

## SUMMARY

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The present study was carried out on *Brucea mollis* Wallich ex Kurz, which is a RET medicinal plant species restricted to a few pockets of Karbi Anglong district, Assam. Details taxonomic investigation, floral biology and seed biology was carried out on the species. The species belongs to Simaroubaceae. Many researchers (Ouyang *et al.*, 1994; Liu *et al.*, 2009; Bharati and Singh, 2012; Prakash *et al.*, 2012; Tung *et al.*, 2012; Chen *et al.*, 2013) have reported the medicinal uses and importance of the species worldwide. The species has long been used in the preparation of antimalarial and anticancer drug in traditional medicine in China (Liu *et al.*, 2009). Ethnic groups of Karbi Anglong, Assam, has been using decoction of either root or fruit for the treatment of fever (Barthakur, 1976).

In India the genus is represented by two species *viz.*, *Brucea javanica* (L.) Merr. and *B. mollis* Wall. ex Kurz (Gupta *et al.*, 2004; Santapau and Henery, 1973). Globally the species is assessed by IUCN as near threatened (NT) (Anonymous, 2003) and in India the species is listed as endangered plant in Arunachal Pradesh and Assam (CAMP, 2003).

The species was first established by Kurz based on a material collected by Wallich in 1847 (Wall. 8483 B) from Burma (Myanmar) (Kurz, 1873). Later on the species was also described by other workers (Kurz, 1977; Merrill, 1906, 1908, 1911, 1915 and 1917; Hua and Thomas, 2008). However, the species was described based only on male plant and as such remained incomprehensive. The species is morphologically diverse not only between the male and female plants but also among the plants of same sex, for which the species was described under different names by different workers erroneously *viz.*, *B. luzoniensis* by Vidal (1883), *B.*

*membranacea*, *B. macrobotrys* and *B. stenophylla* by Merrill (1906, 1915, 1917) and *B. acuminata* by Li (1943).

In the present study the specimens were identified with the help of relevant literature (Kurz, 1873; Bennett, 1875; Kurz, 1877; Merrill, 1908, 1906, 1923; Nootboom, 1962; Ho, 2000) and/or with the help of microfilms of herbarium specimens present in online databases of various Herbaria. Several morphological, micromorphological and anatomical features of the species were investigated such as, gross morphology of the vegetative and reproductive parts of the species, diversity of forms and functions of stomata and trichomes, study of leaf architecture, anatomy of vegetative and reproductive parts, floral biology and study of seed germination and viability. The traditional methods of using the species in local communities of Karbi Anglong were also recorded.

After consultation of protologue and type materials, it is confirmed the species was described based on more than one specimens. Moreover the description was based only on male specimens, hence to clear the ambiguity, lectotype (K001125627) is selected along with an epitype.

*B. mollis* exhibits morphological variability with a series of transitional forms. Homogeneity exhibits neither in numbers of leaflets present in the leaf nor in the size and shape of leaflets. There are four distinct variations are there in leaves having 7, 9, 11 and 13 leaflets. Similarly, leaflet shape also ranges from lanceolate to obovate or even bilobed or round. Leaflet number, size and shape in the same plant or between and among the male and female plants within the species *B. mollis* are significant and can be used as taxonomic tool for further studies. Leaflet margins of *B. mollis* are characteristically either entire or undulating distinguishes the species from *B. javanica* where it is distinctly toothed, serrate or crenate.

The major venation pattern in *B. mollis* is pinnate type, first order vein type is brochidodromous, second order vein type percurrent or cascade and third order vein type is lattice. The vein system terminates into fine 5° branching within the areola. *B. mollis* exhibits formation of ununiform cascades with higher order venations which could not be described with any existing terminology. Therefore, a more comprehensive terminology to describe such type of venation pattern in angiosperm is yet to be coined. As per terminology suggested by Pole (1991) the pattern of leaf venation of *B. mollis* is simultaneous because veins of equal width along their length terminated against a lower order vein at each end and the “percurrent” tertiaries present. Such venation also provides resistance against the environment (Zarinkamar and Sharifsadat, 2016).

The present study examined the structural features of the trichomes of leaflet, petiole and rachis of *B. mollis*. Trichomes in *B. mollis* are unbranched *i.e.* simple type consisting of both glandular and non glandular trichomes. They may be unicellular or multicellular. There are twenty different types of trichomes are observed in *B. mollis* including both glandular and non glandular trichomes. Non glandular trichomes are of four types – short unicellular, short multicellular, long unicellular and long multicellular. Glandular trichomes are of eight types- capitate, stipitate, peltate, fusiform, cupular, patelliform and digitate. Head of stalked capitate trichomes may be either smooth or folded or wrinkled or calcified. Peltate trichomes are of four types depending on its head cell assembly.

Distribution of multicellular trichome is abundant in foliar epidermis, petiole and rachis inferring that the active principle responsible for the therapeutic property of the plant might be synthesized in the leaflet, petiole and rachis of *B. mollis*. Presence of patelliform and cupular trichomes regarded as nectaries (Fróes *et al.*,

2015) in leaf blades may contribute to the presence of large number of ants on leaves. Presence of stipitate trichome secretes sticky substances and may have played some defensive role in the species. No papillate trichome is present in *B. mollis* rather some simple non glandular trichomes exhibit micro-ornamentation of micro papillae. Type and distribution of the trichomes in *B. mollis* correlates with the site of production and storage of active principle of medicinal property, plant insect relationship and probable defensive strategy adopted by the plant. The present study reveals that the diversity in the type and distribution of trichomes in *B. mollis* can be used as a significant taxonomic character for identification in generic level in *Brucea* as well as in species level in *B. mollis*. This can also be considered at intraspecific level of *B. mollis* at population level.

Floral biology of the species was also investigated and exhibit several interesting finding, which includes -Parthenocarpic development in male plants, porogamic fertilization, Anthesis is both diurnal and nocturnal, ambophilic pollination syndrome, etc. The distribution of the species is considered as Holoendemic due to its restricted distribution throughout the evolution. Hence, the present is significant in understanding the taxonomy, seed and floral biology, which help in the conservation aspect of this RET medicinal species.