Assessment of Ecological Diversity of Butterflies and Their Association With Host and Nectar Plants in Selected Areas of the Amravati Region, Maharashtra, India. A Review of Research from 2010 To 2025

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ABSTRACT

Butterflies are important components of terrestrial ecosystems and are widely recognized as useful ecological indicators because their distribution, abundance and seasonal occurrence respond rapidly to changes in vegetation structure and environmental conditions. The Amravati region of Maharashtra contains a heterogeneous landscape comprising dry deciduous forests, scrublands, agricultural areas, urban and semi-urban habitats, riverine environments and protected areas such as Melghat Tiger Reserve. These habitats support a diverse butterfly fauna and provide larval host plants as well as adult nectar resources. The present review synthesizes available literature on butterfly diversity and butterfly–plant associations in selected areas of the Amravati region. In Sant Gadge Baba Amravati University campus and the Melghat landscape. Previous investigations documented 48 butterfly species from five families on the university campus and identified 19 nectar plants belonging to 12 plant families. Tiple et al. (2006), Studies from Melghat reported considerably greater diversity, including 101 butterfly species and 101 larval host plants.

The literature indicates that butterfly assemblages are strongly associated with vegetation composition, availability and continuity of larval host plants, abundance of flowering plants, floral morphology, flower colour, flowering period and habitat structure. Host-plant availability is particularly important because larval stages depend on specific plant resources, whereas adults frequently use a broader range of nectar sources. The review identifies the need for standardized, long-term monitoring of butterflies and their host and nectar plants across forest, agricultural, urban and semi-natural habitats of Amravati. Conservation planning should emphasize the maintenance of native vegetation, seasonal floral resources, larval host plants and habitat connectivity. The synthesis provides a framework for future field-based assessment of butterfly ecological diversity in the Amravati region. Butterflies are among the most studied, diverse, and widespread animal groups, making them an ideal model for climate change research. They are particularly informative for studying the effects of climate change on species ecology because they are ectotherms that thermoregulate using a suite of physiological, behavioural, and phenotypic traits (Hill et al.2021). By studying these climate-based impacts on the ecological processes of Lepidoptera, appropriate strategies for species conservation and habitat management can be proposed broadly across animals (Bladon et al. 2020).

Keywords: Butterflies, Amravati, Melghat, host plants, nectar plants, Species diversity, Urban ecosystem, biodiversity, butterfly–plant interaction, Maharashtra.

INTRODUCTION

Butterflies constitute an important component of terrestrial biodiversity and participate in several ecological processes, particularly pollination, herbivory and food-web interactions. Their relatively short generation times, sensitivity to microclimatic conditions and close relationships with vegetation make them useful organisms for studying environmental change and habitat quality. Standardized butterfly monitoring methods, including transect-based approaches, have consequently become important tools in ecological research and conservation monitoring (Pollard & Yates, 1993; Haddad *et al.,* 2008).

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The ecological requirements of butterflies differ substantially between their immature and adult stages. Larvae generally require particular host plants for feeding and development, and many species exhibit varying degrees of host specificity. Adult butterflies, in contrast, obtain carbohydrates and other nutrients primarily from flower nectar, although they may also use tree sap, rotting fruits, mineral-rich soil and other resources. Consequently, the composition of both larval host plants and adult nectar plants can influence the structure of local butterfly communities.

Research from central India has demonstrated the importance of plant resources in determining butterfly distribution. A detailed study in Nagpur documented larval host-plant relationships for 120 butterfly species and 126 host plants, with Poaceae and Fabaceae among the plant families most frequently used by butterfly larvae (Tiple *et al.,* 2011).

The Amravati region is particularly suitable for studying these relationships because of its ecological heterogeneity. The district includes portions of the Melghat landscape, where tropical dry deciduous vegetation, hills, valleys, streams and forest edges create a variety of habitats. The Amravati District administration describes Melghat as a major biodiversity repository, with tropical dry deciduous forests dominated by teak and a network of rivers and tributaries.

Earlier studies specifically conducted in and around Amravati provide a valuable foundation for understanding the regional butterfly fauna. Nymphalidae was the most species-rich family in their survey, followed by Lycaenidae, Pieridae, Papilionidae and Hesperiidae (Wadatkar & Shirbhate, 2004). Their results demonstrated relationships between butterfly visitation and floral characteristics including flower colour, corolla shape, plant habit and flowering duration (Tiple *et al.,* 2005).

The Melghat region provides an even broader ecological setting. Wadatkar and Kasambe (2008) recorded 101 butterfly species from Melghat Tiger Reserve and documented 101 larval host plants, demonstrating the strong association between butterfly diversity and the availability of plant resources. Therefore, an integrated assessment of butterfly diversity together with host and nectar plants is necessary for understanding the ecological structure of butterfly communities in Amravati. Urban biodiversity is crucial for urban development and plays a vital role in urban ecosystems' stability, sustainability, and ecological security (Manes et al., 2012). Economic growth, coupled with the expansion of urban and agricultural land and the rapid development of advanced transportation networks, has resulted in increased fragmentation of ecological land use (Duo et al., 2023; Mao et al., 2013). This fragmentation results in declining biodiversity and threatens regional ecological security and sustainable development (Zhang et al., 2014). Therefore, conserving urban biodiversity is essential for fostering a favourable urban ecological environment.

Objectives of the Review

The major objectives of this review are: The present study adopts a structured literature review approach to assess the ecological diversity of butterflies and their associations with larval host plants and adult nectar plants in selected areas of the Amravati region, Maharashtra, India. The review covers published research and relevant scientific literature from January 2010 to December 2025. It aims to synthesize existing knowledge of butterfly species richness, diversity, distribution, habitat preferences, seasonal occurrence, and plant–butterfly interactions.

