

## Nesting characteristics of House Sparrow (*Passer domesticus*) in and around the Government Arts College campus, Udthagamandalam, The Nilgiris, Tamil Nadu.

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### Abstract

The present study was attempted to assess the House sparrows' *Passer domesticus* nesting characteristics in and around the Government Arts College campus from December 2018 to March 2019 in Udthagamandalam, The Nilgiris. The result shows that a total of 97 House sparrow nests were found on four nesting platforms namely Tiled houses, Buildings, Mud walls and Compound walls. Of which more number of nests were seen in Tiled houses (n=34). Overall nest height preference by house sparrow was minimum 0.5m and maximum 19.5m (6.85±0.48) and nesting platform height was minimum 8m and maximum 22m (10.84±0.55). There was a strong positive correlation observed between nest height and nest platform height ( $r^2=90868$  P< 0.00001). Overall the length (15.4±0.54) was higher than width (4.7±0.31) irrespective of nesting locations. The nests that were located on the Compound walls shows a negative weak correlation ( $r^2=-0.061859$  P> 0.81609) between nest length and width. The direction of House sparrow nests shows that most of them were on North West Direction (n=29). The average distance between two nests was 19.4m irrespective of the nesting platforms. The nest entrance length (12.97±0.65) was always higher than the width (6.50±0.19) irrespective of nests with positive strong correlation ( $r^2=-0.29498$  P< 0.0048). The present study suggests that preservation of thatched roof buildings, Mud walls and Concrete walls holes and ancient buildings are very much important in the city for supporting house sparrow populations. Modern urbanization and not in use of grains resulted to loss of habitat and food for house sparrow population.

**Key words:** House Sparrow, Nesting Characteristics, Government Arts College, Nilgiris, Tamil Nadu

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### INTRODUCTION

House sparrows *Passer domesticus* are the commonest and widest distributed bird species in nature. The widespread and once abundant house sparrow which is universally familiar in appearance has become a rare bird at many localities in recent times. House sparrow numbers have declined by about 60% in urban and suburban areas and the habitat composition and quality in urban suburban landscapes is likely to have changed over this period (Dott, 2006). In large cities, the number of house sparrows decreased significantly in recent decades. High reduction of sparrow population in London (60%), Glasgow (99%) and Hamburg (77%) have led to the inclusion on the UK Conservation Red List (Crick *et al.*, 2002; Prowse, 2002). The main reasons for the decline of this species in the urban-suburban landscape were the loss of suitable foraging habitat (Robinson *et al.*, 2005) and the loss of suitable nesting

sites. According to the survey at different places of India on the occurrences of house sparrow, it was reported that their population also has decreased considerably at present (Rajashekar and Venkatesha, 2008; Daniels, 2008; Bhattacharya *et al.*, 2011; Ghosh *et al.*, 2010; Baskaran *et al.*, 2010).

Of the studies that have been conducted on birds in urban areas many have concentrated on how habitat structure affects avian abundance, composition and richness. In most cases, these studies measured habitat structure at one scale. However different species probably respond to habitat at different scales, and single-scale studies may not adequately reflect what many species are responding to in a landscape (Hostetler, 2001).

We are beginning to understand how habitat features relate to bird abundance and diversity in urban landscapes. Research has been undertaken on the population dynamics of suburban Blackbirds in southern England to understand what determines the level of a population in this habitat. Batten (1973) found that Blackbirds had better breeding success in

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suburban than rural areas, but this difference was compensated by differential survival, so that both populations were balanced in the longer term. Studies at various locations in Europe have shown that nest box populations of tits in urban habitats produce fewer eggs and fledglings than do birds in rural (Cowie and Hinsley, 1987; Solonen, 2001). Cowie and Hinsley (1987) found that suburban tits suffered a reduction in breeding success, rearing half as many young as populations in woodland. Despite the additional supply of supplementary food in suburban gardens, nestling mortality through starvation was very high, perhaps due to the unsuitability of the foods provided (Cowie and Hinsley, 1987). Solonen (2001) found that urban tit populations laid fewer eggs and had lower fledgling production than their rural counterparts. This suggests that breeding conditions for tits were less good in urban areas (Horak, 1993; Solonen, 2001).

