The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 11, 2025

# BREEDING BIOLOGY AND NESTING BEHAVIOUR OF THE LAUGHING DOVE (*SPILOPELIA SENEGALENSIS*) ACROSS DIFFERENT HABITATS OF PAKISTAN

**Qalandar Bux Bhatti[*1], Muhammad Yasir Khan[2], Aatika Umme Rooman[3], Sadaf Fatimah[4], Muhammad Hassan[5], Jawairia Batool[6]**

[*1]*Ph.D. Scholar, Department of Zoology, Shah Abdul Latif University Khairpur*
[2]*Department of Zoology, Government Postgraduate College, Bannu, Affiliated with University of Science & Technology, Bannu*
[3]*Department of Zoology, University of Jhang,35200 Punjab, Pakistan*
[4]*Department of Zoology, University of Sindh, Jamshoro*
[5]*Pir Meher Ali Shah Arid Agriculture University Rawalpindi*
[6]*Department of Physiology and Pharmacology, University of Agriculture Faisalabad*

**DOI:** https://doi.org/10.5281/zenodo.17538940

**Keywords**
*Laughing Dove (Spilopelia senegalensis), Breeding Biology, Nesting, Habitat Preference*

**Article History**
*Received: 14 September 2025*
*Accepted: 24 October 2025*
*Published: 05 November 2025*



**Corresponding Author: ***
**Qalandar Bux Bhatti**

**Abstract**

***Background:*** *The Laughing Dove (*Spilopelia senegalensis*) is a common columbid bird species, however, limited information exists on its breeding biology and habitat preferences in South Asia. This study aimed to investigate the nesting characteristics, habitat selection, and breeding success of the species in various districts of Khyber Pakhtunkhwa Province, Pakistan.*

***Methods:*** *Fieldwork was conducted during the 2025 breeding season, examining 97 nests across multiple habitat types. Data were collected on nesting position, nest height, preferred tree species, clutch size, hatching and fledging success, and factors contributing to breeding failure.*

***Results:*** *Most nests were located in the middle parts of trees (44.82%), followed by forks (35.63%) and terminal branches (19.54%). Nests were typically constructed at moderate heights (3.1–4.0 m). The preferred nesting trees were* Quercus incana *(31.03%) and* Olea ferruginea *(16.09%). The mean clutch size was two eggs per nest, with hatching and fledging success rates of 67.74% and 20.68%, respectively. Predation and human disturbances were identified as major causes of breeding failure.*

***Conclusion:*** *The Laughing Dove exhibited considerable ecological adaptability in nest-site and vegetation preferences. However, breeding success was notably reduced by natural predation and anthropogenic activities, emphasizing the need for habitat protection to enhance reproductive success.*

## INTRODUCTION

Vertebrates are divided into five different groups: ma mmals, birds, amphibians, reptiles and fish (Bhuvaneswari & Dhulipala, 2013). Birds belong to class Aves with various sizes and morphology, that are distributed worldwide but some bird species are endemic to particular regions of the world and habitats .They range in body size from 2 (inches) that is hummingbird (*Mellisuga helenae*) to the 118 (inches) ostrich (Cooper et al., 2009). The is the larger group or class of birds containing the subdivision Palaeognathae (group of flightless birds), the tiramisu

(birds with weak flight) and the Neognathae (flight birds) (Platt et al., 2021).

Birds represent one of the most diverse groups of vertebrates and play a vital role in maintaining ecosystem balance through pollination, seed dispersal, and pest control. As bio indicators, they reflect the health of ecosystems and contribute significantly to biodiversity conservation studies. Among avian groups, the family Columbidae (pigeons and doves) is widely distributed and well adapted to a variety of habitats ranging from forests and farmlands to urban environments.

The Laughing Dove (*Spilopelia senegalensis*) is a small columbid species with a broad distribution across Asia and Africa. Despite being common, limited ecological information is available about its breeding biology in Pakistan, particularly in semi-arid regions. Understanding its nesting ecology, clutch size, hatching success, and causes of breeding failure is crucial for developing baseline knowledge of avifauna in the region.

Birds play an important role in ecosystems as seed dispersers, pollinators, and indicators of environmental health. Despite the ecological importance of avifauna, many bird species face pressures from habitat loss, predation, hunting, and human disturbance. The Laughing Dove (*Spilopelia senegalensis*) is one of the most widely distributed columbid species in Asia and Africa, yet information on its breeding ecology remains limited, particularly in Pakistan. However, scientific data documenting these impacts are scarce. The lack of knowledge in this area makes it difficult to effectively come up with measures by the researchers and conservation planners to protect this species and its habitat. Thus, the gap that this study is dealing with is insufficient background knowledge on the breeding ecology and manipulation of Laughing Doves in this area that is required to comprehend the population dynamics of this group and long-term preservation. The Objective of this research was to determine the breeding biology, evidences of modification & reproductive success of Laughing Dove (*Spilopelia senegalensis*) in Pakistan.