The review also considers the ecological importance of vegetation composition, habitat characteristics, and land-use changes in influencing butterfly communities. Particular emphasis is placed on identifying research gaps concerning butterfly diversity and plant associations in the Amravati region and the wider Vidarbha landscape.

1. To synthesize published information concerning butterfly diversity in selected areas of the Amravati region.

2. To review the documented association between butterflies and their larval host plants.

3. To examine the importance of nectar plants and floral characteristics in adult butterfly visitation.

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4. To compare butterfly diversity among major habitat types represented in the Amravati landscape.
5. To identify ecological factors influencing butterfly distribution and seasonal abundance.
6. To identify research gaps and suggest approaches for future monitoring and conservation of butterflies and their associated plants in the region.

Study Region: Amravati and Its Ecological importance:

Amravati is situated in the Vidarbha region of Maharashtra. The district contains a mixture of urban settlements, agricultural landscapes, plantations, scrub vegetation, grasslands and forest ecosystems. The ecological importance of the district is particularly associated with the Melghat landscape in its northern and northwestern portions.

Melghat occurs along the southern extension of the Satpura Hill Range and includes rugged hills, valleys and dry deciduous forests. The official district information identifies teak (*Tectona grandis*) as an important dominant tree and describes the region as an important biodiversity repository. Melghat Tiger Reserve is located in Amravati district and represents an extensive protected landscape. The reserve's habitat heterogeneity provides opportunities for butterflies with different ecological requirements, including forest-dependent species, grassland-associated species, edge species and species capable of using human-modified habitats. The study was conducted in a city public park located within the urban area of the study city. The park comprises landscaped gardens, lawns, flowering ornamental plants, shrubs, scattered trees, and open grassy patches that provide suitable habitats for butterflies. The diversity of flowering vegetation and relatively undisturbed green spaces make the park an appropriate site for a preliminary survey of butterfly diversity. Developing an urban green space system that is ecologically sustainable, environmentally safe, spatially rational, aesthetically pleasing, and efficiently managed is essential for advancing urban ecological networks (Bongaarts, 2019; Liu et al., 2023)

List of selected parks in Amravati region: -

1. Chatrapati Shahu Maharaj Park, Kediya Nagar Amravati
2. Wadali Talao, Amravati
3. Shyam Nagar, Amravati
4. Nandgaon Peth, Amravati
5. Sant Gadge Baba Amravati University Campus
6. Dastur Nagar Amravati

For an ecological study, selected sites within the Amravati region can therefore be classified broadly into:

- Forest habitats
- Forest edges and clearings
- Scrub and grassland habitats
- Agricultural landscapes
- University and institutional campuses
- Urban and semi-urban gardens
- Riparian or moist habitats

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- Plantation and roadside vegetation

Such habitat classification is useful because butterfly communities often respond to differences in vegetation structure, microclimate, resource availability and disturbance.

Butterfly Diversity in the Amravati Region

Amravati University Campus

One of the earliest published studies of butterflies in Amravati University documented 47 species belonging to 38 genera and five families. Nymphalidae accounted for the largest number of species, followed by Lycaenidae, Pieridae, Papilionidae and Hesperiidae. The authors also categorized species according to their observed abundance, demonstrating that the campus supported both common and uncommon butterfly species (Wadatkar & Shirbhate, 2004).

The presence of numerous butterfly species within an institutional campus is ecologically significant because such landscapes can function as small refuges within an increasingly modified matrix. Gardens, shrubs, grasses and flowering plants may provide nectar resources, while planted or naturally occurring host plants can support larval development. Butterflies depend on plants for food, reproduction, shelter and survival. On the Sant Gadge Baba Amravati University campus in Maharashtra, flowering plants in gardens, tree plantations, grasslands and natural vegetation provide important resources for butterfly populations.

Nectar-resource study on the Amravati University campus

The study demonstrated that butterflies did not visit all flowers equally. Flower characteristics influenced visitation, with greater use reported for flowers with tubular corollas and flowers that were red, yellow, blue or purple compared with white or pink flowers. Herbs and shrubs were also important nectar resources, and plants with longer flowering periods could provide resources for butterflies over extended periods.

These observations emphasize that simply measuring the number of flowering plant species may not adequately explain butterfly abundance. The phenology and morphology of flowers are also important.

Melghat landscape

Melghat represents a much larger and more heterogeneous ecological system than an urban or institutional campus.

An earlier study of the Melghat region similarly emphasized its rich butterfly diversity and attributed this ecological richness partly to the region's tropical dry deciduous forests and variation in temperature and rainfall. The Melghat region includes parts of Chikhaldara and Dharni tehsils of Amravati district and contains several protected areas. The substantially higher number of butterfly species reported from Melghat compared with the university campus should not be interpreted simply as a direct difference in ecological quality. The sites differ greatly in area, habitat heterogeneity, sampling duration, vegetation structure and sampling design. Nevertheless, the findings illustrate the importance of extensive and heterogeneous natural habitats for supporting butterfly assemblages. Butterflies are widespread and adaptable across various ecological environments, playing a pivotal role in promoting plant reproduction and pollination, which is essential for maintaining the balance of plant populations and ecosystems (Ghazanfar et al., 2016).

