

Chapter 6

Ecological, medicinal, and economic importance of *Gmelina arborea* Roxb.: a native tree of India

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ABSTRACT

Multipurpose trees like *Gmelina arborea* have high values for its versatile uses of almost all the plant parts. Choosing the right species for plantation programmes is necessary to cope up the deforestation and its impact on climate change. An attempt has been made to gather the literature of the importance of *Gmelina arborea* that fits best to be chosen as one of the best species for Plantation of forest edges, avenue, urban forestry, etc. Ecological, medicinal, and economic importance of the said species has been provided with photographs for easy identification. This recapitulative information could help individuals, government, and non-governmental organizations, etc. to include such species in the plantation programmes for the benefit of the people, conserving birds, and healthy environment.

Keywords: Tree species, conservation, Ayurveda, plantation, economic

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Introduction

Gmelina arborea is a tree species of Lamiaceae family that thrives in a different forest habitat. The species grow well in the tropical regions but are adaptive to a wide range of elevation ranging from 0 to 1200 m above the mean sea level. The species is native to South Asian countries like India,

Myanmar, Thailand, Laos, Cambodia, South province of China, Vietnam, Sri Lanka, Pakistan, etc. In India, it is distributed in the foothills of North-Western Himalayas, Western Ghats and widespread through the Deccan Peninsular region. Again, it is also found with good population in the Andaman Islands (Berry et al. 2021; Ashalata and Sankh 2014). In India, the species has gained great importance due to its use in the ancient therapeutic system like the Ayurveda. Apart from its therapeutic values, each part of the tree including flowers, leaves, fruits, wood, bark, and root has species uses that benefit not only human but also birds and bees. The rapid urbanization has led to the deforestation of forest for construction of roads, cities, towns, etc. that has clearly cause tremendous impact on global warming, climate change, loss of habitat for wildlife, etc. This greatly demands for afforestation in large scale to cope with the loss carbon sinks, climate change impacts and restoration of wildlife habitat. The present study attempts to highlight the potential tree species like *Gmelina arborea* for plantation in large scale considering its exclusive multipurpose uses. The tree is also known as white Teak as the bark show dark grey or greyish brown in colour, cordate leaves, and yellow flowers. For easy identification, photographs of the plant parts are illustrated in Figure 1. Table 1 also shows the nutshell of the different values of *G. arborea* for the present study. *G. arborea* naturally prefers a warm temperate region and reported to be distributed in the rain forest, semi-evergreen forest, sub-montane, moist teak forest and even in dry deciduous forest (Orwa et al. 2009). Several field survey by the authors in the dry deciduous forest of Odisha found its distribution in good population at the forest fringes, villages and even in the semi urban areas of Cuttack, Odisha. The species prefer silt or loamy soils that are well drained. It could be found growing profusely near rivers or streams. It can tolerate a wide range of pH of 5.0 – 8.0. However, growth on poor soil conditions, less drained soil or high acid leached soils could show stunted growth. The flowers of *G. arborea* attracts many nectar birds

and bees and the fruits attract frugivorous birds. This also makes a healthy relationship with human trees and avian and other wildlife (Orwa et al. 2009; Ashalata and Sankh 2014; Berry et al. 2021).

Table 1: Potential values and particulars of *Gmelina arborea*

Potential Uses	Particulars of Uses	Reference(s)
Ecological Uses	❖ Provide nectar for nectar birds, bees, etc. ❖ Adaptive to wide range of ecosystem & habitat: Elevation (0-1200) m; Mean annual rainfall (750-4500) mm ❖ Fast growth rate ❖ Weed control after 18 months ❖ Habitat restoration for wildlife and avian	Orwa et al. 2009; Berry et al. 2021
Medicinal Uses	❖ Ingredients of Dashmoola and Brihath Panchmoola ❖ Flowers, fruits, leaves, barks and roots use for medicinal purposes	Pathala et al. 2015; Berry et al. 2021; Ashalata and Sankh 2014; Kulkarni and Veeranjaneyulu 2013

	❖ Fruits helps in enhancing memory, revuvinating, aphrodisiac activities, etc. ❖ Root used in hallucination, fever, haemorrhoids, laxative, dyspepsia, tonic, etc. ❖ Bark has antidiabetic properties	
Economic	❖ Fodder, fuelwood, fibre for paper; timber; dye, wood less degrading, dimensional stability and durability, etc. ❖ Also use in making particle board, plywood, core stock, furniture, carriages, musical instruments and sports products, etc.	Orwa et al. 2009; Berry et al. 2021

The species pertains a high medicinal value and has also been recorded in the ancient therapeutic system of Ayurveda of India. In Ayurveda, *G. arborea* has been used for several diseases and disorders.