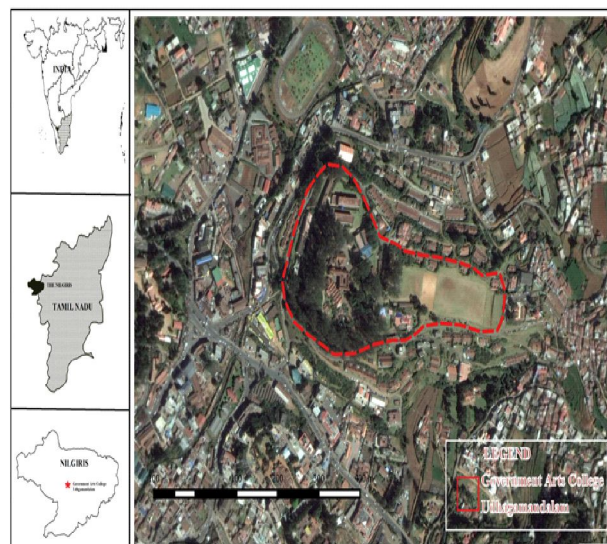
This type of research is essential to understanding the external limiting factors that have an impact on reproductive and mortality rates on species in this distinctive habitat. Advances in these areas are required if we are to foster self-sustaining bird communities with a greater proportion of native species and contribute to the quality of urban life for humans (Savard and Falls, 2001). Some studies were undertaken for House sparrow in Nilgiris Karthick *et al.* (2016) studied the population of house sparrow in Ketty Valley, The Nilgiris. Karthick *et al.* (2017) reported that House Sparrows feeding on dressed meat. Jayaraman *et al.* (2017) studied the utilization of artificial nest boxes by house sparrow in the Nilgiris. Samson *et al.* (2017) found that House Sparrows breeding in nests of the red-rumped swallow (*hirundo daurica*) in Nilgiris. Dilip Clinton *et al.* (2019) observed the first melanistic sparrow in Nilgiris, India. Hence such studies were concentrated on population and feeding and artificial nestboxes occupancy none of the studies were attempted on natural nesting behaviour of House sparrows in Nilgiris. Considering the lacunae this present study was attempted in the Government Arts College in and around the Campas from December 2018 to March 2019 in Udhagamandalam, The Nilgiris.

### Study Area

Government Arts College is an arts and science college located in Ooty in the Nilgiris district, Tamil Nadu, India. The college is located in a locale called *Stone house hill* named after the landmark building Stone House. Before independence the present building of the college was the summer secretariat of the British Madras Presidency. Still today the Oak planted by *Lord Sullivan* in the 18th Century and the two other Oak trees planted by *Lord* and *Lady*

*Wellington*, in college garden, when Ooty celebrates 100 Years. College is situated in a serene splendid atmosphere of the olden Wothkalmundll (pronounced as Ootacamund by English people and presently Udhagamandalam). The college is offering Graduation, Post Graduation and Research in almost all disciplines.

The present study was carried out in the Government Arts College in and around the Campus, Udhagamandalam, The Nilgiris.



**Fig.1.** Map showing the Government Arts College Campus in Udhagamandalam, The Nilgiris

### MATERIALS AND METHODS

The study was conducted over a period of four months (December 2018 – March 2019). Regular field trips were made throughout this period at four visits in a month. The study consisted primarily of the study of nesting behavior of House Sparrow in the Government Arts College in and around the campus, Udhagamandalam, The Nilgiris.. The Cannon 1200D (55-250X zoom 24 MP, point and shoot) camera was used to take photographs from safe distance without disturbing the birds and their nest. Post capture photo processing was done by using Microsoft Picture Manager for the basic editing. The photographs were labelled using Microsoft Paint Software. During this study only photographs of the birds and bird nests were taken. A good quality binocular was also used for tracing the birds from distance. To determine the nesting characteristics of the House Sparrow Pigeon in the various habitats of the Ooty city, Udhagamandalam, The Nilgiris was collected by observations through the trekking method, general observations, bird watching methods, and field observations. The House Sparrow nests were categorized on the basis of their shape as whole nests

or roughly rounded, half circular and irregular nests. The species of bird was identified by using standard references (Grimmett *et al.*, 1999).