Association of Butterfly Larva with Host Plants

Ecological importance of host plants

Larval host plants are fundamental to butterfly population persistence because eggs are laid on or near suitable plants and larvae depend on plant tissue for food. Consequently, the disappearance of a host plant can affect butterflies even when adult nectar resources remain available. (Ranjan, A., & Bhardwaj, M.2024)

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Host-plant associations may range from highly specialized relationships to relatively broad host use. The degree of specialization varies among butterfly taxa and individual species. Habitat degradation can therefore affect butterfly communities indirectly through reductions in host-plant abundance and continuity.

The findings of the present study underline the importance of institutional estates, in this case a university campus, in providing resources for butterflies. Often, there are large open areas on college campuses and both ornamental and more functional areas can be diversified for the benefit of arthropods and other animals. Naturally, there has to be a balance between naturally grown, wild areas as well as mown grass areas. Increase in semi-natural vegetation has its dangers in a tropical context (e.g., poisonous snakes), particularly for staff and students on a university campus. There is considerable diversity of butterflies on the Amravati campus, to which five more species have been added. (Lin, Y., et al.2024)

Importance of nectar and host plants

- **Food and energy:** Nectar supplies adult butterflies with sugars needed for flight, movement and daily activities.
- **Caterpillar development:** Larval host plants supply the food required for growth, moulting and pupation.
- **Reproduction:** Suitable host plants provide locations for egg laying and improve the chances that caterpillars will find appropriate food.
- **Butterfly diversity:** A variety of flowering plants and larval host plants can support more butterfly species with different resource requirements.
- **Seasonal survival:** Plants flowering at different times help maintain nectar availability across seasons.
- **Pollination:** While feeding on nectar, butterflies may transfer pollen between flowers and contribute to pollination.
- **Habitat conservation:** Protecting native vegetation, flowering herbs, shrubs, trees and grasses helps maintain butterfly populations in university landscapes.

Host plants documented in Amravati

The Amravati University study identified several plant groups used as host plants, including Ricinus *communis*, *Passiflora foetida*, *Cassia fistula*, *Lantana camara*, *Citrus* spp., *Calotropis procera*, *Acacia* spp., *Ziziphus* spp., *Butea monosperma*, *Barleria* spp., *Bauhinia racemosa*, *Nerium* spp., *Murraya koenigii* and grasses, among others (Wadatkar & Shirbhate, 2004). The difference between campus and forest habitats indicates that conservation planning should not concentrate exclusively on flowering plants. A butterfly-friendly landscape must also retain plants required by larvae. Urban biodiversity is crucial for urban development and plays a vital role in urban ecosystems' stability, sustainability, and ecological security (Manes et al., 2012). Economic growth, coupled with the expansion of urban and agricultural land and the rapid development of advanced transportation networks, has resulted in increased fragmentation of ecological land use (Duo et al., 2023; Mao et al., 2013). This fragmentation results in declining biodiversity and threatens regional ecological security and sustainable development (Zhang et al., 2014). Therefore, conserving urban biodiversity is essential for fostering a favourable urban ecological environment.

Nectar resource plants recorded on the campus

The following plants were listed in the 2006 campus study as nectar resources. Common names are included for ease of identification.

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No.	Scientific name recorded in the study	Plant type	Flowering period reported	Importance as a nectar resource
1	*Celosia argentea*	Herb	All year	Provides flowers used by nectar-feeding butterflies.
2	*Cassia siamea*	Tree	All year	Yellow flowers provide nectar resources.
3	*Catharanthus roseus*	Shrub	All year	A long-flowering ornamental nectar source.
4	*Gaillardia* spp.	Shrub, as classified in the study	All year	Red flowers attract nectar-feeding butterflies.
5	*Tagetes* spp.	Shrub, as classified in the study	All year	Yellow and red-toned flowers provide nectar.
6	*Lagasca mollis*	Herb	June–November	Seasonal nectar resource.
7	*Tridax procumbens*	Herb	All year	A commonly available flowering resource.
8	*Trichodesma indicum*	Herb	All year	Blue and white flowers offer nectar.
9	*Trichodesma zeylanica*	Herb	All year	Yellow flowers provide a feeding resource.
10	*Bauhinia purpurea*	Tree	September–December	Purple flowers provide nectar, although fewer butterfly species visited than expected.
11	*Jatropha gossypiifolia*	Herb	June–October	Red flowers attracted more butterfly species than expected.
12	*Tephrosia purpurea*	Herb	All year	Pink flowers provide nectar.
13	*Clotalaria* spp. (as printed; likely *Crotalaria* spp.)	Herb	All year	Yellow flowers contribute to nectar availability.
14	*Ocimum* spp.	Herb	July–October	Flowering herbs provide nectar during part of the year.
15	*Sida acuta*	Herb	July–November	Seasonal nectar source.
16	*Moringa oleifera*	Tree	All year	Flowering tree that adds to campus nectar resources.
17	*Ziziphus mauritiana*	Tree	July–November	Provides flowers during the monsoon and post-monsoon period.

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18	*Lantana camara*	Shrub	All year	A frequently visited nectar source in the study.
19	*Tribulus terrestris*	Herb	June–October	Yellow flowers offer a seasonal nectar source.

Source: Tiple, Deshmukh, and Dennis (2006).

Nectar Plants and Adult Butterfly Associations

Adult butterflies require energy-rich resources for flight, mating and reproduction. Flower nectar is an important source of carbohydrates and may influence the abundance and distribution of adult butterflies.

The Amravati University campus study provides particularly useful evidence because it directly investigated butterfly–nectar plant interactions. Nineteen nectar plants belonging to 12 plant families were recorded. Butterfly visitation was influenced by flower colour, corolla form, flowering duration and plant growth form (Tiple et al., 2005).

