

Research Article

Breeding activity and breeding Success of House Sparrow (*Passer domesticus*) at Open Nests and Inbox nests

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Abstract

House Sparrow plays an important role in the ecosystem, as a secondary consumer in ecological niche. It is a natural pest control. Decline status of House Sparrow in India is as similar to its status observed in the world. As per our survey conducted in the year 2014, we found that the House Sparrow population has reduced to about 92-95% in the West Godavari District of Andhra Pradesh. To restore the bird population, conservation work was started in Jangareddigudem town of West Godavari district by providing Nest boxes. Initially several models were designed and prepared towards their nesting space. In our studies, a comparative analysis made between Open and Inbox nests proved that Inbox nests offer greater advantages both in terms of quantum of nesting materials needed to construct the nests and with respect to time taken to complete the nests it also shown impact on breeding activity and breeding success of House Sparrow. It is concluded that the breeding success and breeding activity are comparatively higher in Inbox nests than Open nests

Keywords: House Sparrow, Breeding, Open nests, Inbox nests, Anova

Introduction

The House Sparrow is a human habitable bird, habituated to live in and around the human settlements (Jawele, 2012). They used to build nests in the cavities of tiled roof houses, thatched houses, false roof ceilings, ventilators, behind the wall hanged photo-frames, including the

electrical meter boxes. The decline of House Sparrow was noticed in 1920 in Britain (Summers-Smith, 2003). There was a major decline during the early 20th century due to various reasons like replacement of horse transport by mechanized vehicles, changes in the built-up areas etc. The decline of farm land House sparrow was around 60% during 1979 and 1995 (Summers-Smith, 2003). The

decline trend is almost the same in Spain. About 70% of the House Sparrow population was declined in the decade from 1998 to 2008 in the urban parks. A remarkable decline was observed during winters in urban areas (Murgui and Macias, 2010).

As a secondary cavity nester, the House Sparrow prefers small crevices in human residences to build their nests. The sophisticated buildings with modern architecture are not providing such small cavities, which were otherwise abundantly available in the thatched houses and tile-roofed houses. The research analysis stated that habitat loss is one of the major threat for their population decline. Survey reports too suggested artificial habitats as suitable measures for sparrow population restoration. A specific model developed by us shown greater occupancy (about 97%) and used for breeding (Mahesh and Suseela, 2021).

In this article we are aimed to compare the breeding activity and breeding success of House Sparrow at both Open nests (the nests made in available spaces, other than nest boxes) and Inbox nests.

Study Area

The study area Jangareddigudem town is located in Eluru District of Andhra Pradesh state, 55 km from the district headquarters Eluru. It is an upland area elevated 74 meters above the median sea level with coordinates 17°07'00"N, 81° 18'00" E. , belongs to tropical climatic zone.

Methodology

Field observation was conducted for breeding activity at Open nests, to compare with the breeding activity at Inbox nests. Clutch size, hatching success, breeding success were determined at Open and Inbox nests.

At each nest (a) Clutch size (i.e. number of eggs laid per attempt) (b)

Hatchlings (baby sparrow coming out from egg) and (c) Number of Fledged Chicks were observed. By these parameters, we calculated the hatchling success (chicks hatched /eggs laid) fledgling success (number of chicks fledged out/total hatchlings) and annual breeding success (Total number of eggs laid/ number of chicks fledged out/ year).

By Simple Random Sampling Method, 160 nests each from Open and Inbox nests were chosen to observe the breeding activity and breeding success in both types of nests.

Statistical Analysis

Correlation, regression and T-test procedure were carried out using SAS (Statistical Analysis Software) to compare the breeding activity of sparrows per year with Inbox and Open nests. T-test procedure was used to analyze the difference between both the nests with respect to breeding success.

Results

The breeding activity at Open nests was 2.04 times in a year compared to 4 times per year in Inbox nests (**Figure 1**). On an average, the clutch size in Open nests is 2.38/ attempt versus 4.0 eggs/attempt in Inbox nests. The hatching success of Open nests was 1.85 compared to about 3.0 in Inbox nests. The fledging success is 1.4 in Open nests versus 2 in Inbox nests which is higher.

