

Chapter 5

Urban Birds-Host Plant Interactions: Conservation in a Modern Urban Landscape

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Abstract: Rapid urbanization has profoundly altered natural habitats, posing significant challenges to avian diversity. However, urban green spaces, roadside vegetation, home gardens and remnant native flora continue to provide critical resources for birds. The present study documents host plant associations of common urban bird species and examines their ecological significance in sustaining avifaunal diversity within a modern urban landscape. A total of 14 bird species belonging to different feeding guilds were observed interacting with diverse native and ornamental plant species. These interactions included mainly foraging and nesting activities. The findings highlight the importance of specific host plants such as *Bombax ceiba*, *Calotropis gigantea*, *Ziziphus mauritiana* and *Streblus asper* in supporting urban bird assemblages. The study emphasizes that conserving and promoting suitable host plants within urban ecosystems can play a crucial role in avian conservation and urban ecological resilience.

Keywords: Avian diversity, bird-plant interactions, conservation, green spaces, host plants, urbanisation

Introduction

Urbanization is one of the most pervasive forms of land-use change in the modern era, profoundly transforming natural landscapes into densely built environments (Das et al., 2024). The rapid expansion of cities has led to habitat loss, fragmentation and alteration of native vegetation, posing significant challenges to wildlife, particularly birds (Li et al., 2022). As sensitive indicators of environmental change, birds reflect the ecological health of urban ecosystems (Liu et al., 2025). Despite increasing anthropogenic pressures, many bird species continue to persist in cities by adapting to modified habitats and exploiting available plant resources

(Singh et al., 2025). Urban vegetation plays a central role in sustaining avian populations by providing essential resources such as food, nesting sites, shelter and perching substrates (Rahman et al., 2025). Trees, shrubs and herbaceous plants offer fruits, nectar, seeds and host insects that support birds belonging to different feeding guilds (Lin et al., 2025). In addition, structurally complex vegetation contributes to microhabitat diversity, enhancing breeding success and reducing predation risk (Chang and Todd, 2023). Consequently, bird-plant interactions form a fundamental ecological link that determines the composition and stability of urban bird communities (Wang et al., 2023). Host plants within urban landscapes may include native species, naturalized flora and ornamental plants introduced for aesthetic purposes (Sarigu et al., 2025). While ornamental vegetation often dominates city green spaces, native and multipurpose plant species generally provide richer and more reliable resources for birds (Zhang et al., 2023). Certain plant species function as keystone resources by supporting multiple bird species across seasons, thereby enhancing urban biodiversity (Lin et al., 2025). Understanding these host plant associations is therefore essential for identifying plant species that contribute most effectively to avian conservation in cities. Despite growing interest in urban biodiversity, detailed documentation of bird-host plant interactions remains limited, particularly in rapidly urbanizing regions. Most studies focus on species richness and abundance, with comparatively less emphasis on the ecological relationships that sustain urban bird populations. The present study addresses this gap by examining host plant associations of common urban birds and highlighting their conservation significance. Focusing on these interactions, the current work aims to contribute to sustainable urban planning strategies that integrate biodiversity conservation within modern urban landscapes.

Methodology

Field observations were carried out across selected urban habitats, including residential areas, roadsides and public green spaces from April 2025 to November 2025 in Cuttack, near the Mahanadi River areas, Odisha, India. Birds were recorded during morning and evening hours through direct visual observation and binoculars. Host plant species were identified through repeated observations of bird activities such as feeding and nesting. Scientific identification of birds and plants was done by the authors, followed by standard taxonomic references (Grimmett et al., 2011; Kumar et al., 2022).

Results and discussion

Present study revealed that urban birds utilize a wide range of plant species for foraging, nesting and other ecological requirements. The interactions documented in Table 1 indicate that both native and commonly planted urban trees and shrubs play a significant role in sustaining avifaunal diversity. A total of 14 bird species belonging to different families were observed interacting with multiple host plants, reflecting the heterogeneous nature of urban vegetation and its ecological importance. Among the recorded birds, the Red-vented Bulbul showed the highest frequency of plant associations. This species was observed utilizing diverse host plants, including *Bombax ceiba*, *Cassia siamea*, *Flueggea virosa*, *Spathodea campanulata*, *Streblus asper*, *Ziziphus mauritiana* and *Ziziphus oenopolia*. Such wide host plant usage indicates the highly adaptable and generalist feeding behaviour of this species, enabling it to thrive in urban environments. The Red-whiskered Bulbul also exhibited multiple associations, particularly with fruiting and shrub species, highlighting its similar ecological flexibility. Flowering plants such as *Calotropis gigantea* and *Leonotis nepetifolia* were primarily associated with nectar-feeding species like the Purple-rumped Sunbird. These plants provide abundant nectar resources, highlighting the importance of flowering vegetation in urban landscapes for sustaining specialized feeding guilds. Fruiting plants such as *Phyllanthus acidus*, *F. virosa*, *Trema orientale*, *Z. mauritiana* and *Z. oenopolia* supported a range of frugivorous and omnivorous birds, including starlings, mynas and bulbuls. Large and medium-sized trees like *B. ceiba*, *C. siamea*, *Erythrina variegata*, and *S. campanulata* were frequently used by birds such as Rosy Starling, Chestnut-tailed Starling, Rufous Treepie and Asian Pied Starling. These trees likely serve multiple functions, including perching, nesting and foraging. Shrubs and trees such as *S. asper* and *T. orientale* supported smaller passerines like the Dark-necked Tailorbird and Scaly-breasted Munia, as well as Jungle Myna, indicating the importance of vegetation structural diversity.