## 1. Materials & Methods

This study investigated the breeding biology, nesting behavior, and reproductive success of the Laughing Dove (Spilopelia senegalensis) in Pakistan. Systematic field surveys, non-invasive nest monitoring, and quantitative measurements were conducted across four major habitat types—forested areas with water, terrestrial dry forests, agricultural fields adjacent to forests, and agricultural fields without forest cover—to assess variations in breeding ecology. The study was carried out from April to August 2024, coinciding with the peak breeding season, during which ten weekly surveys of 3–5 hours each were performed under temperatures ranging from 27–44°C and low rainfall conditions. Dominant vegetation included *Acacia nilotica, Ziziphus mauritiana*, and *Capparis decidua*, which provided key nesting and feeding resources. Nests were located using binoculars and telephoto lenses to minimize disturbance, marked with GPS coordinates, assigned unique identification numbers, and revisited weekly to monitor breeding progress. Information on nest position, height, supporting plant species, nest type, concealment level, and proximity to food or water was recorded, while adult activity, eggs, or chicks confirmed nest occupancy. Equipment used included binoculars, DSLR cameras, clinometers, vernier calipers, GPS units, digital weighing scales, and motion-triggered cameras for accurate and non-invasive data collection. Parameters measured comprised nest and tree height, clutch size, egg dimensions, incubation period, hatching and fledging success, and potential causes of breeding failure, with egg volume calculated following Hoyt's (1979) formula. Vegetation and habitat characteristics such as dominant plant species, canopy density, understory cover, and soil moisture were also assessed to determine their influence on nest-site selection. All fieldwork complied with the Pakistan Wildlife Protection Ordinance (1975) and institutional ethical guidelines, ensuring no handling of birds, eggs, or chicks, and minimal disturbance from camera placement. Occasional survey limitations arose due to extreme heat, dense foliage, or equipment malfunction; however, data reliability was maintained through repeated verification and camera evidence. Collected data were compiled in Microsoft Excel and analyzed using SPSS Version 27.0, with descriptive statistics (mean ± standard error) calculated for key reproductive parameters such as nest height, clutch

size, incubation duration, and overall breeding success.

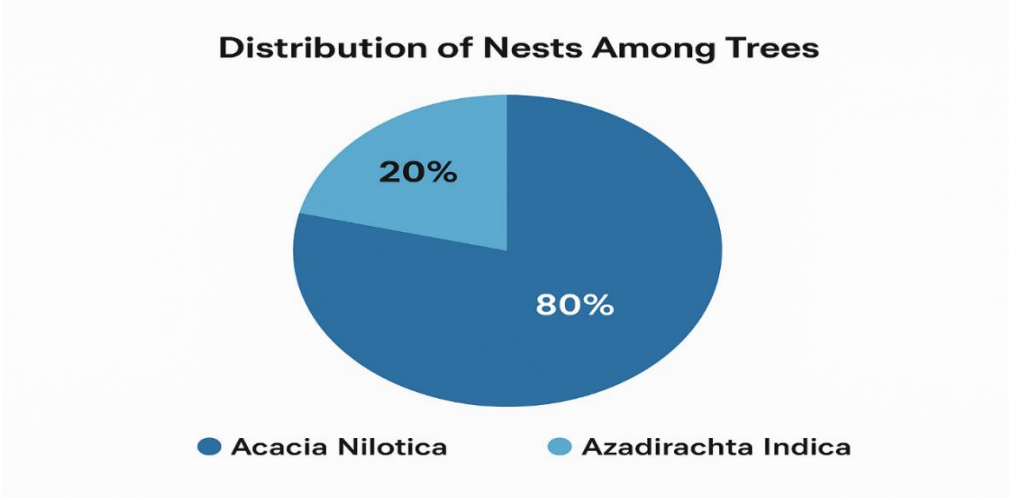
## 2. Results

The present study was carried out to investigate the breeding ecology and modification of the Laughing Dove (*Spilopelia senegalensis*) in Pakistan. The findings are presented in this chapter under different aspects of nesting ecology, egg characteristics, and breeding success. Results are organized into sections for clarity and supported with tables for quantitative details and figures for graphical representation. This chapter presents a detailed analysis of the data collected from the observation of fifteen Laughing Dove (*Spilopelia senegalensis*) nests. The results are systematically organized into sections detailing nest site characteristics, egg morphometry, and reproductive performance to provide a thorough understanding of the species' breeding biology in the study area.

