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**Syeda Gulrez**  
School of Life Sciences,  
Department of Zoology, Swami  
Ramanand Teerth Marathwada  
University, Nanded. PIN-  
431606, Maharashtra State,  
India

**Shivaji P Chavan**  
School of Life Sciences,  
Department of Zoology, Swami  
Ramanand Teerth Marathwada  
University, Nanded. PIN-  
431606, Maharashtra State,  
India

**Dipak Puri**  
School of Life Sciences,  
Department of Zoology, Swami  
Ramanand Teerth Marathwada  
University, Nanded. PIN-  
431606, Maharashtra State,  
India

**Shivaji Poul**  
Madhavrao Patil ACS College,  
Palam, Dist. Parbhani,  
Maharashtra State, India

**Correspondence**  
**Shivaji P Chavan**  
School of Life Sciences,  
Department of Zoology, Swami  
Ramanand Teerth Marathwada  
University, Nanded. PIN-  
431606, Maharashtra State,  
India

## Nest characters, nesting success and parental care in some birds at Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra

**Syeda Gulrez, Shivaji P Chavan, Dipak Puri and Shivaji Poul**

### Abstract

Nest is one of the essential need for nidicolous species of birds having altricial youngs. It is especially used for breeding and parental care. Nest characters of some Passerine bird species were examined and resource utilization for the purpose was correlated. The nesting success in S. R. T. M. University, Nanded Maharashtra was in the range of 0.42 % to 1.64 % in four different areas. Overall nesting success was 5.56 % in 650 acres area which is quite higher than earlier studies mainly in forest areas in India. This study was limited to specific types of nests rather than common nests of Baya weaver (*Ploceus philippinus*) abundantly found in the region. The birds use easily available material from the nesting site to construct nest this also implies the non availability of material is limiting factor for the nesting in birds which was found in Area 3 of the selected site. Starting from nesting, egg laying to fledging three species of birds Red vented Bulbul, Spotted Dove and Tailor Bird has different nesting cycles in the summer season from month of March to April. The Red vented Bulbul represent highest parental care amongst the other studied species. The human movement favours the nesting as an obstacle for predators but less resource to less and moderate tree covered in relation to available land limits the nesting in Passerine birds.

**Keywords:** Bird, nests, S. R. T. M. University, Nanded.

### 1. Introduction

A nest is a special construction forming a bed or receptacle in which the eggs are laid and young ones develop. Nest occur throughout the animal kingdom (Collias and Collias, 1984)<sup>[7]</sup>, and are designed by evolution to help the parents to meet the need of their young. The type of nest built gives important insights into the life of each species since nest focus the essential requirement of animals for reproduction. Nests are therefore very relevant to the science of ecology if we define ecology as the study of the relationship of the living organisms to their environment. F. H. Herrick (1911) one of the early pioneer in the scientific study of the nest, or "Caliology" as it was then called. C. Dixon (1902) stated that "it would be difficult indeed from the standpoint of the student of instinct and behaviour to find a more unsatisfactory class of scientific literature than that which deal with the nest of birds." The picture is now changing with the growing realization that nest provides clues to real and significant ecological relationship in birds particularly. During last ten to fifteen years a large and important body of literature has grown up for this study. Four common shapes of nests found in Passerine birds are 1) Cup nest, 2) Platform nest, 3) Spherical nests, 4) Pocket nest and 5) Colonial nest.

