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Nesting Ecology of Spotted Owlet (*Athene brama*) and Barn Owl (*Tyto alba*) in Agroecosystem of Punjab

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ABSTRACT

The nesting behaviour of Spotted Owlet (*Athene brama*) and Barn Owl (*Tyto alba*) was observed at different sites of Punjab Agricultural University, Ludhiana and villages Baranhara and Ladhowal of district Ludhiana. Nesting of Barn Owl was also observed in field area of village Machaki Mal Singh of district Faridkot. The breeding season of Spotted Owlet was observed to start from January and continued until the end of May whereas in case of Barn Owl there was no definite season for breeding, it completed its breeding as per the availability of food and suitable weather conditions. The Spotted Owlet was reported to largely prefer the holes/cavities in trees as their nesting sites. A total of 15 nests of Spotted Owlet were located out of which 10 nests were observed in PAU field area, 3 at Village Baranhara and 2 at Village Ladhowal. Mean nest height above the ground was 5.14±0.68 m at Punjab Agricultural University, 5.33±2.09 m at Baranhara and 3.75±0.25 m at Ladhowal. Most preferred tree utilized by Spotted Owlet for nesting was Dek tree. In case of Barn Owl only 2 nests were located, one at Village Ladhowal and second at Village Machaki Mal Singh. Both the nests were built in closed buildings with average height of 8 m above the ground.

Key Words: Breeding Season; Cavities; Nesting Sites; Clutch Size

INTRODUCTION

Birds of prey are quite helpful to mankind especially in agricultural fields by destroying different pests of crops. Owls are nocturnal raptorial birds belonging to order Strigiformes. Many bird species are likely to nest in tree cavities or holes in buildings. This strategy benefits these species by providing a favorable surrounding for incubating eggs and proper parental care to the young ones with decreased predation risk of nest (Ali and Sanathanakrishanan 2015). Spotted Owlets are likely to choose nesting sites that increase their reproductive success. It survives in all possible types of habitat and adapts to the changing environment both natural and man-made (Patki and Zade 2017). The presence of large temples, old trees, schools, ruins and public buildings provides suitable nesting sites for the Spotted Owlet in both rural and urban areas (Pande et al. 2007, Gaba and Vashishat 2018). Barn Owls are cavity nesters that can use both natural and man-made cavities. These are typically nocturnal and usually prefer to eat small mammals but sometimes they may also eat rabbits and bats (Marti et al. 2005, Santhanakrishnan et al. 2011a). These raptors are recognized as an important bio-control agent of small mammals and insect pest of agricultural crops. Thus, understanding the ecology of these species and enhancing their survival are important for the society (Vanitha et al. 2014). Primary limiting factors for the population of Barn Owls include paucity of nesting sites and human perception (many people view this species as bad omen; Mahmood-ul-Hassan et al. 2007, Dickerson 2017). Most of the research on Barn Owl in India has been carried out in southern parts, mainly on its feeding behaviour and diet and to lesser extent on nesting and roosting sites (Santhanakrishnan et al. 2011b). Keeping in view the beneficial role of Spotted Owlet and Barn Owl in agricultural areas, the present study was carried out on their nesting ecology.

STUDY AREA

We observed various ecological aspects of Spotted Owlet and Barn Owl in villages Baranhara and Ladhowal of district Ludhiana, and field areas of Punjab Agricultural University (PAU), Ludhiana. The nesting of Barn Owl was also examined in the field of village Machaki Mal Singh (district Faridkot). Ludhiana is located at 30.9° North and 75.85° East and Faridkot is located at 30.67° North and 74.76° East.

MATERIALS AND METHODS

Field surveys were made on weekly basis in non-breeding season and daily in the breeding season from January 2016 to June 2017 during late evening and early morning hours. Locations were selected from the villages and field area where Spotted Owlet and Barn Owl inhabits the whole year. Different parameters such as the selection of nesting site, nest structure, height of nest, height of nesting structure and other breeding parameters were observed at selected sites. All observations were made twice a week using a binocular (8×42 Nikon). Different tree species preferred as nesting site were also recorded. Height of the tree or building was measured using Ravi altimeter.

