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# Nesting of avian diversity in relation to indigenous trees

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**Abstract**
The main objective of the present study was to find out the nesting preference of avian species in relation to indigenous trees at two different locations *i.e.* Punjab Agricultural University, Ludhiana and village Machaki Mal Singh, Faridkot from April 2016- April 2017. Nesting of 8 bird species was observed on seven tree species. Five bird species were observed nesting at location I while only three were observed at location II. Selection of nesting site, nesting materials and nesting structures were monitored and studied. Total 40 nests (Four on Pipal tree, 3 on Banyan tree, 2 on Mulberry, 4 on Jamun, 2 on Neem, 24 on Kikar and 1 on Sheesham) were recorded. Out of these, three nests were of Black Kite, 6 of House Crow, 1 of Spotted Owlet, 1 of Little Brown Dove, 1 of Oriental Magpie Robin, 1 of Asian Pied Myna, 14 of Cattle Egret and 13 of Baya weaver bird. Breeding of all the 8 bird species was noticed from beginning of April to end of November.

**Keywords:** Bird species, indigenous trees species, nesting, tree heights and nesting materials

## 1. Introduction
An ancient evolutionary history of birds dates back to more than 150 million years [1, 2]. Bird community forms an integral component in an ecosystem and need to be conserved by preserving their habitats. For conservation of avian diversity, the study of birds and their abundance is a prerequisite step [3, 4]. Various factors decide the distribution of birds in a particular area which generally includes availability of suitable food, roosting and nesting sites [5]. Even a single ecosystem is used differently by different species [6]. In a habitat, variables such as foliage height, connectivity, heterogeneity and vegetation cover can all have influence on avian abundance and diversity [7, 8].
Vegetation composition and habitat structure around the growth site of a particular fruiting tree affect the feeding behavior of birds, by determining food distribution and cover sites. Eleven species of birds were found interacting with the fruiting trees of Jamun *Syzygium cumini* in the Soppinabetta forests of Sringeri. Of these, nine species were frugivorous and two were insectivorous [9].
A nest is a platform for birds, specifically, to hold eggs, where they incubate their eggs and raise their young-ones during breeding period [1, 10]. On the basis of nesting, birds are grouped into two categories *viz.*, open nesters and cavity nesters [11]. Nest site selection act as a major factor in habitat selection by birds and is greatly influenced by food availability, presence of suitable nesting material, protection from predators and suitability of area [10]. Likewise, the old and tall trees are preferred by birds like hawks and eagles and the cavity nesters like parakeets [12]. Trees with large stem diameter and branches welcome more birds and their offspring [13]. Larger birds generally prefer their nest construction on the top of the trees while smaller birds usually try to occupy the lower part of trees canopy [14]. Woodpeckers, Parakeets and Barbets excavate their nests in tree trunks or branches while Hornbills, Common Myna *Acridotheres tristis*, Brahminy Myna *Strnus pagodarum* prefer to use the existing natural tree cavities for nesting. Gajera *et al* [14] observed 103 terrestrial bird species in Danta forest in Gujarat during his investigation. Of these, nesting of 31 species was recorded. The highest number of nests were made by Baya Weaver *Ploceus benghalensis* [16], followed by House Crow *Corvus splendens* [14] and Green Bee-eater *Merops orientalis* [12].
Most of the workers claim that birds mainly depended upon trees for their nesting. Even aquatic birds like Egrets, Herons and Water-Hens, which otherwise inhabited water bodies for their food requirements, prefer their nesting on trees [12].

Building of nests on large and tall trees helps birds not only to reduce predation, but also provide protection from stormy winds and rains. Bird nesting success was influenced by several factors, ranging from habitat destruction to the introduction of new predator species. Habitat fragmentation causes direct loss of nesting habitat features needed by breeding birds. Habitat loss led to a decrease in potential nest sites affecting nesting success as birds were forced to use unsuitable nest sites. In the absence or scarcity of suitable nesting sites, some birds made their nests at odd places like electric transmission cables [16, 17], on telephone and electric poles [18], top of building roofs [14], underneath river bridges, inter spaces among girders, window lodge and chimney [19], sewage, gas pipes and radio transmitter masts [20]. Information about the nesting habitats of birds, including those needed for successful nesting, provided a better understanding of the ecological factors that permitted coexistence of different species and helped in conservation efforts [21]. According to Garcia *et al* [22] high nesting densities offered by habitat structure minimize the loss of predation. The abundance and distribution of prey, and the foliage structure, which vary among tree species, influence prey detection and accessibility by birds [23].

Nest site selection can be influenced by several factors, including nest predation risk, physiological tolerance to abiotic factors and inter specific competition [24, 25]. Nest predation diminishes with an increase in vegetation heterogeneity and foliage density near the nest by reducing the transmission of acoustic, chemical or visual signals [26]. This idea is based on the premise that nesting site and vegetation architecture must offer some kind of protection against climate and predation [27].

