pH levels.

**Growth rate** Moderately fast growing with growth rates of 0.75–1.5 m/yr (2.5–5 ft/yr) per year.

**Main agroforestry uses** Silvopasture, crop shade.

**Main products** Fodder, timber.

**Urban forestry** Well suited for large public areas such as parks, school grounds, etc., and large homesteads.

**Yields** A 5-year-old tree can produce 550 kg (1210 lb) of green forage; timber yields of 10–25 $m^3$/ha/yr (1715–4290 bf/ha/yr) under a 10–15 year rotation.

**Intercropping** Interplanted as a shade tree with coffee, cacao, and other crops.

**Invasive potential** Considered invasive in Fiji and Vanuatu, elsewhere in the Pacific it is naturalized but rarely considered to be problematic.

# INTRODUCTION

Rain tree (*Samanea saman*) is easily recognized by its characteristic umbrella-shaped canopy. When grown in the open, the tree usually reaches 15–25 m (50–80 ft) in height with a canopy diameter wider than the tree is tall. Rain tree is most important in the Pacific as a shade tree on small farms, along roads, in parks and pastures. The wood has limited use for carved bowls in local markets; it could be developed more widely as a commercial timber, comparing favorably to black walnut. A multitude of minor uses is documented for rain tree, most of them of purely local significance, but all could be explored for wider applicability. Rain tree naturalizes freely almost everywhere it has been introduced and is considered an invasive pest in Vanuatu and Fiji. In many other places naturalized rain tree is not considered a problem.

# DISTRIBUTION

## Native range

Extensive cultivation has obscured the native range of rain tree. It is believed to be native in northern South America (Colombia, the Caribbean slope and the Orinoco drainage of Venezuela), and in Central America as far north as El Salvador. It is now widespread from Mexico south to Peru, Bolivia, and Brazil. In these areas, it occurs in low-elevation dry forests and grassland/savannah habitats.

## Current distribution

Rain tree is cultivated and naturalized throughout the tropics. In the Pacific, rain tree is known to occur on the following islands: American Samoa (Tutuila), Commonwealth of the Northern Mariana Islands (Saipan, Rota), Federated States of Micronesia (Chuuk, Kosrae, Pohnpei), Fiji (Kanacea, Taveuni, Vanua Levu, Viti Levu), French Polynesia (Íles Tubuai [Rurutu], Tahiti, Marquesas, Moorea, Raiatea), Guam, Hawai'i, Marshall Islands (Jaluit, Kwajalein), Niue, Palau (Koror), Papua New Guinea, the Philippines, Pitcairn, Rotuma, Samoa ('Upolu), and Tonga (Tongatapu, 'Eua, Vava'u, Lifuka/Foa). The species is also naturalized in a number of the Caribbean Islands including Puerto Rico. It is almost certainly even more widespread than the foregoing list indicates.

# BOTANICAL DESCRIPTION

## Preferred scientific name

*Samanea saman* (Jacquin) Merrill

## Family

Fabaceae (alt. Mimosaceae), legume family

## Subfamily

Mimosoideae

## Non-preferred scientific names

*Albizia saman* (Jacquin) F. Mueller
*Enterolobium saman* (Jacquin) Prain ex King
*Inga salutaris* Kunth.
*Inga saman* (Jacquin) Willd
*Mimosa saman* Jacquin
*Pithecellobium saman* (Jacquin) Bentham

## Common names

### Pacific islands

*filinganga* (Northern Marianas)
*gouannegoul, saman* (French)
*gumorni spanis* (Yap)
*kasia kula, mohemohe* (Tonga)
*marmar* (New Guinea)
*'ohai* (Hawai'i)
rain tree, monkey pod, saman (English)
*tamalini, tamaligi* (Samoa)
*trongkon-mames* (Guam)
*vaivai ni vavalangi, sirsa* (Fiji)

### Other regions

*acacia, palo de China* (Philippines)
*algarrobo, algarrobo del país, carreto negro, delmonte, dormilón, guannegoul, samán* (Spanish)
*gouannegoul, saman* (French)

## Size

Rain tree generally attains maximum heights of 15–25 m (50–80 ft). In rare cases it can reach a height of 50 m (160 ft). The crown typically reaches 30 m (100 ft) in diameter. Very large trees may reach 50–60 m (160–195 ft) in diameter. Rain trees usually have a short, stout trunk of about 1–2 m (3–6.5 ft) in diameter at breast height (dbh), but the trunk can attain 2–3 m (6.5–10 ft) dbh in exceptional cases. Under dense planting conditions, trees may attain greater height (to 40 m, 130 ft) with a narrower crown diameter than when planted in the open.