RESULTS AND DISCUSSION

Spotted Owlet

During the study period (January 2016 to June 2017), breeding was observed from late January to May. A total of 15 nests of Spotted Owlet were located out of which 10 nests were observed in PAU field area, 3 at Village Baranhara and 2 at Village Ladhowal (Table 1). All the nests were located in natural tree cavities (Figure 1a, 1b) only one nest was located in empty building at Village Baranhara. Spotted Owlet may use variety of trees as its nesting sites, including both exotic and indigenous (Ali and Sanathanakrishanan 2013). The spotted owlet uses tree cavities, cracks and recesses in building walls, rocks and cliffs as nests and is strongly associated with agriculture dominated landscapes (Mahmood-ul-Hassan 2008). Different nesting parameters observed in PAU field area are described in Table 2. At village Baranhara, three nesting sites were observed. At site 1, the nest was observed in a branch of peepal tree. Height of the tree was about 21 m. Height of nests was 3 m above the ground level. Opening of nest cavity was about 14 cm and nestlings observed were two. At site 2, nest was observed in cavity present in trunk of dek tree. Height of the tree was about 12 m. Height of nest was 3.5 m above the ground level. Two nestlings were observed and opening nest cavity was about 12 cm. At site 3, the nest was observed in cemented structure above the entrance gate. Height of the structure was about 10 m and height of nest was 9.5 m above the ground level. Opening nest cavity was 40 cm and two nestlings were observed. At village Ladhowal, sites observed were 2. At site 1, the nest was observed in dek tree. Height of the tree was about 12 m and height of nest was 3.5 m above the ground level. Opening of the nest cavity was about 10 cm and three nestlings were observed. At site 2, only one

Table 1. Nesting parameters of Spotted Owlet at PAU field area

Nest	Nesting Site	Tree species	Nest height (m)	Tree height (m)	No. of nestlings
1	Site 1	Tun (*Cedrela tuna*)	4.0	10.0	3
2	Site 1	Tun (*Cedrela tuna*)	3.5	11.0	2
3	Site 2	Banyan (*Ficus spp*)	8.0	21.0	2
4	Site 3	Dek (*Melia azedarach*)	4.0	10.0	3
5	Site 3	Dek (*Melia azedarach*)	3.0	10.0	3
6	Site 4	Dek (*Melia azedarach*)	7.0	13.0	2
7	Site 5	Silver oak (*Grevillea robusta*)	5.0	14.0	2
8	Site 5	Gulmohar (*Delonix regia*)	4.0	10.0	3
9	Site 6	Chakresia *Neolamarckia cadamba*	5.0	14.0	2
10	Site 7	Dek (*Melia azedarach*)	3.0	10.0	3

Table 2: Comparison of nesting parameters of Spotted Owlet at different locations

Parameters	PAU	Baranhara	Ladhowal
Tree height (m)	13.00 ±1.22	15.33 ±2.85	12.50 ±0.50
Nest height (m)	5.14 ±0.68	5.33 ±2.09	3.75 ±0.25
Opening of nest (cm)	11.50 ±0.84	22.00 ±9.02	13.00 ±3.00

Values are given as Mean ±SE

Figure 1a. Nesting cavities of Spotted Owlet at field area of PAU

Figure 1b. Nesting cavities of Spotted Owlet at Ladhowal

nest was observed in cavity present in the trunk of dek tree at site 2. Height of the tree and nest was about 13 m and 4 m above the ground level respectively. Two nestlings were observed and opening of nest cavity was about 16 cm. The nesting parameters of Spotted Owlet from different locations (Table 3) show that the height of nesting trees was more in village Baranhara with maximum opening size of nesting cavity. However, the nest height was almost similar at PAU and Baranhara sites but lesser at Ladhowal. Although a variety of tree species provided nest structures, the largest proportion were dek trees at all the locations.

The Spotted Owlet breeds during January to April as also reported by Mahmood-ul-Hassan et al. (2007) in Central Punjab of Pakistan. Spotted Owlet mostly prefers tree cavities and holes found in buildings and crevices. Kumar (1985) found that 57% of nests of Spotted Owlet were in tree cavities in Andhra Pradesh, India. Pande et al. (2006) also found that most of the nests were in tree cavities and stated that the Spotted Owlets are secondary cavity nesters, they depend mainly on natural cavities present in trees or cavities made by other bird species and crevices or holes present in buildings of residential areas.

Table 3. Comparison of breeding parameters of Spotted Owlet and Barn Owl

Breeding parameter	No. of days	
	Spotted Owlet	Barn Owl
Nest selection	4-11	4-6
Nest construction	10-15	8
Egg laying	4-5	3-4
Incubation	20-21	28-30
Feeding young ones	27-29	30-35
Fledging	20-21	**

** Not observed because of predation of nestlings by cats at both the sites

Many researchers have found different nesting habits in different parts (Pande et al. 2006, Sanathan-krishnan et al. 2011b). In present studies also the same trees like, banyan, dek and many others were reported to be used by Spotted Owlet for nesting. Preference for tall trees with deep cavities in our study reflects the adaptations to avoid predation and anthropogenic activities. The variation in composition of nest tree species in other regions suggests that preference is primarily based on availability of suitable place to accommodate their young ones rather than pre species. Mean nest height and tree height in the present study were less than other studies (Sanathanakrishnan et al. 2011b). The variations in these parameters in different regions suggest that height of nests or size of tree is less important in nest site preference than the presence of suitable cavity. In recent years, deforestation in rural as well as urban areas and urbanization resulted in decreased nesting habitat and food availability for Spotted Owlet. Tome et al. (2004) stated that main factor for nests site preference by Little Owl (*Athene noctua*) was the presence of predators. Avoidance of predators was one of the key factors for nest site selection by owls and other cavity nesting birds. Spotted Owlet preferred

the nesting sites closer to groves, buildings, human habitations and agricultural lands. These habitats provide more food such as insects, rodents, frogs, etc. during the breeding season to feed their young ones.

