"PHOTOPERIOD INFLUENCE ROOSTING TIME AND OTHER ACTIVITY IN COMMON MYNA (*ACRIDOTHERES TRISTIS*)"

*Vasundriya Ranjana R. and Ishaque Shehla

Department of Zoology, Madhav Science college, Ujjain, M.P.

*E mail: jatinrathod152@gmail.com

Abstract

This review examines how birds use the annual cycle in photoperiod to ensure seasonal events during roosting like arrival, departure and flock size, particularly in Common Myna. It is an Omnivorous open woodland bird with a strong territorial instinct and has well adapted extremely to urban environments. The present study deals with the waking calls, departure, arrival time and sleeping call with its flock size. Three distinct phases: Summer, Monsoon and Winter were noticed in the annual cycle. The various roosting activity from the first call to the final settlement show a systematic diurnal and seasonal changes in relation to the time of sunrise to sunset. And a comparative study was made in urban as well as in rural area. The study shows that Common Myna shows close association with the urban environment.

Key words: *Photoperiodism, Acridotheres tristis, U- urban And R- Rural*

INTRODUCTION

Photoperiodism is the physiological reaction of organism to the length of day or night. In present study response of Common Myna to the relative lengths of light and dark period has been carried out. The present study deals with the waking calls, departure, arrival time and sleeping call with its flock size. Three distinct phases: Summer, Monsoon and Winter were noticed in the annual cycle. Most seasonal events are triggered by a photoperiod of a certain length like arrival, departure and flock size etc. pertaining to Common Myna's roosting. These results are generally constant with a study of Indian Myna (*Acridotheres* tristis) by Counsilman, (1974b) who found that mynas departed on average later on rainy season and cloudy mornings and departure was more delayed on these days. The word roost derived from the German language meaning "a sleeping house for fowls". The roosting behaviour of various avian species has been studied in all over the world. The functions of pre roosting, gathering have been reported in present study with respect to day light.

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 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 flock size and its relationship with the microhabitat were determined by recording departing and arriving birds. Student's t-test is performed between the average arrival and departure period to assess any significant difference and to conclude apparent significance. 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 to determine the relationship between periods of light with the peak arrival as well as departure timing of the Common Myna.

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.

RESULT AND DISCUSSION

- **Arrival and Departure:**

Arrival and departure time at roost site do not remains constant throughout of study period, it changes with seasonal photoperiod. Though the seasonal arrival and departure time of the Common Myna depends upon the lightning period (Table:1 and 2). Common Myna's arrival at its roost is determined to be just before an average sunset time and departed just after the sunrise time all year around (Table: 3). Light duration is most positively influenced the roosting time (Davies and Lussenshop, 1970).

On the average, the Common Myna takes 67.25 $\pm$13.80 min. (n=24, range=42- 90 min.) in urban and 68.16$\pm$10.83 min. (n=24, range=46-82 min.) in rural to enter the roost and 38.58 $\pm$7.83 min. (n=24, range=28-56

min.) in urban and 40.00 ±6.72 min. (n=24, range=32-52) in rural to leave the roosts (Table: 1 and 2). It has been shown that the number of birds that arrived per minute was lower then the number of birds that departed. Students t-test revealed mean arrival period of the Common Myna is significantly longer then the mean departure period (Urban: t=1.66, df=22, p=5%, Rural: t=1.83, df=22, p=5%).

Departure of the Common Myna from the roost was based upon the factors which related to take advantage of foraging ground, it resulted that clump of birds leaving the roosting site in a particular direction in a shorter period of time. However, during the arrival it takes longer period of time to fill the roost.

Even though the number of birds recorded during the arrival are not precisely same as the number of birds recorded during the departure. Average flock size of arrival and departure is correlated (Urban: r=0.74, Rural: r=0.90).

