

“SELECTION OF ROOSTING TREE AND COMMUNAL ROOSTING BENEFITTED THE COMMON MYNA TO SURVIVE”

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Abstract

There are many factors which affects the selection of roosting sites like; physical characteristics of that sites, low anthropogenic disturbance, anti predation tactics. But distance from foraging ground is the prime factor for selection of roost. Tree height, distance to the nearest available tree and percent canopy closure also determined. The distance between subsequent roost trees was short. The Common Myna is confirmed to be communal and heterogenous rooster.

Key words: GBH, Canopy, interspecific, heterogenous

INTRODUCTION

Roosting is a typical animal behaviour where a group of animal congregate in an area for few hours. Safety was found to be an important factor in the roost site selection. There are many factors which affects the selection of roosting sites like; physical characteristics of that sites, low anthropogenic disturbance, anti predation tactics. But distance from foraging ground is the prime factor for selection of roost. During our study period we found 84 trees of 6 genera and 8 species for its roosting. Tree height, distance to the nearest available tree and percent canopy closure also determined. The distance between subsequent roost trees was short. Common Myna is human commensal species and it shows closed association in urban environment. Urbanisation tends to support to Common Myna in many ways. During the study it seems to roost as a communal rooster. By roosting communally probably gain social, population regulation, foraging and antipredatory benefits which develops the awareness of the individual bird and acquired some kind of protection not only at the roost but in day time at the feeding area also (Mahabal, 1992). The present study was intended to identify the roosting site selection characteristics for Common Myna. The functions of pre roosting, gathering and communal roosting have been reported by Ward and Zahavi, (1973) and Zahavi, (1971). Zahavi, (1995) interpreted the roosting of birds as the “information centre” for food finding, Whereas Erwin (1983) suggested that food location might not enhance through any information exchanged at the colony but it takes place via local enhancement.

MATERIAL AND METHOD

This study was carried out during January, 2011 to December, 2012. The roosting sites were detected by following the Common Myna leaving their foraging ground in the evening. Usually the observations were taken during late evening and following morning. Number of Common Myna and its associated birds were determined by direct counting at roosting sites at least once in a month either in morning or in evening. The evening counting was made from one hour before from sunset time and continued till arrival completed even after sunset. The morning count started from 30 minute before sunrise and continued until the bird left the roosting site.

The tree species and height of each preferred tree species for roosting is measured using Abney level and measuring tape.

The flock size and its relationship with the microhabitat were determined by recording departing and arriving birds. It is necessary to make a note on total number of individual arrived and departed at the roosting site to avoid a bias on it and comparison of time required to enter and to leave the roost by the same number of birds. Sunrise and sunset timing were obtained from the meteorological department, Ahmedabad.

The flock size and flight path is decided by recording departing and arriving birds at the interval of every 5 minute. The Karl Pearson's correlation is applied to confirm the significant equal flock size of Common Myna that arrived and departed. Other bird species sharing communal roost of Common Myna also recorded. Comparisons have been made on all the parameters in urban as well as in rural area.

Parameters related to breeding, feeding roosting and population were calculated with different formulae. Karl Pearson's Coefficient of Correlation is used to find out the correlation between climatic parameters and bird community parameters. Also, correlate some biotic factors with bird community parameters.

RESULT AND DISCUSSION

Roosting tree and factors inducing its selection:

Tree species with its characteristics was described in (Table: 1), which Common Myna selected for its roosting. Total 84 trees were recorded to use for roosting by it. Out of which highest (52.38%) *Azadirachta indica* and the lowest (2.38%) *Mangifera indica* were selected. Other tree which occupied by Common Myna are *Polyanthia longifolia* (11.90%), *Mimusops elengi* (5.95%), *Ficus religeosa* (9.52%), *Ficus tsiela* (4.76%), *Ficus benghalensis* (7.12%), *Tamarindus indica* (5.95%).

It has been also recorded that most of the times a big population of Common Myna was roosted in cluster of the tree. The trees within the cluster are just 5 to 9 meter ($\bar{x}=6.46$ mt) at the distance with each other. All the roosts are natural.

Tree with particular characteristics also play an important role in roosting.

