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A Study of Arrival and Departure of Rose-Ringed Parakeet at Nocturnal Roost in the Shekhawati Region of Rajasthan, India

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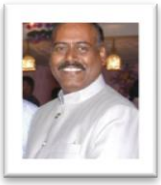
Sunita Singh
Assistant Professor,
Dept. of Zoology,
Government Science College,
Sikar, Rajasthan, India



Digvijay Singh Shekhawat
Associate Professor,
Dept. of Zoology,
Government M L B College,
Nokha, Bikaner, Rajasthan, India

Prakash Chandra Acharya
Associate Professor,
Dept. of Zoology,
Government N D B College, Nohar,
Hanumangarh, Rajasthan, India

Abstract

The rose-ringed parakeet (*Psittacula krameri*) belongs to family Psittacidae and the order Psittaciformes, is a communal rooster bird. Roosting habits of Rose-ringed parakeet were studied for a period of 2 years (from July 2012 to June 2014) in the Shekhawati region of Rajasthan. This paper reports on seasonal fluctuations in arrival and departure time at nocturnal roost and night rest period of parakeets. It was found that they roost together in noisy, communal flocks usually in large cavities of tall and old trees in the older buildings of cities, towns or near human habitat in various types of agro ecosystems. According to findings of the study, Parakeets start arriving at the nocturnal roost in the hour before sunset and arrival was lasted in a range of 05:00 to 40:00 minutes after sunset. The average of last arrival time was estimated at 13:57 minutes after sunset. These green birds leave the roost for the morning foraging from 01:00 to 30:00 minutes before the sunrise and average time of the last departure from roost was found as 12:17 minutes before sunrise. It is revealed that the arrival of parakeet to roost at dusk is inherently correlated with the sunset time and the departure from the roost at dawn with the sunrise time as well. Seasonal fluctuations were also observed in night roost hours of parakeets and average of roost hours was estimated as 10:53 hours during this study.

Keywords: Arrival, Departure, Rose-ringed Parakeet, Roost and Shekhawati region.

Introduction

The rose-ringed parakeet (*Psittacula krameri*) popularly known as a parrot (Suwa & Tota in local dialect in the study area), belongs to the order Psittaciformes and the family Psittacidae (Ali, 2002). The rose-ringed parakeet is a cavity nester communal bird. They roost together in noisy, communal flocks, usually in a large grove of tall and old trees in the older parts of cities, towns and near human habitat in agro-ecosystems. The size of communal roosts can measure in thousands to millions of individuals, especially among avian species (Juan, 2012). Khan (2002) has studied the day-long movement patterns (diurnal rhythms) of the rose-ringed parakeet extended in five months viz. January, March, April, June and October in daylight hours in a communal roost showed a total number of parakeets. A roost has been defined as a place where birds rested during a long inactive period (Zahavi, 1971). While recording the importance of roosting behavior in Brown-throated parakeets (*Aratinga pertinex*), Black birds (*Agalaius phoeniceus*), Amazon parrots (*Amazona amazonica*) and Barn Swallows (*Hrundo rustica*); Heisterberg (1983), Harms et al (2003) and Gordo (2006) respectively considered that roosts besides being the centre of diurnal activity also served as a nightly resting site (Mabb, 1997). There are several studies on the roosting requirements, and behavior of Rose-ringed Parakeets (Gadgil & Ali, 1975; Khan & Beg 1998; Zeeshan et al. 2016).

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Plate:1. Pre & post-roosting activities of Rose-ringed Parakeet

Plate:2.Roosting activities of Rose-ringed Parakeet

Roosting behavior (Zia, 1982) and roost selection were important determinants of individual fitness (Fisher et al, 2004) with particular consequences for energy budgets and predators avoidance. Night roosts played a crucial role in avian biology because of the large amount of time they spent roosting during the night and their presumed vulnerability to inclement weather and predation (Woltmann, 2004; Narayanan et al. 2018). According to Sharma (1983), birds were choosy about their roosting sites both for comfort and safety. Birds particularly selected dense vegetation related to frequency as well as covered with a good canopy and tree height (Rumble, 1992; Thompson, 2003; Grüebler, 2013). According to Santhanakrishnan et al, (2010), birds selected different roosting places like trees, manmade structures, nest boxes and even wells.