- **Flock size:**

The percentage frequency distribution of flock sizes and percentage proportion of birds in each flock size is shown in (Figure 1 and 2). During arrival, flock size of smaller than the 5 birds was most frequent (U= 55.84% and R= 50.79%), where frequency of paired birds was highest (U= 29.44%, R=14.95%) and flock size of less than 40 birds was least occurred (U= 1.73%, R= 0.79%). As well as during departure (Figure: 1 and 2), flock size of highest (U= 60.7% and R= 0.79%) was recorded within the flock of more than 5 birds (6 to 30) and flock size of 31 to 35 in urban (1.35%) and more than 40 in rural area (0.85%) were least frequent.

Mahabal reported that this bird forming preroosting gathering only in the non breeding season while we found more number of bird during post breeding (Table 1 and 2). Even we found that the average flock size were larger during arrival to the roost at sunset and during sunrise average flock size were small when Myna was departing (Figure 1 and 2).

The experienced adults are capable of utilizing full day length to consume maximum amount of food before returning to the roost in the dark. But inexperienced members of the colony return soon. It has been also observed that Common Myna mostly remains in pair. So, the frequency of small flock size was higher than the large flock size during arrival in the evening. While, the frequency of large flock size was higher than the small during departure in the morning. It denoted that the threshold to leave the site due to empty digestive tracts may results in faster scattering.

The pattern of arrival and departure was inconsistent with relation to geographical distribution. It was very interesting to see that the Common Myna arrived and departed in same direction, such as; at Kankaria, Maninagar, it arrives from east and departed towards the same direction (east). It means it arrives from the feeding ground and departs to the same place (Vasundriya *et al.,* 2011).

Patchy distribution of food resulted in the dispersion of the birds in the clumps. The occurrence of socially induced flight i.e. when one fly from the roost the others are induced to do likewise was observed (Bayer, 1981; Erwin, 1983). The result of short dispersion is apparently relevant to the flock feeding habit of the Common Myna which tends to emphasize that they remain in a flock on the feeding ground and elicit them to leave the site as a group. Salimkumar (1982) observed in Black Ibis that flock gathering occurred either at feeding ground or near their roost.

- **Waking call and Sleeping call:**

Waking calls of Common Myna is normally recorded during dawn and the sleeping calls during the dusks. In the summer, average waking calls are made at 6.03 hrs. (n=8) and average sleeping calls are made at 19.23 hrs. (n=8), in the monsoon average waking calls are made at 5.4 hrs. (n=8) and average sleeping calls at 19.42 hrs. (n=8). And during the winter season, average waking calls are at 6.22 hrs. (n=8) and sleeping calls at 18.37 hrs. (n=8) (Figure: 3).

The difference between timing of waking calls made during summer and winter season is significant (t= 0.66, df=8, p=5%). The timing of waking calls made during summer and monsoon season which are obtained are significant (t=0.32, df=8, p=5%). Similarly, significant difference was found between the timing of waking calls made in monsoon and winter seasons (t=0.05, df=8, p=5%) (Table: 4).

As well as the difference between the timing of sleeping calls made during; summer and monsoon (t=0.19, df=8, p=5%), summer and winter (t=0.04, df=8, p=5%) and monsoon and winter (t=0.02, df=8, p=5%) are significant (Figure: 4).

In (Figure: 4) it has been shown that difference between the timing of arrival start and arrival end is significant. During winter and summer the difference is highly significant x̄=1:17 hrs. and x̄=1:19 hrs. respectively). The reason may during winter sunset is early (18:12 hrs.) so some birds arrive to their roosting sites before darkening and some were engaged in pairing and territory establishment during foraging but in summer sunset is late (19:19 hrs.) and at this time some birds arrive on time but some becomes late due to foraging because it is the time when food is scarce so birds spent more time in foraging. Since, it is also the time for breeding activities so some pair was engaged in those activities. The lowest difference was found during post monsoon (x̄=59) min. and early winter (x̄=59). It is the time of end of breeding activities; so some birds are engaged in rearing of young ones. Insect food is abundant at this time so Common Myna doesn't need more time to spend for foraging so they arrive timely to their roosting sites. Other reason was 'monsoon', August-

