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Review on *Adansonia digitata* L. (Gorakshi): A historical and endangered tree species in India

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Abstract

Adansonia digitata L. one of the important plant of the world and abundant in African countries. It is rare in India. The present review article highlight the geographical distribution of this plant in India, etymology of genus and species, synonyms, botanical description, chemical constituents and medicinal uses. This article is beneficial for researcher and scientist for research.

Keywords: *Adansonia digitata* L., baobab tree, endemic plant

Introduction

Geographical distribution

The baobab tree is endemic to the areas of South Africa, Botswana, Namibia, Mozambique and other tropical African countries where suitable habitat occurs. It is also found in Pakistan, Sri Lanka and Bangladesh. In India it is found in Tamil Nadu, Andhra Pradesh, Maharashtra, Uttar Pradesh and other coastal regions of the country. It is restricted to hot, dry woodland on stony, well drained soils, in frost-free areas that receive low rainfall. In South Africa it is found only in the warm parts of the Limpopo Province [1].

Baobabs are a rare sight in India. This Baobab tree is a living monument and a mute witness to numerous Kumbh Melas held under its boughs. At present in Jhunsi area (Pratishthanpuri) of Allahabad on the bank of river Ganga, there is a massive, magnificent yet lonesome tree stands. This monolithic tree is probably one of the largest and longest living trees in India reportedly over 2000 years old which was described by Chinese traveler Hieun Tsang during his visit (629-644 AD) about 1400 years ago. He visited there in 630 AD, during King Harsh Vardhan's era to attend Khumbh Mela in Prayag at Sangam, the confluence of Ganga and Jamuna rivers. He wrote that "a great wide spreading umbrageous tree" is standing on the bank of river Ganga, ancient then, it still survives today. The tree's base has a huge diameter and its branches were wide spread. Mughal king Akbar had also seen it in 1575. The District Gazetteer of Allahabad (1968) contains an account of this tree which says: "A gigantic tree supposed to be more than 500 years old locally called *Vilaiti immli* which has not been identified botanically. It is growing on the left bank of the Ganga at Prayag and is sacred to Hindus and Muslims alike". A recent visit by author to this place found that now this historical tree is in very bad condition and its huge stem is damaged from one side by local residents and neither Forest Department nor any other agency is protecting and preserving this tree. In any case, the historic Baobab tree at the Sangam deserves a better deal. It needs urgent protection, not only from vagaries of nature and vandals, but also from an eroding riverbank that has exposed its huge roots. It requires immediate attention from public and government agencies. It should be declared as heritage tree and conserved for future generations. Another tree of this species is found at Chandra Shekhar Azad Park of Allahabad which is about 150 year's old [2].

Savanur Baobabs: Savanur, a small town located in the Haveri District of Karnataka, boasts of its three majestic baobab trees reputed to be the oldest in the country. Each of them is allegedly over 5,000 years old (without tree rings, none can say for sure), and the girth of one tree measures an impressive 18 meters [3].

Rani Bagh Gateway Mumbai Baobab: A plump baobab at the entrance of Rani Bagh, greeting visitors to the Zoo and botanical gardens of Mumbai [4].

Mandu Baboabs: Strangely, this baobab at Mandu seems to have a small, unleaved branch sprouting from its roots. Second baobab is perhaps the largest of the several large baobab's at Mandu, this tree looms over a small farm field on the plateau. The third baobab at Mandu, this big old baobab near an old palace has recently lost a big branch [5].

Kalpataru: Three baobabs at the entrance to Doranda college were incorrectly reported to be rare members of the Kalpavrish [6].

Baz Bahadur's Baobab: Amongst Sultan Bahadur's palaces ruined by the Mughals, this is one of the most spectacular of the baobabs planted high on this rocky plateau [7].

The Celestial Tree: A Celestial Wishing Tree can be found— behind a cage— at the Dilwara Jain Temple in Mount Abu, Rajasthan's craggy holiday town [8].

Diu Rukhda Baobab: A superbly squat, elderly, and elephantine baobab is hidden in the woods near Nagoa beach [9].

Elephant's (Hathion ka) Baobab: A most magnificent, immense baobab tree on the outskirts of Hyderabad's Golconda Fort offers the full experience for any landmark tree: you can climb on to the branches, go inside of its hollow trunk, stand next to it, gawk at it, and relax under it [10].

Mallanimli Baobab: One of the most spectacular trees in India, a monstrously proportioned giant African Baobab standing in a field near Orcha, reputedly planted by the Maharaja Bir Singh Deo almost 500 years ago [11].

Just a few kilometers distant from the amazing Mallanimli Baobab – which locals say is the only tree of its kind in the world is another immediately recognizable Baobab!

Along with these landmarks, a few baobabs grow in Madhya Pradesh's ruined city, Mandavgad. Outside the Vasai fort in Maharashtra, one can behold an ancient tree growing amidst the fort's stoic, 15th century facades. One or two baobabs grow in Gujarat's cities of Kutch, Bhavnagar, and Baroda. In Chennai, a single baobab tree grows in the Theosophist Society Gardens, a site dedicated to biological preservation. One small baobab tree is in the zoological and botanical garden of Thiruvananthapuram, Kerala.