Prajapati & Prajapati (2012) studied on the roosting habitat of rose-ringed parakeet in small-town area of Gujarat (India). Rose-ringed parakeets are cavity nesters and function of nest cavities in breeding season along with roosting was described by Wistler (1986). The size of communal roosts (Juan, 2012) of rose-ringed parakeets provides an estimate of the population size (Keiji 2001; Butler, 2003; Peck, 2014; Clergeau et al, 2015 & Pârâu et al, 2016) also suggested that during the spring season (breeding season) roost size of *Psittacula krameri* is decreased. Chapman et al (1989) reported that communal flocks of *Psittacula krameri* produce a loud noise before roosting. Roost and roost habits of this green bird also have been studied by Iqbal (1998).

Aim of the Study

A very little information is available on arrival and departure time of parakeets at nocturnal roost, so this study was carried out on some aspects of roosting behavior of *Psittacula krameri* in the Shekhawati region of Rajasthan. This article can use as a supporting tool by researchers in ornithological studies.

Material and Methods

The Shekhawati is a semi-arid historical region located in the North-eastern Rajasthan (Figure-1). From the administrative and geographical point of view, Shekhawati is limited to Jhunjhunu and Sikar districts only (Figure-2). Jhunjhunu is located between 27^0.5'N to 28^0.5'N latitude and 75^0.00'E to 76^0.00'E longitude, Sikar is located between 27^0.21'N to 28^0.12'N latitude and 74^0.44'E to 75^0.25'E (Sharma & Goshwami, 2010-2011; Singh et al, 2015 & 2020).

The region has a sub tropical climate, which is exceptionally seasonal with a cold winter (November to January), hot summer (April to June) and warm monsoon (rainy) season (July to September). Extreme high and low temperature, low rainfall and excessive evapo transpiration are characteristics of this region. The Shekhawati region has optimum availability of food, nest and roost sites for this active and energetic bird.

The study was conducted over a period of 24 months ranging from July 2012 to June 2014 in two phases and two different habitats of parakeet. The first phase of study was conducted from July 2012 to June 2013 in an agricultural habitat of *Psittacula krameri*, situated at Jhunjhunu district. The duration of second phase of the study was from July 2013 to June 2014 and this study was done in urban area of Sikar

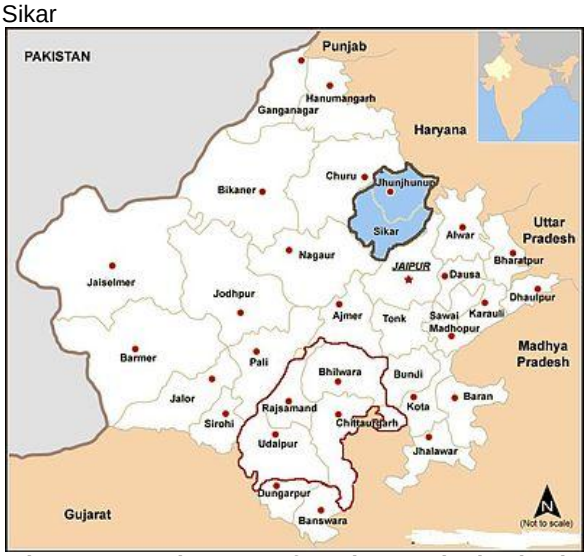

Figure:1.Location map of Study Area (Rajasthan)

Figure:2.Location map of Study Area (Shekhawati region)

District. During the study of two year period, two different habitats of rose-ringed parakeets were examined for roosting behavior on every first Sunday of every month regularly. Observations regarding time scale such as sunrise, sunset, departure from and arrival to roost of parakeets etc were recorded with the help of a wrist watch (Titan RAGA) and a binocular (Nikon, 10 X 50). Roosting activities (Plate-1 & 2) were recorded using photography by DSLR camera (Canon, Power Shot SX40HS). The first was an agro-ecosystem habitat which comprised of cropland area, an orchard of Ber (*Ziziphus mauritiana*) and human habitat. The second was urban (a town) area which comprised of parks, gardens and road side plantation. Point count & focal animal methods were used in this behavioural study of parakeet.

