

EMERGENCY EXTINCTION AND PRESENT STATUS OF THE BIODIVERSITY OF SHOREA TUMBUGGAIA ROXB IN SESHACHALUM HILLS OF EASTER GHATS

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Article Received on
12 March 2016,

Revised on 01 April 2016,
Accepted on 22 April 2016

DOI: 10.20959/wjpr20165-6170

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ABSTRACT

Shorea tumbergaia Roxb. belonging to the family Dipterocarpaceae, is globally threatened medicinal tree tax is valued for its timber and pharmaceutical properties. The systematic study was conducted on the distribution of the *shorea tumbergaia* in seshachallum hill region revealed a rich resources for many of the things. Now this tree is facing high risk of extinction in wild due to ecological conditions specially Forest fires and other anthropogenic pressures seem to have affected the vegetation considerably. There is an urgent need to protect this endangered and endemic plant in Seshachalum area.

ABBREVIATIONS: *Shorea tumbergaia*, endangered species and conservation.

INTRODUCTION

India is the seventh largest and one the 12 mega biodiversity countries in the world having rich biodiversity due to its strategic locations with respect to zoological significance. The varied climate conditions give rise diversity of flora and fauna containing in the 12 major biogeographically limits with exclusive endemic species of India subcontinent. Acquiring knowledge of flora is of immense scientific and commercial importance. India is a large country covering wide diversity in environment and biogeographically conditions which leads to the development of wide range of vegetation types^[1] and represent a very rich flora including a large number of endemic species.^[2, 3&4] Region wise consolidation and up-to-date account of flora survey help us to understand the biological wealth of the country and their distribution and status. It has become clear that biodiversity is the cornerstone of our existence on Earth. It is also important to conserve biodiversity for the sake of our own

curiosity and aesthetic appreciation. The study area Seshachalum hill range is a part of 11th hot spot of India, harboring large number of endemic species due to vivid geographical conditions and climatic factors. These are favorable for the distribution of endemic plant wealth along with an admixture of a very rich deciduous semi ever green and evergreen species established in different climatic zones of these hills.^[5] The seshachalum hill range is situated between 79° 19' and 79° 23' East Latitude and 13° 37' to 13° 47' North latitude. The present study is mainly on Biodiversity and conservation of *Shorea tumbergia* Roxb Seshachalum forest of Eastern Ghats Which is under threat.