Plants reported as nectar resources in the Amravati campus literature included *Tridax procumbens*, *Lantana camara*, *Zinnia elegans*, *Impatiens balsamina*, *Tagetes erecta*, *Delonix regia*, *Bougainvillea* spp., *Ziziphus* spp., *Tephrosia purpurea* and *Gaillardia* spp. (Wadatkar & Shirbhate, 2004).

Comparable research from Bhor, Maharashtra, recorded 64 butterfly species and 19 nectar plants and found particularly frequent use of plants belonging to Asteraceae. Butterfly abundance also varied seasonally, with higher species abundance during the monsoon and post-monsoon period (Nimbalkar *et al.,* 2011). These findings suggest that maintaining continuous flowering resources across seasons can be important for sustaining butterfly populations.

Floral Characteristics Affecting Butterfly Visitation

Butterfly visitation is influenced by several floral traits.

Flower colour

Butterflies possess well-developed visual systems and commonly respond to conspicuous flower colours. The Amravati campus study found greater visitation to red, yellow, blue and purple flowers than to white and pink flowers (Tiple *et al.,*2005).

However, flower colour should not be treated as an isolated determinant. The abundance, accessibility and temporal availability of flowers can interact with colour and other floral characteristics.

Corolla morphology

Corolla depth can affect nectar accessibility. Research from Nagpur involving 108 butterfly species and 20 plant species demonstrated relationships between butterfly morphology and flower morphology. Corolla depth can impose constraints related to proboscis length, while butterflies with different body sizes and wing-loading characteristics may exploit different floral resources (Tiple *et al.,* 2009; 2010).

This suggests that plant–butterfly relationships should be considered from a functional perspective rather than simply recording the presence or absence of visits.

Flowering duration

Plants flowering for longer periods can provide relatively stable nectar resources. In seasonal environments such as Vidarbha, continuity of flowering may be particularly important because the availability of floral resources changes substantially during the year.

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Plant growth form

The Amravati study reported frequent visits to flowering herbs and shrubs compared with trees. Trees may have relatively short flowering periods and fewer concentrated flowers, whereas some herbs and shrubs can produce accessible floral resources for longer periods (Tiple *et al.,* 2005).

Seasonal Variation in Butterfly Diversity

Butterfly communities are strongly seasonal. Temperature, rainfall, humidity, vegetation growth, host-plant availability and flowering phenology all influence butterfly activity.

In Maharashtra, the Bhor study recorded greater butterfly abundance during August–November, followed by a decline from December through the dry season (Nimbalkar et al., 2011).

Although the precise seasonal pattern in Amravati may differ according to habitat and annual rainfall, the regional evidence suggests that the monsoon and post-monsoon periods are likely to be particularly important for butterfly activity. Increased rainfall promotes vegetation growth and may increase both larval host-plant availability and nectar resources.

Seasonal monitoring should therefore include the major climatic periods:

- Pre-monsoon/summer
- Southwest monsoon
- Post-monsoon
- Winter

Sampling throughout an entire annual cycle is preferable to short-term surveys because species that are uncommon during one season may become abundant during another.

Climate change has already had adverse effects on biodiversity and ecosystem functioning and these effects are likely to worsen as warming proceeds in future (IPBES, 2019; IPCC, 2022). Climate change impacts on ecological processes scales from genes to entire ecosystems, can affect organisms, populations or entire communities and vary between physiological, morphological, phenological and distributional shifts (Bellard et al., 2012; Scheffers et al., 2016).

Habitat Heterogeneity and Butterfly Diversity

Butterfly diversity is often associated with habitat heterogeneity. A landscape containing forest interiors, clearings, grasslands, shrubs, flowering patches and water-associated vegetation can provide resources for species with different ecological requirements. As significant representatives of the insect world, butterflies hold a prominent position in nature. Their ecological, economic, cultural, and aesthetic values are substantial and cannot be ignored (Pu et al., 2014; Shi, 2013).

The Melghat landscape demonstrates this principle at a large spatial scale. Its dry deciduous forests, hills, valleys and varying environmental conditions create multiple ecological niches. The official description of Melghat emphasizes its dry deciduous vegetation and major role in the biodiversity of Maharashtra.

Urban and institutional habitats can also contribute to butterfly conservation when they contain diverse vegetation. The Amravati University findings demonstrate that a relatively restricted campus landscape supported dozens of butterfly species and numerous nectar and host plants.

This indicates that conservation should consider both protected natural habitats and smaller semi-natural habitats embedded within human-dominated landscapes. (Paul, M. & Sultana, A.2020).

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Recommended Methodology for Future Field Assessment

Because the present article is a literature review, the following methodology is proposed for a future empirical assessment rather than presented as newly collected data.

Site selection

Selected study sites should represent major habitat categories:

1. Forest
2. Forest edge
3. Scrubland
4. Grassland
5. Agricultural land
6. Urban/semi-urban gardens
7. Institutional campus
8. Riparian habitat

At least three representative sampling sites per major habitat category would improve statistical comparison.

Butterfly sampling

A standardized Pollard-type transect approach can be used. Transects should be permanently marked and surveyed repeatedly at approximately standardized times under suitable weather conditions.

The Pollard method has been widely used for monitoring butterfly abundance, while modified transect approaches have also been developed for tropical environments (Pollard & Yates, 1993; Haddad et al., 2008).

Recent methodological research also indicates that standardized line-transect and time-constrained approaches can provide useful estimates of tropical butterfly diversity when sampling effort is carefully controlled.

