

## **Review Article**

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# Ethnobotany and distribution status of *Ensete superbum* (Roxb.) Cheesman in India: A geo-spatial review

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## ABSTRACT

In view of the ethnomedicinal importance of the *Ensete superbum*, an endemic species of India, this review is an attempt to introduce the traditional knowledge mapping framework that compiles all available information reported on ethnobotanical uses and distribution status of the species. The study intends to draw attention of scientific communities towards conserving *E. superbum* and associated traditional knowledge.

Keywords: Medicinal Plants, Cliff Banana, Kalluvazha, Rare, GIS.

## INTRODUCTION

**T**he Genus Ensete comprises nine species geographically ranges throughout tropical Africa and Asia. Among these, *E. superbum* and *E. glaucum* are reported to occur in India<sup>[1].</sup> *E. superbum* (Roxb.) Cheesman, belongs to the family Musaceae is endemic to the Western Ghats, the Aravalli range and North-Eastern hills of India. They are monocarpic and non-stoloniferous tall herb. The preferred habitats of *E. superbum* are rocky slopes and crevices (Fig.1). It is popularly known as Cliff Banana... Seeds are especially used in the treatment of diabetes<sup>[2]</sup>, kidney stone<sup>[3-6]</sup> and leucorrhoea<sup>[7-8]</sup>. Fruits, flowers and pseudostem of *E. superbum* are used as wild edibles<sup>[9-13]</sup> in almost all reported localities of India. It is recognized as a Non Timber Forest Product (NTFP) in Kerala,<sup>[14]</sup> India.

*E. superbum* is also an ornamental plant. It resembles a banana plant. Massive pseudo stem base and red flower head with broad leaves outlined in deep red and mid-rib are specific morphological features enhances the aesthetic value. It is planted as a focal point on a lawn or in a small group, making it suitable for a garden <sup>[15]</sup>.

In view of the ethnic medicinal importance of *E. superbum*, this review is an effort to compile the available information reported on its ethno botanical uses, status, threat and challenges. In addition, the present compilation also opens new vistas on mapping of traditional knowledge using Geographical Information System to protect associated traditional knowledge from endangerment. Traditional knowledge on indigenous use of *E. superbum* is tacit and nurtured verbally across generations. Amorphous nature of this knowledge renders it difficult to capture and conserve. Globally, a rising concern has been emerged that traditional knowledge is fast eroding for reasons such as biotic interference, shrinking land resource base, deforestation of forest and other natural resources. Currently there are no accepted standards or hermeneutics to capture and decipher tacit knowledge.

### General description of Ensete superbum

The Genus *Ensete* was first named by Horaninow (1862) and later 25 species of *Ensete* were included by Cheesman (1947). The genus was again revised by Simmonds (1953 and 1960)<sup>[1]</sup> which consists of *Ensete superbum.* The species prefers to grow on moist moss-laden rock edges, rock crevices and rocky barren lands of Western Ghats<sup>[16]</sup>, north-eastern sub-Himalayan tracts and dry deciduous forests of central and Western India. It has remarkable adaptability and tolerance in its habitat during dry months. Medicinal properties coupled with the hardy, rain-fed and evergreen characteristics makes *E. superbum* an excellent crop for better utilization of capability Class 7 type of land in India<sup>[17]</sup>. It will open an avenue of sustainable commercial prospect from marginal lands and help in maintaining biological diversity.

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### Growth forms

*E. superbum* is monocarpic, non-stoloniferous, unbranched herb that reproduces only through seeds. The ecotype found in moist Western Ghats completes its life cycle in 3-3.5 years <sup>[17]</sup>. It attains an average height of 3-4 m and is characterized by an enormous swollen base of 2.5-3 m circumference. Leaves of *E. superbum* have short, green petiole with a prominent red midrib. Mature leaves attain an average length and width of 3.5-4 m and 0.5-1.0 m respectively. Petiole short green and red. Leaf sheaths are persistent at the base and closely set scars on the corm. The inflorescence is globose at first (30 cm – 32 cm diameter) later drooping and elongating to one-third the length of the trunk. The bracts are orbicular, dark brown-red, reaching 30 – 32 cm in length, breadth and subtend dense biseriate rows each of 10 - 15 flowers. The fruits are subcoriaceous 7.5 - 8.0 cm long, 3.5 cm diameter more or less triangular and contain numerous dark brown seeds. The seeds are sub globose but angled by pressure, 0.8 – 1.3 cm in diameter.