Despite the baobab's usefulness, the tree faces extinction in India and other parts of the world. Bihar's Sanjay Gandhi Biological Park maintains one tree as part of its conservation efforts to preserve the baobab. The Surat Municipal Corporation in Mumbai also declared two as heritage trees, thus providing them immunity from removal.

Origin of *Adansonia digitata* in India [12, 24, 33]:

According to Prof. H.Y. Mohan Ram, a prominent botanist from Delhi, "This enormous tree supposedly has its origin in the African continent and brought in by sailors who came to establish trade links with India; they thereafter planted them across the Indian subcontinent." However, a handful of scientists believe Baobab trees to be a part of Indian culture and attribute their existence to have been influenced by various mechanisms of evolution. According to the theory of continental drift, the super-continent Pangaea broke up

some 50 million years ago creating new continents and subcontinents. The resultant fragmented landmass drifted away across the oceans to form Africa, India and Australia. These drifting continents carried away the ancestors of the Baobab species.

A minority of botanists have suggested that this tree is an Indian tree which has been mentioned in historical books, etched on some of our ancient temple walls and even worshipped for ages as *Kalpa Vriksha* - the mythical wish fulfilling tree.

Another theory floated by an American taxonomist said that sturdy seed pods of Baobab might have been swept by sea currents and reached India. Thus, the Baobab trees which love arid zones have been found growing as stragglers in the Indian subcontinent, including Sri Lanka.

By combining genetic analysis of baobabs with historical evidence of oceanic trade, it provides three important findings that improve current understanding of the history of their dispersal across the Indian Ocean.

First, it shows that there have been multiple instances of dispersal from continental Africa to the Indian subcontinent, possibly even extending back into prehistoric times. Second, it infer that the dispersal of baobabs in the Indian subcontinent and around the Indian Ocean was due to the agency of African migrants. Their long-standing familiarity with the baobab fruit and the tree's ubiquitous presence along inland trade routes would have made it a free and important food for surviving long journeys on land and by sea. The evidence of multiple introductions, and sources from different regions of continental Africa show, without doubt, that the presence of baobabs in the Indian subcontinent, the Mascarenes and Penang signals the forgotten history of African migrants to these places

Finally, there is a need for further genetic analyses of African baobab populations incorporating additional samples from West Africa, Somalia, Ethiopia, Sudan, coastal Yemen, Oman, Iran, Pakistan and Sri Lanka. These analyses can be combined with more detailed historical, cultural and linguistic evidence to establish new hypotheses of baobab dispersal across the Indian Ocean.

Taxonomic Position

Kingdom Plantae; Class: Equisetopsida C. Agardh; Subclass: Magnoliidae Novák ex Takht.; Superorder: Rosanae Takht.; Order: Malvales Juss.; Family: Malvaceae Juss.; Genus: *Adansonia* L.; Species: *digitata* (Tropicos, 2017) [13].

Etymology

Genus name given in the honour of French explorer and botanist, Michel Adanson (1727-1806), who observed a specimen in 1749 on the island of Sor, Senegal. Species name derived from Latin word *digitata* refers to the 'digits of the hand' (Wikipedia, 2017) [14].

Synonyms

Adansonia bahobab L.; *Adansonia baobab* Gaertn; *dansonia integrifolia* Raf.; *Adansonia scutula* Steud.; *Adansonia situla* (Lour.) Spreng.; *Adansonia somalensis* Chiov; *Adansonia sphaerocarpa* A. Chev.; *Adansonia sulcate* A. Chev.; *Baobabus digitata* (L.) Kuntze; *Ophelus sitularius* Lour. (The Plant List, 2013) [15].

Vernacular Name

Arabic- Alomarah, Hujed, Homar, Babbab; Bengali- Gorakhimali; China- Hou mian bao shu; English- African baobab, Monkey bread, Baobab Tree, Monkey Bread Tree ;Cream of Tartar Tree; Lemonade Tree; French- Azbre de mille ans; German- Adansonie; Gujarati- Gorakambali; Hindi- *Gorakhaimali*; Japan- Baobabu; Kannada- Goraksh tunachi, Brahmamlika; Marathi- Gorakhchinch; Persian- Gorahn imli; Sanskrit- *Sitaphala, Ravanamlika, Coramali, Dirghadandi, Goraksi, Pancaparnika, Sudandika, Citrala, Gandhabahula*; Spanish- Baobab del; Tamil- Eneipuliamaram, Papparappuli; Telugu- Maggivamu, Brahmamlika; Thailand-Baobab; Urdu- Goraimli. Vietnam- Bao bap chau phi.

Taxonomic features

A. Vegetative Characters

A medium sized to large, deciduous tree up to 21 m tall and upto 27 m in girth, connate, long lived. Stem short with thick broad trunk at the base, rapidly narrowing upwards and very widely spreading branches forming a mushroom-shaped head. Bark smooth grayish. Leaves crowded at the ends of branches with a distinctive slightly unpleasant smell when crushed. Leaves 5-7-foliolate, digitate with petiole up to 12 cm. Leaflet lamina 5-15 × 3-7 cm, oblong-elliptic to obovate-elliptic, covered below when young with stellate hairs or glabrous.