Plant sampling

For each transect, the following information should be recorded:

1. Plant species identity
2. Number of individual plants
3. Growth form
4. Flowering status
5. Flower abundance
6. Flower colour
7. Corolla type
8. Flowering duration

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9. Native/exotic status

10. Evidence of larval feeding

11. Egg or larval presence

Host-plant observations

Where possible, larval associations should be confirmed through direct observations of:

- Eggs
- Larvae
- Feeding damage
- Pupae
- Adult oviposition

Simply observing an adult butterfly on a plant should not automatically be interpreted as evidence that the plant is a larval host plant. This distinction is important in ecological studies.

Nectar-plant observations

For each butterfly–flower interaction, researchers should record:

1. Butterfly species
2. Plant species
3. Number of visits
4. Duration of visit
5. Flower colour
6. Flower morphology
7. Time of observation
8. Habitat type
9. Flower abundance

Repeated observations can then be used to construct a butterfly–nectar plant interaction matrix.

Diversity Indices

Future field data can be analysed using standard biodiversity measures.

Species richness

Species richness is the total number of butterfly species recorded:

$$S = \text{number of butterfly species recorded}$$

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Shannon–Wiener diversity index

$$H' = -\sum_{i=1}^{S} p_i \ln(p_i)$$

where $p_i$is the proportional abundance of species i.

Simpson's diversity index

$$D = 1 - \sum p_i^2$$

Pielou's evenness

$$J' = \frac{H'}{\ln S}$$

These indices allow comparison of butterfly communities among forest, agricultural, urban and other habitats.

However, diversity indices should be interpreted alongside sampling effort, species detectability, habitat area and seasonal variation.

Butterfly–Plant Interaction Analysis

The relationship between butterfly abundance and host/nectar plant availability can be examined statistically.

For example, correlation or regression analysis may be used to examine whether butterfly abundance increases with:

- Number of host-plant species
- Host-plant abundance
- Number of flowering plant species
- Flower abundance
- Flowering duration
- Vegetation complexity

Network analysis can also be used to examine butterfly–plant interactions. A bipartite network can represent butterflies on one side and plant species on the other, with links representing nectar visitation or larval association. (Zhang, et al. 2021) Such an approach can identify plants that function as important resource species and butterflies that have relatively specialized resource requirements.

Conservation Significance

The available literature demonstrates that butterfly conservation in Amravati cannot be separated from plant conservation. Protecting adult butterflies without protecting their larval host plants is unlikely to maintain populations over the long term. The Melghat study provides strong evidence for the importance of host-plant diversity, with 101 larval host plants recorded alongside 101 butterfly species.

Similarly, the Amravati University studies demonstrate the importance of maintaining flowering plants within semi-urban habitats.

The following conservation measures are therefore relevant:

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Protection of native vegetation

Native trees, shrubs, herbs and grasses should be retained wherever possible, particularly plants known to function as larval hosts.

Development of butterfly gardens

Butterfly gardens should contain both:

- Larval host plants
- Nectar-producing flowering plants

A garden containing only nectar plants may attract adult butterflies but may not support their complete life cycle.

Seasonal continuity of flowering

Planting species with complementary flowering periods can help to maintain nectar availability throughout the year.

Reduction of indiscriminate pesticide use

Pesticides and herbicides can directly affect butterflies and indirectly reduce their host and nectar plants. Integrated pest-management approaches are preferable where agricultural production occurs near important butterfly habitats.

Maintenance of habitat connectivity

Small forest patches, roadside vegetation, hedgerows, riparian vegetation and institutional green spaces can function as stepping stones between larger habitat patches.

Long-term monitoring

Repeated surveys using consistent methodology are needed to distinguish genuine population changes from differences caused by sampling effort or seasonal variation.

Research Gaps

Despite several valuable studies, important gaps remain in understanding butterfly–plant relationships in Amravati.

First, many existing studies are relatively old and were conducted during specific periods or at individual locations. Long-term standardized datasets covering the entire annual cycle are limited.

Second, information on adult nectar associations is better documented for the university campus than for the broader Amravati landscape. More detailed research is required in forest, agricultural and semi-urban habitats.

Third, larval host-plant records require systematic verification. Literature-based host associations should ideally be supplemented by field observations of eggs and larvae.

Fourth, changes in land use, agricultural intensification, urban expansion and vegetation management may alter butterfly communities and plant resources. Long-term comparative studies are needed to evaluate these effects.

Finally, climate variability may influence the timing of butterfly emergence, plant flowering and larval development. Future research should therefore integrate climatic variables with butterfly and plant observations.

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DISCUSSION

The available evidence indicates that butterfly diversity in the Amravati region is closely connected with habitat structure and plant-resource availability. Studies conducted on the Amravati University campus documented approximately 48 butterfly species, while the much larger and more heterogeneous Melghat landscape supported 101 recorded species in the study by Wadatkar and Kasambe (2008).

The difference demonstrates the importance of spatial scale and habitat heterogeneity, but comparisons between studies should be made cautiously because survey periods, sampling intensity and study areas were not identical.

Host plants appear to be especially important because they directly determine where successful larval development can occur. Evidence from the wider central Indian region shows substantial diversity in host-plant use and demonstrates the importance of plant families such as Poaceae and Fabaceae (Tiple *et al.,* 2011).

Adult butterflies, meanwhile, may interact with a broader set of flowering plants. Research in Amravati demonstrated that floral colour, corolla morphology, flowering duration and plant growth form influence nectar visitation.