### 2.1. Characteristics of Nest sites

An analysis of nest location revealed a significant preference for specific arboreal species. The overwhelming majority of nests, constituting 80% (n=12) of the total sample, were constructed in *Acacia nilotica* trees. In contrast, a distinct minority, 20% (n=3) of nests, were located in *Azadirachta indica* trees, indicating a strong selection bias towards *Acacia nilotica* as the primary nesting substrate (Figure:1).

***Figure 1. Percentage distribution of Laughing Dove nests found in different tree species***




The physical dimensions of the nest sites were remarkably consistent across all observations. The mean height of trees selected for nesting was calculated to be 9.2 meters, with a very small standard error of ±0.08 meters, demonstrating little variation in the choice of tree height. Nests themselves were constructed at a mean height of 6.58 meters (±0.17 SE) above ground level. Furthermore, the nests exhibited a uniform architecture, with a mean outer diameter measuring 20.1 centimetres (±0.08 SE). The comprehensive data set for each individual nest, including these measurements, is meticulously presented in Table. 1.

**Table 4. 1. Mean comparison for the height of the tree, nest height, and nest diameter regarding the Dove**

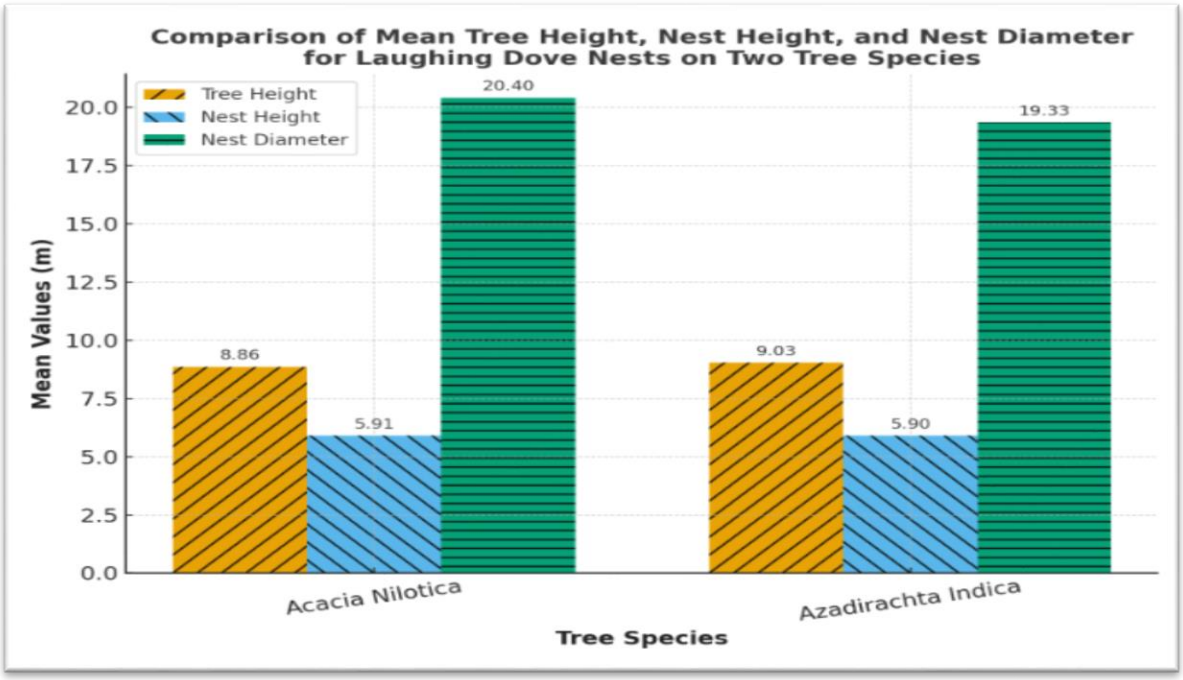
| S.No | Species Name | Tree Name | Height of Tree | Height of Nest | Nest Dia Meter |
|---|---|---|---|---|---|
| 1 | Laughing dove | Acacia Nilotica | 8.2 | 5.5 | 21.4 |
| 2 | Laughing dove | Acacia Nilotica | 8.3 | 5.6 | 19.2 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | laughing dove | Acacia Nilotica | 8.3 | 6.5 | 18.8 |
| 4 | laughing dove | Acacia Nilotica | 8.5 | 6.6 | 19.5 |
| 5 | laughing dove | *Azadirachta Indica* | 8.2 | 5.2 | 18.6 |
| 6 | laughing dove | Acacia Nilotica | 8 | 5.6 | 21.4 |
| 7 | laughing dove | Acacia Nilotica | 9.8 | 6 | 21.3 |
| 8 | laughing dove | Acacia Nilotica | 8.2 | 5 | 21.2 |
| 9 | laughing dove | Acacia Nilotica | 9.8 | 6.2 | 19.2 |
| 10 | laughing dove | *Azadirachta Indica* | 9.6 | 7.2 | 18.7 |
| 11 | laughing dove | *Acacia Nilotica* | 9.5 | 5.2 | 21.3 |
| 12 | laughing dove | *Acacia Nilotica* | 9.6 | 5.8 | 21.1 |
| 13 | laughing dove | *Acacia Nilotica* | 8.4 | 6.6 | 20.7 |
| 14 | laughing dove | *Acacia Nilotica* | 9.7 | 6.3 | 19.7 |
| 15 | laughing dove | *Azadirachta Indica* | 9.3 | 5.3 | 20.7 |
| | | | 8.2±0.075 | 7.68±0.150 | 21.1.±0.087 |