Results and Discussions

A nocturnal roost was rarely a separate entity as the tree grove serving as a nocturnal roost was a continuous part of the communal roost and before going directly to the nocturnal roost, the parakeets descended to a tree for the communal roost. A maximum number of tree, used by parakeets as roosting sites, in the study area were those of *Azadirachta indica* followed by *Ziziphus mauritiana* , *Prosopis cinereria, Albizia lebbeck, Ailanthus excels* and some other tree species.

Results about the sunset and the sunrise time, arrival of parakeets to the roost and departure from the roost in every month of studied years are depicted in table: 1 and figures: 3, 4 &5. These were recorded on every first Sunday of every month during the study. It is evident from the data that in the month of July,

Table. 1: Depicting times of sunrise, sunset, departure from roost, arrival to roost and roosting periods of Rose-ringed Parakeets during entire study period (Month Wise)

S.No	Month	Time for Sunrise in hours	Time for Sunset in hours	Time for departure from roost in hours	Time difference b/w sunrise & departure(before)	Time for Arrival from roost in hours	Time difference b/w sunset & arrival(after)	roost Hours
1	July (2012)	5:44	19:32	5:39	0:05	19:42	0:10	10:01
2	August (2012)	6:01	19:11	5:56	0:05	19:23	0:12	10:33
3	September(2012)	6:15	18:38	6:10	0:05	18:50	0:12	11:00
4	October (2012)	6:34	18:03	6:32	0:02	18:18	0:15	12:14
5	November (2012)	6:58	17:39	6:48	0:10	17:54	0:15	12:42
6	December (2012)	7:15	17:35	7:00	0:15	17:53	0:18	13:07
7	January (2013)	7:18	17:58	7:03	0:15	18:13	0:15	13:10
8	February (2013)	7:10	18:20	6:50	0:20	18:37	0:17	12:13
9	March (2013)	6:44	18:42	6:15	0:29:00	18:57	0:15	11:18
10	April (2013)	6:05	18:56	5:35	0:30	19:10	0:14	10:25
11	May (2013)	5:40	19:12	5:30	0:10	19:23	0:11	10:07
12	June (2013)	5:32	19:25	5:27	0:05	19:35	0:10	9:52
13	July (2013)	5:42	19:21	5:37	0:05	19:25	0:04	10:12
14	August (2013)	5:58	19:05	5:53	0:05	19:16	0:11	10:44
15	September(2013)	6:13	18:36	6:08	0:05	18:50	0:14	11:18
16	October (2013)	6:31	17:56	6:30	0:01	18:10	0:14	12:20
17	November (2013)	6:52	17:38	6:42	0:10	17:53	0:15	12:49
18	December (2013)	7:10	17:37	6:55	0:15	17:57	0:20	12:58
19	January (2014)	7:21	17:57	7:05	0:16	18:17	0:40	12:48
20	February (2014)	7:07	18:18	6:50	0:17	18:28	0:10	12:22
21	March (2014)	6:38	18:39	6:08	0:30	18:52	0:13	11:16
22	April (2014)	6:05	18:55	5:40	0:25	19:10	0:15	10:30
23	May (2014)	5:37	19:09	5:27	0:10:00	19:19	0:10	10:08
24	June (2014)	5:32	19:29	5:27	0:05	19:34	0:05	9:53
					Average-00:12:17		Average-00:13:57	Average-10:53:00

August and September the parakeets began leaving the roost at about 05 minutes before the sunrise. In October, only a few minutes before sunrise, in November about 05-10 minutes, in

December about 10-15 minutes, in January about 15 minutes, in February about 15-20 minutes, in March and April about 15-30 minutes. In May, about 05-10 minutes before the sunrise while in June, they started flying out of the roost only 05 minutes before the sunrise (Table: 1). Thus the parakeets began leaving the roost for the morning foraging from 01:00 to 30:00 minutes before the sunrise and average time of last departure from roost was estimated as 12:17 minutes before sunrise.

