Available online www.worldscientificnews.com

World Scientific News

An International Scientific Journal

WSN 213 (2026) 78-88 EISSN 2392-2192

Ethnomedicinal Importance, and Ecological Role of *Blumea* Species in East Singhbhum District, Jharkhand (India): Emphasis on Plant–Insect Interactions

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https://doi.org/10.65770/YJKV7902

ABSTRACT

The genus *Blumea* (Asteraceae) comprises aromatic herbaceous plants widely distributed in tropical Asia and well represented in eastern India. The present account synthesizes field observations and local knowledge on *Blumea* species occurring in East Singhbhum district, Jharkhand, with particular emphasis on morphology, medicinal use, habitat preference, distribution, and ecological interactions with insects. Species such as *Blumea flava*, *B. fistulosa*, *B. lacera*, *B. axillaris*, and allied taxa were recorded from forest edges, grasslands, roadside vegetation, and disturbed habitats around Dalma, Jamshedpur, Musabani, and Ghatshila. Local communities utilize these plants extensively for respiratory, digestive, febrile, and dermatological ailments. Flowering *Blumea* species attract a wide assemblage of insects including butterflies, bees, moths, ants, and beetles, indicating their role as important nectar and pollen resources. The study highlights *Blumea* species as key components linking traditional medicine with ecosystem functioning in Jharkhand's forested landscapes.

Keywords: Ethnobotany, medicinal plants, traditional knowledge, pollination biology, plant–insect interaction, nectar resources, conservation importance.

(Received 8 January 2026; Accepted 17 February 2026; Date of Publication 13 March 2026)

1. INTRODUCTION

The genus *Blumea* DC. (Family: Asteraceae) comprises aromatic herbs and shrubs widely distributed across tropical and subtropical regions of Asia, Africa, and Australia (Pornpongrungrueng et al., 2016; Abdullah et al., 2021; Sharma et al., 2022). In India, *Blumea* species are common components of grasslands, forest edges, wastelands, and disturbed habitats, where they often dominate early successional stages (Dey et al., 2016; Gazoulis et al., 2022). Despite being frequently regarded as weeds, several *Blumea* species possess considerable ethnomedicinal value and ecological significance (Kundu et al., 2022; Upadhyay, 2022; Chatterjee & Maurya, 2024). In eastern India, particularly in the state of Jharkhand, these plants are deeply integrated into traditional healthcare systems and local ecological networks yet remain insufficiently documented in scientific literature (Kumar et al., 2011; Kumar & Saikia, 2020; Sharma et al., 2024; Kumar et al., 2025).

East Singhbhum district of Jharkhand forms part of the Chota Nagpur Plateau and supports a mosaic of dry deciduous forests, sal-dominated woodlands, scrublands, and anthropogenically influenced landscapes (Kumar & Saikia, 2020; Maiti & Adhikary, 2021). Areas such as Dalma Wildlife Sanctuary, Ghatshila, Musabani, and adjoining forest fringes harbour rich floristic diversity and sustain indigenous communities including Ho, Santhal, Munda, and Bhumij tribes (Riya et al., 2024). These communities possess extensive traditional knowledge regarding the medicinal use of local plants, including *Blumea* species, which are employed in the treatment of fever, cough, cold, wounds, skin infections, digestive disorders, and inflammatory conditions (Buragohain, 2011; Ju et al., 2019; Bushi et al., 2021; Upadhyay, 2022). However, this ethnomedicinal knowledge is largely oral and is rapidly eroding due to socio-economic changes, habitat alteration, and reduced dependence on traditional medicine (Anyinam, 1995; Bag, 2017; Kumar et al., 2021; Sharma et al., 2021; Pradhan & Patra, 2023; Mbelebele et al., 2024).

Beyond their medicinal importance, *Blumea* species play a vital ecological role by supporting diverse insect assemblages (Lounibos & Frank, 2009; Verma et al., 2023). The plants produce numerous small capitulate flowers rich in nectar and pollen, making them highly attractive to a wide range of insects such as butterflies, bees, moths, beetles, and ants (Dar et al., 2017; Zariman et al., 2022). Their prolonged flowering period, often extending across seasons, ensures a continuous supply of floral resources, particularly in degraded and fragmented habitats where other nectar plants may be scarce (Zimmerman, 1988; Wray & Elle, 2015; Sponsler et al., 2023). As a result, *Blumea* species function as important nodes in local pollination networks, linking plant reproduction with insect survival and contributing to ecosystem resilience (Bascompte & Scheffer, 2023).