The Cup nest: It is common among Passerines having singing ability. This is common nest with spherical inside with a rim height several times the diameter of edge e.g. nests of Red Vented Bulbul (Fig. 02). Platform Nest: It is typically found in the birds which roughly built and big enough for the parent to land on; e.g. nest of Spotted Dove (Fig. 14). Spherical Nest: Common nest in certain areas of S. R. T. M. University campus. The nest which has spherical appearance inside out e.g. nest of Muniya species (Fig.17). Pocket Nest: The nest of cylindrical shape with opening at the upper region of the nest e. g. nest of Tailor bird (Fig. 08). Colonial Nest: These nests found from the lower side or cliff parts of roof of buildings, over-bridges, and fly-over's etc, e. g. Indian Swift and Wire tailed swallow nest colonies. The main materials used in these nests of Indian Swift (*Apus affinis*) were feathers, twigs, human hair bunches, grasses etc. They also use adhesives as saliva which keeps the nest stick to the substratum (Fig.18). Birds use certain type of materials in nest construction. There are various

reasons like to strengthen the nest structure, to provide cushion and protection for laid eggs and their developing nestlings. Solid and durable materials such as sticks and twigs of tree and shrub provide the lattice structure for the nest (Table 1.b). Thin flexible material such as rootlet, grasses, bark is used to line the nest. Soft material such as feathers, moss, leaves, cotton as cushion for the eggs (Table.1 c). In addition birds often put some human made objects in their nest for no apparent reason. Notably, some bird's species from Passeriformes have the habit of adding green leaves or cedar bark with pesticidal properties to their nest as the sanitizer. This behaviour is often spotted in species that reuse their old nests. In the present study the Bulbul species found to reuse their nest in the same breeding season by other commensal bulbuls of the same species. Present study was aimed to determine nesting success , nest structure and resource utilization by Passerine birds in a public place like university area to suggest how bird nests may be used as markers to represent environmental status.

## 2. Materials and Methods

### a. Study area

The present study was carried out in Swami Ramanand Teerth Marathwada University campus at Nanded, Maharashtra State in India. The University campus is having about 500 acre area with different kinds of vegetation found in different region surrounded by open woodland. The area is dominated by plants like Babul (*Acacia nilotica*), Ber (*Zizipus mauritiana*), Neem (*Azadirachta indica*) and a number of shrub are also found in this campus area. Seventeen grass species are also found in this region. It is a hilly area. The optimum temperature of the region was about 36<sup>0</sup>C. which provides a good environment for birds for their breeding. For convenience to note the resources and their categorization, we divided the area in the University campus as Area 1, 2, 3, 4. Area 1: The whole region from main entry gate to administrative building of the University. Area 2: The whole region from School of Life Sciences to School of Languages Literature and Cultural Studies. Area 3: The whole region from the school of Languages to School of Commerce and Management Sciences included in this area. Area 4: Entire remaining open central region of all department buildings including the backside of University Library/Information Centre building and university canteen area.

### b. Collection of data

To collect the baseline data on bird nests and bird species in the selected study area we walked at a slow and constant pace listening and looking for any sign of nesting birds. Any significant vegetation that has the potential to support nesting birds was observed for sign of nesting activity. Where ever possible the vegetation was carefully searched for sign of currently active nests. Signs of bird breed on site include; birds being observed in suitable habited such as a tailor birds found singing or producing calls over the nest for the purpose of protection, territories being defended, agitated behaviour of nest building was observed and noted for each observed species. Recently fledged young ones observed and adult birds carrying food for young ones were also observed. The nest specificity of a bird species was identified by repeated observation of the following bird species activity at the nest without disturbing them. The abandoned and left out nests were collected and brought to the laboratory for the purpose of further research. Radius method and Line Transect method

were used for nest survey. In radius method, by standing in particular area all the birds surrounding in radius or radar were observed and noted. The same process repeated after fixed distance to note weather there is a site of nesting or not.

