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Population of House Sparrow *Passer domesticus* (Linnaeus, 1758) in Three Different Habitats of the Tarai Arc in Kumaun Region, Uttarakhand, India

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Abstract: The present study was carried out to determine the population of House Sparrow in three different habitats of the tarai arc in Kumaun region, Uttarakhand for a period of one year. The monthly field visits were carried out from August 2018 to July 2019 at different locations of three habitats viz. agricultural area, urban area and forest area. The findings of the present survey revealed that the agricultural areas enjoy highest number of individuals and relative abundance (525, 56.21%) followed by urban area (316, 33.83%) and least in forest area (93, 9.95%), respectively. In terms of seasonal variations, the maximum individuals were observed during winter season (November to February, 63%) followed by summer season (March to June, 29%) and lowest in rainy season (July to October, 8%). The study also indicated a significant difference between the numbers of House Sparrow observed among the three different habitats. While comparing the number of House Sparrow during the investigation in three habitats it was observed that number of species were less in forest habitat whereas the highest numbers were recorded in and around agricultural areas which could be due to availability of reasonable nesting sites in traditional dwellings of farmers and availability of food.

Keywords: House sparrow, Population, Seasonal variations, Agricultural area, Urban Area, Forest area

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Introduction

Birds are considered as the most important indicators for ecological monitoring as they are very sensitive to small environmental change that occurs in the environment. They are used as very useful models for studying a variety of environmental prospective and problems (Newton, 1995). The House Sparrow (*Passer*

domesticus) is one such species, which is known for its co-existence with human civilization since historic times and serves as a good indicator of the ecological quality since time immemorial (Khera *et al.*, 2010). The House Sparrow is highly adaptable to urban, sub-urban and agricultural habitats (Ali and Ripley, 1983). In India, the distribution of

House Sparrow is widespread across the country and is considered as almost domesticated and commonest urban birds of India (Daniels, 2008).

Recent studies showed that there is dramatic decline in the population of House Sparrow in many parts of the world. In most of the Europe, their population is decreasing drastically. In the Netherlands, this species is even considered as an endangered species. Since mid- 1970s, there has been 47% population decline in rural areas and 60% decline in urban and suburban areas of U.K (Robinson, 2005). The population decline of this species is also reported throughout north-western Europe (Prowse, 2002). Hence, House Sparrow is now listed in the species of European Conservation Concern (Shaw *et al.*, 2008). The main reasons for the decline of this species in the urban-suburban landscapes were the loss of suitable foraging habitat and suitable nesting sites (Robinson *et al.*, 2005).

In India, a sharp decline has been observed in the House sparrow population in last few decades across West Bengal, Bangalore, Punjab, Rajasthan, Delhi and Haryana (Bandel, 2010). The House Sparrow population in Andhra Pradesh dropped by 80%, and Kerala, Gujarat and Rajasthan observed a decline of more than 20% in last few years (Nath *et al.*, 2012). Due to lack of authentic historical data on the species it is difficult to compare their population trends. The present study was conducted in three different habitats of the tarai arc in Kumaun region, Uttarakhand with the goal of determining the current population status of House Sparrow in these areas.

Materials and Methods

Study area:

The Kumaun Division of Uttarakhand state is broadly divided into two surface geographic entities viz., the submontane (foothills belts or tarai and bhabar) region to the south and the mountainous region in the north, popularly known as the Himalayas. The present study was conducted at different habitat viz., agricultural area, urban area and forest area of Khatima block,

district Udham Singh Nagar located within latitude N 28°43'20.47" to 28°54'02.53" and longitude E 79°54'35.49" to 80°02'58.66". The average temperature of the study area varies from 11 °C to 33.5 °C with an average annual rainfall 577 mm recorded during the study period.

Field survey:

The survey was conducted for a period of one year (August 2018 to July 2019). The study consisted primarily to observe the population of House Sparrow in three selected habitats and its distribution pattern. To examine the population pattern line transects method was used (Verner, 1985). In monthly surveys, sixteen random transect were laid in each month at every study site. The length of the each transect was 1 km and the width was 50 m on both sides. A total of 578 transect were laid during the study period in all three study sites. The survey was made in morning 6:00 am to 10:00 am and evening 05:00 pm to 06:00 pm in summer and rainy season and in winter season survey was made in morning 7:00 am to 11:00 am and evening 4:00 pm to 5:00 pm regularly.