Plant–insect interactions are fundamental to ecosystem functioning, influencing pollination success, genetic diversity, and trophic stability (Fontaine et al., 2006; Moreira & Mooney, 2013; Gardarin et al., 2018; Wan et al., 2022). Generalist plants like *Blumea* often support multiple pollinator guilds, providing functional redundancy that buffers ecosystems against pollinator decline (Blüthgen & Klein, 2011; Kaiser-Bunbury et al., 2017; Ollerton, 2017). In the context of increasing habitat disturbance and climate variability in eastern India, understanding such interactions is critical for biodiversity conservation and habitat management (Behera et al., 2019). Moreover, the ecological services provided by medicinal plants like *Blumea* highlight the interdependence between human well-being and ecosystem health (Astutik et al., 2019; Sumiati et al., 2025).

Despite their importance, integrated studies addressing both the ethnomedicinal uses and ecological roles of *Blumea* species in Jharkhand are scarce. Most existing research focuses either on phytochemistry and pharmacology or on floristic inventories, with limited attention to plant–insect relationships. The present study aims to bridge this gap by documenting the ethnomedicinal importance of *Blumea* species in East Singhbhum district and examining their ecological role with special emphasis on plant–insect interactions. in the region.

Study Area and Habitat

The study area lies within East Singhbhum district, Jharkhand, encompassing forest and forest-fringe zones of Dalma range, Jamshedpur outskirts, Musabani, and Ghatshila. The region is characterized by tropical moist and dry deciduous forests, interspersed with grasslands, rocky slopes, stream margins, village commons, and roadside vegetation. Soils are predominantly lateritic with patches of sandy loam in low-lying areas. *Blumea* species thrive mainly in open sunny habitats, forest edges, degraded patches, fallow land, and lightly grazed grasslands, reflecting their adaptability to disturbance and seasonal moisture availability.

2. METHODS

Field surveys were conducted through repeated seasonal observations across different habitat types. *Blumea* populations were recorded through direct visual surveys along forest trails, roadsides, and open clearings. Morphological traits were noted in situ, and flowering phenology was monitored. Ethnomedicinal information was gathered through informal discussions with local residents, forest-dependent communities, and traditional healers. Insect visitation was documented by direct observation and photography, focusing on diurnal and crepuscular periods when flowers were most active.

3. FINDINGS

Several *Blumea* species were consistently recorded across East Singhbhum. Commonly observed taxa include *Blumea flava*, *Blumea fistulosa*, *Blumea lacera*, *Blumea axillaris*, and a few locally variable forms allied to these species. *B. flava* and *B. lacera* were abundant in open grasslands and roadside habitats, while *B. fistulosa* showed preference for moist forest margins (Table 1). Flowering occurred mainly during the monsoon and post-monsoon seasons, coinciding with peak insect activity. Local communities recognized these plants as medicinally valuable and frequently collected leaves and young shoots for household remedies.

Table 1. Checklist of *Blumea* species recorded from Dalma–Ghatshila–Musabani region, East Singhbhum, Jharkhand, with habitat, ethnomedicinal use, flowering season, life-form, and pollinator associations.

Order	Family	Scientific Name	Common / Local Name	Habitat	Life Form	Flowering Season	Medicinal Use (Local)	Pollinator / Insect Interaction
Asterales	Asteraceae	*Blumea flava*	Yellow blumea	Grassland, roadside	Perennial herb	July–November	Cough, fever, wound healing	Butterflies, bees, ants
Asterales	Asteraceae	*Blumea fistulosa*	Hollow blumea	Forest edge, moist roadside	Perennial herb	August–December	Respiratory ailments, chest congestion	Bees, butterflies, beetles
Asterales	Asteraceae	*Blumea lacera*	Kalijiri blumea	Open scrub, fallow land	Annual herb	June–October	Fever, digestive disorders	Butterflies, bees

Asterales	Asteraceae	*Blumea axillaris*	Scented blumea	Roadside, grassland	Perennial herb	July–November	Cold, inflammation	Bees, ants
Asterales	Asteraceae	*Blumea balsamifera*	Sambong	Moist forest margin	Perennial shrub-like herb	September–January	Asthma, cough, urinary disorders	Bees, moths
Asterales	Asteraceae	*Blumea mollis*	Soft blumea	Open grassland	Annual herb	July–October	Skin diseases	Small bees
Asterales	Asteraceae	*Blumea oblongifolia*	Oblong blumea	Forest fringe	Perennial herb	August–November	Anti-inflammatory	Bees
Asterales	Asteraceae	*Blumea eriantha*	Hairy blumea	Roadside scrub	Annual herb	June–September	Fever	Butterflies, bees
Asterales	Asteraceae	*Blumea clarkei*	Clarke's blumea	Open woodland	Perennial herb	July–October	Traditional tonic	Bees
Asterales	Asteraceae	*Blumea wightiana*	Wight's blumea	Moist forest edge	Perennial herb	August–December	Cold, cough	Bees, butterflies