### c. Equipments used

To conduct this study the equipments used were Compass, Digital camera (Nikon cool pix P-510) having 42 X auto zoom, 14 Mega Pix, extra battery, Topographic map of survey area, Clipboard, pencil and eraser, Small notebook for making own notes of special events seen, Watch, Bird field data sheets (one set for each survey site), Plastic sheets or large clear plastic bag to protect data sheets when raining, Flagging tape or coloured strip and mobile phone for communication. The Nesting success % (NS) was calculated using formula NS % = Total number of trees + Total number of shrubs/ Total number of nests or %NS= TT +TS / TN. Where (TT=Total number of Tree, TS=Total number of Shrub, TN=Total number of Nest)

## 3. Results and Discussion

The survey of study area indicates that there were 343 trees and 264 shrubs, the total number of bird nests were 34 (Table. 3.1). In the selected study area (Area 1) had highest number of nests. Total nesting success( in area1) was 1.90 % (Fig. 21) this high number of nesting as compared to other area was due to sufficient availability of resources in this area (Fig 19..A). The study (area 2) includes total number of 350 trees, 210 shrubs and 30 nests (Table 3.2).This area had less number of nests as compare to study area 1,which has the availability of food, water source and human mobility (Fig 19..B). The total nesting success in (area 2) was 1.60%. In Area 3 (Fig. 21) due to scarcity of water source, food and less human mobility (Fig 19. C), only 16 nests were found (Table. 3.3).Total nesting success (in Area 3) was 0.42% (Fig. 21). (In Area 4) the total number of tree were 95, total number of shrub were 148 and the total number of nest were 20 (Table. 3.4). The total nesting success (in area 4) was 1.64 % (Fig. 21) due to high number of sources regarding food availability, water source and area mobility (Fig 19. D).

The parental care was observed in three species that includes Spotted Dove (*Zenaida macroura*), Red-vented Bulbul (*Pycnonotus cafer*) and the Tailor bird (*Orthotomus sutorius*) for their related activities like nest construction, egg laying, incubation, feeding to nestlings, care and precaution during feeding and fledging (table 5, 6. ; Fig. 19, 20). Melisa *et al.*, (1995) [13] reported that there is large scale use of Passerine birds in the laboratory research on human and animal husbandry welfare hence it has been widely studied, in this context the basic biological studies that include the nesting and parental care in the present study was most important. The nest structure and nest location related to reproduction in birds and evolutionary patterns states that the group breeders and nesters have high life span, similarly the safe place nesters have short life span, in this regard also the present study is important and adds valuable data on the position of nests of various species of passerine group selected. The majority of species have selected the safe place which is in the area where there was frequent human movements. Pinho *et al.*, (2013) [16] found that the apparent nesting success, the abundance and richness of nesting birds in four forests type and monitored the nests of passerine birds during reproductive seasons. The productive forest area has high nesting % and high % of successful nests whereas in the present study we

found that due to human activities this group of species from Passeriformes considered safety as more important aspect as compared to the productivity of area hence we found more nests in the high human activity area. On the contrary the studies by Pinho *et al.* (2013) [16] indicates that the safety and productivity of the habitat both are most important for higher nesting success up to 26.8% whereas present study shows 5.56 % which is quite less is due to less number of trees and less productivity of the area. The nest building in birds is one of the important phenomenons in the evolution of vertebrates to higher taxa. It is one of the integral parts of the life of birds which get continued in the higher groups of vertebrates. Therefore to study the nest structure, nest material and selectivity is an important aspect which is changing with change in environment. In this view present investigation also explains the nest materials used by the passerine birds. The present study is first report of nest structure and nesting success in passerine bird species from SRTMUN after Achegave *et. al.* (2016) investigated nesting of Baya weaver (*Ploceus philippinus*) from the same area. To construct new infrastructure is an essential part of development but the loss of natural resources in this process like habitat destruction by cutting the trees, shrubs and reduces space need to be replanted during originally existed landscape development in future plan and rejuvenated for the betterment of avian life is strongly suggested through this research . The creature in our surrounding are unable to understand the meaning of so called development conducted by human being, just they are in need of space, food and shelter. Achegave *et al* (2016) [17] studied the distribution and ecology of Baya weaver nests from the same study area and concluded that this bird species also aware of nest and egg safety during nesting site selection. But the co-relation with nesting site selection to area with human activity in Baya weaver was random and insignificant. In another study on nesting of wired-tailed swallow (Chavan *et. al.*, 2016) [6] concluded that the nest site selection is in non-polluted area to collect the mud pallets; in this species the nest is of colonial type. Each nest was for individual bird but get support from other and support to other adjacent nest. The security of nesting place and availability of raw material for nest construction was considered in priority. In Godavari river basin the studies on avian diversity are limited to reporting of species diversities and richness (Chavan *et al.* 2015) [5] with