Average number of eggs laid in all surveyed Inbox nests was 5.01 versus 3 in Open nests. Hatching success was almost similar in both Open and Inbox nests which is about 79%. Fledging success was 81% and it was higher in Inbox nests compared to Open nests (75.83%). Overall breeding success was 59% at Open nests (per 2.01 attempts/year), where as in Inbox nests it was 66% (per 4 attempts/year)

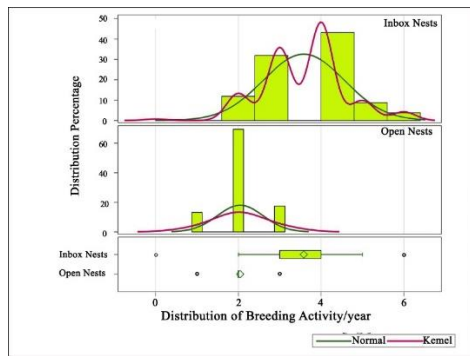


Fig. 1: Graph showing the difference in breeding activity/year between Inbox nests and Open nests.

Statistical Analysis for Comparison of Breeding Activity and Breeding Success between Open and Inbox Nests.

The correlation, regression procedure and T- test were carried out using SAS to compare the breeding activity of sparrows per year with Inbox and Open nests. From the table of simple statistics and pearson correlation coefficient, we can infer that breeding activities are not same between Open nests and Inbox nests. When compared to Open nests (2.04±0.55), Inbox nests are showing more breeding activity (3.58±0.98).

The regression analysis also reveals that there is a significant difference between the two types of nests with regard to breeding activity per year, as is evident from the significant p value (p<0.0001). Regression procedure is carried out by taking breeding activity in Inbox nests as dependent variable and breeding activity in Open nests as independent variable (Table 1).

Method	Variiances	DF	t Value	Pr > t
Pooled	Equal	318	17.27	<.0001
Satterthwaite	Unequal	250.93	17.27	<.0001

Statistical analysis for comparison of breeding success between Open nests and Inbox nests was carried by T-test procedure using SAS. The number of eggs laid at nest boxes is 12.89 (SD ±4.65) and in the Open

nests it was 5.01 (SD ± 2.2) (Table 1). The test results showed a significant difference in the clutch size between Open nests and Inbox nests (P value < 0.0001)

From the test results, it is clearly evident that the hatching success was similar between Open nests and Inbox nests, mean 0.7906 (SD ±0.2212) for Inbox nests and 0.7974 (SD±0.2081) for Open nests. The hypothesis accepted null hypothesis regarding hatching success (p value 0.43) (Figure 2).

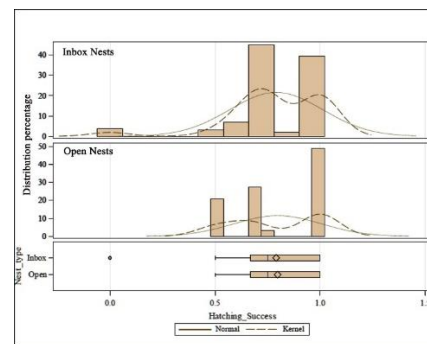


Fig. 2: Graph showing similarity of hatching success between Open and Inbox nests.

Regarding the fledging success, the Inbox nests showed significant variation compared to Open nests (p value < 0.0001) (Figure 3). The mean of fledging success for Inbox nests was 0.81 (SD± 0.23) whereas it was 0.75 (SD ±0.34) for Open nests.

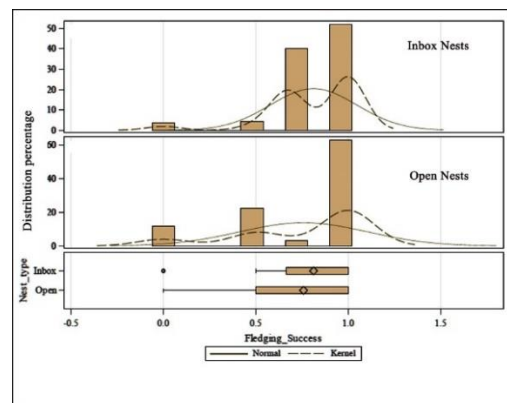


Fig. 3: Graph showing variation of fledging success between Open and Inbox nests.

