



Comparative Floral Morphology of *Mesua ferrea* L. and *Kayea assamica* Prain from Lakhimpur District, Assam, India

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Abstract

The present study provides a comparative account of the floral morphology of *Mesua ferrea* (Nahor) and *Kayea assamica* (Sia-Nahor), two closely related taxa of the family Calophyllaceae (formerly Clusiaceae) found in Lakhimpur district of Assam, India. Both species exhibit bisexual, actinomorphic flowers with numerous stamens and superior ovaries, yet they differ in floral size, arrangement, structural adaptations and regional proximity. This study focuses on comparative floral analysis between these two species. The study highlights similarities and differences in sepals, petals, androecium, and gynoecium, contributing to taxonomic distinction and ecological understanding of these two species.

Keywords: *Floral morphology, Calophyllaceae, Mesua ferrea, Kayea assamica, Lakhimpur, Assam, taxonomy.*

Introduction

The Lakhimpur district of Assam, situated in the foothills of the Eastern Himalayas, serves as a vital habitat for several ecologically and economically significant species of the family Calophyllaceae [1], [2]. The tropical evergreen forests of North Lakhimpur, Assam, are home to a rich diversity of flora. Among these, *Mesua ferrea* and *Kayea assamica* are prominent. *Mesua ferrea* is widely distributed across Southeast Asia and is recognized as the state tree of Mizoram [3], whereas *Kayea assamica* is a more localized, endemic species found primarily in the riverine belts of Upper Assam and Arunachal Pradesh [4]. Understanding their reproductive biology starts with a rigorous comparison of their floral morphology [5], [6]. Both taxa were historically placed under different genera [4], but later taxonomic revisions have shown close affinities between them. Floral morphology plays a crucial role in distinguishing related taxa and understanding their evolutionary relationships [2], [5], [6]. The aim of this study is to compare the floral structures of these two species to understand their morphological variations and taxonomic significance.

Materials and Methods

Floral samples were collected mainly from the Kakoi and Dulung Reserved Forest areas of North Lakhimpur. For floral analysis, we collected ten specimens of each species from different parts of the above mentioned study sites. Fresh specimens were analysed during their respective peak flowering seasons (February–April, 2025). Morphological characters were studied using standard botanical methods [6], [7], [8] including dissection under a Magnus stereomicroscope (Magnus MSZ-TR, No- 23B1149) present in North Lakhimpur University. A map indicating the collection site of the specimen has been constructed using Quantum GIS.

Herbarium of both collected species are also prepared using standard herbarium techniques as per Jain & Rao, 1977 [9] for further studies.