all details of about 168 species. Later on recently Chavan *et al.* (2016) [18] investigated the detailed study of nest structure of Yellow-wetted lapwing (*Vanellus malabaricus*) and reported that this wader build ground nest in the scrub land near village or in the scrubland pasture area. Similarly Chavan *et al.* (2017) [20] conducted studies on nesting ecology of three species of Nightjar Savannah nightjar, Forest nightjar and Indian nightjar; the study concluded that these species prefer area for camouflage to secure eggs and themselves in priority. In the present study the Red Vented Bulbul (*Pycnonotus cafer*), Tailor bird (*Orthotomus sutorius*) also prefer nest security by nest building in highest % of human activities, it is to reduce the possible chance of nest predation by the Rat snake or predatory birds like Black drongo, Black shoulder kite/Sikra etc.

#### 4. Conclusion

In all the study area of STMUN ,five types of nest of birds were found, they were of cup shaped, open platform shaped, spherical shaped, pocket shaped and colonial type. The materials used by different birds were dried grasses; twigs and branches of tree; mud and feathers (Table.3). Nesting success in area (1) was 1.90%. In area (2) the nesting success was 1.60%, the nesting success of area (3) was 0.42% and in area (4) it was 1.64% (Fig.20). The birds such as Red Vented Bulbul completed its nesting cycle from 15<sup>th</sup> February 2017 to 14<sup>th</sup> March 2017 (Table 6.1). Nesting cycle of Tailor bird was completed from 13<sup>th</sup> March 2017 to 13<sup>th</sup> April 2017 (Table.6.3) and the nesting cycle of dove was completed from 20<sup>th</sup> March 2017 to 18<sup>th</sup> April 2017. (Table.6.4). Comparatively less tree population and nesting sites were limiting factors for nesting whereas the human activities in the area favours the nesting because it act as an obstacle for intervention to predators for nest damage and predation. Monsoon season was the nesting and breeding period of selected bird species. Red vented bulbul represents comparatively good parental care amongst the selected species. The spotted Dove (*Zenaida macroura*) feeds to young ones very late up to max 02 hrs between two feeding times. It feeds crop milk to young ones. Increase the plantation and water resources to favour nesting and breeding in SRTMUN are suggested.