Morphology of *Blumea* Species

Species of *Blumea* in East Singhbhum are erect, aromatic herbs, ranging from 30 cm to over 1 m in height. Leaves are generally simple, alternate or opposite, lanceolate to ovate, and covered with fine hairs, often emitting a strong camphor-like aroma when crushed. Stems may be solid or hollow, as in *B. fistulosa* (Image 1). Inflorescences are composite capitula arranged in panicles or clusters, bearing numerous small tubular florets, typically yellow to yellowish-orange. Fruits are small achenes with pappus hairs aiding wind dispersal.

Image 1. A) *Blumea fistulosa and* B) *Blumea flava* (Family: Asteraceae) in natural habitat at East Singhbhum, Jharkhand, showing elongated flowering axis with small purplish capitula bearing yellow disc florets. The species commonly occurs along forest edges and disturbed forest floors, flowering profusely and providing nectar resources for diverse insect visitors, thereby contributing to local pollination networks.

Medicinal Use and Importance

In East Singhbhum, *Blumea* species are integral to folk and tribal medicine. Leaves are commonly used as decoctions or infusions to treat cough, cold, bronchitis, fever, and digestive disorders. Leaf paste is applied externally for wounds, boils, skin infections, and insect bites. Steam inhalation of crushed leaves is practiced for respiratory congestion. The importance of *Blumea* lies in its easy availability, low cost, and multipurpose therapeutic value, especially in rural areas with limited access to modern healthcare.

Distribution in India and Jharkhand

Blumea species are widely distributed throughout India, from the plains to lower hill regions, particularly in the eastern, northeastern, and peninsular parts. In Jharkhand, they are common across forested districts such as East Singhbhum, West Singhbhum, Ranchi, and Latehar. Their success is linked to tolerance of disturbance, seasonal drought, and varied soil conditions.

Ecological Significance

Ecologically, *Blumea* species act as pioneer and stabilizing plants in disturbed habitats, reducing soil erosion and contributing organic matter. Their prolonged flowering period provides continuous nectar and pollen resources, supporting insect diversity when other floral resources are scarce. As part of secondary vegetation, they enhance habitat heterogeneity and ecological resilience.

Plant–Insect Relationship and Interaction

The plant–insect interaction network (Figure 1) highlights the ecological importance of *Blumea* species as multifunctional floral resources within the Dalma–Ghatshila–Musabani landscape of East Singhbhum, Jharkhand. The dense connectivity between *Blumea* species and multiple insect groups indicates a predominantly generalist pollination system, a strategy that enhances reproductive assurance under variable environmental conditions. Such generalist interactions are particularly advantageous in disturbed habitats, forest edges, and grasslands where specialist pollinators may be seasonally scarce. The presence of several interacting insect taxa suggests that *Blumea* species contribute significantly to the stability and resilience of local pollination networks.

Bees and butterflies emerge as the most prominent pollinators in the network, reflecting their high visitation frequency and efficiency in pollen transfer. Their strong association with flowering *Blumea* underscores the role of these plants as reliable nectar and pollen sources during extended flowering periods. Moth interactions, though fewer, extend pollination activity into dusk and night, demonstrating temporal complementarity in pollination services and reducing dependence on diurnal insects alone. This temporal expansion of pollination enhances overall reproductive success and indicates ecological redundancy within the system.

The interactions involving ants and beetles, while often overlooked, add functional complexity to the network. Ants, attracted by nectar and plant exudates, may indirectly benefit *Blumea* species by deterring herbivores and reducing florivory, thereby enhancing plant fitness. Beetles, acting as occasional pollen feeders and incidental pollinators, further diversify the pollination assemblage and contribute to interaction redundancy. Such multi-trophic interactions emphasize that *Blumea* species support not only pollination but also broader ecological processes.