For the safe roosting tall tree and dense canopy is important. In urban area, average tree height, canopy diameter and GBH were 16.65 ± 1.76 m, 11.45 ± 0.71 m and 1.09 ± 0.11 m respectively. As well as in rural area, average tree height, canopy diameter and GBH were 15.30 ± 1.38 m, 11.29 ± 0.76 m and 0.82 ± 0.19 m respectively (Table: 1).

It was observed that in rural area, *Mimusops elengi*, *Ficus religeosa*, *Ficus benghalensis* and in urban area, *Mangifera indica* were not selected to roost. It reveals

that physical characteristic around the roosting tree also influence the roosting and it was different in many ways from urban to rural.

The Common Myna roosts on dense canopy of the tall tree. Number of Common Myna which roosted, increases with its canopy diameter ($r= 0.88$, $n= 84$).

Safety was found to be an important factor in the roost site selection. The Common Myna selected dense canopy tree and height is one of the considerations for roosting. On trees with dense foliage, some birds preferred to roost on the highest branches (Yasmin, 1994; Subramanian and Mathew, 2001).

Besides the others factors, 'disturbance' is the major factor. The Common Myna mostly found to be roosted in highly disturbed and traffic area. The reason was safety, availability of food resources and distance from feeding sites. It was an important observation indicated the differentiation among the bird species in the same area which remains constantly under the pressure of interspecific competition.

Communal roosting:

The Common Myna is confirmed to be communal and heterogenous rooster (Plate figure: 1). Twenty other species of birds were recorded to roost along with it in urban and rural area (Table: 2). Out of twenty, three (Yellow-legged-green pigeon, Black kite and Great Cormorant) was not found to be roost with Common Myna in rural area. In the present study Common Myna observed to be roosted at their roosting sites for the entire study period.

Out of twenty associated species of Common Myna, the major portion of roosting population was consisted by Rosy Pastor, Bank Myna and Brahmani Myna (Table: 3).

Total roosting population was recorded as $\bar{x}=6388.33$ birds in urban and $\bar{x}=2758.08$ birds in rural area. Out of which the average population of Common Myna was 32.16% in urban and 25.10% in rural area (Table: 3).

The highly populated associated bird was Rosy Pastor which was 24.49% of total urban roosting population and 24.59% of total rural roosting population. It is a migratory bird which is absent in Ahmedabad only for four month (May to August), but it stayed here for eight month. During this time it is highly populated and dominated the population of Common Myna and other associated birds (Table: 3).

Bank Myna was 7.04% in urban and 16.53% in rural area. Brahmany Myna was roosted at very small population (0.36% in urban and 0.76% in rural) whether other species was recorded as 10.03% in urban and 11.05% in rural area (Table: 3).

A very interesting thing has been observed during the study of roosting population, from the month of January to April Common Mynas population was 14.11% in urban and 11.96% in rural area and Rosy Pastors population was 77.28% in urban and 73.47% in rural area. Similarly, from September to December Common Mynas were 17.09% in urban and 18.87% whether Rosy Pastor was 73.47% in urban and 73.76% in rural area. But when (May to August) the Rosy Pastor was left the area, Common Myna was recorded as 65.27% in urban and 44.48% in rural area (Figure: 1).

Presence of highly populated Rosy Pastor shift the Common Myna and other birds from the roosting places, it compels them to disperse at other locations. It is very much active, rapid, aggressive and dominating bird than the Common Myna and other associated bird. Its population is also very high at all around the Ahmedabad and every year its population is recorded to increase (Vasundriya *et al.*, 2011).

Preening, body shake, fluffing and scratching behaviour were found to be indispensable for the maintenance of the body. Preening is the basic and significant act which performed by the birds to take care of its feather (Simmons, 1964). The body shakes or fluffing of feathers was performed to remove the parasites (Mc Kinney *et al.*, 1983) and scales.

Gathering before the roosting (Plate figure: 4.B.1: A-D) has been seen principally among the species that feed together and roost communally (Zahavi, 1970; Ward and Zahavi, 1973). It serves as a roosting advertisement acts as an information center related to the possible food sources. Salimkumar (1982) observed in Black Ibis that flock gathering occurred either at feeding ground or near their roost. The present study also supports this. Mating during pre roosting depicts one of the roles of flock gathering in pair formation as well as influencing strength of bonding for next breeding season (Vyas, 1997).

