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RESEARCH ARTICLE

Study on the population of House Sparrow *Passer domesticus* in urban and rural areas of Punjab

Tejdeep Kaur Kler, Manoj Kumar and Jasgeet Sofia Dhatt
Department of Zoology, Punjab Agricultural University, Ludhiana-141004

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Corresponding Author

Tejdeep Kaur Kler

Abstract

House Sparrow *Passer domesticus (L.)* population was monitored in the year 2013 in relation to the total bird diversity in 149 villages belonging to 18 districts of Punjab falling under five agro-climatic zones i.e. Sub-mountain undulating zone (Gurdaspur), Undulating plain zone (Ropar, Shaheed Bhagat Singh Nagar, Mohali), Central plain zone (Taran Tarn, Amritsar, Kapurthala, Jalandhar, Ludhiana, Fatehgarh Sahib, Sangrur, Patiala), Western plain zone (Ferozepur, Mukatsar, Faridkot) and Western zone (Moga, Bhatinda, Barnala). Observations on House Sparrow were taken in 28 selected villages out of the total initially surveyed 149 villages. During the study period out of 64 birds species identified, a total of 33 and 47 bird species were observed (including commonly found bird species at both types of study areas) at urban and rural areas respectively. Large flocks (>250) of House Sparrow were observed in village Varhing Dhania (Mukatsar) and Tangra (Amritsar). Medium size flocks of House Sparrow (60-90) in Udaykaran (Mukatsar), Thothian, Chauhan (Amritsar). In addition, small sized flocks of House Sparrow (10-25) were regularly observed in the selected villages i.e. Gaunspur (Ludhiana), Malian (Amritsar), Littan, Pandori, Ramgarh (Kapurthala), Mirjapur (Mohali). Relative percentage abundance of House Sparrow in rural residential areas of selected villages ranged from 0.09 to 93.0%. Highest relative percentage abundance of House Sparrow was observed at village Varhing Dhania (93.0%) of Mukatsar followed by Rasoolpur (84.17) of Ferozepur district of Punjab. Relative percentage abundance of House Sparrow in rural agricultural field areas ranged from zero to 60.2%. In the urban residential areas House Sparrow was observed at only two locations out of the total seven locations studied. The relative percentage abundance of House Sparrow in urban residential areas was highest at Mukatsar (41.9 %).

INTRODUCTION

As far as avian faunal diversity is concerned, Indian subcontinent has more than 1300 bird species including the 328 birds species recorded in Punjab (Jerath et al., 2006; Oleti, 2010). The House Sparrow (*Passer domesticus*) a member of family Passeridae, is the most wide spread and abundant bird in the world (Summer-Smith, 1988; Anderson, 2006). House Sparrow is a sexual dimorphic bird, where male is characterized by grey crown, cheeks and under parts; black on throat, head, upper breast and between the bills and eyes and female counterparts do neither posses black on head or throat nor a grey crown and under parts. Being a sedentary bird, it doesn't travel more than a kilometer or two in search of food and is omnivorous in nature. It is closely associated with human habitation and cultivation from historic times (Ali and Ripley, 1987; Chamberlain et al., 2007). A marked decline in its population has been reported from different countries over the globe particularly in urban habitats. According to Baillie et al.

(2010), the House Sparrow is now listed as a species of conservation concern in Europe. Almost 70% decline in House Sparrow population has also been reported in India. According to Dandapat et al. (2010), in India, the number of House Sparrows has decreased dramatically in several parts of the country especially across Bangalore, Mumbai, Hyderabad and other cities. Moreover Ornithologist survey conducted by ICAR has reported that the sparrow population in Andhra Pradesh alone has dropped by 80% and in other states like Kerala, Rajasthan, Gujarat it has dipped by 20%, while the decline in coastal areas was as sharp as 70-80%. It was reported that the population of House Sparrow has decreased considerably at present according to survey conducted at different places of India by different workers (Rajashekhar & Venkatesha, 2008; Daniels, 2008; Khera et al., 2010; Bhattacharya et al., 2010; Ghosh et al., 2010, Kler & Kumar 2014, Kler et al., 2015). The primary cause of this decline has not been ascertained but a number of hypotheses have been put forth. This includes predation-competition, lack of nest sites, disease, food including seeds that sustain the birds throughout the year and the invertebrates that are required by the House Sparrows for rearing its young ones and pollution (Summer-Smith, 1999; Ghosh et al., 2010). Moreover, increased predator density may reduce the breeding success of House Sparrow via indirect, sub lethal effects such as decreased foraging efficiency (Beckerman et al. 2007). Therefore, the purpose of this preliminary analysis was designed to access the population of House Sparrows in urban and rural areas of various districts of Punjab.