It was observed that for the nocturnal roosting these birds arrived to the roost 10-15 minutes after the sunset in the month of July, August and September, about 15 minutes after in October and November, about 15-20 minutes in December, about 20 minutes in January, about 15-20 minutes in February, 10-15minutes in March and April and 10 minutes in May and June after the sunset. On analyzing the table and figures of observations, it was found that Parakeets start arriving at the nocturnal roost in the hour before sunset and arrival was lasted in a range of 05:00 to 40:00 minutes after sunset. The average of last arrival time was estimated as 13:57 minutes after sunset. Barring rains, fog and dust storm, the parakeets quit foraging and other activities and returned to the nocturnal roost 10-20 minutes after sunset and began departing the roost earlier then sunrise time. In between the morning's first leaving and the evening's last returning, the parakeets kept on flying in and out of the roost to the nearby tree groves within the communal roosts. It may be pointed out again that the parakeets use only a small and specific area as nocturnal roosts. The specific area used for roosting at night was designated as the nocturnal roost. During the day hours, the entire wooded area in the proximity of nocturnal roost may be used as a diurnal roost. The whole wooded area around the nocturnal roost designated as the communal roost is relatively more permanent than a nocturnal roost, which is located within the former. A communal roost may be used for a long time.

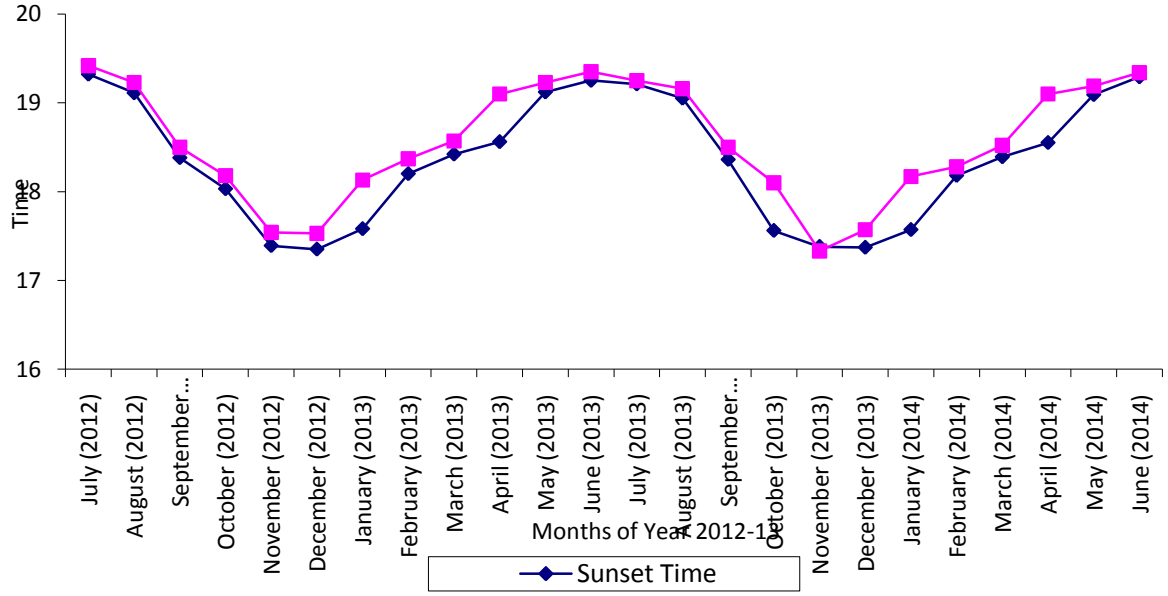

Fig. 3: Depicting correlation between time of sunset and arrival of rose-ringed parakeet at nocturnal roost from the month of July 2012 to June 2013 and July 2013 to June 2014.

On analyzing the table: 1, it is also revealed that the arrival of parakeets to roost at dusk is inherently correlated with the sunset time and the departure from roost at dawn is inherently correlated with the sunrise time as well. By figure: 3 &4, these aspects are clarified much better, that a definite correlation is found between sunset and arrival to roost as well as sunrise and departure of parakeets. Always roost hours of parakeets are according to the length of night hours. On analyzing the table:1 and figure:5 , it was also revealed that maximum roost hours were available in months of November (12:42 & 12:49 hours) and December (12:58 & 13:07 hours) and whereas minimum roost hours in month of June (09:53 & 09:52 hours) which were having direct similarity with the day-night length of these months. The average of roost hours was estimated as 10:53 hours during this study.