Results

The monthly survey of House Sparrow population was carried out in three different habitat viz. agricultural area, urban area and forest area of tarai arc of Kumaun, Uttarakhand. A total of 934 House Sparrows were recorded from all three areas during study period (August 2018- July 2019). The highest number of individuals and relative abundance of House Sparrow was recorded in agricultural area (525, 56.21 %), followed by urban area (316, 33.83 %), and forest area (93, 9.95 %), respectively (Fig. 1). In terms of monthly variation, highest relative abundance of House Sparrow was found in peak of winter i. e. January (21%) and lowest in rainy i.e. July (2%) (Fig. 2). House Sparrow can be separated on the basis of the sex using morphometric without any error and it was observed that out of total numbers studied, 70% were male and 30% were females in agricultural area; similarly in urban

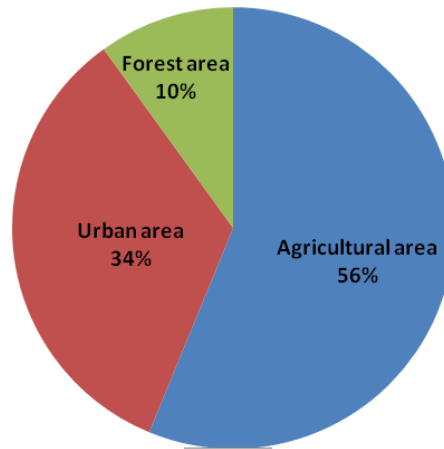


Fig. 1: Percentage (%) of House Sparrows in three different habitats during study period (August 2018- July 2019).

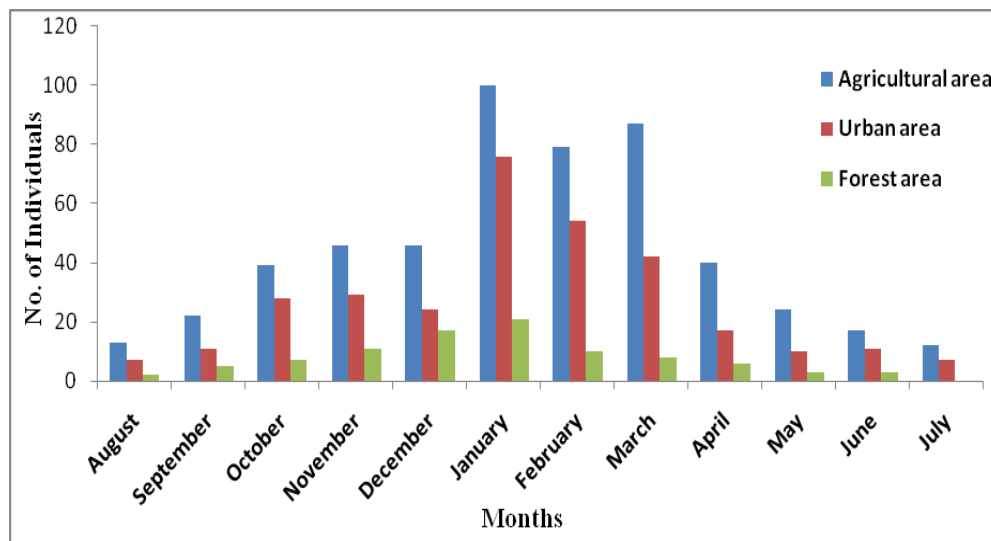


Fig. 2: Monthly variation in number of House Sparrows spotted in three different habitats during study period (August 2018- July 2019).

area it was 73% male and 27% female, and forest area 77% male and 23% female (Fig. 3).

The one-way ANOVA study showed that the three different habitats gave a good indication of the population of house sparrow ($F = 11.1$; $P < 0.001$) during the study period (Table 1). It indicated that the habitat plays an important role in population of this bird species. Post-hoc test revealed that entire three habitats are differently significant among them. The difference between forest area and other two i.e. agricultural and urban area is highly significant, whereas the difference between urban and agricultural area is not highly significant (Table 2).