Discription of plant

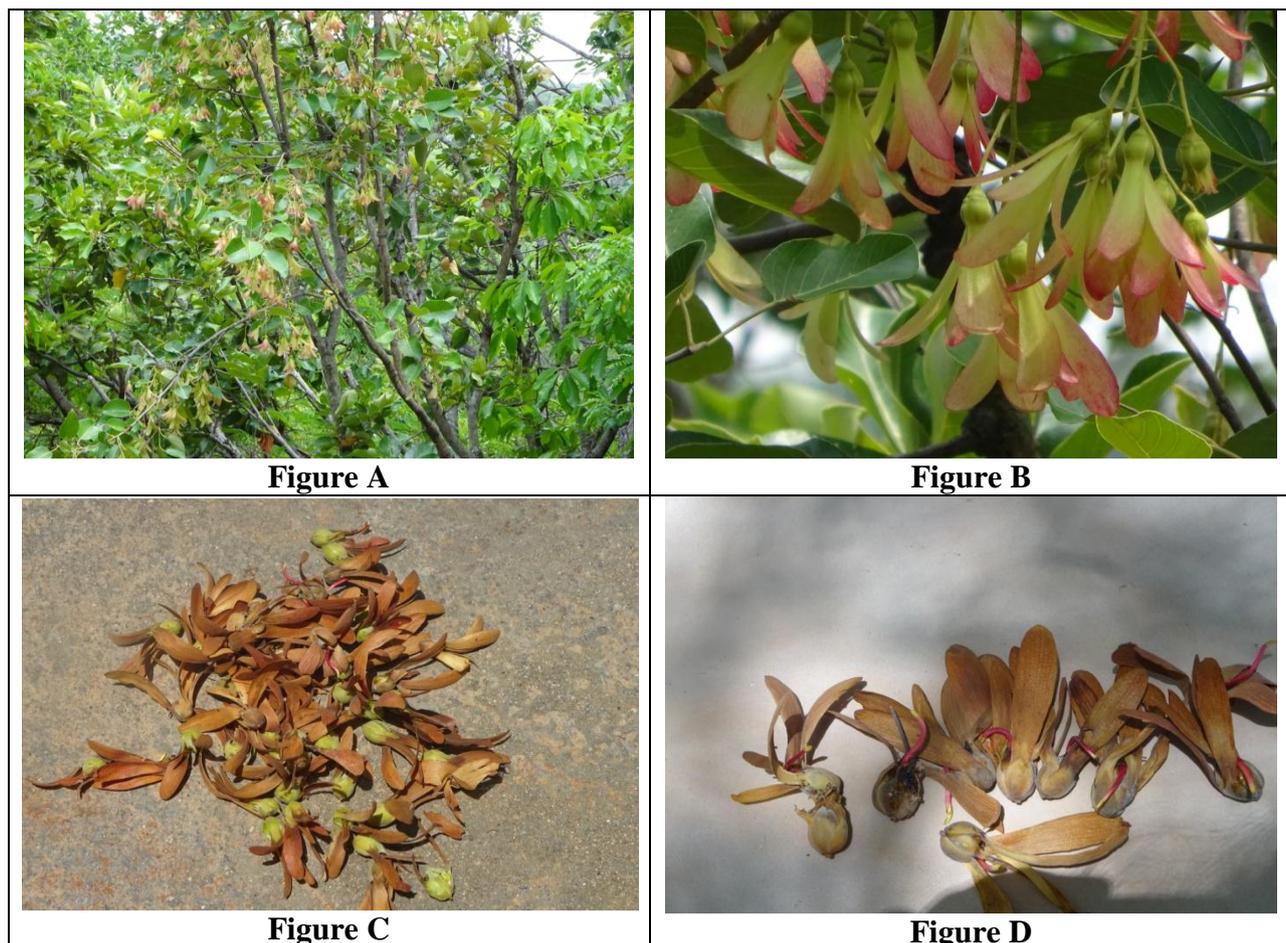
Dipterocarpaceae, a well known family of the Asian rain forests^[6&7] has been variously assigned to Malvales and Theales and consists of the following three subfamilies with an intercontinental disjunction distribution: There are approximately 520 species belonging to 17 genera amongst which the Asian dipterocarps include 470 species alone. It constitutes prominent elements of the lowland rain forests^[8] and is also well represented in the under storey. The genus *Shorea* (family Dipterocarpaceae) is native to Southeast Asia, from northern India to Malaysia, Indonesia and the Philippines. It is a tropical genus with 196 species of mainly rainforest trees, out of which 148 species are currently listed in the IUCN Red List; majority of them are listed as critically endangered. *Shorea tumbergia* Roxb is tree taxa, IUCN Red List of Threatened Species, belonging to the family Dipterocarpaceae. *Shorea tumbergia* is perennal tree. In India leaves appear in March, The flowers appear in March-April, the fruit ripen in June-July and leaves are shed in January-February. The common names of this plant is Green dammar tree, Tembagam, Tampakam, Thambagum, Vanbogar, Kangu, Kango, Karunthumbi, Karuppdamar, Tambagum, Tambugai, Googilaparra, Jalori, Nalladammar, Tamba, Thamba. This tree can be found at altitude from sea level to 900 m. The tree can reach a height of up to 18 m, but usually they are smaller. They tolerate below 13°C temperature.

Distribution in Tirumal hills

Shorea tumbergia is a species of plant in the Dipterocarpaceae family. It is endemic to India. The species is found widely in Seshachalam and Veligonda hills in Cuddapah and Tirupati hills of Chittoor district of Andhra Pradesh to North Arcot and Chingleput, districts of Tamil Nadu.

The distribution of *Shorea tumbergia* in tirumal is located in Akasaganga, Papavinasanam, Japali, Microstation, Darmagiri, Venugopal Gudi and Seshatherdam. It is also located in Sadasivakona which is located between Ranigunta and Papanaidu peta. There is less distribution of this plant in Talakona area also. For this research study We have selected Akasaganga, Papavinasanam and Japali area during the flowering and fruiting season of 2014-16 because the Distribution in this region is more when compared to other area. In this area nearly 30 plants are present. Out of this only 4 to 5 have en mass fruiting.