## Form

Rain tree has a distinctive, umbrella-shaped crown. The crown is typically broad and domed; the horizontal spread is greater than the height when grown in spacious, open settings. Under plantation conditions, the crown is more vase-shaped.

**Large trees, as well as seedlings, can be transplanted readily by pruning the roots and branches, and ensuring sufficient irrigation for a few months.**
PHOTO: C. ELEVITCH

growth rates are improved if vigorous weed control is done until the saplings are taller than the surrounding grasses and herbaceous vegetation.

## PROPAGATION

Rain tree is easily propagated by several methods. It may be propagated by seed (the usual method), stem cuttings (using vertical stems), root cuttings, and stump cuttings. In much of the Pacific, however, no special effort is exerted to grow rain tree. If one or a few trees are wanted for home use, seedlings are dug from near a mature tree and transplanted to the garden. Even very large trees can be successfully transplanted with substantial root and top pruning and proper care. Seedlings are also encouraged to grow where they sprout by protecting them and providing some weed control. When larger numbers of trees are required, seed is collected for nursery planting or direct sowing in the field.

### Propagation by seed

#### Seed collection

Pods are collected from the ground beneath trees after they drop; picking pods off the tree is inadvisable because, although the pods take 5.5–8 months to mature, the seeds only fill out and become viable shortly before the pods fall. In some cases the pods are retained on the tree for up to 4 months past maturity.

#### Seed processing

In Latin America, seeds are manually extracted from the sticky, pitch-like pulp inside the pods. An easier method is to collect seeds from dung of livestock that has eaten the pods; in addition to being less labor intensive, germination is enhanced by passage through the digestive tract of herbivores. In Asia, the pods are placed in a dark place where termites eat the fruit valves and pulp, leaving behind clean seed.

#### Seed storage

The sweet, sticky fruit pulp (endocarp) promotes an intense insect attack, so careful cleaning of seed is vital before storage. Rain tree seed behavior is orthodox, that is, the seeds retain viability when dried and stored. Seed can be stored for extended time periods at 4°C (39°F) with 6–8% moisture content. Seed stored at 5°C (41°F) or colder retains viability longer than a year.

#### Pre-planting seed treatments

Fresh seed germination is about 36–50% with no treatment. Germination of untreated seed increases in the course of the first year of storage. Germination is also enhanced by passage of the seeds through the digestive tract of herbivorous animals. Scarification is not essential although it is recommended to ensure fast, uniform, and optimal germination. Manual nicking of the seed coat using a nail clipper or small file works very well, although it is time consuming. Alternatively, immerse the seed for 1–2 minutes in 80°C (176°F) water (water volume 5 times the seed volume). Stir the seeds, then drain and soak them in lukewarm (30–40°C [86–104°F]) water for 24 hours. This method yields 90–100% germination if damaged seeds are removed prior to treatment.

#### Growing area

Studies indicate that rain tree seedlings are intolerant of shade. Some literature sources recommend partial shade for seedlings in the first 2–4 weeks after emergence and then full sun; other sources state that seedlings should be placed in full sunlight from the beginning.

#### Germination

Germination occurs 3–5 days after sowing scarified seeds. Pretreatment, although not essential, results in more uniform germination and improves the percentage of seeds that germinate.

## INTERPLANTING/SILVOPASTURE

The tree is used in many regions to provide shade for coffee, tea, cacao, nutmeg, patchouli, and vanilla. It is also an important component in silvopastoral systems.

### Benefits

Nitrogen fixation at roots improves soil nutrition. Grasses under and near rain trees remain luxuriant and green when nearby grasses in full sun wither and brown. Nutritional value of grasses grown under rain trees is improved. Rain tree is a valuable component of pasture systems for ranching, providing shade from heat and intense sun as well as nutritious pods that are 12–18% protein and 40% digestible. Pods are eagerly eaten by cattle, hogs, and goats; horses eat them if there is nothing else available but reject them if other foods are available. The leaves contain 22–27% crude protein and in some Asian countries are used as a livestock forage supplement for cattle, sheep, and goats.

### Potential drawbacks of interplanting

Shallow roots, large branches and dense shade compete with companion crops, requiring heavy pruning to admit light.

## PUBLIC ASSISTANCE AND AGROFORESTRY EXTENSION

Extension offices for agroforestry and forestry in the Pacific: http://www.traditionaltree.org/extension.html

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traditional tree initiative

**Traditional Tree Initiative—Species Profiles for Pacific Island Agroforestry (www.traditionaltree.org)**

# *Samanea saman* (rain tree)

**Authors:** George W. Staples[1] and Craig R. Elevitch[2]

1. Botanist, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii, USA 96817-2704
2. Permanent Agriculture Resources, PO Box 428, Holualoa, Hawaii, USA 96725

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