

Stryphnodendron excelsum Harms

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FABACEAE (BEAN FAMILY)

Stryphnodendron microstachyum Poepp & Endl., *S. inaequale* Benth., *S. purpureum* Ducke

Vainilla

Stryphnodendron excelsum grows on both coasts from Nicaragua to Panama.

Stryphnodendron excelsum is a canopy tree that may reach 35 m in height and 1 m d.b.h. The tree has a reddish outer bark and a light yellow inner bark. Large trees are buttressed at the base, and the crown is rounded and irregular. Leaves are alternate, bipinnate, 15 to 35 cm long, with 8 to 15 pairs of opposite or subopposite pinnae 10 to 13 cm long. The pinnulae are alternate and subopposite, dorsiventral, 8 to 12 mm long, oblong or oblong-lanceolated, asymmetrical base, entire margin, and obtuse or emarginated apex (Flores 1992b). The rate of growth is fast, and the tree grows well in acid soils. The species grows at elevations up to 700 m, in areas with annual precipitation from 3500 to 5500 mm and a mean annual temperature between 24 and 30 °C (Flores 1992b, Holdridge and Poveda 1975).

The wood is soft and light, with specific gravity of 0.34 to 0.44. The wood is whitish to light brownish yellow or pink, odorless, and tasteless, with no differences between the heartwood and the sapwood in dry conditions. The grain is straight to slightly interlocked and fine textured, with irregular growth rings (2 rings per cm), diffuse porosity, and multiple pores in radial and tangential lines. The timber is easy to work, with high strength in relation to density, and is used for frame construction, pallets for banana export, and furniture, boxes, molds, and posts (Acuña and Flores 1987, Carpio 1992, Solís 1992).

Inflorescences are racemes, 10 to 15 cm long, grouped in axilar fascicles in the branch distal end. The flowers are small, 3 to 4 mm long, sessile, actinomorphic and hermaphrodite, with yellowish green calyx. The trees flower March through July and fruitification normally begins in November. Fruits are straight pods, 10 to 20 cm long, 1 to 1.5 cm wide, marginally dehiscent, with endocarp septate. Fruits mature from Novem-

ber to May. Collectors know the pods are mature when the color turns to brown.

Pods may be collected off the ground; however, collecting directly from the tree prevents animal or insect damage to pods. Pods are collected between December and February (Asociación Costarricense para el Estudio de las Especies Forestales Nativas 1994, Flores 1992b). A single tree may produce from 8,000 to 15,000 pods (90 to 160 pods per kg), with 9 to 16 seeds per pod, or 17 to 26 kg of seeds annually. Seeds average 9,000 per kg when moisture content is near 18 percent. Mean seed moisture content for a sample of 19 trees was recently reported at 15.25 percent (Müller 1997). Seeds with reduced moisture content (6.5 percent) kept at -15 °C can be stored for 2 years. Germination rates were over 90 percent when seeds were stored at temperatures from -15 °C to 4 °C with moisture content between 6.5 and 10 percent (Müller 1997).

Seed viability may range between 30 and 60 percent without pregermination treatment, to more than 95 percent when pretreated by cutting the seed testa. The germination is epigeous and occurs in steps. Up to 60 percent of the seeds may germinate during the first 10 to 30 days. Fewer numbers germinate weeks or months later. High variability in germination between trees and even within the same tree has been reported (Asociación Costarricense para el Estudio de las Especies Forestales Nativas 1994, Arias 1992, Flores 1992b, Müller 1997, Rodríguez 1995, Serrano 1994).

Seeds are sown in germination boxes filled with washed sand. Small seedlings (5 cm height) are transplanted to nursery potting bags with a potting medium composed of soil, sand, and compost in equal parts. Seedlings require half shade. When they reach 15 to 20 cm in height, seedlings may be planted. Trees in plantations may be infected by a vascular fungi, *Nectria* spp (Arguedas 1997).

ADDITIONAL INFORMATION

Species screening trials and demonstration plots of several tropical timber species including *S. excelsum* have been established in Costa Rica (Butterfield 1993). EARTH College (10° 12' North, 83° 37' West; 26 °C mean annual temperature; 3400 mm annual precipitation; 50 m above sea level), in the Province of Limón, Costa Rica, has established several plots. Data on average d.b.h. and height of vainillo trees from the demonstration plots seven years after planting are presented below (data taken from Russo 1997, 1999).

Age	Average d.b.h. cm	Average height m
1	3.2	1.6
2	8.3	4.7
3	12.2	7.5
4	16.7	10.0
5	21.9	12.6
6	24.4	16.4
7	26.7	19.8

Roots of *S. excelsum* interact with the azotrophic bacteria of the Rhizobiaceae, forming small nodules. According to Baker and Montagnini (1994), who estimated the proportion of nitrogen derived from the atmosphere (pNda) using a ¹⁵N dilution methodology, more than half of the N contained in the leaves (51.9 percent in 22-month-old plants) comes from N fixation. In addition, vesicular-arbuscular mycorrhizae (VAM) are present in its roots. Janos (1980) characterized the species as an obligate mycothroph. In the EARTH plots, 48 percent of the roots evaluated showed evidence of VAM (Russo 1995).

