

Hevea brasiliensis Müll. Arg.

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EUPHORBIACEAE (SPURGE FAMILY)

No synonyms

Caucho, hevea, hule, jebe, seringueira

Hevea brasiliensis is a fast-growing tree that reaches 40 m in height and 35 cm d.b.h. The tree has a straight trunk that is column-shaped and thick at the base; the bark is grayish green and branching is regular. The leaves are compound, trifoliate, alternate, dark green above and light green underneath, and have very marked nervation, a long petiole, and a pair of nectarean glands. The shape and composition of the leaves are varietal characteristics. *Hevea brasiliensis* loses its foliage each year, and refoiliation has a very attractive copper tone. The radicular system of the tree is made up of the pivot root and two crowns of lateral roots. The species grows well in soils at least 1 m deep with a pH of 4.0 to 6.5. The soil should be well drained and well ventilated. The tree grows on slopes ranging from zero to 70 percent at elevations from sea level to 1200 m. The optimal temperature range for the species is 22 to 30 °C, with an ideal average of 25 °C and a minimum temperature higher than 15 °C. Relative humidity should not exceed 70 to 80 percent (Bustamante and Reyes 1994). Annual precipitation must be between 1500 and 3000 mm; its distribution must be regular with a marked or well-defined annual dry period (preferably 3 to 4 months long), with a hydric deficit of approximately 300 mm that coincides with the defoliation/refoliation cycle. Areas with a high cloudiness index and frequent appearance of the dewpoint are not desirable, and the species requires 1,500 to 1,800 hours of annual sunshine. Winds greater than 8 m per second can damage or topple the tree (Rincon 1996).

Hevea brasiliensis is primarily used for its latex, which is tapped. The wood is used for small boards, matches, packing boxes, compressed wood textiles, round arches, and fuel. In the Colombian Pacific it is used as support beams on the floors of rural houses even though it lacks resistance to attacks by insects and fungi.

The flowers are monoecious, small, light yellow, and

grouped in clusters; inflorescence is axillary and lateral in the shape of a panicle. Masculine flowers are 8 to 10 mm long; feminine flowers are larger, 10 to 12 mm long. The fruit is a trilocular capsule containing one seed, rarely with four or six lobules, and 3 to 6 cm in diameter. The seeds are large, quadrangular ovoid, flattened on one or two sides, shiny, grayish or pale in color, with dark coffee-colored spots that are oval, and 2 to 3.5 cm in diameter. They have a spongy tissue that allows them to float, thus contributing to the dissemination of the species. Fruits are collected when they change from green to brown—the time at which the seeds have the most germinative power. Seeds average 180 per kg (Rincon 1996).

Because *H. brasiliensis* has a high content of oil, the seeds quickly lose their germinative power; therefore, planting must occur within 8 days after collection. Fifteen days after collection, the seeds' germination percentage decreases considerably. As a recalcitrant seed, it does not tolerate drying and dies when its humidity content reaches less than 25 percent of its fresh weight. Because a great amount of water is contained in the seed, temperatures less than 5 °C will kill it. If they do not dry out, seeds can survive from a few weeks to a few months. Ventilation should not be limited because the seeds have a high respiration.

Pregermination of the seeds must be done in sawdust beds. Seeds germinate shortly after release from the mother plant and 8 days after being planted. The average germination percentage is 60 percent. The germinator should be 1 m wide by 10 cm high with variable lengths. The germinator is prepared with muddy soil, which is covered with a layer of sawdust. The seeds are placed with their ventral surfaces on the sawdust, 1 cm apart. One thousand seeds will fit into 1 m² of germinator. A threshing floor of 1.7 m² will produce 1,700 seeds, which provide the 500 plants needed to plant 1 ha. Germination occurs 8 to 10 days after planting, and the plantules

are transplanted when they reach an appropriate developmental state. The threshing floors are watered abundantly to maintain humidity and facilitate germination.

Generally, 1 m² of germinator produces enough plantules to establish 133.33 m² of nursery or 430 m² of nursery in bags. The nursery is made up of two parts: the clonal garden and the growing area (nursery proper) (Bustamante and Reyes 1994, Rincon 1996).

In the clonal gardens, small twigs bearing buds for cloning are produced. When the buds, extracted from clones that are highly productive and resistant to diseases, are grafted onto the plantules, with sexual seed (pattern), grafted patterns or stumps are produced. In the field where the selected clones are multiplied, it is established through stumps. (The grafted pattern with the growing bud is released from the soil bare root.)

The planting distance is 1 by 1m. One year after planting, the stems can be used as bud-bearing twigs. Depending on the strength of the plant, one to three twigs per plant can be obtained. The sowing distance has recently been changed to 2 by 2 m, thus decreasing the number of stumps necessary for installation. In the traditional method, two twigs were left at each place; in the new method, four twigs are left. A clonal garden produces material for grafting between 5 and 6 ha of nursery per year for 10 years (Barrero 1984, Bustamante and Reyes 1994, Rincon 1996).

The petioles are cut two days before removing the twigs with leaves; the bud-bearing twigs must be used as soon as possible and must always be protected from the sun. After 1

year, grafted plants in the clonal garden produce 2 m of usable wood and each meter contains approximately 10 viable buds.

ADDITIONAL INFORMATION

The South American leaf blight (*M. ulei*) continues to be an insurmountable obstacle to the establishment of heveaculture in the central basin of the Amazon and constitutes a grave potential threat to production in Southeast Asia and western Africa. Resistant *H. brasiliensis*, *H. pauciflora* (Spruce ex Benth.) Müll. Arg., and *H. benthamiana* Müll. Arg. clones have been used as sources of resistance.

Because *H. brasiliensis* is very susceptible to attacks by the fungus *M. ulei*, escape areas must be described here. The possibility of escaping the fungus occurs when the natural refoliation period of the tree is made to coincide with the low relative humidity of the dry season, until the leaves become resistant at 2 to 3 weeks of age, depending on the clone and the race of the fungus. The concept of escape has been shown to be totally valid. The escape areas are characterized as having a pronounced dry season at least 4 months long, with at least two consecutive months when the relative humidity is less than 65 percent, with a maximum limit of annual hydric deficiency of 300 mm, according to the Thorwaithe Method, and an average annual temperature of 20 °C. The need for escape does not apply to young plants, which produce new leaves during the rainy months; in this case, chemical control is feasible (Barrero 1984, Bustamante and Reyes 1994, Rincon 1996, Valderama 1984).

