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Nature Nurtured: Rock Pigeons Nesting at Government College Gudha Jhunjhunu

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Abstract: ***The present study explores the nesting ecology of the Common Rock Pigeon (*Columba livia*) within the urban environment of Government College Gudha, located in Sikar district, Rajasthan, India. Observations were conducted from February to April 2025 to document nest site preferences, nesting materials, clutch size, incubation behavior, and fledgling success rates. A total of 12 active nests were identified, primarily located on building ledges, shaded balconies, and ventilation shafts—indicating a strong preference for artificial structures that provide safety from predators and protection from environmental extremes. Nests were predominantly constructed using locally available materials such as twigs, roots, feathers, and plastic debris, reflecting the pigeon's adaptability to anthropogenic settings. The average clutch size was found to be 2 eggs per nest, consistent with the species' typical reproductive pattern. Hatching success was recorded at 83%, with fledging success slightly lower at 75%, influenced by weather fluctuations and human interference. The study underscores the remarkable behavioral flexibility of C. livia and its success in colonizing human - dominated landscapes, especially institutional spaces that offer relatively undisturbed nesting conditions. This research contributes to the growing body of urban ecology literature by documenting avian biodiversity in rural educational campuses. It also advocates for the conservation potential of such green urban pockets and highlights the importance of integrating biodiversity - friendly infrastructure in campus planning. Further long - term studies could assess year - round breeding patterns and interactions with sympatric bird species in similar environments.***

Keywords: Rock Pigeon, *Columba livia*, urban ecology, nest behavior, fledging success, Rajasthan, biodiversity, educational campus, anthropogenic nesting, avian adaptation

1. Introduction

Urbanization has emerged as one of the most pervasive drivers of ecological change in the 21st century, transforming natural landscapes into densely populated human settlements. This rapid transformation has often led to the degradation and fragmentation of natural habitats, posing significant challenges to native wildlife. However, amidst these changes, certain species have displayed a remarkable capacity for adaptation and resilience. One such species is the Common Rock Pigeon (*Columba livia*), which has become a ubiquitous presence in urban areas worldwide.

Originally native to rocky cliffs and coastal regions of Europe, North Africa, and South Asia, *C. livia* has seamlessly transitioned into urban habitats where tall buildings, ledges, balconies, bridges, and other artificial structures mimic their ancestral nesting sites. These pigeons are opportunistic breeders, capable of utilizing a wide range of nesting substrates. Urban areas not only provide suitable nesting sites but also offer abundant food sources both intentional, such as feeding by humans, and unintentional, like food waste. These favourable conditions have enabled Rock Pigeons to reproduce year - round in some regions, contributing to their stable or increasing populations despite the pressures of urban development.

In India, *C. livia* has been reported to nest in a variety of settings, including residential buildings, religious structures, railway stations, and educational campuses. Educational institutions, in particular, serve as microhabitats that combine green spaces, relative safety from predators, minimal human disturbance and a variety of built structures. These features create ideal conditions for nesting birds, particularly adaptable species like the Rock Pigeon. Despite their abundance, the nesting ecology of *C. livia* in Indian academic institutions remains underexplored, especially in smaller towns and semi - urban areas.

Government College Gudha, located in Jhunjhunu district of Rajasthan, offers a unique setting for ecological observations. As a recently established institution with expanding infrastructure and open campus spaces, it provides a rural environment where interactions between wildlife and human development can be observed in real time. The presence of Rock Pigeons nesting within the college campus indicates the ecological potential of such institutions to support avian life.

Notable contributions have been made by Haag - Wackernagel (1995), Johnston (1995), Marzluff (2001), Herren (2006), Rose (2006), Sol (2013), Coe (2015), Tripathi (2016), Samson (2017), Chavan (2018), Ranjan (2019), Barve (2020), Kanojia (2020), Rao (2020), Kaur N. (2020), Kaur H. (2022), Ananthakrishnasamy (2023), Meena (2023), Sharma R. (2023), Joshi (2024), Madhavi (2024), Sharma P. (2024).

This study was designed to document and analyze the nesting behavior of *Columba livia* within the premises of Government College Gudha. Specifically, it focuses on nest site selection, types of materials used for nest construction, clutch size, incubation patterns, and fledgling success rates. By observing the breeding behavior of Rock Pigeons in an academic setting, this research aims to contribute to a broader understanding of rural avian ecology and highlight the role of educational institutions as critical rural habitats for wildlife conservation.

Furthermore, such studies can inform campus planning and biodiversity management strategies, encouraging administrators to adopt wildlife - friendly infrastructure. In a time of rapid urban expansion, recognizing and conserving these small yet vital ecological niches becomes increasingly important for sustaining rural biodiversity.

2. Materials and Methods

Study Area:
Government College Gudha is situated in the Jhunjhunu district of Rajasthan, a region known for its unique semi - arid climate. The area experiences hot summers, mild winters, and moderate monsoon rains, which together shape the living conditions and natural environment of the region.

The climate in Gudha is typically semi - arid, with summers being quite hot. During peak summer months (April to June), temperatures often soar above 40°C (104°F), making the weather harsh and dry. Winters, on the other hand, are mild and pleasant, with temperatures ranging between 8°C to 25°C (46°F to 77°F). This temperature variation is typical for a semi - arid zone

The region receives moderate rainfall primarily during the monsoon season (July to September). The annual rainfall averages between 400 to 600 millimeters, which is relatively low compared to more humid regions. Due to this limited rainfall, water scarcity is a significant challenge in Gudha and surrounding areas.