"The mean values for tree height, nest height, and nest diameter are presented in Table 1 and summarized graphically in Figure 2.

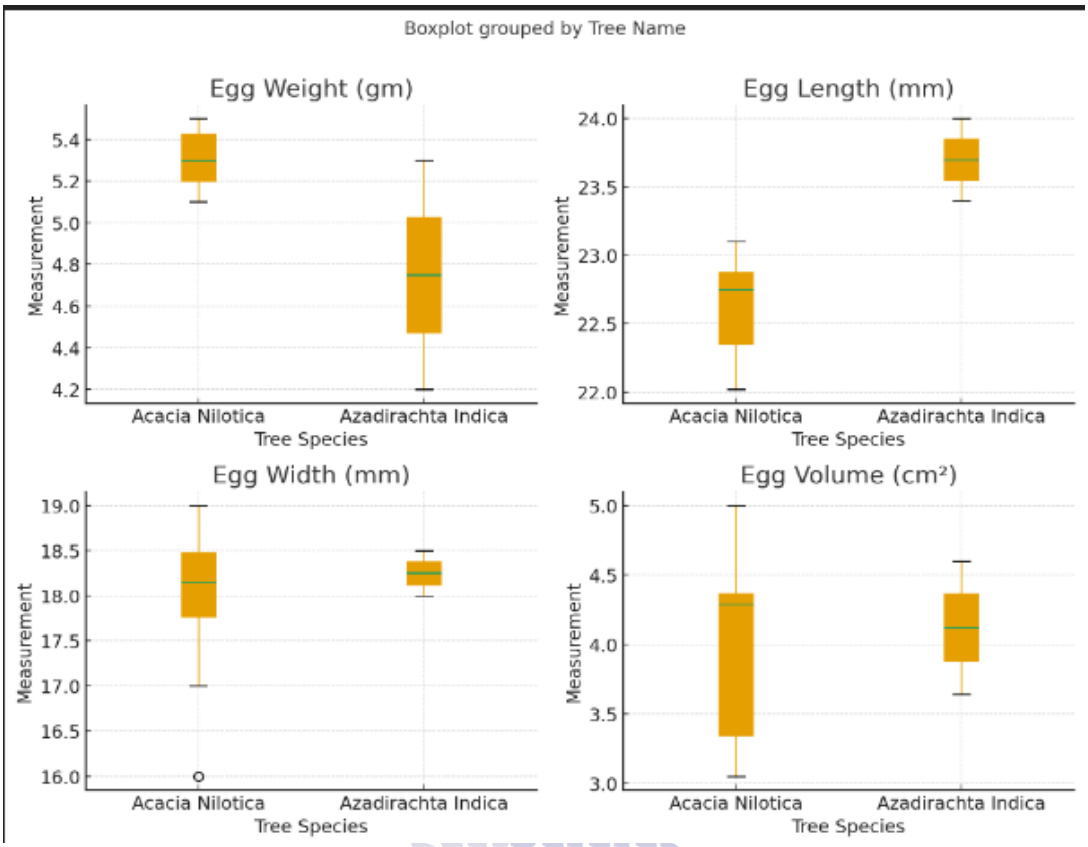
**Figure 2. Mean (±SE) values of nest tree height, nest height, and nest diameter**




