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Sterculia urens: Traditionally important medicinal tree

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Abstract
Non Timber Forest Produces (NTFPs) are essential needs and income generation opportunities for forest tribal communities. Many multipurpose tree species take advantage of the wide range of possibilities from just one species. *Sterculia urens* is one of the important NTFP species that has innumerable uses. The gum exudate of this tree is of great market value. This review is intended to highlight the importance of *S. urens* to the tribal peoples of India. *S. urens* can be a very important species for tribal communities to provide food, medicine and employment for their sustainable livelihood development.

Keywords: *Sterculia urens,* Karaya, g*um,* NTFPs, tribal, medicinal

Introductions
The indigenous tribes are wholly or partially dependent on forests for their livelihood as their home and consider them as an important element of their social life. Non-timber forest products (NTFPs) are the only natural resource that enables the availability and livelihood of the world's poorest people, and can play a vital role in the lives of marginal forest tribal groups worldwide (Dolui *et al*., 2014) [1]. Non-timber forest products refer to all biological inputs obtained from natural forests for human use, except wood. Nearly 170 million people live in India's forests and surrounding areas, more than half of whom are tribal people who rely on forest plants, especially trees, to produce non-timber forest products. (Narayanan and colleagues, 2011) [2]. NTFPs are also important for livelihoods, food security, nutritional value as well as job creation for more than 80 million people (FAO, 2020) [3]. According to ethnobotanical experts (Rout *et al*., 2010) [4], tribes have collected more than 500 plant NTFPs. Wild plants, spices, honey, oils, feed, gums, resins, gum resins, paints, wax, varnish, brooms, fibers, firewood, charcoal, fences, wildlife goods and raw materials such as bamboo, cane and others NTFPs are collected by tribal communities for subsistence, income generation or for their personal use (Bhattacharya and Hayat, 2004; Omkar *et al*., 2012) [5, 6]. In this review, we discuss the economic and medicinal importance of *Sterculia urens* to local forest communities.
Sterculia urens Roxb. (Family: Combretaceae) popularly known as ‘Karaya’ or ‘Kadaya’. *Sterculia urens* is commonly known as: Hindi: Kulu/Katira, English: Indian-Tragacanth

Taxonomic classification
Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Malvales
Family: Malvaceae
Genus: Sterculia L.
Species: *Sterculia urens* Roxb

Distribution
Sterculia urens are found at an elevation of 300-750 m. Temperature of its natural habitat varies from 40-48°C to 0-10°C and rainfall varies from 750-1250 mm. It is generally found in hill slopes, ridges, rocky crevices, eroded slopes and survives in stony, rocky, shallow and ferruginous well drained soils (Sukhadiya *et al*., 2019) [7]. *Sterculia urens* is naïve species in India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam, etc.

In India, it is found in tropical Himalayas, west and central India, throughout eastern and Western Ghats, including states; Andhra Pradesh, Assam, Maharashtra, Gujarat, Odisha, Rajasthan, Madhya Pradesh, Karnataka, Bihar, Chhattisgarh, Kerala, etc.

Morphological characteristics of *S. urens*

Characteristics	Details
Habit	Deciduous Tree
Height	Up to 15 m
DBH	2 m
Bark	Grey white or reddish (10-12 mm thickness)
Leaf	Palmately 5 lobed, 20-30 cm; alternate, crowded at the end of the branches
Flower	Greenish yellow, small in terminal pinnacles, bisexual
Fruit	Follicle 2-5 cm diameter, red, covered with stinging hairs
Seed	3-6 seeds, brown or black color, oblong.

Importance of *Sterculia urens* Gum

Tribal peoples use this species as traditional medicine to treat various ailments. Almost all parts of the plants have medicinal values, but the collection of the gum serves as a source of income and employment, as *Sterculia urens* gum has a long history of significant importance in the pharmaceutical, health, food, cosmetic, waste management, paper and textile, composite fiber and leather industries. The gum exudate of this tree has a great market value worldwide (Dhiman *et al*., 2019) [8]. *S. urens* gum is employed as a thickening ingredient, particularly in textile printing paste, and is also used commercially as a food additive. It is used as a pulp binder in the paper industry. It's also employed in the pharmaceutical, cosmetic, and leather sectors as a tablet binder and gelling agent. (Anderson and Wang, 1994; Nath and Nath, 2013) [9, 10]. According to Persistence Market Research Pvt. Ltd., the global Karaya Gum market might reach US$ 90.1 million by 2025. (www.prnewswire.com). During the forecast periods 2021-2026, advances in global urbanization, greater usage of chemicals and materials in the sector, and a growth in international firms, retailers, and national supply chains might cause the Karaya Gum market to expand. (www.marketwatch.com).