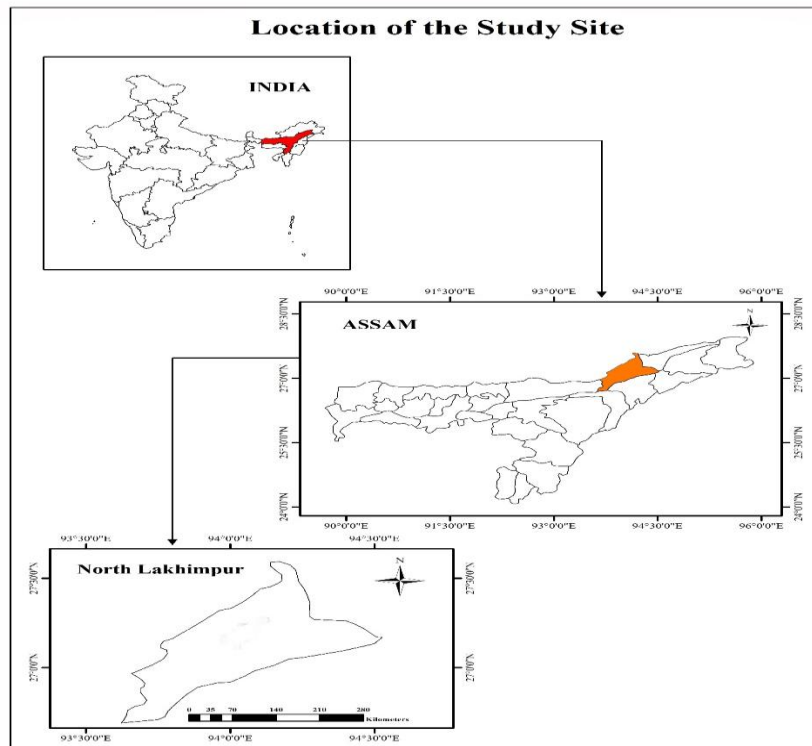


Fig.- 1. Map showing the study site (North Lakhimpur, Assam, India)

Results

Taxonomic classification and floral morphology are fundamental parameters for species identification and understanding evolutionary relationships within a plant family. *Mesua ferrea* L. and *Kayea assamica* Prain, both belonging to the family Calophyllaceae, exhibit several shared taxonomic characteristics but differ markedly in their floral morphology. A comparative assessment of their taxonomic position and floral traits provides valuable diagnostic characters for distinguishing these closely related taxa. The taxonomic classification of both species is presented in Table 1, followed by a detailed comparison of their floral morphology.

Table 1: Taxonomic Position of *Mesua ferrea* L. and *Kayea assamica* Prain

<i>Mesua ferrea</i> L.		<i>Kayea assamica</i> Prain	
Rank	Classification	Rank	Classification
Kingdom	Plantae	Kingdom	Plantae
Division	Angiosperms	Division	Angiosperms
Class	Magnoliopsida	Class	Magnoliopsida
Order	Malpighiales	Order	Malpighiales
Family	Calophyllaceae	Family	Calophyllaceae
Genus	<i>Mesua</i>	Genus	<i>Kayea</i>
Species	<i>Mesua ferrea</i> L.	Species	<i>Kayea assamica</i> Prain

Floral Morphology of *Mesua ferrea* L.

Mesua ferrea is a canopy component known for its striking, large, and fragrant flowers [3], [10]. The flowers are bisexual, large, white, fragrant, and generally solitary or paired in the leaf axils [10], [11]. The pedicel is short and thick. Sepals are four, arranged in two unequal pairs, leathery and persistent. Petals are four, white, obovate, and arranged alternately with sepals. Stamens are numerous and golden yellow, forming a conspicuous mass at the centre. The ovary is superior, bilocular with peltate stigma. Details Morphology of *Mesua ferrea* L were shown in Fig. 2



Fig. 2: *Mesua ferrea* L. a) a complete flower (b) four sepals (c) a single sepal (d) four petals (e) a single petal (f) gynoecium (g) androecium (h) fruit (i) traverse section of ovary a-h = 1cm i= 2mm

The floral Morphology of *Kayea assamica* Prain

Kayea assamica shows distinct reductions in floral size compared to *Mesua ferrea*. The flowers are comparatively smaller and arranged in cymose-paniculate inflorescences [4]. Sepals and petals are four each. Stamens are numerous but less densely arranged compared to *Mesua ferrea*. The stigma is characteristically four-fid. The ovary contains four ovules. Leaves show semi-craspedodromous venation, a distinguishing feature of the genus *Kayea* [4]. Details floral Morphology of *Kayea assamica* Prain were shown in Fig. 3