## 2. Materials and methods

### 2.1 Study area

The study of nesting of avian diversity in relation to indigenous trees was carried out at two selected locations i.e. Location I: Punjab Agricultural University Campus (30.90◦19' N, 75.80◦78' E and 247 meter above mean sea level) and Location II: village Machaki Mal Singh (30.62◦12' N, 74.74◦39' E and 202 meter above mean sea level), Faridkot from April 2016 to April 2017.

### 2.2 Materials

Binocular (8X42 Nikon) was used to study the avian species and observations about nests by examining its contents at regular intervals. Ravi altimeter was used to study the height of nesting trees and nests.

### 2.3 Methods

Seven indigenous tree species were selected *i.e.* Banyan (*Ficus benghalensis*), Jamun (*Syzgium cumini*), Kikar (*Acacia arabica*), Mulberry (*Morus Alba*), Neem (*Azadirachta indica*), Pipal (*Ficus religiosa*) and Sheesahm (*Dalbergisa sissoo*) for study. Point count method was followed by Javed and Kaul [28] to study the bird abundance at selected sites. Nesting tree, tree height, nests height, nest location and nesting times were recorded. *Kruskal-wallis* test was used to check the significant difference among tree species preferred for nesting.

## 3. Results and Discussion

A total of 8 bird species were recorded to utilize seven selected tree species for nesting (Table 1). Total 40 nests (Four on Pipal tree, 3 on Banyan tree, 2 on Mulberry, 4 on Jamun, 2 on Neem, 24 on Kikar and 1 on Sheesham) were recorded. Out of these, three nests were of Black Kite *Milvus migrans*, 6 of House Crow *Corvus splendens*, 1 of Spotted Owlet *Athene brama*, and1 of Little Brown Dove *Streptopelia senegalensis*, 1 of Oriental Magpie Robin *Copsychus saularis*, 1 of Asian Pied Myna *Sturnus contra*, 14 of Cattle Egret *Bubulcus ibis* and 13 of Baya weaver bird *Ploceus benghalensis* (Table 1).

**Nesting at location I**

Nesting of Black Kite was observed from the month of April to July. Total three nests were found, one on Banyan, one on Pipal and one on Sheesham. Nesting structure was same on all the three trees. It was a large platform of dry sticks, twigs, rags and polythenes. Incubation varied from 30-35 days. Hiraldo *et al* [29] also reported highly variable incubation period lasting from 25-38 days. Chicks were raised in the nest for about 42-48 days. Breeding characteristics were similar to the observations given by Boumaaza *et al* [30].

Total six nests of House Crow were recorded, three on Pipal, one on Banyan, one on Neem and one on Jamun. Nesting period began from June and ends in August. Nesting structure was a rough bowl of dry sticks, twigs and rags. Structure was same on the trees. Incubation varied from 15-18 days. Clutch size observed was 2-3 in all the nests recorded whereas Putto and Archer [31] reported 3-5 eggs per clutch. Chicks were raised in nest for 25- 31 days. Fry *et al* [32] reported fledging period from 27- 38 days after hatching.

Nesting of Spotted Owlet was observed in an already existing cavity in Banyan tree from January to April 2017. Similar findings were also recorded by other workers [33, 34] which revealed that the Spotted Owlet is a non-excavator and same cavity was used as a roosting site after successful breeding. Nesting of Asian Pied Myna was noticed on Mulberry tree from first week of May till June. Nest was of closed type and made up of dry grass and straw.

Oriental Magpie Robin was observed collecting nesting material in already existing cavity in the Mulberry tree during month of April. Nesting structure consisted only dry grass. Clutch size of five eggs with pale blue colour and dark brown spots was noticed. Ali and Ripley [1] gauged out the same findings for clutch size varying from 3-6 eggs for Oriental Magpie Robin. Eggs were incubated for about seven days and after that none of the parent was observed near the nest. Risk of predation may only be the reason of leaving the nest as the nesting structure was close the ground.

**Nesting at location II**

Nesting of Little Brown Dove was observed on Neem tree in the month of June at location II. Nest was a small bowl of sticks and dry grass held safely in outer branches of tree. Both the parents took part in nest construction while only one parent played role in incubation. Clutch size was two. Sexena *et al* [35] also reported that clutch size in doves was observed to be strictly two eggs. Difference of six days was noticed in laying of both the eggs. This finding is contrary to that of Sexena *et al* [35] who reported the difference of only day in laying of both the eggs. Incubation was continued for 14-15 days. Successful fledging took place 24-25 days after hatching.

Jamun tree near the canals was preferred by heronry of Cattle Egret for nesting in late April. Three nests were found out of which only one was found active. After six days egg was found lying on ground. No activity was noticed in the nest after the destruction of egg. The only reason for destruction of eggs could be the untidy lose nesting structure. Earlier

findings of few scientists also claimed that improper and unsafe nesting structure proves to be fatal for young ones and eggs [36].