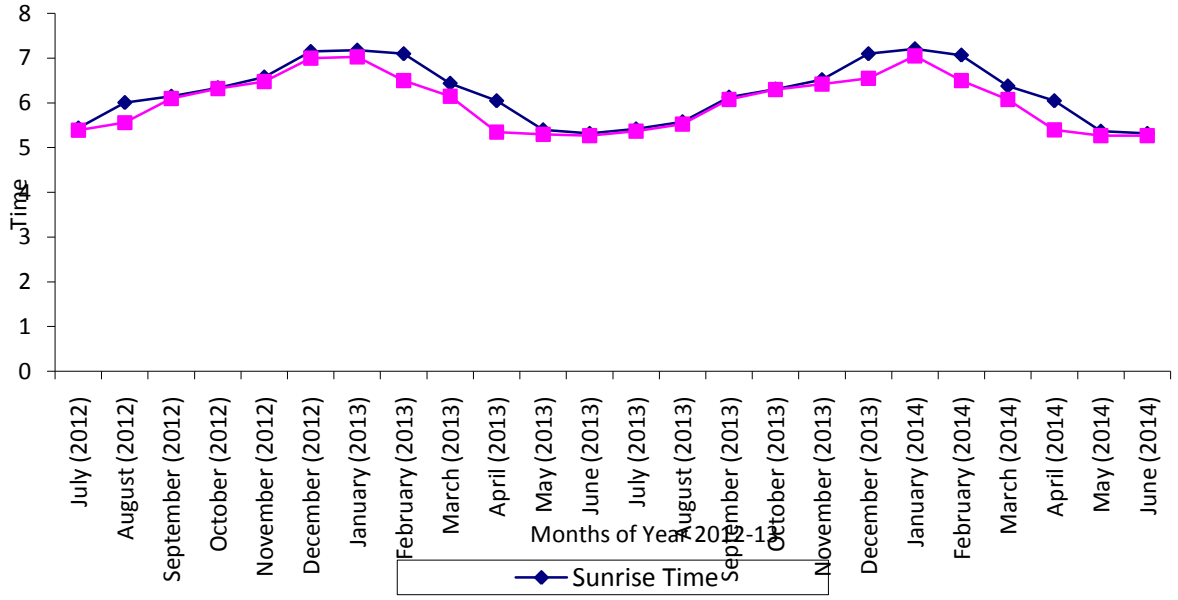

Fig.4: Depicting correlation between time of sunrise and departure of rose-ringed parakeet from the roost from the month of July 2012 to June 2013 and July 2013 to June 2014.