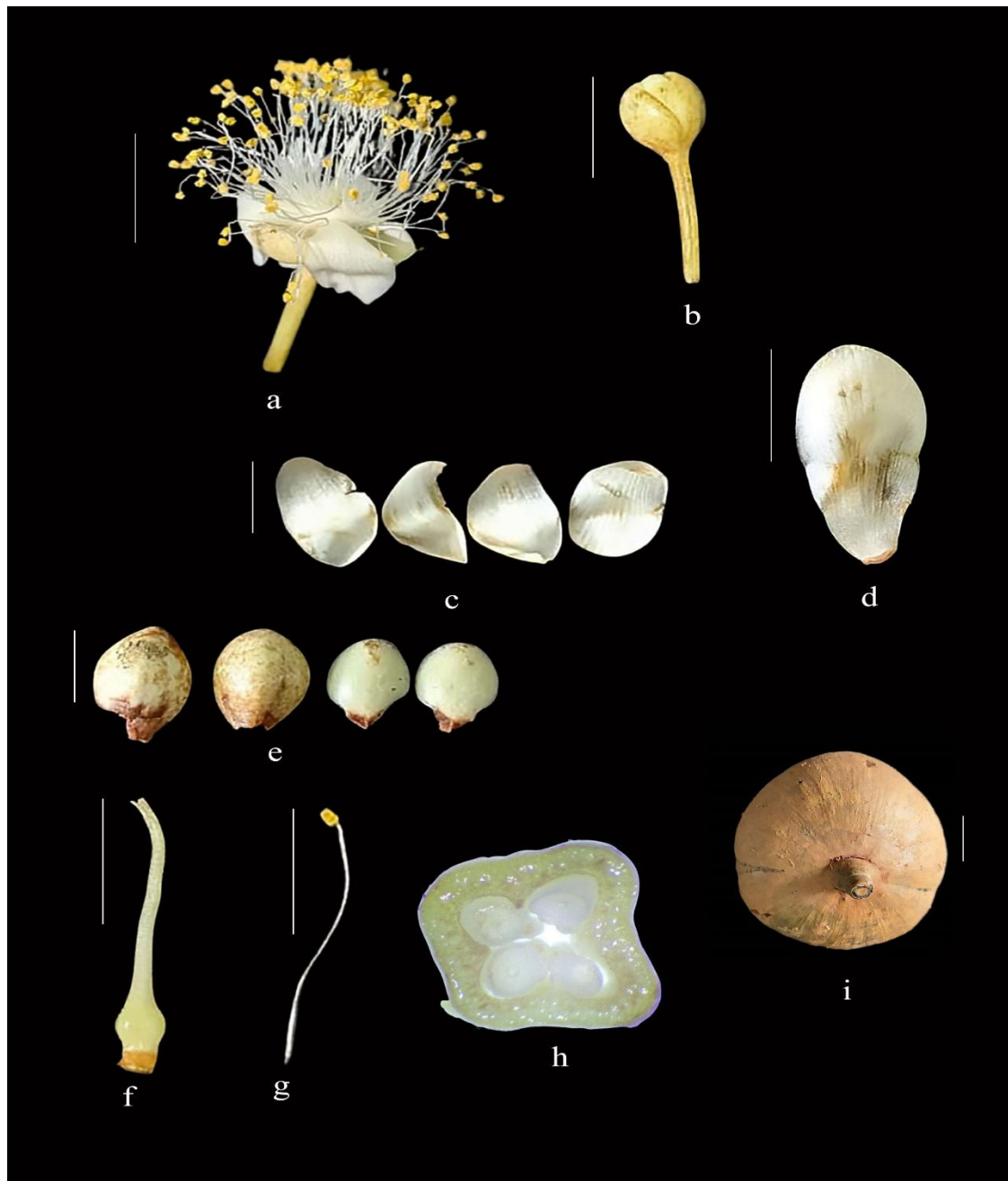


Fig. 3: *Kayea assamica* Prain (a) a complete flower (b) a bud (c) petal (d) a single petal (e) sepals (f) gynoecium (g) androecium (h) transverse section of ovary (i) a fruit a-i= 1cm