September is the time of good rains in Ahmedabad so rainy days minimize the other activities of birds and it has to return at their roost. Difference between the early summer and monsoon was ($\bar{x}=1.04$. hrs) and ($\bar{x}=1.06$ hrs). respectively (Figure: 4). The study on flock structure, directional routes, population fluctuations, pre-roost gathering was done by Mahabal and Bastawade, (1980); Mahabal and Vaidya, (1989); Mahabal et al. (1990); and Mahabal (1993a. 1993b). No seasonal difference was found in arriving and departing Cattle Egrets (Siegfried's, 1971).

CONCLUSION

Arrival and departure time at roost site do not remains constant throughout of study period, it changes with seasonal photoperiod. Common Myna's arrival at its roost is determined to be just before an average Sunset time. The number of birds recorded during the arrival is not precisely same as the number of birds recorded during the departure. The pattern of arrival and departure was inconsistent with relation to geographical distribution. Waking calls of Common Myna is normally recorded during dawn and the sleeping calls during the dusks. After arriving to their roosts Common Myna produced loud calls. At this time, it shows some behaviour like resting, flocking, preening scratching and making calls.

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Table: 1. Roosting population of Common myna in Urban Area during study Period.

Month and year	Total arrival period (min.)	Total number of myna arrived	Total departure period (min.)	Total no. of myna departed	Myna arrival/ min.	Myna departure/ min.
January	85	1202	30	1212	14.18	40.4
February	68	1245	41	1250	18.31	30.49
March	60	1182	38	1187	19.7	31.24
April	86	1167	35	1171	13.57	33.46
May	70	1198	28	1204	17.11	43.00
June	58	1417	36	1418	24.43	39.39
July	60	1469	31	1479	24.48	47.71
August	42	1490	40	1494	35.47	37.37

September	65	1515	42	1525	23.31	33.93
October	63	1436	48	1440	22.80	30.00
November	60	1404	56	1410	23.40	25.78
December	90	1391	38	1395	15.46	36.71
Average ±SD	**67.25 ±13.80**	**1343 ±133.02**	**38.58 ±7.83**	**1348.75 ±133.25**	**21.02 /min.**	**36.61 /min.**

Table: 2. Roosting population of Common myna in Rural Area during study Period.

Month and year	Total arrival period (min.)	Total number of myna arrived	Total departure period (min.)	Total no. of myna departed	Myna arrival/ min.	Myna departure/ min.
January	70	398	33	399	5.69	9.73
February	46	407	32	410	5.36	12.81
March	65	429	39	432	6.60	11.08
April	80	362	32	365	4.52	11.41
May	78	398	38	405	5.10	10.66
June	72	410	40	414	5.69	10.35
July	82	468	46	479	5.71	10.41
August	76	507	52	518	11.02	9.97
September	72	520	50	524	6.5	10.48
October	56	406	44	407	7.25	8.31
November	61	390	36	392	6.72	9.8
December	60	423	38	428	7.05	11.26
Average ±SD	**68.16±10.83**	**426.5 ±47.82**	**40.00 ±6.72**	**431.08 ±49.92**	**6.43 /min.**	**10.52 /min.**

Table: 3. Monthly comparison of sunset and sunrise with starting of Arrival and departure.

Month	Sunset (hrs.)	Arrivals start (hrs.)	Sunrise (hrs.)	Departures start (hrs.)
January	18:16	17:55	7:22	7:20
February	18:35	18:05	7:12	7:00
March	18:47	18:02	6:49	6:50
April	18:53	18:00	6:19	6:21
May	19:14	18:40	5:47	5:50
June	19:26	19:02	5:55	6:00
July	19:27	19:05	6:05	6:10
August	19:11	18:55	6:16	6:18
September	18:43	18:13	6:26	6:30
October	18:14	17:48	6:37	6:35
November	17:53	17:13	6:48	6:50
December	17:49	17:19	7:13	7:15
	19:10	**18:19**	**6.57**	**6:58**

