

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 NAAS Rating (2026): 5.29
 IJABR 2026; 10(1): 1372-1374
www.biochemjournal.com
 Received: 18-10-2025
 Accepted: 21-11-2025

Dr. Rinkal Sundriyal
 Veterinary Officer,
 Department of Animal
 Husbandry, Government of
 Uttarakhand, India

Rahul Sundriyal
 Department of Optoelectronics
 and Optical Communication,
 Indian Institute of
 Technology, New Delhi, India

Corresponding Author:
Rahul Sundriyal
 Department of Optoelectronics
 and Optical Communication,
 Indian Institute of
 Technology, New Delhi, India

Adaptive nesting behaviour of house sparrows in barn swallow nests in Uttarakhand

Rinkal Sundriyal and Rahul Sundriyal

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i1q.7298>

Abstract

Birds (Class Aves) play a vital role in maintaining ecological balance by contributing to insect population control, pollination, seed dispersal, and serving as sensitive indicators of environmental change. Among synanthropic bird species, the barn swallow (*Hirundo rustica*) and the house sparrow (*Passer domesticus*) are closely associated with human settlements and rely heavily on man-made structures for nesting. The present study highlights the nest-building patterns of barn swallows and documents interspecific nesting interactions with house sparrows at a communal nesting site in a hilly rural village of Pauri Garhwal, Uttarakhand, India. Observations revealed that barn swallows initiated nest construction mainly during the monsoon season, forming mud-based nests on sheltered structures. In contrast, house sparrows were observed occupying some inactive swallow nests, removing original nesting materials, and modifying nest structures to meet their own nesting requirements. These findings emphasize the adaptive flexibility and behavioural plasticity of rural-associated bird species in response to limited nesting resources within human-dominated landscapes. The study underscores the ecological significance of interspecific nest use as an indicator of changing habitat conditions and highlights the need to conserve bird-friendly nesting spaces to support avian coexistence and biodiversity.

Keywords: Barn swallow, house sparrow, nesting ecology, rural landscape

Introduction

India is recognized as one of the world's leading regions in terms of avian biodiversity, supporting nearly 1,373 bird species, which represent about 13% of the global bird population. This remarkable diversity encompasses 114 avian families out of the 249 families recorded worldwide, highlighting the country's wide range of habitats and ecological heterogeneity^[1].

House sparrows (*Passer domesticus*), members of the family Passeridae, are among the most widely distributed avian species worldwide^[2]. In India, they have long coexisted with humans and form an inseparable component of both rural and urban environments. Beyond their cultural relevance, house sparrows contribute significantly to ecosystem functioning through activities such as insect population regulation, seed dispersal, and occasional pollination. The species is omnivorous, sexually dimorphic, and well adapted to a largely sedentary mode of life^[3]. House sparrows typically construct solitary or semi-colonial nests, with nest-building activity reaching its peak between January and May. This multi-brooded species is widely distributed across urban and rural environments and is known to build open-cup nests that may be reused within the same breeding season as well as across successive seasons. Nesting primarily occurs in cavities, holes, and crevices of man-made structures, as well as in artificial nest boxes. For nest construction, house sparrows utilize a diverse array of materials, including feathers, grass inflorescences, plant stalks and roots, bark fragments, threads, strings, paper pieces, and wool. House Sparrows typically construct solitary or semi-colonial nests, with nest-building activity peaking between January and May^[4]. They are known to build open-cup nests using a wide variety of materials, including feathers, grass inflorescences, plant stalks and roots, bark fragments, and threads; unlike Barn Swallows, mud is not used in nest construction.

The barn swallow (*Hirundo rustica*) is a widely distributed migratory passerine bird commonly observed across India, including the Himalayan region of Uttarakhand. In this state, barn swallows are frequently seen around rural settlements, agricultural landscapes, river valleys, and traditional houses, where suitable nesting substrates and abundant insect

prey are available [5]. Their close association with human habitations reflects a long-standing adaptation to anthropogenic environments, particularly in villages and semi-urban areas [6]. Among the barn swallow, female mate choice is strongly influenced by male tail length, a morphological trait widely regarded as a signal of genetic quality. Nest building is a shared activity between both sexes; however, the extent of males' involvement shows an inverse relationship with their attractiveness, as males with longer tails tend to contribute less to nest construction [7].