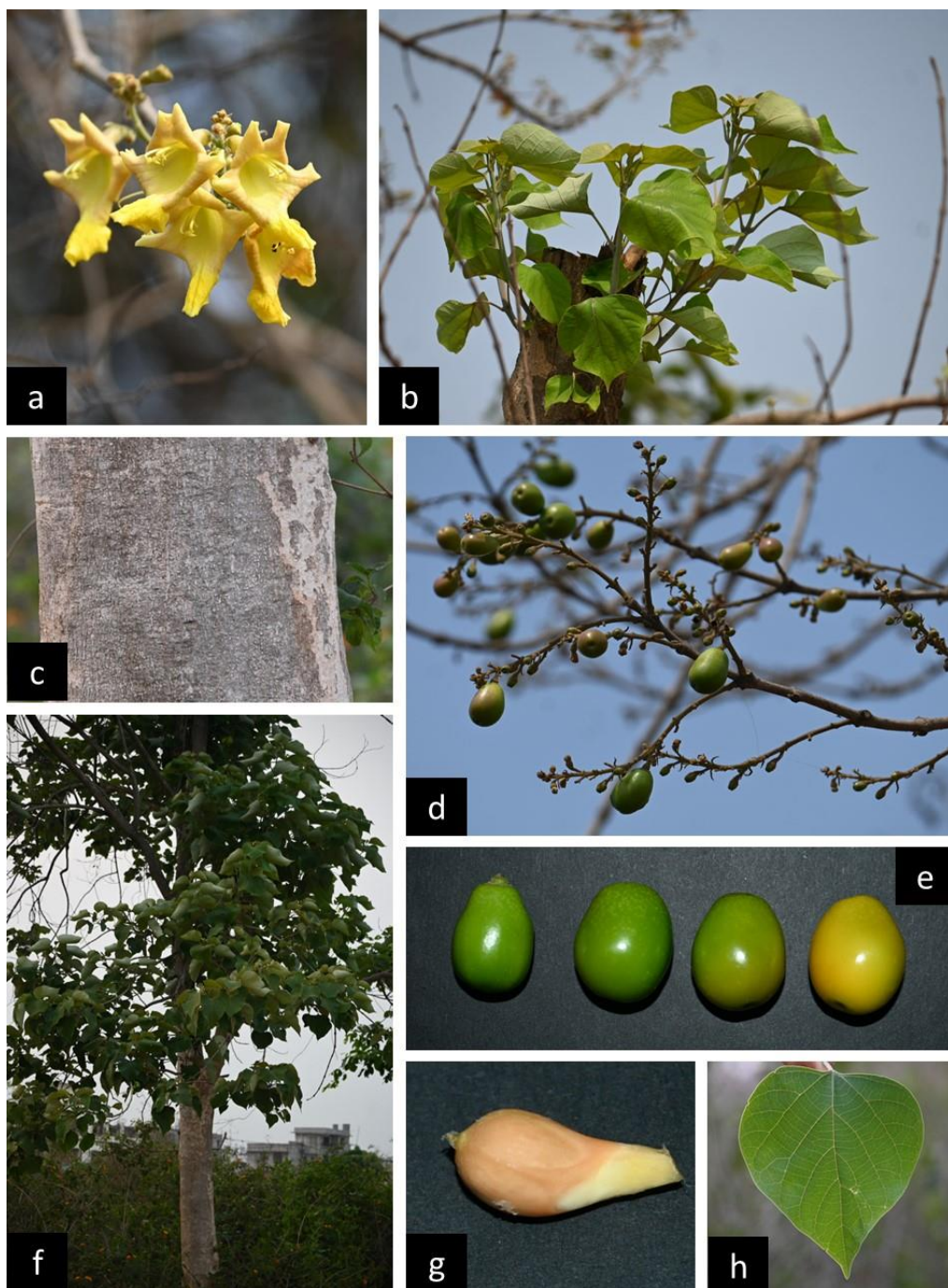


Plate 1: Plant parts of *Gmelina arborea* a) flower b) leaf foliages c) bark d) & e) fruits f) whole tree g) seed h) cordate leaves of *G. arborea*