Communal roosting behaviour of Common Myna has been suggested that the aggregation of large number of birds may be helpful to minimize the potential danger against predators. Selection of the same spot again suggested experience of safe location and preference towards the center of the flock helps in hiding lesser revelation to the wind.

Communal roosting in birds has some significant values. There has been a huge deal of discussion on the functional significance of communal roosting; many suggestions and hypothesis have been put before, few major hypotheses have been discussed in present study. Some are as follows;

o Anti predatory function

Communal roosting serves birds to protect from danger. The Common Myna had evolved primarily as an anti-predator adaptation (Sengupta, 1973). Assemblages of birds could attract predators and acquired protected position for the inactive period and anti-predator behaviour while the birds were assembling (Ward and Zahavi, 1973; Feare *et al.*, 1974). Mixed roosting strongly supports the notion of avoidance of predation being an important function of communal roosting (Gadgil, 1975; Elgar, 1989).

In our study we also found that Common Myna gives a warning call when any predator comes. For instance, more eyes in communal roost may detect predator.

Communal roost enables birds to reduce the risk of predation and serves as an anti-predatory function (Zahavi, 1971; Gadgil, 1975; Gadgil and Ali, 1975; Bertram, 1978; Pulliam, 1973; Khera and Kalsi, 1986, Subramanian *et al.*, 2001). Like wise, it is possible that Common Myna and its mixed roosting associates have developed a system of anti-predatory warning signals (Mahabal and Bastawade, 1991) which develops the awareness of the individual bird and acquired some kind of protection not only at the roost but in day time at the feeding area also (Mahabal, 1992).

o Thermoregulation benefits

Communal roost minimizes the loss of heat in cold weather (Counsilman, 1974; Vasundriya *et al.*, 2011). The presence of near by associates in communal roost is contemplation to reduce the energetic demands for thermoregulation through mechanism such as huddling and reduction. All though the physical structure of the roost can provide protection from weather, evidence suggested that thermoregulation benefits also grow from the presence of associates (Walsberg and King, 1980; Du Plessis and William, 1994).

o Social significance

Pair formation and mating are also observed in our study during prerooting gathering. Occurrence of mating during pre roosting exposes one of the role of flock gathering in pair formation as well as influencing strength of bonding for next breeding season (Vyas, 1996).

Braestrup, (1963) has quoted that the main survival value of communal roosts consists in reduced mortality during night. It doesn't mean that communal roost have no social significance. Probably roosting behavior benefited in synchronizing various activities within the social behaviour (Tast and Rassi, 1973; Gyllin and Kallander, 1976). In ours study various systematic and synchronized behavioural patterns observed in Mynas (Mahabal and Vaidya, 1989; Mahabal, 1993 a and b) do suggested that the communal roost has social significance.

o Feeding efficiency

Moreover, 10 (62.5%) roosts are situated near by an aquatic habitat and 6 (37.5%) are located nearby foraging ground.

The main advantage of communal roosting in birds is increased foraging efficiency (Richner and Hebb, 1995; Mock *et al.*, 1988). Communal roost act as information centre where by unsuccessful foragers can follow more companions that are successful to good foraging area (Ward and Zahavi, 1973). He also stressed that large communal roost may exist even when all the members of the roost are fed adequately but could act as and insurance against any unpredictable food shortage affecting part of the population. Communal roosting has evolved as a method of distributing information about food allocation.

Weatherhead (1983) suggested that successful foragers return to the roost to gain protection from predation by establishing a more central roost position defended from predators by surrounding individuals.

Communal roosts serve as information center for the exchange of information regarding the location of food sources and have been evolved for the efficient exploitation of patchy distributed food sources. This theory was also supported by (Gadgil and Ali, 1975 and Greg-Smith, 1982).

o Population regulation

Communal roosting enables to the assess population density, food supply through migration or regulation of reproductive rate. This hypothesis was proposed by Wynne-Edwards (1962). Many workers has opposed this hypothesis, indicated that it is inconsistent with the principle of natural selection.