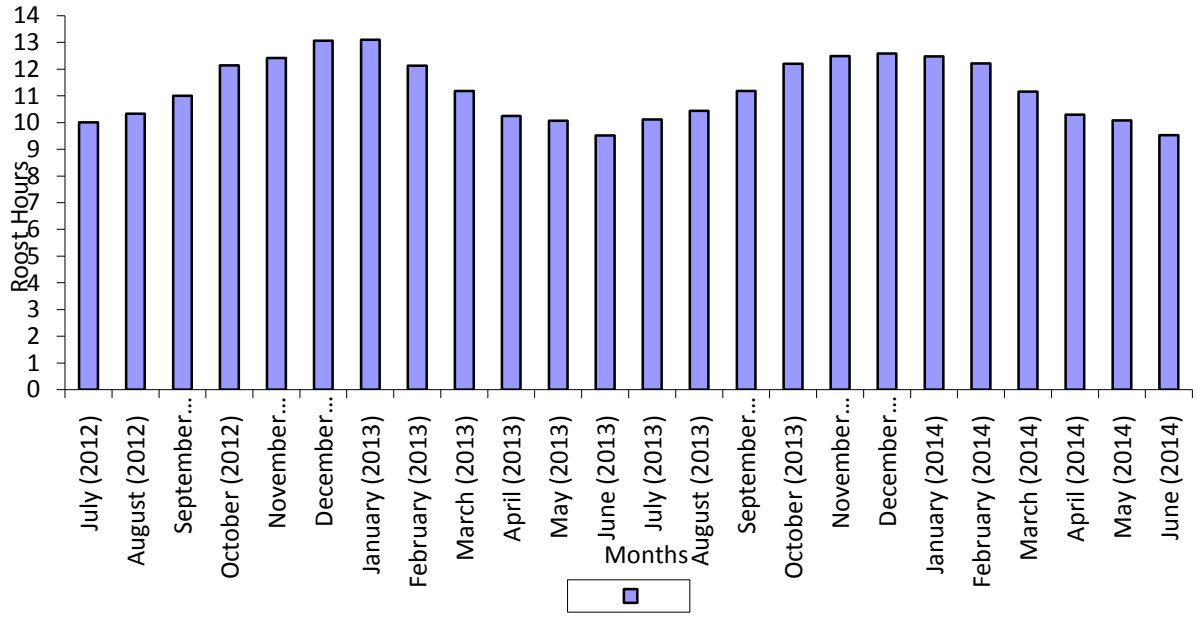

Fig. 5: Showing roost hours of rose-ringed parakeets during entire two year study period (month wise)

During the study, many important things about roosting activity of *Psittacula krameri* were also visually observed. These are-generally, rose-ringed parakeets in groups of 02 to 10 individuals started gathering about one hour before the sunset and lasted about 15-20 minutes after the sunset at roosting place. The parakeets returning to the roost in the evening were in flocks of 02 to 03 individuals. The flocks comprising 04 to 09 birds were common. Before coming here, they took rest (Plate No.:1 & 2) at nearby buildings, electricity line as well as on telephone towers (Zahavi, 1971). Pre and post 15 minutes of the sunset, several rose-ringed parakeets reached to roost in the company of 50 to 100 individuals from various directions by making loud call notes (Chapman et al, 1989). Then they chirped very loudly inside the canopy of roosting trees and after that, they settled down for the night rest. Before the sunrise, they flew away in groups in different directions. Parakeets being largely communal, assembled in substantial numbers customarily in the evening following the day-long activities within their roosts to spend the night as also described elsewhere (Sarwar et al, 1989) in India and Pakistan. Earlier, Khan & Beg (1998) also stated that rose-ringed parakeet spends the night in communal roosts, where

they gather at dusk emitting loud call notes and leave their roosts at dawn in search of food by again producing blaring calls. Roosting requirement and roosting habits of a rose-ringed parakeet (P. krameri) were studied by Zeeshan et al. (2016) and stated that the parakeet roosts was fairly large and was located less than a kilometer away from the well-grown croplands.

Many authors like Nice (1935), Thomson & Coutlee (1963) and Grüebler (2013) have suggested that light is the most important proximate factor influencing roosting in birds. Other factors as temperature and humidity may have a secondary influence on roosting, nevertheless. Kluijver (1950) has opined that making fuller use of light in gathering food is the ultimate factor responsible for the awakening in birds. Counsilman (1974) has also contended that light is not the absolute factor influencing roosting since the partridge never return prematurely to roost on extremely cloudy days or heavy storm. Counsilman suggested that an endogenous clock, set by light to control the arrival at roost sites have some relevance here.

Butler (2003) reported that roosts of the rose-ringed parakeets are considered broader and stable than that of any other global roosting bird. Santhanakrishnan et al, (2010) found that the spotted owlet (Athane brama) preferred structurally complex roost trees with well-branched, high canopy densities with thick green foliage, large diameter with various height classes of trees for roosting. Zeeshan (2016) studied on behavioral displays of the parakeets viz. exits and returns (morning and evening), allo-feeding, allo-preening and intra and inter-specific tussles proved beneficial to determine the relative population abundance of the bird and the interactions of short distance roosts from the crops. Narayanan et al (2018)carried out a study on hanging roosting of rose-ringed parakeets and revealed that this roosting to be an anti-predatory safety measure adopted by the birds, as mentioned by Collar et al (2016), which could also help them escape from the strong monsoon winds, and torrential rain.

Conclusion

On the basis of above discussion, this conclusion was made in the matter of roosting that a definite correlation is found between sunset and arrival of parakeets to roost as well as sunrise and departure there from. Always roosting periods of parakeets are according to the length of night hours. This paper can be useful for those scholars who study about the behavioral pattern of various birds.

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