**Fig 1:** Red vented Bulbul found grasshopper to feed their young.



**Fig 2:** Cup nest of Red vented Bulbul.



**Fig 3:** Hatchlings of Red vented Bulbul (*Pycnonotus cafer*).



**Fig 4:** Hatchout chicks of Bulbul.



**Fig 5:** Developing chicks of Bulbul.



**Fig 6:** Developed chicks of Bulbul before fledging.



**Fig 7:** TailorBird (*Orthotomus sutorius*).



**Fig 8:** Pocket nest of Tailor Bird.



**Fig 9:** Eggs of tailor bird in the nest.



**Fig 10:** non-hatched eggs of Tailor bird.



**Fig 11:** Hatchlings of Tailor bird in the nest.



**Fig 12:** Chicks of Tailor bird opened mouth, expecting food.



**Fig 13:** Spotted Dove (*Zenaida macroura*)



**Fig 14:** Platform nest of Spotted Dove.



**Fig 15:** Hatchlings of Dove.



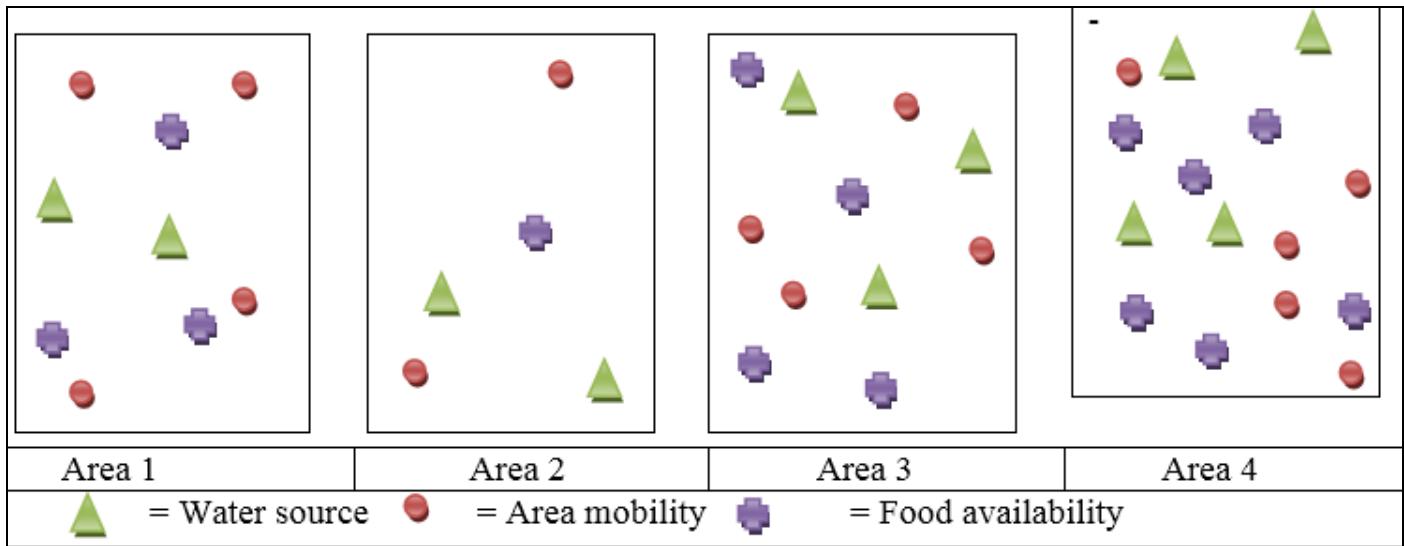
**Fig 16:** Spotted Muniya



**Fig 17:** Spherical nest of Muniya species



**Fig 18:** Swift with colonial nest



**Fig 19:** Nesting and breeding of birds in relation to resource distribution.

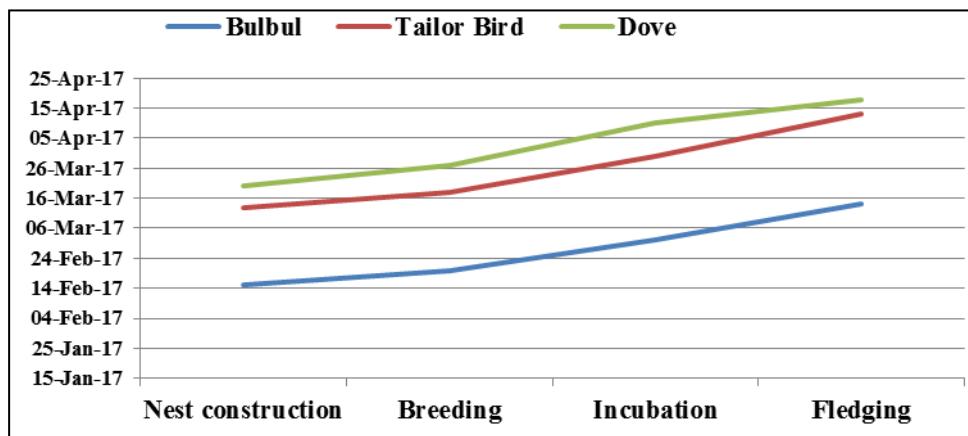


Fig 20: Time period of nesting and breeding

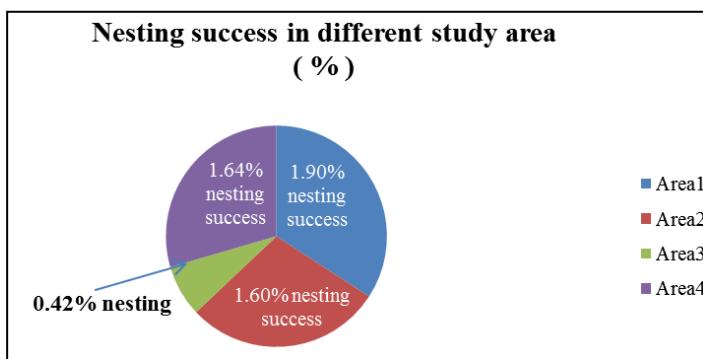


Fig 21: Nesting success in different study area



Fig 22: Study area distribution of S.R.T.M. University Campus, Nanded.

Table 1: Material used by bird species to construct different types of nests in the study area.

Sr.No	Type of Nest	Main material	Lining material	Adhesive	Example
a)	Cup Nest	Grasses, plant fibre and small twigs	Same as main material but finer lichen, rootlets, hair and feathers.	spider silk or mud which strengthen the nest and keep the nest stationary on the tree	Red vented Bulbul ( <i>Pycnonotus cafer</i> )
b)	Platform Nest	Thin Stick or light weight small twigs	Not present in most case. Sometimes grasses, Small branches.	Not present.	Pigeon, Dove, Kite etc.