Wynne- Edwards (1962) further stated that species of dissimilar feeding habits associated in mixed roosting only in rare case. The hypothesis was rejected by Gadgil and Ali (1975). Present data shows that birds of different food habits roost communally. This study was also supported by Mahabal and Bastawade (1991). The Phenomenon of mixed roosting also poses difficulties, as an associated species is more likely to dissimilar rather than of similar feeding habits.

Plate Fig. 1. Common Myna in Communal roosting.



Table: 1. Characteristics of Roosting trees.

Sr.no.	Common name of tree	Scientific name	Numbers of the tree	Urban			Rural		
				Tree height (m)	Canopy Diameter (m)	GBH (m)	Tree height (m)	Canopy Diameter (m)	GBH (m)
1.	Neem	<i>Azadirachta indica</i> Bth. & Hook.	44	16.72±1.90	13.28±0.41	0.79±0.18	15.04±1.15	12.86±0.38	0.59±0.15
2.	Asopalav	<i>Polyanthia longifolia</i> Bth. & Hook.	10	18.33±1.68	4.63±1.36	0.36 ±0.08	14.94±1.81	3.14±0.47	0.61±0.23
3.	Borsali	<i>Mimusops elengi</i> Lnn.	5	14.81±1.54	9.43±0.74	0.65±0.11	-	-	-

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4.	Peepal	<i>Ficus religiosa</i>	8	15.57±1.20	8.89±0.59	0.54±0.04	-	-	-
5.	Peepar	<i>Ficus tsiela</i> Roxb.	4	16.22±1.71	13.15±0.89	0.62±0.08	15.55±1.60	10.54±0.79	0.42±0.11
6.	Banyan	<i>Ficus benghalensis</i> Linn.	6	15.87±2.15	14.24±0.58	2.26±10.16	-	-	-
7.	Tamarind	<i>Tamarindus indica</i> Linn.	5	19.05±2.17	16.51±0.37	2.38 ±0.12	16.27±1.08	16.25±0.83	1.31±0.25
8.	Mango	<i>Mangifera indica</i>	2	-	-	-	14.64±1.26	13.68±1.31	1.18±0.19
	Average		84	16.65±1.76	11.45±0.71	1.09±0.11	15.30±1.38	11.29±0.76	0.82±0.19

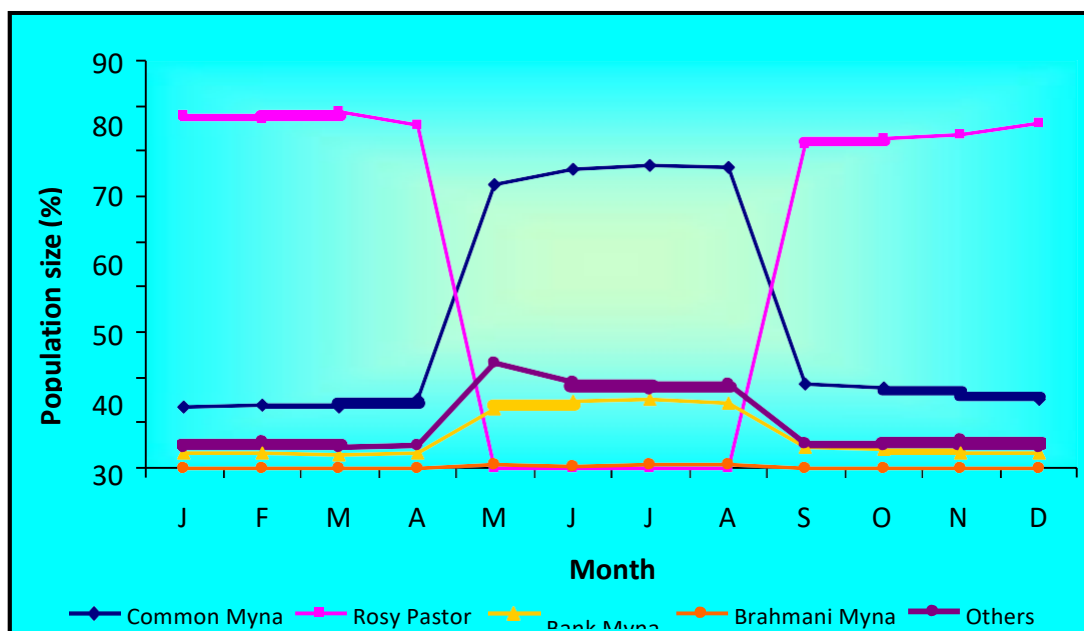
Table: 2. Members of Communal roosters with Common myna.