Thus, the relationship between butterflies and plants is not simply a matter of plant abundance. The ecological value of a plant depends on its function, seasonal availability, accessibility and relationship with particular butterfly species.

A useful conceptual model for the Amravati landscape is therefore:

Habitat structure → Plant diversity → Host and nectar resource availability → Butterfly abundance and richness → Ecological stability

CONCLUSION

The literature reviewed in this article establishes the Amravati region as an important area for butterfly ecological research in Maharashtra. Existing studies have documented substantial butterfly diversity in both semi-urban habitats such as the Amravati University campus and natural landscapes such as Melghat Tiger Reserve.

The available evidence demonstrates two complementary aspects of butterfly ecology. First, larval host plants are essential for successful development and population maintenance. Second, adult butterflies depend on suitable nectar resources whose availability is influenced by flower colour, morphology, abundance and flowering season. The Amravati University studies provide evidence that relatively small managed landscapes can support considerable butterfly diversity when suitable vegetation is available, whereas the Melghat studies demonstrate the importance of extensive heterogeneous forest ecosystems and diverse larval host plants.

Future research should therefore adopt an integrated butterfly–plant approach rather than examining butterflies independently. A year-round standardized survey incorporating Pollard-type transects, vegetation sampling, host-plant verification, nectar visitation observations and diversity indices would provide a stronger baseline for evaluating ecological diversity in Amravati. Conservation programs should emphasize protection of native vegetation, preservation of larval host plants, provision of continuous nectar resources, reduction of unnecessary pesticide use and maintenance of habitat connectivity. Such measures can contribute not only to butterfly conservation but also to the broader ecological integrity of the Amravati landscape.

Table 1. Major published butterfly studies relevant to Amravati

Year	Author and study	Study location	Main findings / relevance	Nectar plants reported
2011	A. D. Tiple, Butterflies of Vidarbha region,	Vidarbha, including	Regional review reporting approximately 167 butterfly species across five families; useful for regional species	Not the main focus; no verified nectar-plant list extracted.

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	Maharashtra State, central India	Amravati division	comparisons Journal of Threatened Taxa	
2014	K. Narasimmarajan et al., Butterflies Diversity in Gugamal National Park, in the Melghat Tiger Reserve, Maharashtra-Central India	Gugaml National Park, Melghat	Recorded 66 species during October 2010–March 2011 using repeated line-transect surveys.	Lantana camara and Celosia argentea were mentioned among plants associated with butterfly observations; verify the article's tables before treating these as confirmed nectar records.
2023	A. Kawadkar and T. Khedkar, Assessing Butterfly Diversity at Bodalkasa Dam at Gondia District, Vidarbha Region, Maharashtra	Gondia district	Surveyed March 2018–March 2019; useful for comparison with another Vidarbha landscape.Indian Journals	No verified species-level nectar-plant list located.
2024	Shri Shivaji Science College, To Study the Diversity of Butterflies and their Host Plants — institutional survey report	Pohara–Malkhed Reserve Forest, Amravati	A local field survey reported 40 butterfly species and identified habitat loss, grazing and pesticide/weedicide use as threats. This is an institutional activity report, not confirmed as a peer-reviewed journal paper. DBT Star College Project	Focused on host plants and life cycles; a verified nectar-plant list was not available in the retrieved report.
2011	Nimbalkar, R.K., Chandekar, S.K. & Khunte, S.P. (2011)	Bhor, Pune	Butterfly diversity in relation to nectar food plants from Bhor Tahsil, Pune District, Maharashtra, India	Reports 64 butterfly species and 19 nectar plants.
2014	Chandekar, S.K. et al. (2014)		The seasonal patterns in the abundance of butterflies, their biotopes and nectar food plants from Maval Tahsil, Pune District, Maharashtra, India	Reports 85 butterfly species and 32 nectar plants; useful for seasonal comparisons.

Table 2. Examples of plant resources associated with butterflies in Amravati

Plant	**Resource role**	**Importance**
Ricinus communis	Larval host	Supports larval development of some butterfly species
Passiflora foetida	Larval host	Important host resource
Citrus spp.	Larval host	Associated with swallowtail butterflies
Calotropis spp.	Larval host	Important for milkweed-associated butterflies

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Ziziphus spp.	Host/nectar resource	Used by different butterfly species
Tridax procumbens	Nectar	Frequently visited flowering herb
Lantana camara	Nectar	Important flowering resource
Zinnia elegans	Nectar	Ornamental nectar source
Tagetes erecta	Nectar	Flowering nectar resource
Tephrosia purpurea	Nectar	Documented nectar source

Checklist of Commonly reported butterflies relevant to Amravati urban parks from previous Research study: -

No.	Common name	Scientific name	Reported status
1	Rice Swift	*Borbo cinnara*	Very Common
2	Lime Butterfly	*Papilio demoleus*	Very Common
3	Mottled Emigrant	*Catopsilia pomona*	Very Common
4	Small Grass Yellow	*Eurema brigitta*	Very Common
5	Common Grass Yellow	*Eurema hecabe*	Very Common
6	Rounded Pierrot	*Tarucus nara*	Very Common
7	Common Evening Brown	*Melanitis leda*	Very Common
8	Yellow Pansy	*Junonia hierta*	Very Common
9	Lemon Pansy	*Junonia lemonias*	Very Common
10	Blue Pansy	*Junonia orithya*	Very Common
11	Plain Tiger	*Danaus chrysippus*	Very Common
12	Common Leopard	*Phalanta phalantha*	Very Common
13	Common Indian Crow	*Euploea core*	Very Common
14	Lemon Emigrant	*Catopsilia pomona* / related taxonomic treatment	Common
15	Spotless Grass Yellow	*Eurema laeta*	Common
16	White Orange-tip	*Ixias marianne*	Common
17	Grass Jewel	*Freyeria trochylus*	Common
18	Pea Blue	*Lampides boeticus*	Common
19	Forget-me-not	*Catochrysops strabo*	Common