Heronry of Cattle Egrets consisting of 11 nests, recorded on single Kikar tree (*Acacia arabica*) with close proximity to pond. Kour and Sahi [36] have also revealed that first preference of nesting tree was Acacia *sp.* (Babool). In case *Acacia* sp. was not available, Mango tree *Mangifera indica* was preferred. Tree was observed in the month of May when six nests were already constructed and remaining were under construction. Dry and naked sticks and twigs were used as the construction material. The findings of Iyer [37] were also similar for nest building by Egrets. Till the end of October all breeding activities were over and successfully raised nestlings started feeding in the nearby grounds. The above finding is similar to that of other workers [38, 39] who also stated that thorny trees protect the nests against predators so thorny tree provided the ideal nesting platform. Nestlings and parents continued visiting their nests even after the breeding season was over.

A swinging retort shaped nesting structure of Baya Weaver bird with long vertical entrance tube, compactly woven by strips of paddy, bamboo, coconut and rough-edged grasses was observed suspended in clusters on Kikar tree. Nesting was noticed from the month of August till end of November. Height of nesting structures ranged from 7- 10m from ground. Total 13 nests were recorded on single Kikar tree. Out of which 5 nests were of previous breeding season which were not occupied during present breeding season. Eight newly constructed nests were only continued for successful breeding. Kruskal-wallis test used to check if the significant difference among for nest preference shows no significant difference among the tree species ($p$>0.05).

## 4. Conclusion

To conclude a total of 8 bird species were recorded to make nest on seven selected tree species. Total 40 nests (Four on Pipal tree, 3 on Banyan tree, 2 on Mulberry, 4 on Jamun, 2 on Neem, 24 on Kikar and 1 on Sheesham) were recorded. Out of these, three nests were of Black Kite, 6 of House Crow, 1 of Spotted Owlet, 1 of Little Brown Dove, 1 of Oriental Magpie Robin, 1 of Pied Myna, 14 of Cattle Egret and 13 of Baya weaver bird. Breeding of all the 8 bird species was noticed from beginning of April to end of November. Tall trees (Banyan, Pipal and Sheesham) with dense foliage are preferred by large birds for nesting *e.g.* Black Kite and House Crow. Trees with less height (Mulberry) are preferred by small birds for nesting like Pied Myna and Oriental Magpie Robin. Cavities in the trees (Mulberry) are used by birds for nesting and roosting e.g Spotted Owlet and Oriental Magpie Robin.

Depletion of indigenous tree cover and invasion of exotic tree species directly affects the distribution of avian fauna. Old and indigenous trees account to be an important substrate for nesting in the form of dense canopies and cavities. Indigenous trees must be promoted over exotic ones because the services provided by them are already part of local ecology.

## 5. Acknowledgement

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**Table 1:** Observations on the nesting of bird species on selected tree species.

| Tree | Bird | Tree height (m) | Nest height (m) | Initiation of Nesting | Nesting material | Breeding completed |
|---|---|---|---|---|---|---|
| **Location I (PAU, Ludhiana)** | | | | | | |
| Banayan | Spotted Owlet (*Athene brama*) | 21 | 8 | Third week of Jan | cavity | Last week of April |
| | House Crow (*Corvus splendens*) | 21 | 10 | Fourth week of June | Dry sticks, old wires and rags | Fourth week of August |
| | Black Kite (*Milvus migrans*) | 21 | 12 | First week of April (Partially completed) | Twigs, rags and polythenes | First week of June |
| Pipal | Black Kite (*Milvus migrans*) | 20 | 12 | Second week of April | Sticks, twigs, rags and polythenes | Last week of May |
| | House Crow (*Corvus splendens*) | 20 | 17 | Second week of June | Dry sticks and rags | Second week of August |
| | | 21 | 18 | Second week of June | Dry sticks and rags | Third week of August |
| | | 21 | 20 | First week of July | Dry sticks and rags | First week of September |
| Jamun | House Crow (*Corvus splendens*) | 12 | 8 | First week of July | Dry sticks and rags | Last week of August |
| Neem | House Crow (*Corvus splendens*) | 14 | 9 | Fourth week of June | Dry sticks, twigs and rags | Last week of August |
| Sheesham | Black Kite (*Milvus migrans*) | 18 | 16 | Third week of April | Dry sticks, twigs, rags and polythenes | Last week of May |
| Mulberry | Pied Myna (*Sturnus contra*) | 6.6 | 6 | First week of May | Dry grass and straw | Third week of June |
| | Oriental Magpie Robin (*Copsychus saularis*) | 6.1 | 1 | First week of April | Dry grass | Abandoned |
| **Location II ( Village Machaki Mal Singh, Faridkot)** | | | | | | |
| Neem | Little Brown Dove (*Streptopelia senegalensis*) | 12 | 4 | First week of June | Sticks and twigs | Third week of July |
| Jamun | Cattle Egret (*Bubulcus ibis)* | 13.5 | 8.2 | Last week of April | Dry sticks | Abandoned |
| Kikar | Cattle Egret (*Bubulcus* | 12.1 | 7 | First week of June | Dry and naked | Last week of |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *ibis)* | | | | sticks and twigs | August |
| | Baya weaver bird (*Ploceus benghalensis*) | 10.2 | 4.6 | First week of august | Leaves of different trees | Last week of November |

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