



ECOLOGICAL STUDY ON *STERCULIA URENS* AND ITS FOREST COMMUNITY IN PENCH FOREST AREA SEONI (M.P.)

Kunta Thakre¹ and Dr. N. P. Bhalla²

¹Research Scholar Botany Swami Vivekanand University Sagar (M.P.)

²Prof. of Botany Swami Vivekanand University Sagar (M.P.)

ABSTRACT

Ecological studies in Pench National Park have explored the vegetation structure, plant community types, and the role of *Sterculia urens* (Karaya gum tree) within the dry deciduous forest ecosystem. These studies have investigated factors like tree density, basal cover, species diversity, and the impact of human activities on forest regeneration. *Sterculia urens* is a significant species in the area, valued for its gum and medicinal properties, but its natural regeneration faces challenges. *Sterculia urens* belonging to family Sterculiaceae. It is a medium sized deciduous tree met within Central Indian Forests. The plant parts are used in various ways for economic upliftments by the tribals. Non Timber Forest Produces (NTFPs) are basic needs and income generation opportunities for forest based tribal communities. Many multi-purpose tree species make broad their opportunity from only the single species. *Sterculia urens* is one of the important NTFPs species having myriads of uses. Gum exudate of this tree is having large market value. This research is to highlight the importance of *S. urens* to the tribal peoples of Pench forest area Seoni district (M.P.) India. *S. urens* can be very important species for tribal communities for food security, medicinal and employments generation for their sustainable livelihood development. *Sterculia urens* has a great economic importance. The medicinal and other importance of the plant has been noted from the mouth of tribal of Seoni district. From very ancient it was used in various ways. The two important treatises on Ayurveda, Sushrita Samhita and Charak Samhita describes the activity of the plants. Thus the study finally concluded that the *Sterculia urens* Roxb. plant is of a great economic as well as Ecological significance. The species should be managed silviculturally for the better regeneration and maintenance in the nature.



KEYWORDS: *Sterculia urens*, Kadaya, gum, NTFPs, tribal people Pench forest Seoni, medicinal value.

INTRODUCTION:

Forest management, as an important environmental indicator, has a significant impact on plant species diversity. Forest structure and function dynamics are influenced by several biotic and abiotic elements. The ecological qualities of locations, abundance, variety, species richness, regeneration and distribution state of species all have a significant impact on the nature of forest communities. The overall population structure represented by tree diameter and class distribution gives useful data about each given stand's reproductive capabilities. Furthermore, evaluating the variety of species indicators reflects the resilience and long-term viability of forest ecosystems. All of these elements are required for

maintaining biodiversity and conservation. Therefore, properly assessing the ecological makeup of every forest area is critical for scientific oversight. The study gives data on species diversity, community structure, resource allocation in niches, and the rate at which species change in an ecosystem. Species diversity, community structure, resource allocation for niches, and species turnover rate in a forest ecosystem can all be learned via a thorough vegetation analysis. Trees, as a key component of vegetation, need careful monitoring and management in order to preserve habitat as well as species variety, which, in consequently, are crucial features of the dynamics of forests that influence succession processes. The collection of tree varieties will thus be a helpful tool for providing knowledge of forest varieties and maximizing biodiversity protection. To examine floristic structure, diversity of species, structural analysis and community are essential for providing the required information on forest diversity and species richness, and different species of vegetation are helpful for forest administration and help to understand ecosystem activities and forest ecology. Furthermore, understanding the structure and floristic composition of a forest is beneficial for describe biologically or efficient significant plants and their diversity, as well as safeguarding endangered and commercially important plant species. Forests play a crucial role in maintaining environmental balance and offer numerous benefits to people and other animals. Central India's tropical dry forests are biologically rich, with a variety of floristic compositions. It also boasts a varied range of commercial and medicinal plant species on which the residents rely to satisfy their basic needs and sustain their livelihoods.

Sterculia urens Roxb. is moderate sized tree found in Mahakoshal region Indian Forest and other parts of India and also in the world. *Sterculia urens* belonging to family Sterculiaceae. Its Ayurvedic name is Kullu. It is a principal tree of hilly area of Central India and coromandel coast. It has also ecological importance in Satpura hills. Indigenous tribes are entirely or partially reliant on forests for their subsistence call forests home and consider it a significant element of their social lives. Non-Timber Forest Products (NTFPs) are the sole natural resource that allows accessibility and subsistence to the world's poorest people, and they may play a critical role in the life of forest fringe tribal groups all over the world (Dolui *et al.*, 2014). Non-timber forest products refer to all biological supplements acquired from natural forests for human use other than wood. Nearly 170 million people live in India's forests and surrounding regions, with more than half of them being tribal who rely on forest plants, particularly trees, for non-timber forest products. (Narayanan and colleagues, 2011).

NTFPs are also important for the livelihoods, food security, nutrition value well as for job creation of more than 80 million people (FAO, 2020). More than 500 plants NTFPs have been gathered by tribes, according to ethnobotanical experts (Rout *et al.*, 2010). Wild food plants, spices, honey, oils, fodder, gums, resins, gum-resins, colours, wax, lac, brooms, fibers, fuel wood, charcoal, fences, wildlife goods, and raw materials such as bamboo, cane, and other NTFPs are collected by tribal communities for livelihood, income generation or for their personnel uses (Bhattacharya and Hayat, 2004; Omkar *et al.*, 2012).

Forest resources have value to human beings. The forestry is an art and science of managing an devaluating forest resources with the object of producing goods and services on sustained basis of human society. Forests provide several products broadly classified as major and minor forest products which serve as back-bone in rural economy. In this research, we are discussing about economic and medicinal significance of *Sterculia urens* for local forest dwelling communities.