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20	Plains Cupid	*Chilades pandava*	Common
21	Common Three-ring	*Ypthima asterope*	Common
22	Striped Tiger	*Danaus genutia*	Common
23	Blue Tiger	*Tirumala limniace*	Common
24	Tawny Coster	*Acraea violae*	Common
25	Common Castor	*Ariadne merione*	Common
26	Painted Lady	*Vanessa cardui* (listed as *Cynthia cardui* in the older study)	Common
27	Great Eggfly	*Hypolimnas bolina*	Common

REFERENCES

1. Alex, N. P. (2023). Urban parks for conservation of butterflies: A case study of butterfly diversity of urban parks in Kozhikode urban agglomeration, Kerala. Research Square.
2. Arya, M. K., Chandra, H., Bisht, S., & Fasuil, F. (2021). Preliminary report on moth diversity in the landscape of Nandhaur Wildlife Sanctuary: Adding subset to lepidopteran insects of protected area network. Uttar Pradesh Journal of Zoology, 42(15), 12–22.
3. Biodiversity in cities needs space: a meta-analysis of factors determining intra-urban biodiversity variation (Ecol. Lett 2015)
4. Bhuyan, M., Kataki, D., Deka, M., & Bhattacharyya, P. R. (2005). Nectar host selection and floral probing by the Indian butterfly Danaus genutia (Nymphalidae). Journal of Research on the Lepidoptera, 38, 79–84.
5. Boggs, C. L. (1995). Male nuptial gifts: Phenotypic consequences and evolutionary implications. In S. R. Leather & J. Hardie (Eds.), Insect Reproduction (pp. 215–242). CRC Press.
6. Boggs, C. L., & Nieminen, M. (2004). Checkerspot reproductive biology. In P. R. Ehrlich & I. Hanski (Eds.), On the Wings of Checkerspots: A Model System for Population Biology (pp. 92–111). Oxford University Press.
7. Bonebrake, T. C., Ponisio, L. C., Boggs, C. L., & Ehrlich, P. R. (2010). More than just indicators: A review of tropical butterfly ecology and conservation. Biological Conservation, 143(8), 1831–1841.
8. Corbet, S. A. (2000). Butterfly nectaring flowers: Butterfly morphology and flower form. Entomologia Experimentalis et Applicata, 96, 289–298.
9. Culin, J. D. (1997). Relationship of butterfly visitation with nectar qualities and flower color in butterfly bush, Buddleia davidii. News of the Lepidopterists' Society, 39, 35–39.
10. Dennis, R. L. H., Shreeve, T. G., & Van Dyck, H. (2003). Towards a functional resource-based concept for habitat: A butterfly biology viewpoint. Oikos, 102, 417–426.
11. Faegri, K., & van der Pijl, L. (1979). The Principles of Pollination Ecology. Pergamon Press.
12. Feber, R. E., Smith, H., & Macdonald, D. W. (1996). The effect of butterfly abundance on the management of uncropped edges of arable fields. Journal of Applied Ecology, 33, 1191–1205.
13. Gey, T., Kehimkar, J. D., & Punetha, J. C. (1992). Common Butterflies of India. Oxford University Press.
14. Gilbert, L. E. (1973). Pollen feeding and reproductive biology of Heliconius butterflies. Proceedings of the National Academy of Sciences of the United States of America, 69, 1403–1407.
15. Gilbert, L. E. (1981). The biology of communities. In R. I. Vane-Wright & P. R. Ackery (Eds.), The Biology of Butterflies (pp. 41–54). Academic Press.
16. Goodman, L. A., & Kruskal, W. H. (1972). Measures of association for cross-classifications. IV. Simplification of asymptotic variances. Journal of the American Statistical Association, 67, 415–421.