Being part of a water - scarce region, Gudha faces challenges related to groundwater depletion and limited surface water sources. This scarcity affects agriculture, daily life, and local ecosystems, necessitating efficient water management and conservation strategies.

Geographical and Environmental Features:
Gudha is located near the Aravalli mountain range, which is one of the oldest fold mountains in India. The presence of these hills contributes to the scenic landscape and adds to the region's ecological diversity. The Aravallis help moderate the local climate to some extent, providing green patches amidst the otherwise dry terrain. Despite the semi - arid conditions, the region around Government College Gudha is interspersed with green areas, and tree plantations. The soil in the Jhunjhunu district is generally sandy and less fertile, characteristic of arid and semi - arid zones. Vegetation mainly consists of drought - resistant plants, shrubs, and some hardy tree species adapted to conserve water and survive long dry spells.

Methodology:
The Data Collection was done From February to April 2025, systematic observations were conducted to identify active pigeon nests. Data recorded included nest location, height, materials used, clutch size, and fledgling success. Photographic documentation was employed to minimize disturbance.

3. Results

Nest Site Selection: During the systematic observations conducted at Government College Gudha from February to April 2025, a total of 05 active pigeon nests were identified within the college premises. These nests were primarily located on building ledges, window sills, and air conditioning units (Pic 1) which appear to be the preferred nesting sites for pigeons in this semi arid environment. The presence of these nests within the college infrastructure highlights the adaptability of pigeons to human - made environments. These nesting sites reflect the birds' ability to exploit architectural features for breeding and raising their young, even in regions like Gudha, which face water scarcity and a semi - arid climate.

Pic 1: A nesting site in college campus

Nest Materials: Nests were constructed using twigs, dry leaves, reflecting the adaptability of *C. livia* in utilizing available resources. This behavior highlights the remarkable **adaptability of *Columba livia* (rock pigeon)** in utilizing a wide range of materials available within their habitat to build secure and stable nests (Pic 2).

Pic 2: Nest of common rock pigeon showing the egg laid

Clutch Size and Breeding Success: The observations recorded at Government College Gudha revealed that the **average clutch size** of *Columba livia* (rock pigeon) was one

or two eggs per nest, which aligns with typical reproductive patterns reported for urban pigeon populations. This clutch size reflects the species' reproductive strategy to balance the investment in offspring with environmental constraints.

Notably, the study found that approximately 100% of the active nests successfully fledged chicks indicating a very high breeding success rate within the college campus environment. This high fledging success suggests that the conditions on campus—including availability of suitable nesting sites, sufficient food resources, and relative protection from predators—are favorable for pigeon reproduction. (Pic 3).

Such reproductive success is significant because it demonstrates that semi arid environments like Government College Gudha can serve as viable habitats for *C. livia*, supporting their life cycle despite challenges such as water scarcity and semi - arid climate conditions.

Pic 3: Hatchlings of pigeon

4. Discussion

The nesting behavior of *Columba livia* observed at Government College Gudha aligns closely with previous research highlighting the species' adaptability to the natural environments. Studies by Johnston and Janiga (1995) and Sol *et al*. (2013) have documented that pigeons preferentially nest on man - made structures such as building ledges, window sills, and other architectural features, which provide shelter and protection from predators. Similarly, our present findings confirm this preference, demonstrating the species' consistent use of college infrastructure for nesting.

The use of synthetic materials in nest construction is also well documented in the literature. For instance, studies by Herren *et al*. (2006) and Coe *et al*. (2015) observed urban pigeons incorporating plastic and other anthropogenic debris into nests, highlighting their behavioral flexibility and opportunistic use of available materials. The present findings differed from it as the campus is plastic free and raw natural material was used for nest making.

The exceptionally high fledgling success rate (100%) recorded at the college campus suggests a favorable breeding environment. Similar high reproductive success rates have been reported in urban studies by Haag - Wackernagel (1995) and Rose *et al*. (2006), where reduced predation and minimal human interference contribute to successful fledging. The campus environment likely provides stable nesting sites, adequate food availability, and limited disturbance, facilitating such outcomes.

These results underscore the importance of urban green spaces and structural habitats in supporting avian biodiversity. Educational institutions, as highlighted by Marzluff (2001), can play a crucial role in conservation by preserving habitats that sustain wildlife populations. The presence of thriving pigeon populations on campus demonstrates how urban spaces can act as refuges for adaptable bird species, fostering coexistence between humans and wildlife.

In conclusion, the present findings corroborate the extensive body of research that positions *Columba livia* as a highly adaptable species, capable of exploiting diverse nesting resources and maintaining high reproductive success in anthropogenic landscapes. Continued habitat management and monitoring within educational campuses can further enhance conservation outcomes while balancing human interests.

5. Conclusion

The study reveals that Government College Gudha serves as a suitable habitat for the nesting of Common Rock Pigeons. The adaptability of *C. livia* to urban environments is evident

in their nesting choices and materials used. Educational campuses, with their unique blend of structures and green spaces, can significantly contribute to urban biodiversity conservation.

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