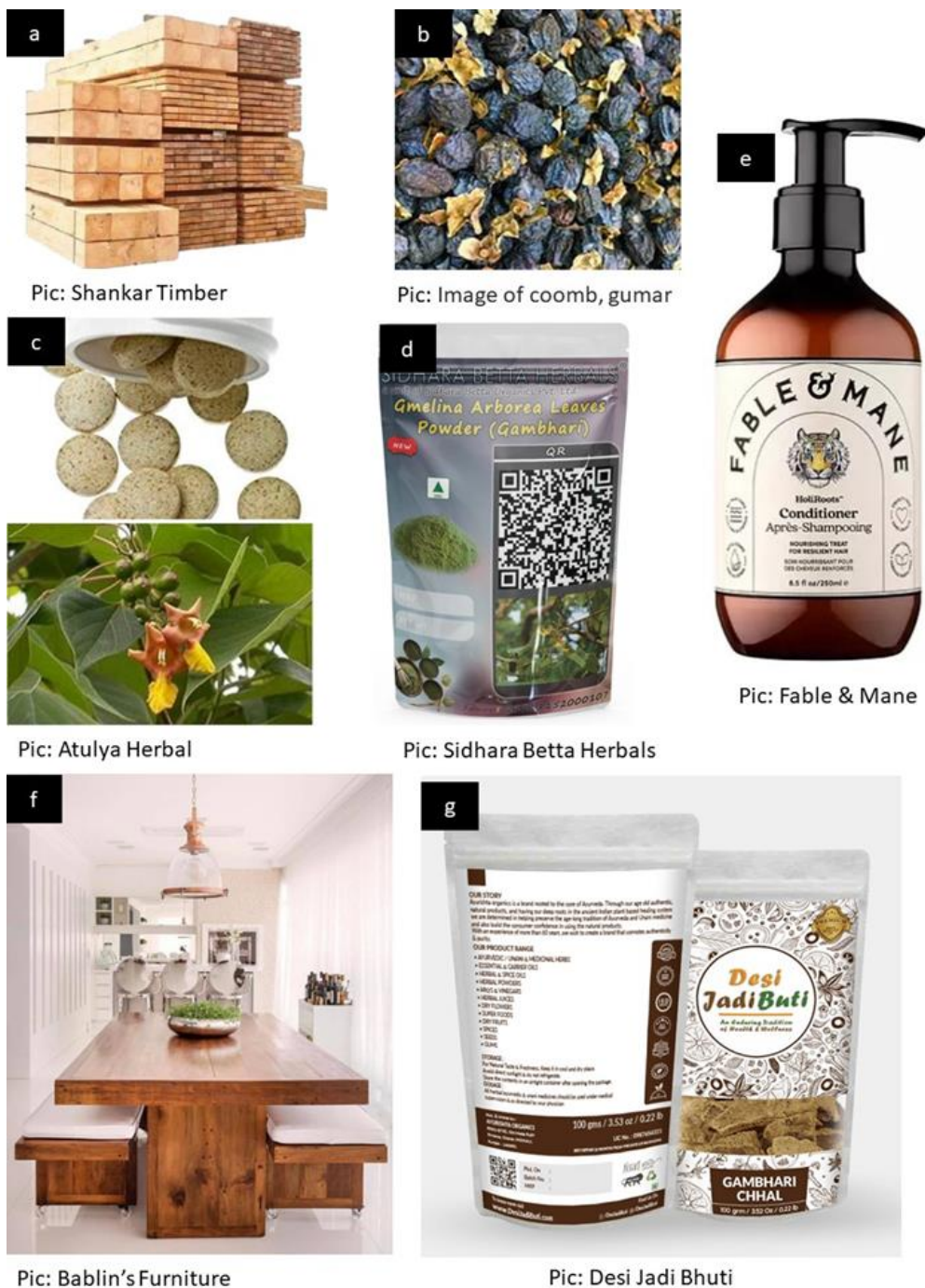


Figure 2: Market products of *G. arborea* a) wood planks b) dried fruits c) tablets from root d) leaves powder e) hair care products f) furniture g) bark

It is part of the ingredients of the famous Dashmoola and Brihath Panchmoola. Here, the fruits have been described to have memory enhancing potential, revuvinating, aphrodisiac activities, etc. Recent research has documented its anti-helminthic, antimicrobial activities and hepatoprotective potential (Sinha et al. 2006; Berry et al. 2021; Pathala et al. 2015). Again, literature in Ayurveda revealed that the root has been used in hallucination, fever, haemorrhoids, laxative, dyspepsia, tonic, etc (Ashalata and Sankh 2014). Kulkarni and Veeranjaneeyulu in 2013 demonstrated that the bark of *G. arborea* showed anti-hyperglycaemic activity for diabetes induced rats. The fruit, bark and leaves have been reported to use in snake bite and scorpion sting. Corresponding to the therapeutic values, the phytochemical compounds content of the plant includes alkaloids, carbohydrates, anthocyanins, tannins, flavonoids, saponins, phenolic compounds, steroids, and triterpenes (Chothani and Patel 2018; Kaur and Kaur 2018).

The species has wide economic values (Figure 2). The honey collected from *G. arborea* are considered high quality and so good tree for apiculture. The wood of this species is a good quality wood as it seasons well, less degrading, attains good dimensional stability and durability. The natural durability is up to 15 years. The paper made from wood pulp of *G. arborea* is one of the highest quality papers. The fruits and wood ash yield yellow colour dye that is very lasting colour. Again, the wood is considered good quality wood with a calorific value of 4800 Kcal/Kg. The leaves are also a good fodder and fruits edible (Orwa et al. 2009).

The capability of fast growth rate of this species and showing a dense canopy within 18 months providing a weed control makes this tree species potential species for plantation in large scale, avenue, gardens, parks, forest edges, etc (Orwa et al. 2009). Earlier experimental works on germination explores the germination capability and demonstrated that pre-treatment

of seeds with Gibberellic acid of 200ppm showed the very good germination rate followed with pre-treatment with sulfuric acid as compared to the untreated seeds (Berry et al. 2021).

Conclusion

The overall potential of *G. arborea* with respect to medicinal properties, economic values, and the adaptive nature of the species to various habitats and elevations, on top of its contribution to providing wildlife and avian habitat, makes it the best choice of tree species for plantation programs on a large scale, in avenues, parks, etc. Researchers and scientists should recommend this species to governmental and non-governmental organizations that are conducting afforestation on a small and large scale.

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