### Nesting Behavior of House Sparrows

Nesting behavior of house sparrows were done by direct observation method search was made by the entire GAC campus and House sparrows nesting was identified once the nests were identified and the nesting variables were collected without disturbance of the nesting pairs. The variables such as Nest height, Nest platform height, Nest to Nest distances, Nest cover, Nest entrances length and width and Nest length and width was collected for further analysis

### Statistical Analysis

Statistical analysis was performed by Past 3.11 statistical computer software. Mean and Standard Error and Correlation analysis was used for this study

### RESULTS

A total of 97 House sparrows nests were found in the four nesting platforms in and around GAC campus namely Tiled houses, Buildings, Mud walls and Compound walls. Of which Tiled houses holds more numbers of nest (n=34) followed by Compound walls (n=42), Mud walls (n=11) and less number of nests were found in Buildings (n=10). House sparrow nest height and nesting platforms height result shows that overall house sparrow nest height preference was minimum 0.5m maximum 19.5m (6.85+0.48) and nesting platform height was minimum 8m maximum 22m (10.84+0.55) and the correlation result shows that strong positive correlation was observed on the nest height and nest platform height ( $r^2=90868$   $P < 0.00001$ ). Among the all nesting platforms Mud walls only negatively correlated with the nest height and nest platform height ( $r^2=0.2471$   $P > 0.463845$ ) (Table 1).

**Table.1.** House sparrow nest height and nesting platforms height in and around the GAC campus

S. No.	Type of Nesting Place	Number of Nests	Min.-Max. (M)	Nest Height (M)	Min.-Max.	Nesting platforms height (M)	Correlation Significant P<0.05
1	Tiled Houses	34	5-19.5	10.18+0.69	22-Nov	16.17+0.60	$r^2=0.7857$ $P < 0.0001$
2	Buildings	10	16-Apr	11.17+1.27	20-Dec	16.3+0.93	$r^2=0.97$ $P < 0.0001$
3	Mud walls	11	6-Feb	4.09+0.43	10-Jun	7.45+0.38	$r^2=0.2471$ $P > 0.463845$
4	Compound walls	42	0.5-8	3.34+0.29	10-May	6.11+0.16	$r^2=0.5149$ $P < 0.00048$
	Total	97	0.5-19.5	6.85+0.48	22-Aug	10.84+0.55	$r^2=90868$ $P < 0.00001$

House sparrow nest length width in nesting platforms results shows that overall nest length (15.4+0.54) and width (4.7+0.31). Among the platform wise highest nest length was observed on the Mud Walls on the other hand highest nest length was observed on the Compound walls and the correlation results shows that there is negative weak correlation ( $r^2=-0.061859$   $P > 0.81609$ ) among the overall nest length and width in nesting platforms. House sparrow nest cover in the nesting platforms results shows that Buildings have high percentage (98%) of nest cover followed by Compound walls (94%), Tiled house (92%) and low number of nest cover was observed on the Mud walls (88%). House sparrow nest direction in nesting platforms result shows that Compound walls hold high number of nests on North West Direction (n=29) followed by Tiled house North East (n=16) and South West Direction (n=11) low number of nest was observed on the Buildings, Mud Walls and Compound Walls respect to the direction of South East, South West and North West each one nest respectively. House sparrows nest to nest distance in nesting platforms result shows that Buildings (n=19.4m) shows that maximum nest to nest distance followed by Mud walls (n=12.1m) and Tiled houses (n=10.64) minimum number of nest to nest distance was observed on the Compound walls (n=6.28). Over all House sparrows nest entrance length width result shows that length (12.97+0.65) width (6.50+0.19) and the correlation results shows that a positive strong correlation ( $r^2=-0.29498$   $P < 0.0048$ ) was observed on the nest entrance length width in overall nesting platforms. On the other hand among the nesting platforms only Compound walls have a positive strong correlation ( $r^2=1$   $P < 0.00001$ ) other nesting platforms have negative weak correlation (Table 2).

**Table.2.** House sparrows nest entrance length width in nesting platforms in and around GAC campus

S. No.	Type of Nesting Place	Number of Nests	Nest entrance Length (cm)	Nest entrance Width (cm)	Correlation P< 0.05
1	Tiled Houses	34	6.88+0.40	7.29+0.45	$r^2=-0.11206$ $P > 0.528284$
2	Buildings	10	8.4+0.97	6.5+0.81	$r^2=-34575$ $P > 0.328906$
3	Mud walls	11	9.18+0.68	6+0.35	$r^2=-0.22316$ $P > 0.509828$
4	Compound walls	42	19.90+0.06	5.95+0.03	$r^2=1$ $P < 0.00001$
	<b>Total</b>	<b>97</b>	<b>12.97+0.65</b>	<b>6.50+0.19</b>	<b><math>r^2=-0.29498</math></b> <b><math>P &lt; 0.0048</math></b>