Figure: 1. Percentage frequency of flock size of the Common Myna arriving to the roosting site.
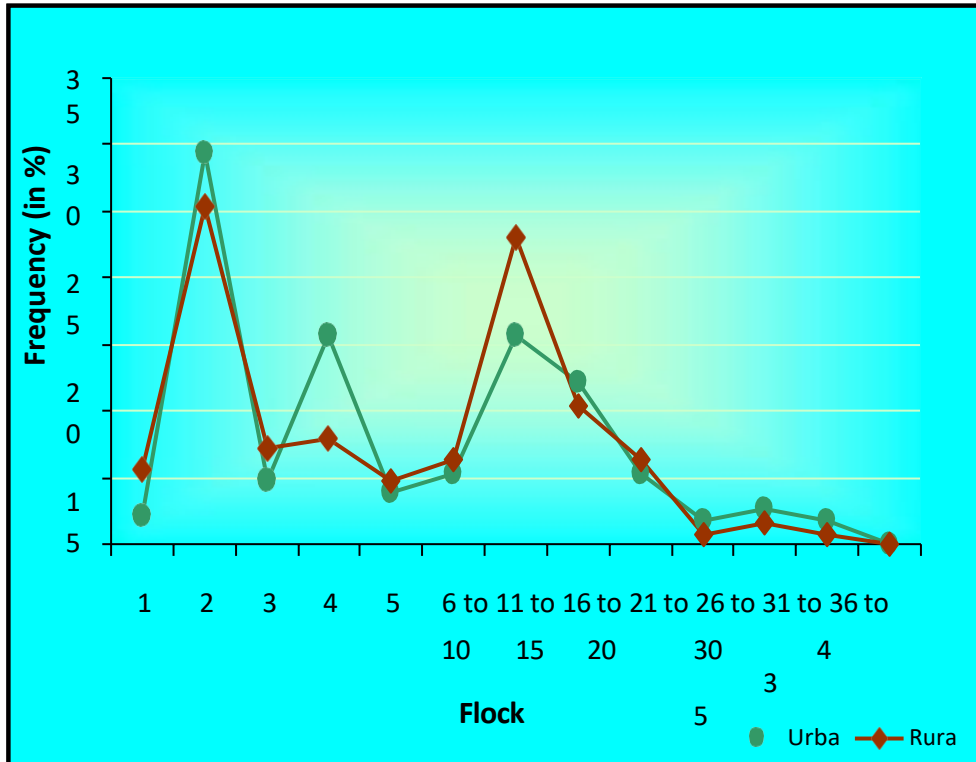