FIGURE 1: SHOREA TUMBUGGAIA



- A. *Shorea tumbergia* Roxb in tirumal forest
 B. *Shorea tumbergia* Roxb in flowering stage
 C. *Shorea tumbergia* Roxb seeds
 D. *Shorea tumbergia* Roxb infected seed

REPEODUCTIVE BIOLOGY

The majority of *Shorea* are But in *Shorea tumbergia* flowering species. General flowering is an event that occurs at irregular intervals of 3–10 yr. Flowering occurs during the fourth

week of April and first week of May. In this some trees or at 12-15m height, while all other are sub-canopy tree at 8-10m height. Flowering occurred on some branches exposed to sunlight in canopy trees Akashaganga, Papavinasanaum and Japali in 2014-2016. During each year, the flowering trees were different at both the study sites. Mass flowering occurred during the short flowering period.

And flowers were covered under the foliage. Inflorescence is a long drooping, terminal or Axillary racemose panicle with an average of 20 flowers [Fig-1a&b]. *Shorea tumbergia* is a constituent of the seasonal forest in the Easter Ghats, is semi-evergreen and exhibits leaf transitional stage which is characterized by simultaneous leaf fall and new leaf flushing during April-May. This leaf phenology is due to the drought conditions in the forest and it may provide a stimulus for the onset of flowering. In which nearly all Dipterocarp species together with species of other families bloom heavily.^[9] Each fruit produces only one seed, the seed has no dormancy and the embryo is chlorophyllous. It begins germination immediately after the fruit falls to the ground. *Shorea* are insect pollinated and a variety of insects have been implicated, with species within the sections of *Shorea* sharing the same insect pollinators. Flowering within a section is sequential within one habitat and species association to prevent competition for pollinators.

MEDICINAL VALUE

Since all parts of *Shorea tumbergia* are medicinally important, using species using as folklore claims has therapeutic qualities. Leaf juice is used as ear-pain drops for children. The stem barks having anti-ulcer activity. Stem bark is good source for secondary metabolites maximum total phenolic content has been reported in stem bark after flower buds of *Shorea*.^[10] The traditional usages of *Shorea tumbergia* as folklore medicine, the plant parts are administered to counteract heavy sweating. The gum is used in indigenous medicine as an external stimulant and a substitute for arbutus.^[11&12] Anti-inflammatory and anti-nociceptive activity of leaf extract of *Shorea tumbergia* Roxb traditionally used by tribal people. The stem bark revealed that major source for various secondary metabolites like phenols, flavonoids, tannins, anthocyanins, triterpenoids when compared to the stem and leaf.^[13] stem bark of *Shorea tumbergia* has significant anti-ulcer property.^[14] *Shorea tumbergia* Roxb. (Dipterocarpaceae) Drinking of a cup of decoction prepared from either leaf or bark powder relieves joint pains. It shows a potent anthelmintic activity.^[15]

DISCUSSION

In Eastern Ghats besides natural vegetation, there are numerous exotic species widely spread throughout the Eastern Ghats whose floristic composition differs from the natural vegetation. The vegetation of Eastern Ghats is remarkable for the concentration of character species like *Pterocarpus santalinus*, *Shorea robusta*, *Shorea tumbergia*, *Syzygium alternifolium*, *Santalum album*, *Terminalia pallida* etc. in certain well defined areas and for the presence of complex associations of tropical, sub-tropical and temperate species and of evergreens at the elevation of about 1100m above mean sea level. As a whole, the vegetation is typically deciduous type and scrub jungle in most places.

REASONS FOR THE BIODIVERSITY LOSE IN HOTSPOTS

There are main reasons why species are being threatened in these biodiversity hotspots are habitat destruction, resources management, Poaching and climate change and forest fire. In recent decades, human encroachment has posed a threat to India's wildlife; in response, the system of national parks and protected areas, first established in 1935, was substantially expanded. The key threats in these ranges are Construction and Quarrying. The Andhra Pradesh State Highway Project is undertaking the upgradation of highways in the state of Andhra Pradesh other construction is of the Kapil Teertham Dam inside the Sri Venkateswara national park by the Andhra Pradesh Government and the Tirumala Tirupati Devasthanam. Both these constructions raise concerns over the potential impact of the road and the dam on the habitat and the wildlife.^[16]

Haphazard mining, logging, poaching, forest fires, unsustainable harvest of forest produce, proliferation of rare species, smuggling and export of rare flora and fauna, encroachments of forest land and infrastructure development, myopic industrialization, springing up of habitations with an intention to colonize and devour the forest. The forest area in the Eastern Ghats has shrunk to half of what it was at the beginning of our republic. Exponential growth and development accelerated the decline of the natural glory of Eastern Ghats has to stop.