Traditional uses of various parts of *Sterculia urens* strains Gum and resin: Bark yields gum which is used in pharmaceuticals, tanneries, garbarti making etc. (Omkar *et al*. 2012) [6]. *S. urens* tree gum exudes used in foodstuffs as emulsifiers, stabilizers and thickeners (Oak *et al*., 2015) [11]. Gum of Karaya use to treat blisters, blood dysentery, dysentery, joint pain, stomach disorder, throat infection, tonic, jam, and confectionary. Emulsifier Thickener, Dental adhesive (Lujan-Medina *et al.* 2013) [12], A small amount of gum and a mixture of $CaCO_3$ are used as antidote for snakebite and are useful both externally as well as orally, Extract of gum is applied locally to remove the spine from the skin, helps in treatment of Leucoderma and peptic ulcer, Regularize menstrual disorders (Jain *et al*. 2005) [13], helps to remove blisters, joint pain, throat infections, thickening agent, especially in printing-paste for the textile industry. Being a good pulp binder it is used in paper industry. It is also used in pharmaceutical, cosmetic and leather industries (Kala, 2016) [14]. It is used as tablet binder and gelling agent in pharmaceutical industries (Nath and Nath, 2013; Kala, 2016) [10, 14]. The gum of *Sterculia urens* is also used commercially as food additives (Anderson and Wang, 1994; Kala, 2016) [9, 14]. It is also having importance in gynecology (Kala, 2011) [15], a fried mixture of resin and wheat flour/jaggery is given to women as a nutritious food, abdominal disorders (Dhiman *et al*., 2019) [8], regularize menstruation, burning sensation, bone fractures (Meena and Rao, 2010) [16].

Bark: Decoctions of bark used in delayed labour. The infusions of bark or wood are used for treating intestinal ulcers, stomach complaints, haemorroids and diarrhoea. Mixture of *Sterculia* stem bark and *Haldinia cordifolia* with pepper, decoction given orally for 9 days to treat Leucorrhoea by tribes of Eastern ghat, Arunachal Pradesh (Ratnam and Raju, 2005) [17], barks are also used for heals wound and throat infections (Oak *et al*., 2015) [11], rubbing the feet on the bark of *S. urens* can heal the cracks in the feet, where is half a cup of bark decoction taken once a day for 10-12 days to clear the uterus by Korku tribe of Amravati district, Maharashtra (Jagtap *et al*., 2006) [18], teaspoon of bark powder mixed with warm water once given helps in labor pains (Panduranga *et al.* 2011) [19] and is taken orally to maintain menstrual cycle (Jain *et al*., 2005) [20], stem bark ground with turmeric and the filtrate is mildly heated and administered in 2 spoonfuls twice a day for 5 days to treat Rheumatoid Arthritis (Rao *et al.* 2016) [21]. Oligospermia is treated by soaking the bark of the twig for 10 days and drinking water on an empty stomach. (Murthy, 2012; Dhiman *et al*., 2019) [22, 8].

Root: Root powder of *Sterculia urens* (Kullu) mixed with bark powder of *Ailanthus excelsa* and bark powder of *Madhuca longifolia* var. latifolia, leaf powder of Vitex negundo boiled in water which is used for bathing and 10 g of mixture taken with water to reduce body swelling uses by Korku tribe of Amravati district of Maharashtra (Jagtap *et al.* 2006) [18].

Seed: Seeds use to treat wound healing and throat infections (Oak *et al*., 2015) [11].

Leaf: A leaf, gum and bark of Karaya are used for wound and throat infection (Oak *et al*., 2015) [11], Leaf juice applied externally to treat wound fractures and cracked skin leukemia by the tribals in the Kollihills, Eastern ghats, Tamilnadu (Vaidyanathan *et al.* 2013) [23].

Tree branches: Cordage, facilitates child delivery, provides ease of delivery and is used as a tonic after childbirth (Kala, 2016; Kala, 2011) [14-15]. Leaves of *S. urens* are use as fodder for livestock of tribal communities (Omkar *et al.* 2012) [6].

Other NTFPs uses of *S. urens* by tribals Its bark is useful for making rope and rough cloth (Kala, 2011) [15], yields fibre (Omkar *et al.* 2012) [6]. Its Seeds are edible (Omkar *et al.* 2012) [6], eaten after roasting, it having nutritional value. Seeds and young tender roots are eaten in times of food crisis (Oak *et al*., 2015) [11]. The seed oil is suitable for edible purposes and soap manufacturing. (Galla and Dubasi, 2010) [24]. The branch stalk is used as a toothbrush to relieve toothache (Padal and Vijayakumar, 2013) [25]. Its wood is used for making chandelier, pencil, wooden picture frames, packing, etc. (Seth, 2003; Sivaraj *et al.* 2017) [26-27].

Conclusion

Efforts are needed in India to support research and development for clinical trials and research on *S. urens* in the field of medicine. Almost every part of *S. urens* are useful to cure various diseases. Other than the medicinal uses also useful for making rope, matches, clothes, toothbrush, pencil, wooden picture frames, packing etc. seed of *S. urens* also having high nutrition value and young tender roots and seed oil are edible. In nutshell, *S. urens* have multifarious uses and immense potential in tribal socio-economy in India.

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