In present study, Spotted Owlet laid eggs in February; the chicks hatched during March and fledging took place during April-May. The breeding season range was similar to that in other areas of India and Pakistan (Pande et al. 2007 and Mahmood-ul-Hassan et al. 2007). Slight variability may be due to food availability, predation and other climatic factors. Ali and Sanathanakrishanan (2015) also revealed that Spotted Owlets laid their eggs from January to February; chicks hatched between February to March and fledging took place during April. Clutch size was about 2-4 eggs same as described earlier in Punjab (Kler and Kumar 2012). Several hypotheses state that clutch size depends on different factors like predation risks, geographical range and food availability.

Barn Owl

Nesting ecology of Barn Owl was observed at two locations only i.e. village Ladhowal and village Machaki Mal Singh. However, Barn Owl was not observed in the field areas of PAU and village Baranhara during the study period. While not globally threatened, Barn Owls are present in low numbers in certain areas as well as listed as a species of special concern or even endangered in certain countries. Fall plowing, variation in temperature, nest site loss, and secondary poisoning from pesticides are all contributing factors to Barn Owl decline (Dickerson 2017).

At village Ladhowal, the nest was observed in the closed grain store shed present along with other sheds (Figures 2a, 2b). The breeding season was observed from August 2016 to January 2017. Height of the structure was about 10m. The eggs were laid on the floor covered with waste material of grain packages inside the shed. Eggs were laid during September with clutch size of two. Barn Owls do not build nests in the traditional sense but instead nest in natural cavities or man-made structures often laying eggs directly on older owl pellets or hard surfaces (Dickerson 2017). Many factors are at play when a Barn Owl searches for a suitable nest, and they are constantly changing due to dynamic environmental effects. At village Machaki Mal Singh, the nest was observed in the closed wheat straw room present along the side of field area near tubewell. The breeding season was observed from February to May. Height of the nesting structure was about 6 m. The eggs were laid on the floor of room completely covered with wheat straw. Eggs were laid during March with clutch size of three. But before the fledgling the nestlings were predated by cats at both the sites, may be because of competition for same prey items i.e. rodents.

Figure 2a. Nestling of Barn Owl at Ladhowal village

Figure 2b Nestlings of Barn Owl at Machaki Mal Singh village

In the present study, Barn Owl bred from August to January during cold when weather. It primarily depends upon colder season and availability of food resources. Mahmood-ul-Hassan et al. (2007) also found that Barn Owl prefers colder weather conditions for breeding, when prey items are abundant. Clutch size and other breeding parameters are comparable to other researches. Mahmood-ul-Hassan et al. (2007) revealed that breeding of Barn Owl in Central Punjab of Pakistan took place from August to January, with few pairs breeding from May to July. Even in temperate zone, Barn Owl begins

nesting from early springs and sometimes in winter season. Laying of eggs extended from first week of August to October because of more availability of rodent prey, the major component of Owl's diet due to paddy cultivation. Most females produced one brood per year and only few pairs produced two broods in. Mean clutch size was 5.83 ± 0.47 from August to January. Nestlings of Barn Owl remained in the care of their parents for more than two months after fledging. This breeding schedule helped Barn Owl in avoiding the hot months of summer as well as competition for tree cavities from other cavity nesters like Parakeets, Spotted Owlets, Common Myna and other birds (Mahmood-ul-Hassan et al. 2007). There have been little to no published work on the reproductive success of the Barn Owl because of its being nocturnal and a bird of prey.

However, a comparison of the nesting ecology of both the species shows that the Spotted Owlet prefers moderate temperature whereas Barn Owl prefers colder temperature. The Spotted Owlet used tree cavities and crevices in building walls for nest making whereas Barn Owl prepared nest on floor of closed and undisturbed buildings. But the decreased population of Barn Owl and unsuccessful breeding of existing population is a matter of concern in agroecosystem of Punjab. The habitat fragmentation and depletion of predator free nesting sites have resulted in decline in natural population of Barn Owl. The provision of artificial nest boxes is likely to be a beneficial conservation strategy for this species.

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