Though Eastern Ghats is such a rich and diverse eco-geographic unit, it has not caught the attention for conservation and to protect has national heritage is a prominent eco-geographic unit, for ages the hill ranges were not viewed as one entity since they are dissected by river gaps, wetland and planes. There is a felt and immense need of a concerted and macro level conservation movement by the involvement of all stakeholders especially the public, for

Eastern Ghats region. It is also felt that collectivizing or binding all individuals and civil society groups in to a network will bring much focus and strength to this cause.^[16]

REASONS FOR THE ENDANGERED STATUS OF THE SHOREA TUMBUGGAIA

The reason for endangered status of the plant in tirumal region is phenology status of the flower that is continued up to the seed formation. Even though massive flowers were present in that there is no anthers found in the flowers. From flowering stage on words more bees and Wild Red Aunts are found on the trees. Out of this only 40% of the plants pollinated by pollination and seed set happens. The fruits are winged and mature with 20-30 days. The seeds lack Dormancy, some seeds germinate before falling from the tree and some seed germinate as soon as they fallen from trees. The poor seed set is due to the high temperature. The healthy fruiting occurs in ever 1-3 years, but not in every year. This is common in Shorea species. The germination is very fast as soon as the seed is fallen Hypocotyle comes out in the form of long ,cylindrical red color structure and penetrate into the litter and produce root, only 1or2 plants are produced with root,shoot and leaf [fig-1b&c]. The percentage of germination is high but seed ling production is very less of 0.01%. Even though rich nutrient soil is present under the tree the growth of the seed is suppressed due to the seed born diseases, some unknown beetles and due Ecological conditions like high temperature suppress the growth of the plant. Because fruit set, seed fall and germination takes between May-July. The seeds are produced irregularly and sparsely in some species and fruit production varies in quantity and quality from year to year. Mass fruiting appears to favor seed predators. Seed predation can be very high and crops can be completely wiped out. The major losses are caused by insect pest was also observed on other Shorea species.^[17, 18] The seeds are infected by both pre and post dispersal Insects. Some seed born fungal infections most probably takes place during the flowering period or at the early stage of fructification. The seed collection is very difficult because so many Aunts cover total tree. The seeds are collected by moving the tree mechanically or the seeds which are fallen on the ground. The collected seeds cannot store artificially. Bacteria, Viruses and especially fungi cause loss of seed viability. Infection takes places on the tree, during the flowering, development of fruit, on the ground at the fruit fall, and during the period from harvesting to sowing in the nursery. Seed fungi been identified in Tree species, ^[19,20,21,22 &23] the mature mature seed germinate within 3-5 days after collection. The seed germination can be avoided by keeping the seeds in refrigerator under 10-15 ° temperature. But seed born disease will destroy embryo. Seed destruction in forest is also noticed in forest trees.^[21] Finally the percentatge of healthy seed

is only 3-5% only after collection. The study reveals that seed Predator, absence of of seed dormancy, incomplete seed germination, an able to preserve seed artificially for long time, Seedlings and saplings in nurseries also damaged by insects and other pest Might leads to the endangered status of the plant.

BIOSECURITIES

Seshachalam hill ranges of Andhra Pradesh have been designated as Biosphere Reserve. Several Wildlife Sanctuaries have been established in the Eastern Ghats to preserve its Biodiversity. There is an urgent need to conserve this endemic, endangered and threatened tree by artificial seed germination by established herbaria and medicinal plant gardens and developed packages for cultivation of economically important medicinal plants with modern techniques including tissue culture, and genetic engineering. Enrichment plantations could be taken in degraded forestlands to introduce valuable species and a mixture of species having multipurpose characters. Appropriate conservation measures will not only stop further depletion of trees, but will also help in improving tree diversity in Eastern Ghats. The country needs to establish a network of forest sites across the biogeography regions of the country. However, a network of *in situ* (field) gene banks, in the forest habitats is the most cost-effective way to manage the intra- and interspecific diversity.

ACKNOWLEDGMENTS

The author is thankful to UGC for founding. The author is thankful to Dr. M. Purushotham Reddy Principal, K.V.R Degree College for Women (A), Kurnool for providing the facilities.

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