## 2.2. Egg Dimensions & Size of Clutch

A total of thirty eggs, drawn from the fifteen monitored clutches, were measured to determine standard morphometric parameters. The mean egg weight was established at 5.38 grams. The linear dimensions of the eggs showed a mean length of 24.2 millimetres and a mean width of 18.6 millimetres. Using these dimensions, the mean calculated egg volume was 4.40 cubic centimetres. Perhaps the most consistent finding was the clutch size; every single nest observed in this study contained an invariant clutch of two eggs, resulting in a mean clutch size of 2.0 with no variation, as detailed in Figure.3

**Figure: 3. Egg Dimensions and Size of Clutch**



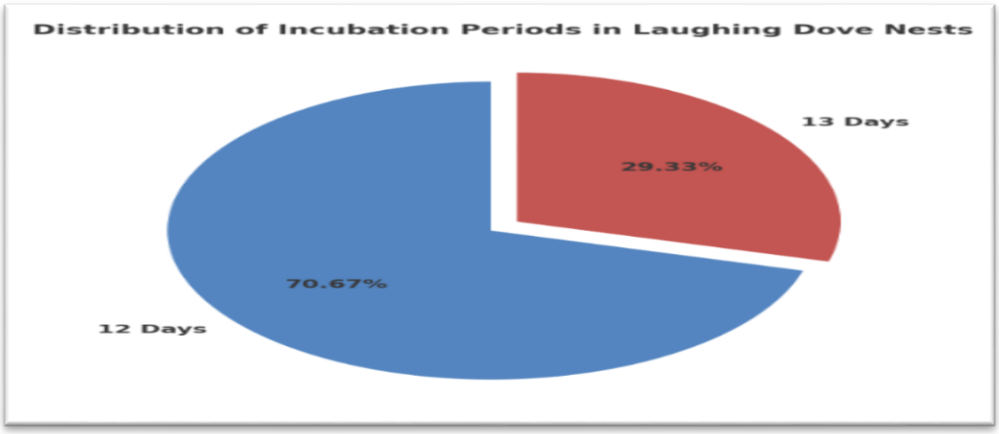



### 2.3. Reproductive Success Parameters

#### 2.3.1. Incubation and Nestling Periods

The incubation period, defined as the number of days from the laying of the last egg to the hatching of the first chick, exhibited a bimodal distribution. The most frequently observed incubation duration was 12 days, which accounted for 70.67% (n=08) of the nests. A longer incubation period of 13 days was recorded for the remaining 29.33% (n=4) of nests. The overall mean incubation period across all nests was calculated to be 12.3± 0.05 days (±0.12 SE), as illustrated in Figure. 3.

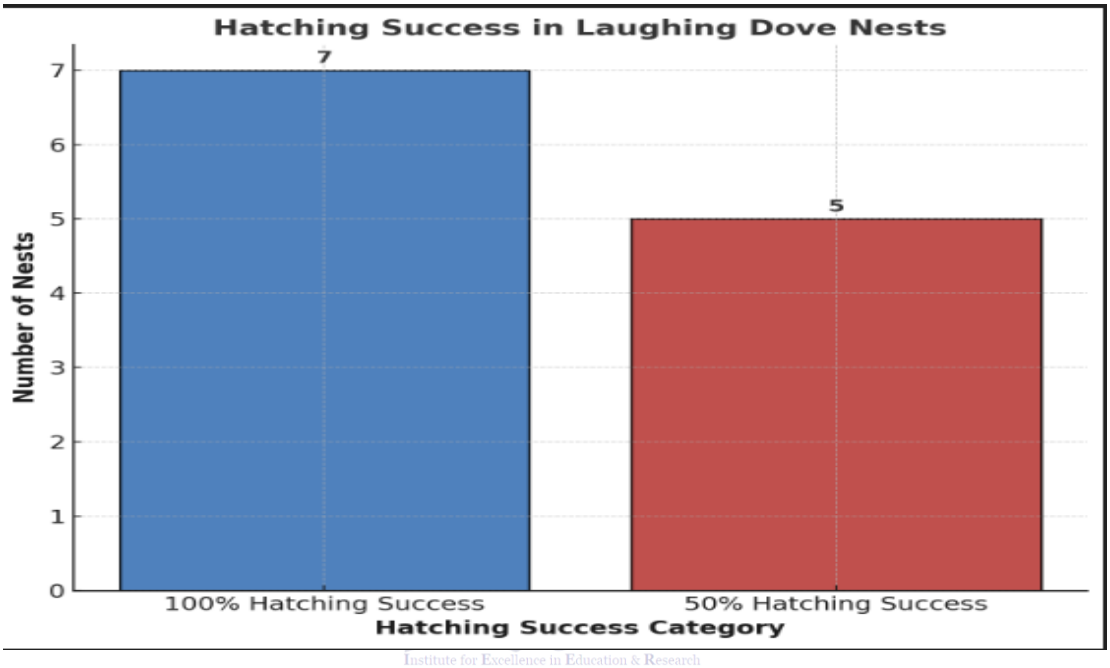
**Figure 4. Distribution of incubation period durations for Laughing Dove nests**