The plant growing in drier regions of the Western Ghats and Aravalli ranges exhibits geophytic nature <sup>[17-19]</sup> and reach a maximum height of 1-1.5 m, with relatively shorter leaves and base. It completes their life cycle in 4 to 4.5 years under such adverse conditions.



Figure 1: Ensete superbum in natural habitat (Location: Jog falls, Karnataka, India, Coordinates: 14.5167 N, 75.1667 E)

#### MATERIALS AND METHODS

The authors introduce a spatial traditional knowledge mapping framework, in which the ethno botanical uses of E. superbum across various indigenous communities in India were geo-tagged on a Quantum GIS 2.0.1 (Q.GIS) platform. Data of ethno botanical uses and status of E. superbum were compiled from various scientific journals through Google scholar, Science direct, Scopus using specific search word as "Ensete" and published scientific reports of research organizations in India. Secondarily, extensive field surveys were carried out during year 2009-2013 and coordinates of study sites were measured using a hand held GPS at Pavagadh and Dang (Gujarat), Veer (Maharashtra), Vithura and Kottiyur (Kerala) among Nachbava, Bhil, Naikada, Rathwa, Kani and Paniyar communities respectively to compile information on various ethnobotanical uses of the species. Data collected from literatures and field survey includes: Study region, regional vernacular name of species, Name of ethnic group, plant part used and type of uses.

#### **RESULTS AND DISCUSSION**

The present compilation resulted in documenting ethno botanical uses *E. superbum* from different parts of the India. Fifty -six indigenous communities involved in thirty-eight locations spread across nine

states in India identifies *E. superbum* by twenty two vernacular names. The plant/ plant product is a prescribed medicine by indigenous practitioners for nineteen (19) etiological symptoms. Inflorescence and unripe fruits of *E. superbum* are used as vegetables in *culturally distinct* communities in the states of Tamil Nadu and Arunachal Pradesh.

Different parts of E. superbum are used to treat wide range of human diseases like appendicitis, cancer, diabetes, dog bite, dysuria, kidney stone, leucoderma, leucorrhoea, measles, psychosomatic disorder, stomach ache, venereal diseases. Fruits, flowers and pseudostem of E. superbum are used as vegetable in different parts of the country. Table 1 summarizes different ethno botanical uses of E. superbum reported from various localities of India (Fig.2). Safe sites for E. superbum are rocky outcrops in the Western Ghats, Aravallis and northeastern hills of India. There are no reports of the species from alluvial belt of India. E. superbum has a sporadic distribution in south Asia <sup>[34]</sup>. The scientific studies by various Government of India organizations like Indian National Bureau of Plant Genetic Resources (NBPGR), Botanical survey of India (BSI) and Kerala Forest Research Institute (KFRI) recommends it as conservation concerned, relict and rare species in various parts of the country. Table 2 summarizes the scientific reports on distribution status of *E. superbum* in different regions of India (Fig.2a).



Figure 2: Ethno botanical uses of *E. superbum* reported from various localities of India. Figure 2a: Reported distribution status of *E. superbum* in different regions of India.

Geo-spatial review of indigenous uses of *E. superbum* opens a new vista for ethnobotanical studies. Such a database incorporating traditional knowledge associated with medicinal plants of India is an effective strategy against bio-piracy.

*Ensete superbum* is a lithophyte. It shows well developed geophytic adaptations under rocky habitats, there it grows and produces viable seeds. Unique edaphic characters of rocky habitat and pollination by bats <sup>[45]</sup> supports the wild type of *E. superbum* for better pollination and seed dispersal. Habitat unsuitability and lack of suitable or preference of pollinators limits the species to set viable seeds under cultivated or garden conditions. This stifles prospects of *ex-situ* multiplication for conservation of the species <sup>[46]</sup>.