## DISCUSSION

House sparrows mostly found to construct nests in the four types of structures in and around the Government Arts College, Udahgamandalam, the Nilgiris namely Tiled houses, Buildings, Mud Walls and Compound. The tiled houses roof gaps, buildings with concrete roofs, mud walls holes and compound walls holes are provide excellent nesting sites for the House Sparrows. This indicates the adaptive nature of the species to a modified environment. The house sparrow is primarily associated with human habitation e.g., agricultural land, village and urban areas (Lowther and clink, 1992). The optimum habitat for house sparrow in temperate regions is a combination of buildings with holes under tiles or eaves to provide suitable nesting sites and sufficient green areas to provide insect food for the young (Summer-Smith, 1988). House Sparrows are facultative cavity nesters, and Cink (1976) also reported that cavity nest sites are preferred to sites with no cavities and pairs that nest in cavities or nest boxes have greater reproductive success. House Sparrows predominantly nest in holes and gaps in soffit boards and under tiles, therefore this tendency may have an impact of the availability of nest sites. A nationwide survey held in the UK indicated that house sparrows were avoiding newer buildings (build after 1985) or those that had undergo extensive roof repairs the last decade (Shaw *et al.*, 2008). This may result in fewer nesting opportunities and there may also be a possibility of adverse respiratory effects from airborne fiberglass on breeding birds and chicks (Crick *et al.*, 2002). A loss of suitable nesting sites in modern buildings or after renovation and an insufficient nestling diet are discussed as main causes for the decline of sparrows in urban areas, but other factors may also play a role (Summers-Smith, 2003; Vincent, 2005). Crows could be a nuisance for the sparrows because of their kelptoparasitic behavior (Kheera *et al.*, 2009) and nesting predation habits. It has been found in some species that the probability of nest predation varies with the features of the immediate area around the nest (Martin and Roper, 1988; Kelly, 1993). Furthermore, nest site selection in birds may have evolved as an adaptive response against nest predators (Martin, 1993). As sparrows are colonial nesters (Summers-Smith, 2003), a small decrease in the size of a colony may inhibit breeding in the remaining individuals. This could lead to the loss of the colony altogether (Summers-Smith, 2003).

Loss of nest sites, especially in buildings, as a consequence of present construction and renovation style in building, may be one of the potential causes of house sparrow decline in Europe (Pineda *et al.*, 2013).

On the other hand, it is suggested that house sparrow is especially connected with urban areas of lower socio economic status, therefore with buildings in worse condition that offer more nesting sites. Additionally, being flexible in choice of nest sites, house sparrow is expected to build the nests in other available places (including nest-boxes), when those in buildings are lacking (Shaw *et al.*, 2008). Similar kinds of results were found by Anderson (2006) who reported that the availability of nest sites is one of the most important factors influencing sparrow abundance in urban places. In India, a similar kind of response by house sparrows towards artificial placed nest boxes was reported by Balakrishnan *et al.* (2011) from Manjerimunicipality, Kerala. They studied the nest site characteristics of House sparrow and found that majority of the nests were placed on the Institutional area. Jayaraman *et al.* (2017) found that Utilization of artificial nest boxes by House Sparrow (*Passer Domesticus*) in urban areas of Udahgamandalam, The Nilgiris he found that productivity was highly observed in the market area. House sparrow clearly prefers nesting in buildings, and uses other sites only when those in buildings are not available (Shaw *et al.*, 2008; Wegrzynowicz, 2012). It was noticed that house sparrows usually built their nests in the crevices of thatched roofs of old houses, electric pipelines, in ventilation holes and space available on the electricity metres (Ali, 1996). Present study found that nests were situated at a height of 0.5-19.5 m from the ground level. Jayaraman *et al.* (2017) found that 4 to 7 meters height is the preferable one for nesting by House sparrows in artificial nest boxes in urban areas of Udahgamandalam, The Nilgiris. Nest material consisted of grass, straw, jute threads, leaves, weeds, feathers, etc. In the city areas, sparrows in small groups were usually found resting on electric wires, nesting hanging from the tube lights and pipe lines that accidentally broken in the house. These kinds of observation show that there were no place for house sparrow to build its nest in the urban areas and the sex ratio of house sparrow did not vary significantly and similar kind of result was also given by Rajashekar. The present study suggests that retaining old hatched roof buildings, Mud walls and Concrete walls holes and native buildings in the city are necessary for sustaining house sparrow populations. These reports were supported by (Baskaran *et al.*, 2010). Due to the increasing globalization large acres of land have been transforming into modern cities, as a result there is a loss of habitat for house sparrow population.

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