Overall, the interaction network depicted in Figure 1 demonstrates that *Blumea* species function as ecologically significant nodes linking insect diversity with plant reproduction. Their ability to sustain a wide array of pollinators highlights their importance in maintaining ecosystem services, particularly in human-influenced landscapes. From a conservation perspective, protecting and retaining common medicinal plants such as *Blumea* can yield disproportionate benefits by supporting pollinator populations and enhancing ecological connectivity across forest–grassland mosaics in eastern India.

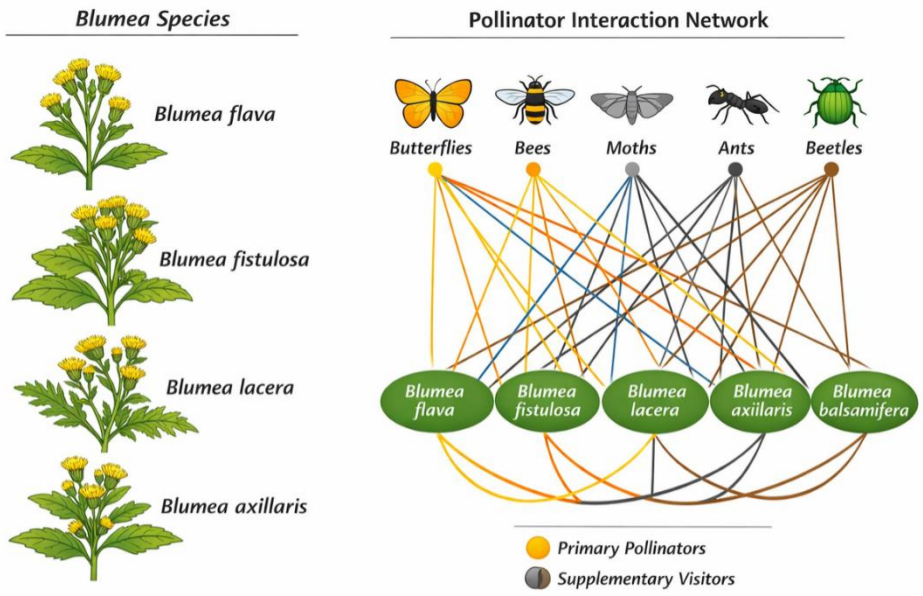

Figure 1. *Plant–Insect Interaction Network of Blumea Species in Dalma–Ghatshila–Musabani Forests, East Singhbhum, Jharkhand, India.*

Illustrations of Blumea species on the left and the pollinator interaction network on the right. Primary pollinators include butterflies and bees, while moths, ants, and beetles are supplementary visitors.

4. DISCUSSION

The present study highlights the dual importance of *Blumea* species in East Singhbhum district, Jharkhand, by integrating ethnomedicinal knowledge with ecological observations, particularly plant–insect interactions. The findings demonstrate that *Blumea* species are not merely common weeds of disturbed habitats but are culturally significant medicinal resources and ecologically important components of local ecosystems. Their widespread occurrence in forest edges, grasslands, village commons, and mining-affected landscapes enables continuous interaction with both human communities and insect fauna.

Ethnomedicinal data reveal that local tribal communities extensively utilize *Blumea* species for treating a range of ailments, including respiratory disorders, fever, skin infections, wounds, and digestive problems. Such uses are consistent with earlier reports from other parts of India, suggesting a broad pharmacological potential within the genus. The continued reliance on *Blumea* by indigenous communities underscores its accessibility, efficacy, and cultural acceptance. However, the predominantly oral transmission of this knowledge makes it vulnerable to loss, emphasizing the need for systematic documentation and integration into conservation and healthcare planning.

Ecologically, the study shows that *Blumea* species play a crucial role in sustaining insect diversity through their generalist pollination strategy. The interaction network indicates strong associations with bees and butterflies, which act as primary pollinators, while moths extend pollination services into crepuscular and nocturnal periods. Ants and beetles, although less effective as pollinators, contribute to interaction redundancy and may provide indirect benefits such as herbivore deterrence. This diversity of insect visitors enhances pollination stability and ensures reproductive success under fluctuating environmental conditions, particularly in disturbed and fragmented habitats.

The prolonged flowering period of *Blumea* species further enhances their ecological value by providing consistent nectar and pollen resources during periods when floral scarcity is common. Such temporal availability is critical for maintaining pollinator populations in landscapes experiencing seasonal stress, habitat degradation, or agricultural intensification. By supporting multiple insect guilds, *Blumea* species contribute to broader ecosystem services, including pollination of adjacent wild and cultivated plants, thereby reinforcing landscape-level ecological connectivity.