Unlike other members of musaceae, *E.superbum* does not produce suckers. Regeneration by seeds is the only means for natural multiplication. The white powdery endosperm of *E. superbum* seeds contains starch grains, calcium oxalate and parenchyma cells <sup>[47]</sup>. Powdery endosperms of grounded seeds are traditionally reported to be very effective to cure urolithiasis <sup>[48]</sup>. Unregulated harvest of seeds for indigenous medicinal use and removal of seedlings for ornamental trade are the major threats that led to a dramatic decline in the population of *E. superbum* during the last decade <sup>[49]</sup>. The native

population of *E. superbum* is declining at alarming rate. Currently *E. superbum* is listed as rare, relict, endangered, threatened and conservation concern species <sup>[50]</sup> in various parts of India. Hence, creating awareness among the natives residing in forest and scientific communities is the need of the hour. Further initiatives from Govt. of India to (a) Empower Good Agricultural and Collection Practices (GACP)

for medicinal plant recommended by World Health Organization (b) enlist *E. superbum* in prioritized species list of conservation in various medicinal plant conservation areas (MPCA) and Red data book of Indian Plants<sup>[51]</sup> (c) include the species in Schedule VII -The Wild Life Protection Act of India<sup>[52]</sup>. (d) study the present population status of the species by IUCN's guidelines and recommendations.

Table 1: Ethno botanical uses of E. superbum	by various indigenous communities in India
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S.No	State	Study region	Local Name	Ethnic Groups	Part Used	Type of uses
1	Arunachal pradesh	All districts	Kopak & Colon	All ethnic groups	Fruits & stem	Vegetable <sup>[10]</sup>
2	Assam	Anglong	Lobong & Keng tong	All ethnic groups	Pseudo stem	Vegetable <sup>[12]</sup>
3	Gujarat	Pavagadh	Janglikeli	Nachbava, Bhils	Seed	Semen production, Debility*
4	Gujarat	Sivagadh, Dangs	Janglikelo	Bhils & warlis	Seed	Debility & Leucorrhoea*
5	Gujarat	Saputara, Dangs	Janglikela	Dhodiya & Kolcha	Pseudostem & Stem	Leucorrhea & debility*
6	Karnataka	Shimoga	Kallubale	Adi,Besta,Ediga, lambani,vokkaliga , Lingayatha	Pseudostem	Appendicitis <sup>[20]</sup>
7	Karnataka	Uttara Kannada	Kaadubaale	Siddis,Gowlis, Kunbis, Kareokkaligas	Seed	Debility, weakness, Misconception <sup>[21]</sup>
8	Kerala	Attappady	Kallu vazha	Irulas	Leaves ash	Asthma <sup>[22]</sup>
9	Kerala	Parambikulam	Kallu vazha	Malamalasar.	Seed	Kidney stone & Painful urination <sup>[4]</sup>
10	Kerala	Vithura	Kallu vazha	Kanikars	Seed	Leucorrhoea*
11	Kerala	Thaze churam, Kottiyur	Kallu vazha	Paniyars	Seed	Leucorrhoea & Urinary calci*
12	Kerala	Mahadeva Temple, Kottiyur	Kallu vazha	Brahmins	Leaves	Religious rituals*.
13	Kerala	Tiruneli, Wayanad	Kallu vazha	Kurichiar	Seed	Leucorrhoea <sup>[7]</sup>
14	Kerala	Vythiri taluk	Kalluvazha	Kurichiar & Kuruma	Seed	Urinary troubles & Leucorrhoea <sup>[8]</sup>
15	Kerala	Kullathu puzha	Kallu vazha	Kanikars	Seeds	Kidney stone & Leucorrhoea <sup>[23]</sup>
16	Kerala	Achenkovil	Kallu vaaye	Malapandaram	Seeds	Improve vitality & Kidney stone <sup>[23]</sup>
17	Kerala	Kaniyampatta, Wayanadu	Kallu vazha	Kurichiar	Seeds	Kidney stone & Leucorrhoea <sup>[23]</sup>
18	Kerala	Ambazhavayal, Wayana du	Kallu vazha	Mulu kuruma	Seeds	Kidney stone & debility <sup>[23]</sup>
19	Kerala	Silent valley National park	Kallu baaga	Kurumbar	Seeds	Kidney stone <sup>[23]</sup>
20	Kerala	Noolpuzha, Wayand	Kelle baalle	Kattu naikans	Seeds	Kidney stone <sup>[23]</sup>
21	Kerala	Mancheri, Nilambur	Kellu bhalhe	Chola naikans	Seeds	Kidney stone <sup>[23]</sup>
22	Maharashtra	Amboli	Rankeli	Gurav, dhangar, vaidus	Leaf, Flowers	Wild edibles <sup>[24]</sup>
23	Maharashtra	Amravati	Jangali keli	Korku, gond nihal & Gawali	Seeds & roots	Stomach ache, Easy delivery, Semen production <sup>[11]</sup>
24	Maharashtra	Nandurbar	Jangali kela, Rankeli	Bhils, pardhi, pawara, tadvi, wanjar	Leaf, seed, Stem, root	Psychosomatic disorder, dog bite, Venereal diseases <sup>[25]</sup>
25	Maharashtra	Nandurbar	Jangli keli	Bhil, kokani, mavchi & gavit	Seeds	Measles, Stomach ache <sup>[26]</sup>
26	Maharashtra	Satpuda mountains	Janglikeli	Pawara	Stems,Unripe fruits	Vegetables <sup>[28]</sup>