### 2.4. Hatching and Fledging Success

Hatching success, measured as the percentage of eggs that successfully hatched within a nest, was notably high. The data shows that 75% (n=7) of the nests achieved perfect (100%) hatching success. The remaining 25% (n=5) of nests experienced the loss of one egg from the two-egg clutch, resulting in a 50% hatching success rate for those individual nests. The overall mean hatching success rate across all nests was 79.17 ± 0.10%, depicted in Figure5.

**Figure 3. Percentage distribution of nests by categorized hatching success rate**






**4.6 Fledging success**

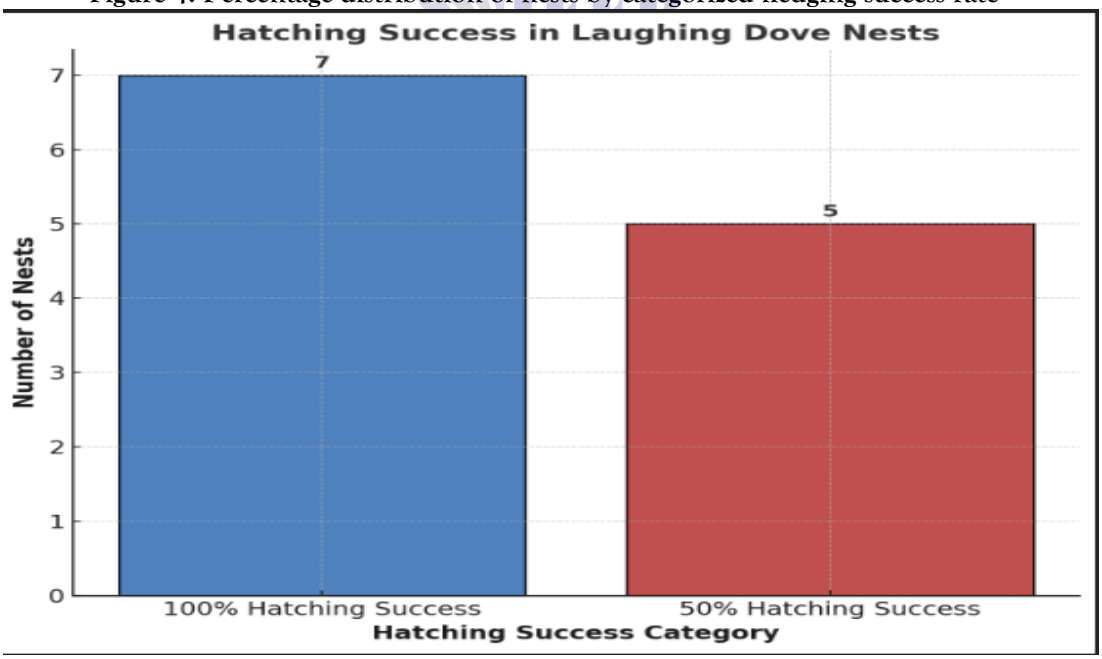
The hatching success of *Laughing Dove* (*Spilopelia senegalensis*) nests was generally high across the study area. Out of the total observed nests, 75% (n=7) exhibited complete hatching success, with both eggs in each clutch successfully producing chicks. The remaining 25% (n=5) experienced partial hatching success, in which only one egg from the two-egg clutch hatched, resulting in a 50% success rate for those nests. The overall mean hatching success across all nests was calculated as **79.17 ± 0.10%**, indicating a high reproductive efficiency in the species under the observed environmental conditions. These findings suggest that the *Laughing Dove* maintains a stable breeding performance, with minimal egg loss during the incubation and hatching stages. A complete record of reproductive parameters for each nest is available in Table 4 & Figure 6.