Bird species		Study area	
Common name	Scientific name	Urban	Rural
Rosy pastor	<i>Sturnus roseus</i>	?	?
Bank myna	<i>Acridotheres ginginianus</i>	?	?
Brahmany sterling	<i>Sturnus pagodarum</i>	?	?
Rose ringed parakeet	<i>Psittacula krameri</i>	?	?
House crow	<i>Corvus splendens</i>	?	?
Yellow-legged Green pigeon	<i>Treron phoenicoptera</i>	?	--
Red vented bulbul	<i>Pycnonotus cafer</i>	?	?
Black kite	<i>Milvus migrans</i>	?	--
Jungle Babbler	<i>Turdoides striatus</i>	?	?
Little cormorant	<i>Phalacrocorax niger</i>	?	?
Great cormorant	<i>Phalacrocorax carbo</i>	?	--
Indian pond heron	<i>Ardeola grayii</i>	?	?
Little egret	<i>Egretta garzetta</i>	?	?
Large egret	<i>Casmerodius albus</i>	?	?
Black Ibis	<i>Pseudibis papillosa</i>	?	?
White Ibis	<i>Threskiornis melanocephalus</i>	?	?
Grey heron	<i>Ardea cinerea</i>	?	?
Median egret	<i>Mesophoyx intermedia</i>	?	?
Indian peafowl	<i>Pavo cristatus</i>	?	?
Black crowned night heron	<i>Nycticorax nycticorax</i>	?	?

Table: 3. Roosting association in Urban and Rural area during study period (in %).

Month Year	Common myna		Rosy pastor		Bank myna		Brahmany myna		Other's		Total roosting population	
January	13.72	10.57	77.95	76.18	3.37	7.36	0.14	0.32	4.82	5.56	8835	3775
February	14.01	11.76	76.76	73.97	3.37	8.32	0.15	0.26	5.71	5.68	8924	3485
March	13.36	12.33	78.76	72.04	3.01	8.99	0.19	0.43	4.67	6.22	8883	3505
April	15.36	13.18	75.64	71.70	3.59	7.80	0.18	0.40	5.22	6.93	7626	2770
May	62.64	43.93	--	--	13.11	33.30	0.83	1.52	23.41	21.26	1922	922
June	65.74	44.71	--	--	14.60	32.18	0.56	1.08	19.10	22.03	2157	926
July	66.56	46.10	--	--	15.30	31.18	0.81	1.83	17.33	20.89	2222	1039
August	66.14	43.17	--	--	14.52	33.17	0.80	1.75	18.55	21.92	2259	1200
September	18.39	43.81	71.47	68.86	4.44	10.47	0.19	0.47	5.51	6.56	8292	3841
October	17.94	11.01	72.74	72.92	4.26	10.22	0.15	0.41	4.91	5.44	8025	3697
November	16.64	9.8	73.41	77.50	3.47	7.65	0.15	0.28	6.36	4.78	8473	4000
December	15.42	10.87	76.25	75.74	3.40	7.75	0.11	0.36	4.80	5.28	9042	3937
Average	32.16	25.10	24.49	24.59	7.04	16.53	0.36	0.76	10.03	11.05	6388.33	2758.08

Figure: 1 Month wise roosting population of associated birds of Common Myna in urban and rural area.



CONCLUSION

Roosting is a typical animal behaviour where a group of animal congregate in an area for few hours. The word roost derived from the German language meaning “a sleeping house for fowls”. This bird roost on large trees, it also roost frequently on iron roofs of railway station and goods sheds. Safety was found to be an important factor in the roost site selection. By roosting communally probably gain social, population regulation, foraging and antipredatory benefits which develops the awareness of the individual bird and acquired some kind of protection not only at the roost but in day time at the feeding area also.

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