27	Maharashtra	Pune	Jangali kela, Rankeli	Mahadeo, dhangar, ramoshi	Tuber	Cancer & AIDS <sup>[29]</sup>
28	Maharashtra	Veer.	Rankeli	Katkari, Mahadeo koli	Seeds	Urinary infection*
29	Maharashtra	Tillari.	Rankeli	Naik & vaidu	Leaf ,Flowers	Wild edibles <sup>[24]</sup>
30	Maharashtra	Satpuda Mountains	Rankeli	Bhil, kokani, mavchi & gavit	Tender stem,flowers & fruits	Wild edibles <sup>[29]</sup>
31	Mizoram	Aizwal	Sai-su	Mizos	Leaf sheath, flower	Leaves eaten boiled. Ripe, fruits are edible <sup>[13]</sup>
32	Rajasthan	Chittogarh	Jangli Kelo	Tribals	Leaves, Fruits	Raise uterus <sup>[30]</sup>
33	Rajasthan	Jhadol	Jangli kelo	Khemji bhil	New sprouts: Indicator species.	New sprouting an Indicator of monsoon <sup>[19]</sup>
34	Rajasthan	Kotera	Jangli kelo	Bhil,meena,garasia, kathodia, damor	Root	Birth control <sup>[31]</sup>
35	Tamilnadu	Agasthiyamalai	Kalluvalai	Kanikars	Fruits & pseudostem	Wild edibles <sup>[32]</sup>
36	Tamilnadu	Madurai	Malai vazha	Palliyars	Flower, fruit, Seed	Vegetable <sup>[9]</sup>
37	Tamilnadu	Saduragiri hills	Malaivazhai	Palliyars	Peduncle	Kidney stone <sup>[6]</sup>
38	Tamilnadu	Pechiparai	Kalvazhai	Kanikars	Seeds	Urinary calculi <sup>[33]</sup>

\*Data collected by ethno botanical survey.

Table 2: Distribution status of E. superbum in various localities in India

S.No	State	Region	Status
1	Arunachal Pradesh and North eastern	Eastern Himalayan foot hills	Conservation concerned <sup>[35]</sup>
	states		
2	Gujarat	Pavagadh	Conservation concerned <sup>[17]</sup>
3	Gujarat	Narmada Valleys	Relict <sup>[36]</sup>
4	Karnataka	Bhimeeshwara Falls	Conservation concerned <sup>[37]</sup>
5	Karnataka	Jog Falls	Conservation concerned <sup>[37]</sup>
6	Kerala	Malayattor	Very rare <sup>[38]</sup>
7	Kerala	Peppara	Endangered <sup>[14]</sup>
8	Kerala	Pooyamkutty	Rare <sup>[39]</sup>
9	Madhya Pradesh	Hoshnagbad	Relict <sup>[36]</sup>
10	Maharashtra	Parinche valley	Threatened <sup>[29]</sup>
11	Mizoram	Entire state	Conservation concerned <sup>[40]</sup>
12	Rajasthan	Sirohi	Conservation concerned <sup>[41]</sup>
13	Rajasthan	Phulwari-ki-Nal	Threatened <sup>[42]</sup>
14	Rajasthan	Wakal Basin	Rare <sup>[43]</sup>
15	Tamil Nadu	Sengaltheri	Rare <sup>[44]</sup>

## CONCLUSION

The spatial assessment on indigenous uses of *E. superbum* opens a new vista for ethnobotanical studies. Geo spatial database incorporating traditional knowledge associated with medicinal plants is an effective strategy against bio-piracy of Indian medicinal plants.

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## **CONFLICTS OF INTEREST**

There are no conflicts of interest.

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