Discussion

The present study revealed that the population of House Sparrow was highest in agricultural areas, relatively less in urban areas and forest areas. In terms of numbers of male-female individuals it was found that males were higher in all three study areas than females. Many workers found that the numbers of House Sparrow was higher in rural areas or agricultural areas as compared to urban areas because agricultural area provides plenty of food in the form of food grains and insects (Goyal, 2005; Kamath *et al.*, 2014; Balaji, 2014; Narayana, 2016).

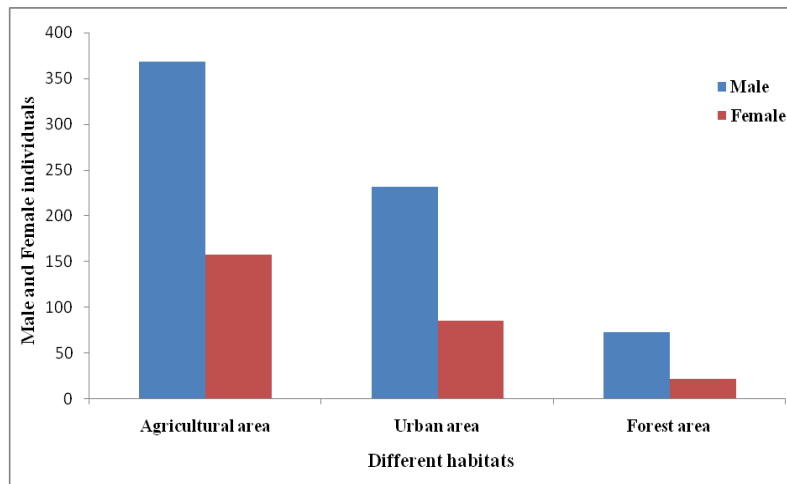


Fig. 3: Status of male female encountered during the investigation (August 2018 to July 2019).

Table 1: House Sparrow population in three different habitats within and between the groups during the study period (August 2018 to July 2019)

Independent variable	Dependent variable	Df	F	P
Habitat	Population of House Sparrow	2	11.1	0.000

Table 2: Post-hoc test of three habitats among themselves during study period (August 2018- July 2019)

Habitat	Urban Area	Forest Area
Agricultural Area	0.02	0.00
Urban Area		0.01

It has been suggested that a decline in insect population may be a major cause of the population decline of House Sparrows (Van der Poel, 2000; Vincent, 2006; Peach *et al.*, 2008). Other reasons cited by the scientist are the reduced availability of nesting sites and changing building designs (Summers-Smith, 2003). Another very probable reason for less density and restricted distribution of the House Sparrow may be the predation by the growing numbers of domestic cats and competition from the co-occurring common bird

species like Common Myna, Rock Pigeon and House Crow (Khera *et al.*, 2010).

Common Myna is an omnivorous bird species and it feeds on insects-specially on the ground among grass, fruits and discarded waste from human habitation. It thus has an overlapping food niche with the House Sparrow. House Crow is another common species of the study area, co-occurring with the House Sparrow. House Crow is an omnivorous bird well adapted to urban conditions. It is reported to be predator of various

avian species and feed on eggs, chicks and other bird species (Long, 1981; Cramp, 1994). In eastern Africa, House Crows are known to pillage passerine nests and heronries (Lim *et al.*, 2003).

Monthly variation is also the cause of increase or decrease in the number of House Sparrow population as suggested by Bohner *et al.* (2003) and Rajashekar and Venkatesha (2008). The results of present study showed that the numbers of House Sparrow was highest in month of January and decreases gradually in March to June and lowest in July. Goyal (2005) also observed that the various seasonal factors such as rainfall, humidity and temperature affect the population density of Sparrows.

Conclusion

The present study revealed that the population of House Sparrows is highest in agricultural habitat followed by urban habitat and least in forest habitat due to the competition from the co-occurring common bird species, predation, lack of food grains and lack of nesting sites due to modern architecture of buildings. This study showed that the numbers of male individuals were higher than female individuals in Sparrow population. Seasonal variations also affect the population of Sparrow. The number of House Sparrow gradually decreased from winter season to summer and rainy seasons. The present study concluded that the preferred habitat of House Sparrow is agricultural or rural habitat and winter season is most favorable season for House Sparrow in tarai arc of Kumaun Region of Uttarakhand, India.

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