From a conservation perspective, the results suggest that the removal or neglect of common medicinal plants like *Blumea* may have unintended consequences for pollinator diversity and ecosystem functioning. Management practices that prioritize only economically important or charismatic species risk overlooking the ecological contributions of such generalist plants. Incorporating *Blumea* species into habitat restoration, roadside vegetation management, and community forestry programs could provide low-cost, nature-based solutions for pollinator conservation while simultaneously preserving ethnomedicinal resources.

Overall, this study underscores the interconnectedness of traditional knowledge, biodiversity, and ecosystem services. The ethnomedicinal and ecological significance of *Blumea* species in East Singhbhum highlights the need for integrated conservation strategies that recognize medicinal plants as key components of functional ecosystems.

5. CONCLUSIONS

The present study demonstrates that Blumea species in East Singhbhum district, Jharkhand, represent an important intersection of traditional ethnomedicinal knowledge and ecological functioning. Far from being merely common or weedy plants, Blumea species serve as valuable medicinal resources for indigenous communities while simultaneously supporting diverse insect assemblages and pollination services. Their widespread distribution across forest edges, grasslands, and disturbed habitats enables continuous interaction with both humans and insects, highlighting their multifunctional role in the local landscape.

Ethnomedicinal findings emphasize the continued reliance of tribal communities on Blumea species for treating common ailments, reflecting the cultural relevance and practical utility of these plants in primary healthcare systems. At the same time, ecological observations reveal that flowering Blumea species act as generalist nectar and pollen providers, attracting butterflies, bees, moths, ants, and beetles. This broad spectrum of insect visitors enhances pollination stability, promotes reproductive success, and strengthens local pollination networks, particularly in fragmented and human-modified environments.

The integration of ethnobotanical and ecological perspectives underscores the need to recognize medicinal plants such as Blumea as keystone floral resources rather than expendable weeds. Their conservation can yield multiple benefits, including the preservation of traditional knowledge, support for pollinator diversity, and maintenance of ecosystem services. Protecting and incorporating Blumea species into habitat restoration and landscape management strategies can therefore contribute to both biodiversity conservation and sustainable livelihoods.

Overall, the study highlights the importance of holistic approaches that link human well-being with ecosystem health. Conservation planning in eastern India should prioritize not only rare or economically prominent species but also ecologically resilient medicinal plants like Blumea, which play a critical role in sustaining plant–insect interactions and ecological resilience.

6. RECOMMENDATIONS

The findings of the present study strongly suggest the need for an integrated approach to conserve and sustainably manage *Blumea* species in East Singhbhum district, Jharkhand. Priority should be given to systematic documentation and preservation of indigenous ethnomedicinal knowledge related to *Blumea*, as much of this information is orally transmitted and increasingly threatened by socio-economic change. Recognizing *Blumea* species as ecologically valuable medicinal plants rather than weeds is essential, and they should be actively incorporated into habitat restoration, roadside plantation, and mine-reclamation programs due to their adaptability and ability to support pollinators in degraded landscapes. Conservation and land-management practices should promote pollinator-friendly approaches by protecting natural populations during flowering seasons and minimizing indiscriminate clearing. Active participation of local communities in sustainable harvesting, awareness programs, and community-based management will strengthen conservation outcomes while safeguarding traditional healthcare practices. Further phytochemical and pharmacological studies are recommended to scientifically validate traditional uses and explore potential herbal formulations, which may enhance livelihood opportunities if managed sustainably. Long-term ecological monitoring of *Blumea*–insect interactions across seasons is also essential to understand pollination dynamics, resilience, and ecosystem services. Finally, conservation policies and regional biodiversity action plans should explicitly include common medicinal plants such as *Blumea*, ensuring that development and conservation objectives are aligned to support both human well-being and ecological sustainability.

Funding: This research is not funded by any agency/ organization.

Competing interests: The authors declare no competing interests.

Authors' Contributions: R.G. and M.A.I.M carried out fieldwork and photography, while M.A.I.M. and S. P were responsible for study design, data analysis, map creation, drafting the original manuscript, and subsequent review and editing.

Acknowledgements:

We are grateful to Shaba Alam Ansari, IFS (DFO, Jamshedpur Forest Division), Dr. Abhishek Kumar, IFS, Smitha Pankaj, IFS, and Harishankar Lal (Technical Officer, Jharkhand Biodiversity Board) for their guidance, support, and valuable contributions throughout this study.

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