Methods

The nest-building patterns of barn swallow were studied over a one-year period from December 2024 to December 2025. The study was conducted at a major communal nesting site located in the hilly villages of Bironkhal block, Pauri Garhwal district, Uttarakhand, India (29.929621° N, 79.080833° E), at an approximate altitude of 1,500 m above mean sea level. The region experiences winter temperatures ranging from 4-10 °C and summer temperatures between 20-30 °C.

The approximate number of *H. rustica* nests present throughout the study period was estimated using random counting methods. Nests were regularly monitored to document nest construction patterns, the presence and activities of Barn Swallows, and interactions with other avian species, including potential predators.

Results

Nest-building pattern of Barn Swallows

Pairs of barn swallows initiated nest construction primarily during the mid-July to August period, coinciding with the monsoon season. Nest building typically began with the

accumulation of mud pellets at the junction of the wall and ceiling (Figure a). Barn Swallows commonly constructed their nests on building walls, verandas, cattle sheds, bridges, and other sheltered structures that provided protection from environmental disturbances. The nests were composed mainly of mud, reinforced with materials such as straw, dry grass, and feathers. Nest construction generally required approximately one to two weeks. During nest construction, freshly applied wet mud was easily distinguishable by its darker colour and softer texture compared to the lighter, hardened mud layers that had been moulded several days earlier (Figure b). However, the duration varied depending on local weather conditions and the availability of nesting materials, particularly during the pre-monsoon and monsoon periods. The predominant nests were enclosed by the ceiling, forming an extended rear chamber with a relatively narrow entrance (Figure c, d); however, in some cases, nest design was cup-shaped and open at the top (Figure e).

Interaction between Sparrow and Swallow

It was observed that some inactive barn swallow nests were subsequently occupied by house sparrows. Before egg laying, sparrows removed feathers, straw, and other nesting materials originally deposited by the swallows. House Sparrows were frequently observed intruding into swallow nests, regularly visiting the swallow colony, and actively extracting nest materials (Figure f, g). However, it could not be conclusively determined whether the targeted swallow nests were active or inactive at the time of intrusion. After occupation, sparrows were observed modifying the nest architecture by enlarging the entrance of the nesting cavity, presumably to better accommodate their own nesting requirements (Figure h).

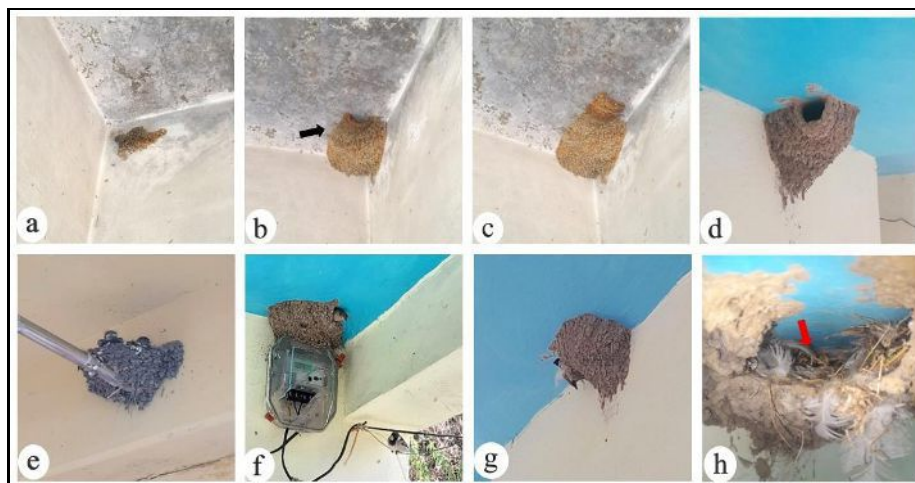


Fig 1: a. Mud pellets accumulated by the barn swallow at the junction of the wall and ceiling by the 6th day of new nest construction; b. Dark-coloured, freshly applied wet mud (arrow) clearly distinguishable from the lighter-coloured mud moulded a few days earlier on the 19th day of nest construction; c. A completely formed nest observed on the 22nd day of construction; d. An inactive nest of the barn swallow; e. Cup-shaped nest of barn swallow with nestlings; f. Barn swallow nest occupied by house sparrows; g. House sparrow removing debris and feathers from an occupied barn swallow nest; h. Two house sparrow nestlings (arrow) inside a barn swallow nest.