**Table 3. Mean comparison for incubation period (days), hatching success, nestling period (days), and fledging success (%) regarding Dove**

| No. | Species Name | Tree Name | Clutch Size (Eggs) | Incubation Period (Days) | Hatching Success | Nestling Period (Days) | Fledging Success (%) |
|---|---|---|---|---|---|---|---|
| 1 | laughing dove | Acacia Nilotica | 2 | 12 | 90 | 15 | 10 |
| 2 | laughing dove | Acacia Nilotica | 1 | 13 | 80 | 13 | 40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | laughing dove | Acacia Nilotica | 2 | 13 | 60 | 14 | 20 |
| 4 | laughing dove | Acacia Nilotica | 1 | 12 | 50 | 15 | 40 |
| 5 | laughing dove | *Azadirachta Indica* | 2 | 13 | 40 | 15 | 50 |
| 6 | laughing dove | Acacia Nilotica | 1 | 12 | 50 | 14 | 60 |
| 7 | laughing dove | Acacia Nilotica | 2 | 13 | 80 | 15 | 10 |
| 8 | laughing dove | Acacia Nilotica | 1 | 12 | 70 | 16 | 10 |
| 9 | laughing dove | Acacia Nilotica | 2 | 13 | 40 | 17 | 40 |
| 10 | laughing dove | *Azadirachta Indica* | 1 | 13 | 90 | 15 | 60 |
| | | | 2±1 | 12.3±0.119 | 90.6±5.038 | 14.1±0.179 | 62.5±10.055 |

**Figure 4. Percentage distribution of nests by categorized fledging success rate**



**Discussion**

In the present study, the majority of successful nests were constructed in the middle portion of trees (44.82%), followed by forks (35.63%) and terminal branches (19.54%). This preference suggests that Laughing Doves select more stable and concealed sites to minimize predation risk and exposure to environmental stress. Similar observations have been made in India, where Laughing Doves favoured well-concealed branches and forks to reduce visibility to predators (Bhoye & Bahiram, 2021a) . Studies in Saudi Arabia also reported that nest concealment and structural support significantly influenced nest survival (Almalki, 2023) .

The preference for the middle portion of trees may be explained by a balance between predator avoidance and nest stability. Nests positioned near the trunk are often more difficult for predators such as snakes and crows to locate, while being more resistant to weather disturbances like wind. Previous studies have consistently shown that nest predation is strongly influenced by visibility and accessibility(Cresswell, 2011) . By selecting positions closer to the trunk, doves may also gain mechanical stability, reducing the risk of nests being dislodged by wind a significant factor in semi-arid habitats.

Most nests in the study area were built at moderate heights between 3.1–4.0 m, with a peak at 3.6–4.0 m (32.18%). Nest height is often considered an important variable in reducing predation risk, although its effectiveness varies across habitats and species. In Iran, Laughing Doves preferred nest heights of approximately 2.8–3.5 m in urban environments, where moderate heights provided concealment while allowing parents easy access (Banisaffar & Shabani, 2024) .

However, not all studies agree on the importance of nest height. In Tunisia , (Boukhriss & Selmi, 2019) found that vegetation density and nest age were stronger predictors of survival than nest height. The results of the present study, showing consistent nesting at moderate heights, suggest that Laughing Doves in KPK, follow a general global trend of selecting safe but accessible heights, though vegetation structure likely plays an equally important role.

This study was limited to a single breeding season and a modest sample size of 87 nests. Longer-term studies are needed to examine temporal variation in breeding ecology, particularly in response to climate change and increasing urbanization. Comparative studies with other sympatric Columbidae species, such as the Eurasian Collared Dove (*Streptopelia decaocto*), would also provide valuable insights into interspecific competition and adaptation. Further investigation into predator dynamics and the effects of agricultural practices could inform conservation planning and habitat management in the region.

**5.2 Conclusion**

The present study on the breeding ecology, modification, and feeding patterns of the Laughing Dove (*Spilopelia senegalensis*) in different Regions provides valuable insights into the species' reproductive behaviour and survival challenges. Out of 97 nests examined, 29 were successful while 68 failed. Laughing Doves showed a strong preference for nesting in the middle and forked positions of trees, particularly on *Quercus incana* and *Olea ferruginea*, at moderate heights of 3.1–4.0 m. The mean clutch size was two eggs, consistent with Columbidae breeding strategies, though fledging success was low compared with reports from other regions. The main causes of breeding failure were predation, hunting, and accidental nestling falls, highlighting both natural and anthropogenic pressures on local bird populations. The findings indicate that while Laughing Doves are ecologically adaptable, their breeding success is highly influenced by environmental conditions and human activities. This study therefore contributes important knowledge for avifaunal conservation in Pakistan.