c)	Spherical Nest	The large sized grasses and twigs.	Small grasses used for lining, feathers and Cotton.	Sticky mud and small grasses	Spotted Muniya ( <i>Lonchura castaneothorax</i> )
d)	Pocket Nest	Small twigs, grasses, larger twigs.	Nylon thread, cotton, feathers and thin grasses.	Usually not found	Tailor bird ( <i>Orthotomus sutorius</i> )
e)	Colonial Nest	Mud, grasses, feathers	Not present	Sticky mud and feathers	Swift ( <i>Apus affinis</i> )

Table 2: Characters of different sections in the study area used.

Sr. No.	Sections of study area in SRTMUN	Characters of the sections for study of bird nests
01	Area (1)	Hilly area having dug well and abundant trees.
02	Area (2)	Hilly area with pond and thick vegetation
03	Area (3)	Hilly area with poor vegetation
04	Area (4)	Hilly area with lake and moderate vegetation

Table 3: Population of tree, shrub and nests in study area of SRTMUN

Sr. No.	Area	Total No. of trees(A)	Total No. of shrubs(B)	Total Nesting sites (A+B)	Total No. of nests	% Nesting
01	Area No.1	343	264	607	34	1.90
02	Area No.2	350	210	560	30	1.60
03	Area No.3	410	195	605	16	0.42
04	Area No.4	95	148	243	20	1.64
	Total	=1198	=817	=1915	=100	=5.22

**Table 4:** Nesting cycle of different passerine birds

Species	Nest construction timing(morning/aft/eve)	Gender involvement	Time required to complete nest(days)	Eggs laid	Incubation time	Incubation period	Hatching success %
Tailor bird	Morning and evening	Both male and female	7-8 days	4 eggs	Afternoon	12 days	85%
Red vented Bulbul	Whole day	Both male and female	4 days	3 eggs	Morning and night	10 days	85%
Dove	Morning and evening	Both male female	8 days	2 eggs	Morning to night	15 days	100%