Discussion

The occupation of barn swallow nests by house sparrows observed in the present study underscores the adaptive flexibility of synanthropic bird species in response to limitations in nesting resources. Such instances of interspecific nest usurpation indicate heightened competition for suitable nesting sites, particularly within human-dominated rural landscapes where natural cavities and traditional nesting substrates are increasingly scarce.

The reuse of pre-existing swallow nests allows house sparrows to substantially reduce the energetic and temporal costs associated with nest construction, which may confer reproductive advantages by enabling earlier breeding or increased investment in clutch production.

At a broader community level, these interactions reflect shifts in avian species relationships driven by alterations in habitat structure. The modification of swallow nests by sparrows, including the removal of original lining materials

and enlargement of nest entrances, highlights behavioural plasticity that facilitates the exploitation of alternative nesting opportunities. Such behavioural adjustments may influence nesting success, breeding strategies, and spatial distribution patterns of both species. Moreover, repeated nest usurpation has the potential to negatively affect barn swallow breeding success by reducing nest availability or increasing nest-site competition.

Conclusion

The present study highlights the dynamic and adaptive nature of avian nesting behaviour within human-dominated rural landscapes. Observations of barn swallow nest construction and subsequent occupation of some nests by house sparrows reflect the flexibility with which birds respond to changing environmental conditions and limited nesting resources. These interactions are not merely acts of competition but represent survival-driven strategies shaped by habitat modification and resource availability.

The reuse and modification of swallow nests by sparrows emphasize the close ecological associations between synanthropic species and human settlements, where traditional nesting sites are increasingly constrained. At the same time, such interactions may influence the breeding success and spatial distribution of barn swallows, underscoring the importance of suitable and undisturbed nesting habitats for their conservation.

Understanding these behaviours from a humane and ecological perspective encourages a balanced view of interspecific interactions, recognizing them as natural responses to anthropogenic pressures rather than conflicts between species. Conservation efforts that promote nesting opportunities, such as preserving traditional structures, maintaining open rural architecture, and providing artificial nesting supports, can help reduce competition and support coexistence among avian species. Ultimately, fostering bird-friendly habitats within rural landscapes is essential for sustaining avian diversity and maintaining healthy ecological communities.

Acknowledgements

The authors express gratitude to Dr Karan Bharat Jain, Scientist, Wildlife Institute of India, Uttarakhand, for providing valuable support throughout the course of this research.

References

1. Ali ZK, Wagh G, Chaudhari P. Diversity and abundance of wetland avifauna at Malkhed lake of Amravati region, Maharashtra, India. *Int J Fauna Biol Stud.* 2024;11(4):50-58.
2. Narayanappa Y, Gautam A, Mahobiya K, Singh A. A pilot study on the occurrence and probable factors influencing the population decline of house sparrow (*Passer domesticus*) along an urbanization gradient in Coimbatore district, India. *Biodiversitas.* 2022;23(8):3884-3889.
3. Kaleri RR, Kaleri HA, Solangi GM, Lanjar Z, Mangi RA, *et al.* Study on declined breeding behavior of house sparrows (*Passer domesticus*) and factors affecting its population in Tando Allahyar, Sindh. *J Zool.* 2024;5(1):51-55.
4. Waldia R, Bhatt JP. Impacts of the changing housing patterns on the populations of house sparrow (*Passer*

domesticus) in the rural hills of Uttarakhand: a case study. *Ecol Environ Conserv.* 2022;28:168-174.

5. Joshi K, Bhatt D. Avian species distribution along elevation at Doon Valley (foothills of western Himalayas), Uttarakhand, and its association with vegetation structure. *J Asia Pac Biodivers.* 2015;8(2):158-167.
6. Verma SK. Population and roosting behaviour of barn swallows *Hirundo rustica* wintering in Jamshedpur, Jharkhand, India. *J Threat Taxa.* 2010;2(2):721-723.
7. Soler JJ, Cuervo JJ, Møller AP, de Lope F. Nest building is a sexually selected behaviour in the barn swallow. *Anim Behav.* 1998;56(6):1435-1442.