Material and Methods

The present study was carried out in accordance with the mandates of UGC sponsored major research project on "Monitoring of House Sparrow population and breeding ecology in rural and urban areas of Punjab". Survey of urban and rural areas of Punjab was conducted over a period of one year (April 2013- April 2014). During the present study observations on House Sparrow were taken in 28 selected villages out of the total initially surveyed 149 villages and seven urban areas i.e. I (Balachaur), II (Kartarpur), III (Raiya), IV (Mukatsar), V (Begowal), VI (Bholath) and VII (Ludhiana) falling in six districts of Punjab. Data on community structure and relative abundance of House Sparrow was collected. The status of House Sparrow was determined by comparing the population pattern in different localities. Line transect method (Watson, 1965; Verner, 1985) was used for observations. The birds inhabiting and visiting the urban and rural areas were observed with naked eye and through binocular (Bushnell 8X42) to record the data from a long distance in order to avoid any interference. Total numbers of bird species and Relative Percentage Abundance was calculated.

Result and Discussion

The survey on population of House Sparrow was carried out in five agro-climatic zones i.e. sub mountain undulating zone, undulating plain zone, central plain zone, western plain zone and western zone classified on the basis of homogeneity, rainfall pattern, soil texture, cropping patterns, etc. The House Sparrow has been reported to breed all the year around (Ali, 1972), but the main breeding season has been recorded from February to May (Louther and Cink, 1992; Monika, 2005; Sharma, 2009; Balaji, 2014; Kamath et al., 2014).

In the current study, a total of 64 species of birds were identified, out of which 33 and 47 birds species (including commonly found bird species at both types of study areas) were observed in urban and rural areas respectively. Species richness was highest in urban area I of Shaheed Bhagat Singh Nagar (11) and minimum was at urban area V of Kapurthala district. Species diversity and species evenness were highest in urban area VII of Ludhiana (2.41) and urban area I of Shaheed Bhagat Singh Nagar (0.79) (Table 1). Large flocks (> 250) of House Sparrow were observed in village Varhing Dhania (Mukatsar) and Tangra (Amritsar) (Table 2). Medium size flocks of House Sparrow (60-90) population were observed in Udhaykarn (Muktsar), Thothian (Amritsar), Chauhan (Amritsar). In addition, small sized flocks of House Sparrow (10-25) were regularly observed in the selected villages *i.e.* Gaunspur (Ludhiana), Malian (Amritsar), Talania (Fatehgarh Sahib), Littan, Pandori, Ramgarh (Kapurthala). Relative percentage abundance of House Sparrow in rural residential areas of selected villages ranged from 0.09-93.0%. Highest relative percentage abundance of House Sparrow was observed at village Varhing Dhania (93.0%) of Mukatsar followed by Rasoolpur (84.17) of Ferozepur district of Punjab. However, relative percentage abundance of House Sparrow in rural agricultural areas and urban area ranges from zero to 60.2% and zero to 41.9% respectively. It was further observed that the most preferred habitat was gardens in urban areas; thorny bushes, shrubs and old houses in the rural areas.