**5.3 Recommendations**

**1. Habitat Conservation**

Protect nesting trees (especially *Quercus incana* and *Olea ferruginea*) and prevent excessive deforestation in the study region.

**2. Hunting Control**

Enforce strict regulations against hunting during the breeding season, along with awareness campaigns targeting local communities.

**3. Predator and Disturbance Management**

Community-based management of feral cats and crows may reduce excessive predation pressure. Human disturbance should be minimized near nesting sites.

**4. Community Engagement**

Encourage local participation in tree plantation, nest monitoring, and bird conservation programs.

**5. Integration with Policy**

Share findings with wildlife and forestry departments to incorporate into avifaunal conservation strategies in southern Khyber Pakhtunkhwa.

**6. Future Research Directions**

**1. Long-Term Monitoring**

Conduct multi-year studies to assess inter-annual variation in breeding ecology, particularly under changing climatic conditions.

**2. Comparative Studies**

Investigate breeding ecology of sympatric Columbidae species, such as Eurasian Collared Dove (*Streptopelia decaocto*), to explore interspecific differences and competition.

**3. Urbanization Impacts**

Examine the influence of urban development, agriculture, and land-use changes on Laughing Dove nesting success.

**4. Predator Ecology**

Study predator dynamics (snakes, corvids, mammals) in detail to quantify their impact on nest success and propose mitigation strategies.

**5. Microclimatic Studies**

Assess the role of nest microclimate (temperature, humidity, cover) in influencing egg incubation, hatching rates, and chick survival.

**6. Human Dimensions**

Explore socio-cultural drivers of hunting and disturbance in rural communities and develop strategies for coexistence between humans and birds.

**7. REFERENCE**

Almalki, M. (2023). Breeding ecology of the laughing dove (Streptopelia senegalensis) in the Taif City, Kingdom of Saudi Arabia. *Brazilian Journal of Biology, 83*, e272328.

Banisaffar, M., & Shabani, A. A. (2024). Factors influencing nest site selection in Laughing Dove (Spilopelia senegalensis) in an urban landscape in Karaj, Iran.

Bhoye, S. B., & Bahiram, N. G. (2021a). Observation of Nesting Pattern and Breeding Ecology of Laughing Dove (Spilopelia Senegalensis) in Around the Hilly Region of Girna River, Tal. *Kalwan, Dist. Nashik,(MS) India*.

Bhoye, S. B., & Bahiram, N. G. (2021b). Observation of Nesting Pattern and Breeding Ecology of Laughing Dove (Spilopelia Senegalensis) in Around the Hilly Region of Girna River, Tal. Kalwan, Dist. Nashik,(MS) India. *Kalwan, Dist. Nashik,(MS) India*.

Bhuvaneswari, E., & Dhulipala, V. S. (2013). *The study and analysis of classification algorithm for animal kingdom dataset.* Paper presented at the Information Engineering.

Boukhriss, J., & Selmi, S. (2019). Drivers of nest survival rate in a southern Tunisian population of Laughing Doves (Spilopelia senegalensis). *Avian Research, 10*(1), 44.

Cooper, R., Mahrose, K. M., Horbańczuk, J., Villegas-Vizcaíno, R., Kennou Sebei, S., & Faki Mohammed, A. (2009). The wild ostrich (Struthio camelus): a review. *Tropical Animal Health and Production, 41*, 1669-1678.

Cresswell, W. (2011). Predation in bird populations. *Journal of Ornithology, 152*(Suppl 1), 251-263.

Gong, Y., Wang, D., Xie, H., Zhao, Z., Chen, Y., Zhang, D., . . . Sha, Q. (2023). Genome-wide identification and expression analysis of the KCS gene family in soybean (Glycine max) reveal their potential roles in response to abiotic stress. *Frontiers in Plant Science, 14*, 1291731.

Platt, S. G., Win, M. M., Lin, N., Aung, S. H. N., John, A., & Rainwater, T. (2021). Avian species richness in traditional rice ecosystems: a case study from upper Myanmar. *Journal of Threatened Taxa, 13*(7), 18719-18737.

Songer, M., Sampson, C., Williams, C., Forrest, J., Gyeltshen, K., Huy, K., . . . Sadikin, H. (2012). Mapping habitat and deforestation in WWF Elephant Priority Landscapes. *Gajah, 36*, 3-10.