

Natural Rubber

Hevea brasiliensis, the **Pará rubber tree**, *sharinga tree*, *seringueira*, or, most commonly, the **rubber tree** or **rubber plant**, is a flowering plant belonging to the family Euphorbiaceae. It is the most economically important member of the genus *Hevea* because the milky latex extracted from the tree is the primary source of natural rubber.

- Natural rubber (NR) is an agricultural crop
- Synthetic rubbers is based on petroleum

Morphology:

Para rubber is a tall tree, 25-35 mt.; stem smooth, straight, un-branched up to a considerable height and then forming a leafy canopy; bark greyish with copious milky latex. Leaves are trifoliolate, alternate or sub opposite, at the end of the branchlets, long petioled; leaflets glabrous, elliptic-lanceolate, acuminate, entire, 10-15 cm. long; petiole 7—10 cm. long, glandular at apex.

Flowers small sweet-scented, unisexual, in large, terminal, paniced cymes.

Fruit a capsule, dehiscent into 3 one seeded cocci; seeds ellipsoid, 3-4 cm. long, mottled brown and shining.

Manufacturing process of rubber Natural rubber is obtained from latex which is a milky substance produced by rubber yielding plant. Tapping and processing are the main steps of the manufacturing process of rubber.

Tapping

When the bark of the *Hevea* tree is partially cut through (tapped), a milky liquid exudes from the



wound and dries to yield a rubbery film. The biological function of this latex is still obscure: it may help wound healing by protecting the inner bark, or it may serve other biochemical functions. The latex consists of an aqueous suspension of small particles,

about 0.5 micrometre in diameter, of *cis*-polyisoprene, a linear rubbery polymer of high molecular weight. The rubber content of the suspension is about 30 percent.

In this step a number of incisions are made in the bark of the trunk of rubber yielding plant by the help of a special knife. Usually incisions are made V-shaped. The incisions are made only on one side of the trunk at a time from the top to bottom. Tapping is done usually during morning hours because latex from the latex vessels found in the inner bark of the trunk, comes out more rapidly due to high turgor pressure.

The flow of latex gradually decreases towards noon and almost stop at noon. The latex is collected in earthen pots by keeping them just below the incisions. Anticoagulant like hydrogen peroxide (H₂O₂) or ammonia is added into the pot to check the coagulation of latex. The coagulated latex which is found attached to the incisions is collected separately from which low-quality rubber is made. Next tapping is done on either side of the trunk normally after 1-2 years.

Processing

- The latex obtained from rubber tree is first passed through a large aluminium sieve to remove the impurities like Pieces of bark and leaves
- Then the water content of the latex is measured with the help of a hygrometer and then it is standardized.
- Next the latex is poured in a larger container where it is allowed to coagulate.
- The coagulation of latex is done by continuous stirring with the addition of suitable amount of formic acid and acetic acid. At this stage some chemicals are also added to the latex to check the growth of fungi and also to make the rubber lighten in color.
- The coagulated rubber is washed with water and then the water is squeezed out by pressing it through roller. The thin rubber sheet formed after passing the latex through the roller is called crepe rubber.
- The “sheet rubber” is translucent, brown, elastic and durable.
- Rubber is mostly exported in the form of sheet rubber.
- Vulcanization of sheet rubber is required to increase its elasticity, tensile, strength and resistance. It is done by heating the sheet rubber by maintaining temperature at about 150°C with the addition of suitable amount of Sulphur, Selenium and Nitrogen.

What is vulcanization

Vulcanization is a chemical process in which the **rubber** is heated with sulphur, accelerator and activator at 140–160°C. The process involves the formation of cross-links between long **rubber** molecules so as to achieve improved elasticity, resilience, tensile strength, viscosity, hardness and weather resistance.

Uses of para rubber

- About 70% of the rubber produced is utilized to manufacture tire, tube and other article associated with the automobiles
- It is also used for making electrical goods, waterproofed materials and sports good.
- The hand globes used in electricity and hospital are made up of rubber.
- Hot water belts used in hospital also made up of rubber.
- Hard rubber is mostly used in electrical and radio engineering industries.
- Sponge rubber is used in carpeting.
- Rubber belt is used for transportation of breakdown vehicle.
- Different agricultural equipment is made from rubber