Table 1: Common host plants of urban birds

Scientific name	Common name	Plant name
<i>Pycnonotus cafer</i> (Figure 1)	Red-vented bulbul	<i>Bombax ceiba</i>
<i>Pastor roseus</i>	Rosy starling	
<i>Dendrocitta vagabunda</i>	Rufous treepie	

<i>Leptocoma zeylonica</i> (Figure 2)	Purple-rumped sunbird	<i>Calotropis gigantea</i>
<i>Sturnia malabarica</i>	Chestnut-tailed starling	<i>Cassia siamea</i>
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Corvus splendens</i> (Figure 3)	House crow	<i>Erythrina variegata</i>
<i>Gracupica contra</i>	Asian pied starling	<i>Flueggea virosa</i>
<i>Sturnia pagodarum</i>	Brahminy starling	
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	
<i>Leptocoma zeylonica</i>	Purple-rumped sunbird	<i>Leonotis nepetifolia</i>
<i>Pycnonotus luteolus</i>	White-browed bulbul	<i>Phyllanthus acidus</i>
<i>Gracupica contra</i> (Figure 4)	Asian pied starling	<i>Spathodea campanulata</i>
<i>Sturnia malabarica</i>	Chestnut-tailed starling	
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	
<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	<i>Streblus asper</i>
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	
<i>Lonchura punctulata</i>	Scaly-breasted munia	
<i>Gracupica contra</i>	Asian-pied starling	<i>Trema orientale</i>
<i>Acridotheres fuscus</i>	Jungle myna	
<i>Gracupica contra</i>	Asian pied starling	<i>Ziziphus mauritiana</i>
<i>Sturnia pagodarum</i>	Brahminy starling	
<i>Clamator jacobinus</i>	Jacobin cuckoo	
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	<i>Ziziphus oenopolia</i>
<i>Gracupica contra</i>	Asian pied starling	
<i>Clamator jacobinus</i>	Jacobin cuckoo	
<i>Pycnonotus cafer</i>	Red-vented bulbul	
<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	

The results clearly demonstrate that urban birds exhibit strong dependence on specific host plants for fulfilling their ecological needs. Generalist species such as bulbuls, starlings and mynas dominated the interactions, reflecting their behavioural flexibility and ability to exploit a variety of plant resources. Their repeated association with multiple host plants explains their success

and widespread distribution in urban landscapes. In contrast, specialist species such as sunbirds showed more restricted associations, closely linked to the availability of nectar-producing plants. Plants like *Z. mauritiana*, *S. asper* and *B. ceiba* emerged as ecologically important host plants, supporting multiple bird species. These plants can be considered keystone components of urban green spaces due to their capacity to provide food and structural support across seasons. The presence of such multipurpose plants enhances habitat quality and promotes stable urban bird communities. The observed interactions also highlight the importance of native and semi-native plant species over purely ornamental vegetation. Many of the host plants recorded are indigenous or well-adapted to local conditions and are known to support higher insect diversity, indirectly benefiting insectivorous birds. Urban landscaping practices that favour exotic ornamentals may therefore reduce the availability of essential resources for birds. The findings emphasize that conservation of urban avifauna cannot be achieved without considering plant composition and vegetation structure. Strategic inclusion of fruiting, flowering and structurally complex plant species in urban planning can significantly enhance bird diversity. Protecting existing mature trees and promoting bird-friendly plant species will be crucial for maintaining ecological balance in rapidly urbanizing landscapes.



Figure 1: Red-vented bulbul taking nectar from *Bombax ceiba* flowers



Figure 2: Purple-rumped sunbird feeding on nectar from *Calotropis gigantea* flowers



Figure 3: House crow sucking nectar from *Erythrina variegata* flowers



Figure 4: Asian pied starling taking nectar from *Spathodea campanulata* flowers

Conservation implications

Promoting bird-friendly urban habitats requires conscious integration of suitable host plants in city planning. Native and multipurpose plant species should be prioritized in parks, gardens and roadside plantations. Protecting mature trees, encouraging fruiting and flowering species and avoiding excessive pruning during breeding seasons can greatly benefit urban birds. Community participation, awareness programs and collaboration between urban planners, ecologists and residents are essential for sustaining bird-plant interactions. Such initiatives can transform cities into biodiversity-inclusive landscapes rather than ecological deserts.

Conclusion

The present study highlights the vital role of host plants in sustaining urban bird diversity within a rapidly changing urban landscape. The observed associations clearly demonstrate that urban birds rely on a wide range of plant species for essential resources such as food, shelter, perching and breeding sites. Both native and well-adapted urban plant species contribute significantly to maintaining functional bird communities, emphasizing the

importance of vegetation composition in urban ecosystems. Plants like *Bombax ceiba*, *Streblus asper*, *Ziziphus mauritiana* and *Ziziphus oenopolia* emerged as key host species that support multiple bird taxa and ecological functions. The findings highlight that urban biodiversity conservation cannot be separated from thoughtful urban vegetation management. Retention of mature trees, incorporation of fruiting and flowering native plants and enhancement of structural vegetation diversity can substantially improve habitat quality for urban birds. Integrating ecological considerations into urban planning and landscaping practices will not only promote avian conservation but also strengthen ecosystem services and ecological resilience in cities.

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