MATERIAL & METHODS:-

Pench Tiger Reserve or Pench National Park is a tiger reserve in India straddling across Madhya Pradesh and Maharashtra. On the Madhya Pradesh side, it encompasses a core area of 411.33 km² (158.82 sq mi), with a buffer of 768.3 km² (296.6 sq mi), making for a total protected area of 1,179.63 km² (455.46 sq mi). On the Maharashtra side, the Pench Tiger Reserve has a core habitat area of 257.3 km² (99.3 sq mi) along with a buffer zone of 483.96 km² (186.86 sq mi) making total protected area of 741.2 km² (286.2 sq mi). Pench Tiger Reserve comprises Pench National Park, Mowgli Pench Sanctuary and a buffer area, which span more than 1,920 km² (740 sq mi).

An extensive literature survey was carried out for compilation of ecological and medicinal information on selected gum yielding woody plant species *Sterculia urens* Roxb. The data were compiled on the traditional uses of various plant parts of these species along with industrial applications and various management practices as adopted by the local communities and the concerned state departments. The fieldwork was conducted in Pench forest division Seoni Madhya Pradesh of India. An ecological and medicinal survey was conducted eliciting information through personal interviews of villagers with the help of local assistants and also through direct and indirect observations made during the field surveys. Locals who practice traditional medical practices and local elder and knowledgeable people were interviewed for information on medicinal uses and availability of selected gum yielding species in both the Indian states. The morphological characteristics of selected species were noted down during the survey period. Various gum harvesting practices from the selected species were also recorded.

RESULT AND DISCUSSION:-

Sterculia urens Roxb. (Family: Combretaceae) popularly known as 'Karaya' or 'Kadaya'. *Sterculia urens* is commonly known as: Gujarati: Kadayo/Kogdol, Konkani: Pandruk, Hindi: Kulu/Katira, English: Indian-Tragacanth

| Taxonomic classification | Plantae |
|--------------------------|---------------------|
| Kingdom | |
| Phylum | Tracheophyta |
| Class | Magnoliopsida |
| Order | Malvales |
| Family | Malvaceae |
| Genus | <i>Sterculia</i> L. |
| Species | <i>urens</i> Roxb |

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. |

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). *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.

Importance of *Sterculia urens* Gum

Tribal peoples use this species as traditional medicine to cure various ailments. Almost all plant parts having medicinal values, however, the collection of gum serves as income and employment generation source since the *Sterculia urens* gum has significant importance in pharma, health care, food, cosmetics, waste management, paper-textile, composite fiber, and leather industries from a long period of time. Gum exudate of this tree is having large market value at globally (Dhiman *et al.*, 2019). *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. (CSIR, 1976; Anderson and Wang, 1994; Nath and Nath, 2013). 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 different parts of *Sterculia urens* by tribals

Gum and resin: Bark yields gum which used in pharmaceutical preparations, tanneries, garbarti making, etc. (Omkar *et al.* 2012). *S. urens* tree gum exudes used in foodstuffs as emulsifiers, stabilizers and thickeners (Oak *et al.*, 2015). 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), A small amount of gum and a mixture of CaCO₃ 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), 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 (CSIR, 1976; Kala, 2016). It is used as tablet binder and gelling agent in pharmaceutical industries (Nath and Nath, 2013; Kala, 2016). The gum of *Sterculia urens* is also used commercially as food additives (Anderson and Wang, 1994; Kala, 2016). It is also having importance in gynecology (Kala, 2011), a fried mixture of resin and wheat flour/jaggery is given to women as a nutritious food, abdominal disorders (Dhiman *et al.*, 2019), regularize menstruation, burning sensation, bone fractures (Meena and Rao 2010) .

Bark: 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), barks are also used for heals wound and throat infections (Oak *et al.*, 2015), 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), teaspoon of bark powder mixed with warm water once given helps in labor pains (Panduranga *et al.* 2011) and is taken orally to maintain menstrual cycle (Jain *et al.*, 2005), 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). 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).

Root: Root powder of *Sterculia urens* (Teklej) 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).

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

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

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

Other NTFPs uses of *S. urens* by tribals

Its bark is useful for making rope and rough cloth (Kala, 2011), yields fibre (Omkar *et al.* 2012). Its Seeds are edible (Omkar *et al.* 2012), eaten after roasting, it having nutritional value. Seeds and young tender roots are eaten in times of food crisis (Oak *et al.*, 2015) [20]. The seed oil is suitable for edible purposes and soap manufacturing. (Galla and Dubasi, 2010). The branch stalk is used as a toothbrush to relieve toothache (Padal and Vijayakumar, 2013). Its wood is used for making chandeliers, pencil, wooden picture frames, packing, etc (Seth, 2003; Sivaraj *et al.* 2017).

CONCLUSION

Forest are valuable natural resources, the goods provided by forests are of immense importance. Man's relation with plants is immortal; it is observed that man has always selected forests places for their habitat because they satisfy a number of basic necessities of life. *Sterculia urens* is a vital component of the forest community in Pench, providing habitat and resources for various species. The gum extracted from *Sterculia urens* is a valuable NTFP, providing income and livelihood opportunities for tribal communities. Unsustainable harvesting practices, such as excessive gum tapping, have resulted in the decline of *S. urens* populations in some areas. Conservation and sustainable management strategies are crucial to ensure the long-term survival of *S. urens* and the well-being of the communities that rely on it. Pench, with its rich biodiversity, is a key area for studying the ecological interactions between *S. urens* and the forest community. Almost every part of *S. urens* are useful to cure various diseases. Thus the study finally concluded that the *Sterculia urens* Roxb. Plant is of a great economic as well as Ecological significance. The species should be managed silviculturally for the better regeneration and maintenance in the nature.

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