B. Floral Character

Flowers: solitary, axillary, pendulous on long peduncled, bi-bracteolate, large (up to 20 cm in diameter), white. Pedicels reaching 20 cm long, softly hairy. Calyx leathery, tawny tomentose outside, gray silky-villous inside, cup-shaped, 5-cleft, lobes 5 cm long, oblong-lanceolate. Petals 5, white, exceeding the sepals, adnate below the stamens. Staminal tube cylindrical, dividing above into numerous filaments. Stamen numerous. Anthers reniform, 1-celled. Ovary densely villous, 5-10 celled with numerous ovules. Style long, exserted, lower part villous. Stigma radiating as many as ovary cells. Fruits oblong, woody, indehiscent, with mealy acidic pulp inside, whitish, yellowish or reddish in colour, pendulous, hairy. Seeds reniform, glossy, blackish-brown in colour, with hard seed coat. Flowering/Fruiting February-July. It is pollinated by bats and bushbabies (Hooker, 1875; Kirtikar & Basu, 1999; Bingham, *et al.*, 2017; Sheth, 2005)^[17, 18, 19, 20]

Phytochemical Profile

Stem bark and leaves contain a glycoside adansonin, scopoletin, tannin and friedeline. Seeds contain steroid, terpenoid, alkaloids and saponin. Roots have fatty oil containing oleic, palmitic, stearic, linoleic and linolenic acid. Fruit pulp contains mucilage, gum, glucose, tartrate. It also contains Fat, Potassium, Carbohydrate, Fibre, Protein, Vitamin-C, Calcium, Iron, Magnesium, Phosphorous and Thiamine.

Pharmacological Activities

Bitter and sweet in taste; cold in potency; useful in blister, diarrhoea, burning sensation and fever. Fruit pulp-Styptic, analgesic, sudorific. Leaf-Sudorific, anti-inflammatory, tonic, antiemetic, styptic, emollient. Wood-Antiseptic, febrifuge. Its leaf shows anti-inflammatory, sudorific and tonic activities.

Methanolic extract of its stem-bark shows hypoglycemic activity (Tanko, *et al.*, 2008)^[21].

Its aqueous extract inhibits ethanol induced gastric ulcer (Karumi, *et al.*, 2008)^[22].

Aqueous extract of its fruit pulp shows hepatoprotective activity (Al-Qarawi, *et al.*, 2003)^[23].

Traditional and Classical Medicinal uses^[34]

- a. Instillation of its leaf decoction as ear drops is useful in otalgia.
- b. Its ripe seed and latex is useful in dentalgia and gums inflammation.
- c. Intake of its dried fruit pulp is useful in dyspnea.
- d. Intake of infusion prepared from its leaf and flower is useful in respiratory system disorders.
- e. Intake of cold concentrated juice prepared from its fruit pulp is useful in haemoptysis and diarrhoea.
- f. Bath with lukewarm leaf infusion gives relief in disorders of urogenital and reproductive system.
- g. Intake of its seed coat decoction is useful in amenorrhea and menorrhagia.
- h. Topical application of its leaf paste is useful in rheumatoid arthritis.
- i. Topical application of powder prepared from bark resin and fruit coat is useful in chronic and foetid wound.
- j. Intake of lukewarm infusion prepared from its leaf is useful in inflammation.
- k. Topical application of leaf paste is useful in worm infestation and other inflammatory disorders.
- l. Intake of its root bark decoction is useful in fever.
- m. Intake of cold infusion prepared from fruit pulp is useful in fever and pestilential fever.
- n. The off-white, powdery substance of the fruit is apparently rich in ascorbic acid. It is this white powdery substance which is soaked in water to provide a refreshing drink somewhat reminiscent of lemonade.
- o. The leaves are said to be rich in vitamin C, sugars, potassium tartrate and calcium. They are cooked fresh as a vegetable or dried and crushed for later use by local people.
- p. The sprout of a young tree can be eaten like asparagus.
- q. The root of very young trees is also reputed to be edible.
- r. The seeds are also edible and can also be roasted for use as a coffee substitute.
- s. Caterpillars, which feed on the leaves, are collected and eaten by African people as an important source of protein.
- t. When the wood is chewed, it provides vital moisture to relieve thirst and humans as well as certain animals eat it in times of drought.

Discussion

Strangely uncommon, some of the mega-sized Baobab trees do occur in remote locations of our country. A few even managed to exist in busy cities like Aurangabad, Mumbai and Hyderabad but people are not aware of their existence. Even the BSI and various universities with botany departments have not shown any inclination to conduct research, catalogue or even save them from destruction. "The amazing thing about Baobab trees is how invisible they are despite their outsized vital statistics," says Thomas

Pakenham of Ireland, who has travelled the world writing books about remarkable trees. He showers praise about the tenacity of the Baobab and says that they may live for 500 to 5,000 years.

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