Several possible reasons have been proposed by different workers for the decline in House Sparrow population in urban areas (Louther and Cink, 1992; Monika, 2005; Sharma, 2009). Firstly, nestling requires an arthropod diet, and parents may be unable to find nestling food of sufficient quantity or the quality due to the scarcity of native vegetation. Secondly, arthropod density may be reduced in the cities by environmental pollution, especially traffic emissions (Summers-Smith 2007). Thirdly, urban parents may suffer increased mortality due to

predation by the growing numbers of domestic cats and other factors associated with urbanization (Heij and Moeliker, 1990; Woods et al. 2003). Occurrence of House Sparrow near human habitations such as suburban areas, gardens, parks, agricultural areas, stables, feedlots, villages and godowns is well documented over the globe (Louther and Cink, 1992; Monika, 2005; Sharma, 2009; Balaji, 2014; Kamath et al., 2014; Bavia et al., 2014). Monika (2005) recorded maximum numbers of House Sparrows in rural areas as compared to agricultural areas and further observed that House Sparrow does not inhabit dense forest area. Similarly Bohler and Claus (2007) observed maximum population density in rural areas (50 individual/10 hectares) as compared to parks and gardens (48 individual/10 hectares) and industry areas (45 individuals/10 hectares.) Similarly, we too observed that the relative abundance of House Sparrow was either very less or absent at most of the sites surveyed (this shows that the habitat quality is known to have a major influence on the sparrow population such as occurrence of criss cross cables in and around House Sparrow rich density areas, loss of nesting sites due to urbanization, use of insecticides, etc. along with availability of food resources). During the surveys carried out in 2003-2006 House Sparrow was recorded as less common species from the agricultural habitat of Ludhiana, Punjab (Kler, 2009). Seasonal variation is also the cause of increase or decrease in the number of House Sparrow population as suggested by (Bohner *et al*, 2003; Monika, 2005; Rajashekar and Venkatesha, 2008). More or less continuous decline of number of House Sparrow was recorded in winter (Easterbrook, 1999). The sparrow population had declined in garden during winters (Robinson *et al*, 2005). Monika (2005) also observed that the various seasonal factors such as rainfall, humidity, temperature etc. affect the population density of sparrows. Thus availability of a variety of food sources for both adults and nestlings and essential nesting sites around the food sources primarily play an important role in the abundance of House Sparrow population. Now a day's majority of village houses / dwellings and cattle sheds are made of concrete with plastered walls and cemented ceilings which do not have suitable spaces like crevices/ holes for House Sparrow nests. As reported by Dandapat *et al* (2010), introduction of unleaded petrol, use of chemically treated seeds, flow of electromagnetic waves from cell phones towers, reducing areas of free growing weeds or reducing numbers of badly maintained building, lack of holes for nesting in modern houses, competition for food by other species etc are possible reasons for this disappearance. Also there was noticed less abundance of green vegetation like shrubs, bushes and small trees in the residential area of some of the modernized villages. However, the population was found considerable in the villages having large fallow land with shrub like vegetation, traditional Kaccha houses, stick piles/straw piles, shellers, *godowns*, grain storage houses and old cattle sheds. In the present study also, population density of House Sparrow was observed maximum in the rural open area/ residential premises followed by warehouses/ *godowns*/ rice shellers and agricultural areas. During our survey, it was also noticed that House Sparrows were having a habit of building nests in tiled houses under the rafters, niches in the gables and in some houses, intentional holes were made near the roofing to accommodate sparrow nests. They were also found to build nests in hanging lampshades. The availability of plenty of food such as grains, vegetables, insects and the suitable nesting sites could be the important factors for the high density of House Sparrows in rural open areas as well as residential premises. From ubiquitous status the House Sparrow has become very limited in numbers and localized in distribution which calls for urgent conservation efforts in the Punjab state.

Thus, a single reason is not responsible for the cause of the decline of House Sparrow in urban, suburban and rural areas of Punjab; there might be combination of several factors responsible for decline of House Sparrow. To help the House Sparrow we can put up artificial nests (wooden/earthen) and provide them the source of food especially cereal grains, seeds of grasses, chick weed and can also provide them weedy or shrubby areas in the garden so that they can get the natural seed source and supply. Further future studies are required to have long term 'Species specific data' to decide on the factors responsible for the decline of various avian species including House Sparrow in the current scenario.

Table 1 Relative abundance (%) of House Sparrow in some urban areas of Punjab.