Figure: 2. Percentage frequency of flock size of the Common Myna departing to the roosting site
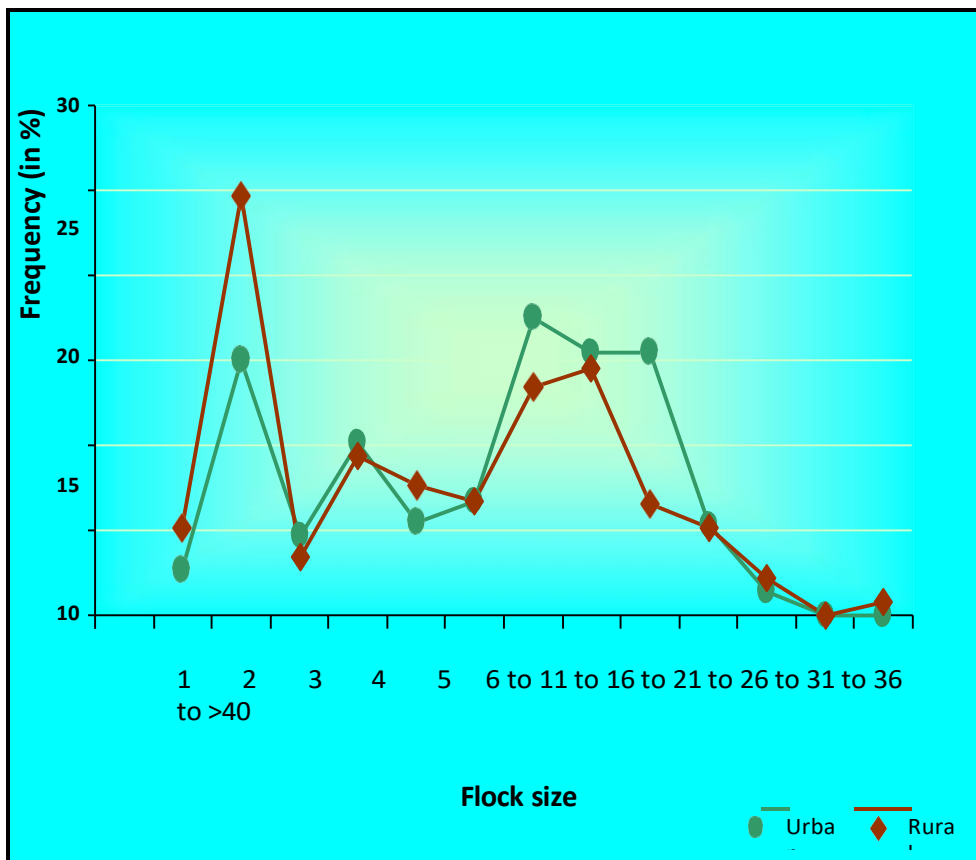
Figure: 3. Timing of walking and sleeping call of Common Myna during different seasons.
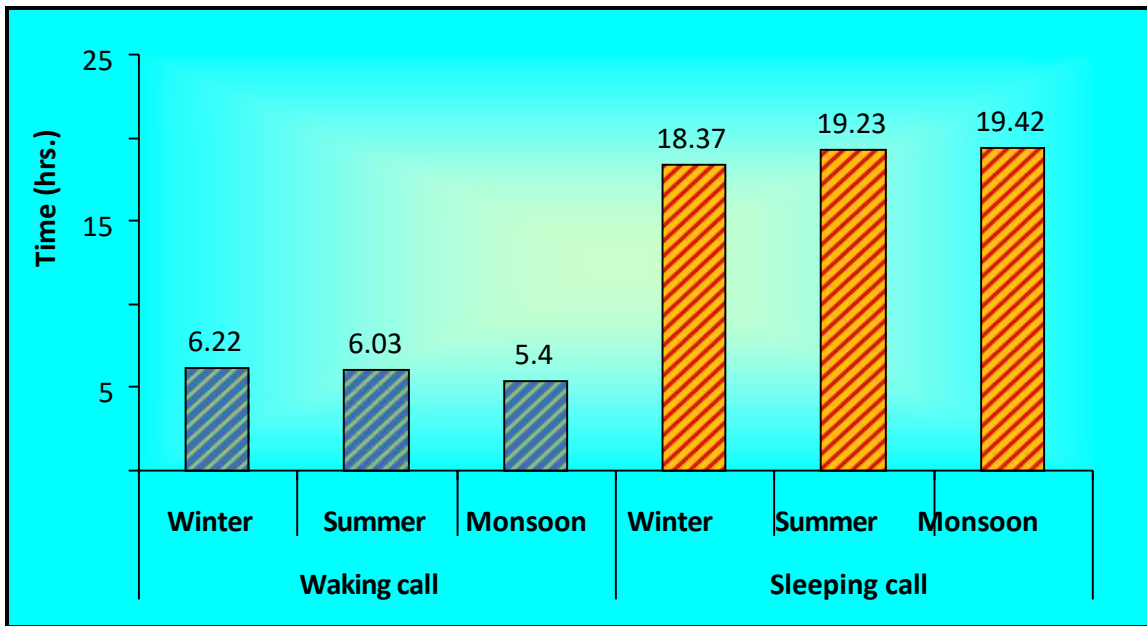

Figure: 4. Time schedule of different activities during roost of Common Myna.