Table 2: Floral comparison between *Mesua ferrea* and *Kayea assamica*

Floral characters	<i>Mesua ferrea</i>	<i>Kayea assamica</i>
Inflorescence	Solitary or paired axillary flowers	Cymose-paniculate
Flower Size	Large (up to 7-10 cm diameter)	Small
Flower color	Silvery-white	White or Creamy-white
Sepals	Four, unequal, leathery	Four, comparatively thinner
Petals	Four, obovate	Four, elliptic-oblong
Stamens	Numerous and densely packed	Numerous but less dense

Stigma Type	Peltate to 4-lobed	Distinctly 4-fid
Ovary	Bilocular	Four ovules present
Fruit	Woody capsule	Capsule with fewer seeds
Flowering Season	April–November, 2025	April–May, 2025

(The floral comparison between *Mesua ferrea* and *Kayea assamica* is presented in Table 2 which was conducted during April to November, 2025.)

Discussion

The comparative study of the floral characters of *Mesua ferrea* and *Kayea assamica* reveals several morphological similarities, while also highlighting distinct diagnostic features useful for species identification and taxonomic delimitation.

Both species possess bisexual flowers with four sepals, four petals, numerous stamens, and capsular fruits, reflecting the conserved floral architecture characteristic of the family [1], [5]. However, they differ considerably in floral size, inflorescence type, floral morphology, and reproductive structures.

Mesua ferrea bears large, showy, silvery-white flowers measuring approximately 7–10 cm in diameter. The flowers are solitary or paired in the leaf axils, making them highly conspicuous and likely adapted for attracting pollinators over longer distances. In contrast, *Kayea assamica* produces much smaller white to creamy-white flowers arranged in cymose-paniculate inflorescences, suggesting a different floral display strategy that increases the number of flowers presented simultaneously [3].

The calyx and corolla also exhibit notable differences. The sepals of *M. ferrea* are thick, leathery, and unequal, providing effective protection to the floral bud, whereas those of *K. assamica* are comparatively thinner. Petals in *M. ferrea* are obovate, while *K. assamica* possesses elliptic-oblong petals, providing reliable morphological characters for distinguishing the two species.

Although both species contain numerous stamens, *M. ferrea* has stamens that are more densely packed, contributing to its prominent floral appearance. In *K. assamica*, the stamens are comparatively less crowded. Differences are also evident in the gynoecium. The stigma of *M. ferrea* is peltate to four-lobed, whereas *K. assamica* exhibits a distinctly four-fid stigma. Furthermore, the ovary of *M. ferrea* is bilocular, while *K. assamica* is characterized by the presence of four ovules, indicating variation in ovule arrangement and reproductive organization.

Fruit morphology provides additional distinguishing features. *Mesua ferrea* develops a robust woody capsule, whereas *Kayea assamica* produces a capsule containing comparatively fewer seeds. These differences may reflect variations in reproductive strategy, seed dispersal mechanisms, and resource allocation during fruit development [10].

The flowering periods also differ between the two species. *Mesua ferrea* flowers over an extended period from April to November, which may enhance opportunities for pollination and fruit production under varying environmental conditions. In contrast, *Kayea assamica* has a relatively short flowering season restricted mainly to April and May, suggesting a more synchronized reproductive cycle.

Overall, the observed variation in inflorescence architecture, flower size, floral organ morphology, stigma structure, ovary characteristics, fruit morphology, and flowering phenology provides valuable taxonomic characters for distinguishing *Mesua ferrea* from *Kayea assamica*. These floral traits not only facilitate species identification but also reflect evolutionary adaptations associated with reproductive biology and ecological interactions [2], [5], [6].

Conclusion

The present investigation on comparative floral morphology of *Mesua ferrea* and *Kayea assamica* from Lakhimpur district reveals significant morphological differences despite belonging to the same family. Floral characters such as inflorescence type, stigma morphology, ovary structure, and venation pattern are important

diagnostic features for taxonomic delimitation. The findings contribute to the systematic understanding of Calophyllaceae and provide baseline information for future floristic and conservation studies in Assam.

Conflict of interest

Authors have no conflict of interests.

Ethical issues

None.

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