17. Goulson, D., Stout, J. C., & Hawson, S. A. (1997). Can flower constancy in nectaring butterflies be explained by Darwin's interference hypothesis? Oecologia, 112, 225–231.
18. Gupta, H., Tiwari, C., & Diwakar, S. (2019). Butterfly diversity and effect of temperature and humidity gradients on butterfly assemblages in a sub-tropical urban landscape. Tropical Ecology, 60, 150–158.
19. Gupta, I. J., & Mondal, D. K. (2005). Red Data Book, Part II: Butterflies of India. Zoological Society of India.
20. Han, D., Wang, C., She, J., Sun, Z., & Yin, L. (2025). Effects of vegetation heterogeneity on butterfly diversity in urban parks: Applying the patch–matrix framework at fine scales. Sustainability, 17(14), 6289.
21. Huang, Q., Zhang, Z., & Ma, H. (2023). Characterization of butterfly diversity in urban parks in Kunming under multiple landscape dimensions. Chinese Journal of Ecology, 42(9).
22. Jennersten, O. (1984). Flower visitation and pollination efficiency of some North European butterflies. Oecologia, 63, 80–89.
23. Kehimkar, I. (2016). The Book of Indian Butterflies (2nd ed.). Bombay Natural History Society & Oxford University Press.
24. Kakde. V and Patil. S. Study of Moth Diversity from Khamgaon City, Buldhana, India.2024.
25. Kingsolver, J. G., & Daniel, T. L. (1979). On the mechanics and energetics of nectar feeding in butterflies. Journal of Theoretical Biology, 76, 167–179.
26. Krauss, J., Steffan-Dewenter, I., & Tscharntke, T. (2003). How does landscape context contribute to effects of habitat fragmentation on diversity and population density of butterflies? Journal of Biogeography, 30, 889–900.
27. Kunte, K. (2000). A Lifescape of Butterflies of Peninsular India. Universities Press.
28. Kurylo, J. S., Lasky, J. R., & McCaffrey, S. (2018). Comparisons of citizen science data-gathering approaches to evaluate urban butterfly diversity. Insects, 9(4), 186.
29. Kumar, P., et al. (2025). Butterfly diversity in the urban ecosystem of Karnal, Haryana, India: Seasonal patterns and conservation implications. The Journal of Basic and Applied Zoology, 86, 57.
30. Lin, Y., et al. (2024). Impact of urban landscape patterns on butterfly diversity in Fuzhou City parks. Science of the Total Environment.
31. Manwar, N., & Wankhade, V. (2014). Seasonal variation in diversity and abundance of butterfly at Sawanga Vithoba Lake Area, District Amravati, Maharashtra, India. Journal of Biological Sciences, 14, 485–493.
32. Meena, A. R. (2020). Butterfly diversity in urban area of Udaipur city, Rajasthan, India. BIOINFOLET, 17(3a), 379–381.
33. Mevi-Schütz, J., & Erhardt, A. (2004). Mating frequency in flower nectar amino acid preferences of Pieris napi. Proceedings of the Royal Society of London, Series B, 271, 153–158.
34. Nair, V. P. (2002). Butterflies of Government College Campus, Madappally, Kozhikode District, Kerala. Zoos' Print Journal, 17, 911–912.
35. Palot, M. J. (2003). Butterfly collection at Entomology Museum, M.E.S. Mampad College, Kerala. Zoos' Print Journal, 18, 1229–1231.
36. Paul, M., & Sultana, A. (2020). Studies on butterfly (Insecta: Lepidoptera) diversity across different urban landscapes of Delhi, India. Current Science, 118(5), 819–827.
37. Pe'er, G., & Settele, J. (2008). Butterflies in and for conservation: Trends and prospects. Israel Journal of Ecology & Evolution, 54(1), 7–17.
38. Pivnick, K. A., & McNeil, J. N. (1985). Effects of nectar concentration on butterfly feeding: Measured feeding rates for Thymelicus lineola (Lepidoptera: Hesperiidae) and a general feeding model for adult Lepidoptera. Oecologia, 66, 226–237.
39. Pollard, E. (1977). A method for assessing changes in the abundance of butterflies. Biological Conservation, 12(2), 115–134.
40. Porter, K., Steel, C. A., & Thomas, J. A. (1992). Butterflies and communities. In R. L. H. Dennis (Ed.), The Ecology of Butterflies in Britain (pp. 139–177). Oxford University Press.
41. Ranjan, A., & Bhardwaj, M. (2024). Butterfly diversity in Harding Park, Patna, Bihar, India: A case study of urban ecosystem. Uttar Pradesh Journal of Zoology, 45(24), 39–51.
42. Roberts, T. J. (2001). The Butterflies of Pakistan. Oxford University Press.

43. Shreeve, T. G. (1992). Adult behaviour. In R. L. H. Dennis (Ed.), The Ecology of Butterflies in Britain (pp. 22–45). Oxford University Press.
44. Solman Raju, A. J. (2004). Nectar host plants of some butterfly species at Visakhapatnam. Science and Culture, 70, 187–190.
45. StatSoft. (1999). STATISTICA for Windows 95/98/NT. StatSoft, Tulsa.
46. Swengel, A. B., & Swengel, S. R. (2001). The effects of prairie and barrens management on butterfly faunal composition. Biodiversity & Conservation, 10, 1757–1785.
47. Tiple, A. D., Khurad, A. M., & Dennis, R. L. H. (2007). Butterfly diversity in relation to a human-impact gradient on an Indian university campus. Nota Lepidopterologica, 30(1), 179–188.
48. Tudor, O., Dennis, R. L. H., Greatorex-Davies, J. N., & Sparks, T. H. (2004). Flower preferences of woodland butterflies in the UK: Nectaring specialists are species of conservation concern. Biological Conservation, 119, 397–403.
49. Varshney, R. K. (1983). Index Rhopalocera Indica, Part II: Common Names of Butterflies from India and Neighboring Countries. Records of the Zoological Survey of India, Occasional Paper No. 47, 1–49.
50. Wadatkar, J. S., & Shirbhate, M. V. (2004). Diversity of butterflies from Amravati University Campus, Maharashtra. Amravati University Research Journal, 1(1), 4–7.
51. Watt, W. B., Hoch, P. C., & Mills, S. G. (1974). Nectar resource use by Colias butterflies: Chemical and visual aspects. Oecologia, 14, 353–374.
52. Wynter-Blyth, M. A. (1957). Butterflies of the Indian Region. Bombay Natural History Society.
53. Wankhade LN, Bidwai PA, Bhonde RS, Kadwe MM. A study on the insect (Insects:Lepidoptera: Heterocera) diversity during rainy season from Tirora, District Gondia, Maharashtra. Journal of Entomology and Zoology Studies. 2021;9(6):93-96.
54. Zhang, et al. (2021). Differences in response of butterfly diversity and species composition in urban parks to land cover and local habitat variables. Forests, 12(2), 140.