**Table 5:** Time period of nesting and breeding.

Sr. No.	Cycle	Bulbul ( <i>pycnonotus cafer</i> )	Tailor bird ( <i>Orthotomus sutorius</i> )	Dove ( <i>Zenaida macroura</i> )
		Natural	Synthetic material	No. Of Nest
1	Nest complete ( Estimate)	15 February 2017	13 march 2017	20 March 2017
2	Eggs laid	20 February 2017	18 march 2017	27 March 2017
3	Eggs hatch	2 march 2017 (10 days incubation )	30 march 2017 (12 days incubation )	10 April 2017 (14 days incubation )
4	Chick fledge	14 march 2017 (12 days after hatching )	13 April 2017 (14 days after hatching )	18 April 2017 (8 days after hatching)

**Table 7:** Nest Population and Character of Nest in Study Area 1.

Name of bird	Type of Nest	Nest Material Used								No. Of Nest	
		Natural				Synthetic material					
		G	L	P	N	S	C	F	H		
Bulbul	Cup nest	+	-	+	-	+	+	-	-	07	
Tailor bird	Pocket nest	+	+	-	+	-	-	+	-	07	
Muniya	Spherical	+	+	+	-	-	+	-	-	02	
Bulbul	Cup nest	+	-	-	-	-	+	+	+	07	
Muniya	Spherical	+	-	-	-	-	-	+	-	05	
Dove	Platform	-	+	-	-	-	-	+	-	06	
										T=34	

**Area 1.****Table 8:** Nest Population and Character of Nest in Study Area 2.

Name of bird	Type of Nest	Nest Material Used								No. Of Nest. Of st	
		Natural				Synthetic material					
		G	L	P	N	S	C	F	H		
Bulbul	Cup nest	+	+	-	-	-	+	+	-	07	
Tailor bird	Pocket nest	+	+	-	+	-	+	+	-	02	
Muniya	Spherical	+	+	+	+	-	+	+	+	05	
Bulbul	Cup nest	+	+	-	-	-	+	+	-	06	
Muniya	Spherical	+		-	+	-	-	+	-	05	
Dove	Platform	-	+	-	-	-	-	-	-	02	
Swallow	Colony	+	-	-	-	+	+	+	+	03 =30	

**Area- 02.**

(G=Grass, L=Leaves, P=Plastics, N=Nylon, S=Spider thread, C=Cotton, F=Feather, H= Human Hair , + = Present, - =Absent)

**Table 9 and 10:** Nest Population and Character of Nest in Study Area 3 and 4  
**Area – 03.**

Name of bird	Type of Nest	Nest material used								No. of Nest	
		Natural				Synthetic material					
		G	L	P	N	S	C	F	H		
Bulbul	Cup nest	+	+	-	-	-	+	-	-	02	
Tailor bird	Pocket nest	+	+	+	-	+	-	+	-	04	
Muniya	Spherical	+	+	+	+	-	+	-	-	04	
Bulbul	Cup nest	+	-	-	-	-	+	+	-	02	
Muniya	Spherical	+	+	-	-	-	-	+	-	03	
Dove	Platform	-	+	-	-	-	-	-	-	03	
										T=16	

**Area 4**

Common Name of bird	Type of Nest	Nest Material Used								No. Of Nest	
		Natural				Synthetic material					
		G	L	P	N	S	C	F	H		
Bulbul	Cup nest	+	-	+	-	+	+	+	-	05	
Tailor bird	Pocket nest	+	+	-	+	-	-	+	-	02	
Muniya	Spherical	+	+	+	-	-	+	-	-	03	
Bulbul	Cup nest	+	-	-	-	-	+	+	-	05	
Muniya	Spherical	+	+	-	-	-	-	+	-	03	
Dove	Platform	+	+	-	-	-	-	+	-	02	
										T=20	

(G=Grass, L=Leaves=Plastics, N=Nylon, S=Spider thread, C=Cotton, F=Feather, H=Hair, + = Present, - =absent)

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**6. Competing Interest**

The authors declare that they have no competing interest.

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