Coming to overall breeding success

(number of chicks fledged out per number of eggs laid), it was significantly more in the Inbox nests than the Open nests (p value < 0.0001). The mean value of breeding success for Inbox nests is 0.6615 ($SD \pm 0.2324$) versus 0.5969 ($SD \pm 0.3169$) for the Open nests.

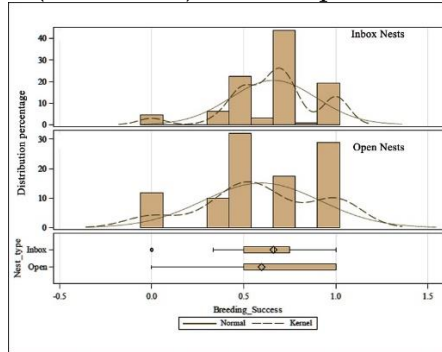


Fig. 4: Graph showing the difference of breeding activity between Inbox nests and Open nests.

Discussion

Breeding success in Inbox nests was comparatively more than Open nests. The number of eggs laid in Open nests was 5.01/year/ 2.01 attempts. But in Inbox nests, it was 13 eggs/year/4 attempts. It shows the comfortability and utilization of nest boxes by sparrows for breeding. Regarding hatching success, there is no difference between Open nests and Inbox nests. It is because of the equal role of both the parents during incubation.

The common myna's (*Acridotheris tristis*) success in building nests was investigated in artificial nests. The main causes of the failure were the messing with the nest and the nesting trees. Birds' nests are an essential part of their life cycles, and the common myna's nesting season runs from April to August Umrani et al. (2023). The number of Great Tit breeding couples decreased when nestboxes were removed from a semi-mature, broadleaved woodland, but the number of Blue Tit breeding densities remained relatively unchanged. The population of Great Tits had no effect on warbler breeding densities. Great Tits and Blue Tits engaged in higher intraspecific

rivalry for natural nestholes when nestboxes were not present. While Blue Tits utilised smaller holes on side branches, Great Tits tended to use larger holes on or near the trunk. Because a larger percentage of total nest failures occurred in natural cavities as opposed to nestboxes, nesting success for both species was lower there. There was no immediate increase in the number of Great Tits mating when nestboxes were reintroduced; several explanations explain (East and Perrins, 1988).

Conclusion:

House Sparrow population faced and still facing a major threat in the form of habitat loss. The so called concrete jungles with modern house designs and the technological advancements in traditional agricultural practices are unable to provide some secured living space and food resources to these tiny birds. The drastic changes in the vegetation pattern of urban localities is another hindering factor for sparrow growth, as they supply them with required insect prey. Provision of secured habitats, with little bit friendly care certainly restores their population back to original levels.

REFERENCES

- Chetan, J. (2012).** Improved design of Nest box for Indian House Sparrow *Passer domesticus indicus*, *Bioscience Discovery*, Vol.3, No.1, pp.97-100. [<https://doi.org/10.5897/IJBC2014.0689>]
- East, M.L. and Perrins, C.M. (1988).** The Effect of Nest boxes on breeding populations of birds in broadleaved temperate woodlands, *Ibis* **130**(3), 393-401. <https://doi.org/10.1111/j.1474-919X.1988.tb08814.x>
- Mahesh, V. and Suseela, L.2023.** "Protective Nest Design for Indian House Sparrow *Passer domesticus*, with reference to predation and reuse". *Agricultural Science Digest*, Vol. 43, No.1, pp:105-112, **2023** [[doi.10.18805/ag.D-5438](https://doi.org/10.18805/ag.D-5438)].
- Murgui E. and Macias A.(2010)** "Changes in the house sparrow *Passer domesticus* population in

Valencia (Spain) from 1998 to 2008"., *Bird Study*, Vol.57, pp. 281-288.

[doi: [10.1080/00063651003716762](https://doi.org/10.1080/00063651003716762)]

Summers-Smith, J.D. (2003). "The decline of House Sparrow: A review", *British Birds*, Vol.96, No.9, pp. 439-446.

Umrani, A.M., Zamir, A., Anwar T., Safdar, E., et al. (2023). Artificial Nesting Success and Nest building behaviour of Common Myna *Acridotheris tristis* using paper/plastic, *Caspian Journal of Environmental Sciences*, [<https://www.researchgate.net/publication/366973528>]

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