Sr. No.	Birds Species	Urban areas						
		Shaheed Bhagat Singh Nagar	Jalandhar	Amritsar	Mukatsar	Kapurthala		Ludhiana
		I	II	III	IV	V	VI	VII
1.	Asian Koel	-	-	-	-	-	-	0.60
2.	Bank Myna	28.7	-	2.8	-	41.5	24.0	1.28
3.	Black Drongo	-	-	-	-	-	-	1.46
4.	Blackwinged Stilt	1.5	2.9	-	-	-	-	-
5.	Blue Rock Pigeon	4.5	44.1	41.0	19.3	23.3	9.0	15.4
6.	Brahminy Myna	-	-	-	-	-	-	0.46
7.	Brown Rock Chat	-	-	0.7	9.6	-	-	0.56
8.	Cattle Egret	7.5	-	-	-	-	2.0	-
9.	Common Myna	4.5	14.7	10.0	3.2	10.3	15.0	25.95
10.	Common Swallow	3.0	-	24.4	-	-	-	4.23
11.	Hoopoe	-	-	-	-	-	-	8.1
12.	House Crow	28.7	14.7	12.9	-	18.1	39.0	15.95
13.	House Sparrow	-	-	-	41.9	-	-	1.76
14.	Indian Robin	-	-	-	-	-	-	0.15
15.	Jungle Babbler	-	-	-	-	-	-	3.55
16.	Little Brown Dove	-	-	-	14.5	-	-	-
17.	Little Cormorant	-	-	-	4.8	-	-	-
18.	Little Green Bee-eater	-	-	-	-	-	-	0.43
19.	Pariah Kite	13.6	2.9			3.89	2.0	2.65
20.	Parrot	-		5.7	1.61	1.29	1.0	4.13
21.	Pied Bush Chat	-	-	-	-	-		0.27
22.	Pied Myna	-	-	-	-	-	6.0	-
23.	Plain Wren-Warbler	-	-	-	-	-		0.71
24.	Purple Sunbird	-	-	-	-	-		2.05
25.	Redvented Bulbul	-	2.9	-	4.8	-	1.0	4.36
26.	Redwattled Lapwing	1.5	-	-	-	-	-	-
27.	Ring Dove	4.5	14.7	1.4	-	1.29	-	5.4
28.	Shikra	-	2.9	0.7	-	-	-	-
29.	Spotted Munia	-	-	-	-	-	-	0.71
30.	Tailor Bird	-	-	-	-	-	-	0.15
31.	Whitethroated Munia	1.5	-	-	-	-	-	-
32.	Wiretailed Swallow	-	-	-	-	-	-	0.72
33.	White Wagtail	-	-	-	-	-	1.0	-
Species richness		11	8	9	8	7	10.0	24
Species Diversity		1.89	1.61	1.59	1.65	1.48	1.67	2.41
Species Evenness		0.79	0.77	0.73	0.75	0.76	0.72	0.76

Table 2 Relative abundance (%) of House Sparrow in some rural areas of Punjab.

S. No.	Range of Relative Abundance (%)	District	Villages (per cent relative abundance of House Sparrow)
1	0-10	Ludhiana	Jassowal (6.8), Tajpur (6.11), Chowkiman (6.33), Sudhar (7.22), Bagge khurd (9.52)
		Kapurthala	Littan (6.6)
		Barnala	Sanghera (3.26)
		Mohali	Gochar (8.06), Abhipur (9.13)
		Shaheed Bhagat Singh Nagar	Bullewal (9.6)
2	10-20	Kapurthala	Ramgarh (10.43), Pandori (11.5)
		Ludhiana	Baranhara (13.8), Aaliwal (17.0)
		Jalandhar	Thabalke (12.76)
3	20-30	Amritsar	Thothian (20.5), Mallian (22.2)
		Ferozepur	Peer Mohmmad (27.1)
4	30-40	Ludhiana	Bhaini Arraean (33.0)
5	40-50	Amritsar	Chauhan (41.4)
6	50-60	Mukatsar	Udaykaran (56.6)
		Mohali	Mirjapur (55.32)
7	60-70	Sangrur	Bhasaurh (66.3)
8	70-80	Ludhiana	Gaunspur (73)
		Amritsar	Tangra (79)
9	80-90	Ludhiana	Sheikhupura (81.3)
		Ferozepur	Rasoolpur (84.17)
10	90-100	Mukatsar	Varhing Dhania (93.0)

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