

## Diurnal Rhythms of the Rose-Ringed Parakeet (*Psittacula krameri*) in Daylight Hours in its Communal Roost

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**Abstract:** Studies on the day long movement patterns of the rose-ringed parakeet (*Psittacula krameri*) extended in five months viz. January, March, April, June and October in a communal roost showed total number of parakeets recorded to be 821 ( $\pm$  SE 13.3), 1111 ( $\pm$  SE 18.8), 1199 ( $\pm$  SE 8.35), 1066 ( $\pm$  SE 8.99), 848 ( $\pm$  SE 9.72), 752 ( $\pm$  SE 10.1), 508 ( $\pm$  SE 14.2), 631 ( $\pm$  SE 9.95), 567 ( $\pm$  SE 18.0) and 483 ( $\pm$  SE 15.5), respectively. It was concluded that the number of parakeets varied in all five months and a roost located close to the food crops, provided the parakeets with an almost effortless access to fetch the food and thus, obliterate the food items to cause economic losses.

**Key words:** Rose-ringed parakeet, diurnal rhythms, communal roost

### Introduction

Of all the bird pests present in the region of Central Punjab, Pakistan, the rose-ringed parakeet (*Psittacula krameri*) is the most serious avian pest. The parakeet, by virtue of its large feeding niche, has acquired the status of a potentially dominant pest as usually it feeds and plunders the nutritious food items in fairly large proportions (Khan and Ahmad, 1983; Shafi *et al.*, 1986; Chakarvorty *et al.*, 1998; Gupta *et al.*, 1998). Certain important aspects of the life history of the parakeet relevant to population management have not yet been investigated in depth. Its food and feeding behaviour have largely been studied with reference to the cultivated crops only. Information on foods other than those grown in the agroecosystems is fragmentary. Likewise, its breeding habits and reproduction have been studied by a number of workers (e.g. Shivanarynan *et al.*, 1981; Paton *et al.*, 1982; Dvir, 1985; Sarwar *et al.*, 1989), but habitat distribution of the breeding pairs seems to have been ignored. There is also an acute paucity of information on the role of communal roosts in the life history of the rose-ringed parakeet. Information about the number of roosts, their distribution in and about the agroecosystem and size of the parakeet's nocturnal aggregations in the roosts in a given region may be useful from population management point of view. The above indicated information on the food, breeding habitats and communal roosts of the rose-ringed parakeet may be useful in maximizing target selectivity, the spatial and temporal life history activity of the parakeet population in relation to the breeding season and vulnerable crops. The present studies were, therefore, aimed at investigating the importance of the communal roosts in the life history of the parakeet with a view to formulate a future strategy to control its unrestrained population.

### Materials and Methods

The morning and evening counting of the parakeets leaving from and returning to the roost located at the Old Campus of Agriculture University, Faisalabad, Pakistan, started 30 min before sunrise and continued till 30 min after sunset. The counting was done in the January, April, July and October, 1999. The counting was done selecting a vantage point near the parakeet communal roost. The procedure of counting was simple. The field of vision was well defined using such objects as trees, cable pylons and other similar objects located at a distance of approximately 100 m from the point at which the observers were positioned. For the accuracy sake, field of vision for monitoring the parakeet movements and flock size was kept small. It may be pointed out that the counting were done around the communal roost and not around the nocturnal roost. There were three reasons for doing so: 1) 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; 2) before going directly to the nocturnal roost, the parakeets descended to a tree in the communal roost; and 3) it was not possible to count the number of parakeets entering the

nocturnal roost. For these reasons, all the counting were done outside the nocturnal roost. At the University farms, all sorts of cereals, oil-seeds and leguminous crops, vegetables and sugarcane are grown; wheat, maize and sugarcane being the common ones. All these farms are located close to the parakeet's roost. The orchards are located within one kilometer radius of the roost. As some parakeets were observed to be already present in the communal roost throughout the day, it was, thus, necessary to assess their numbers also. Before the counting commenced, brief walk within the given roost was necessitated to cover all its parts and making a visual assessment of the number of parakeets present in the roost. Immediately, after obtaining the above estimate, the counting of the incoming and outgoing parakeets commenced, at least, half an hour before the sunrise and ended 30 min after the sunset. The whole of the visual field around the communal roost was covered around the roost. All these measures were necessary to avoid an overlap in the counting. The difference between the number of incoming and outgoing parakeets within the counting period and the estimate of the parakeet numbers present in the roost gave an approximation of the size of the nocturnal roost.

### Results and Discussion

Studies on the movement patterns of the rose-ringed parakeet were extended for five months viz. January, March, April, May and October, 1999 to obtain an information about the number of parakeets present in a communal roost, University of Agriculture, Faisalabad. A communal roost is the one which harbours a large number of the birds and such a roost is housed near the Health Centre, University of Agriculture, Faisalabad, consisting of a long strand old and tall trees viz. *Dalbergia sissoo* and *Salmalia malabarica* offering the parakeets suitable roosting sites. It is evident from the data, that in January, the parakeets began leaving the roost at dawn at about 15 min before sunrise, in March and April about 15 to 30 min before sunrise and in June 5 min before sunrise, while in October, they started flying out of the roost only a few min before sunrise (Table 1). Thus, the parakeets began leaving the roost for the morning foraging from a few to several minutes before sunrise. For the nocturnal roosting they returned to the roost 20 min after the sunset in January, about 14 min in March and April, 10 min in June and 14 min in October after the sunset. Barring rains, fog and dust storm, the parakeets quit foraging and other activities and returned to the nocturnal roost 10 to 20 min after sunset and began leaving the roost earlier than sunrise time. In between the morning's first departures and the evening's last arrivals, the parakeets kept on flying in and out of the roost and 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 a nocturnal roost. The specific area used for roosting at night was designated as the 'nocturnal roost'. During the day hours, the entire wooded area

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**Table 1: The numbers of rose-ringed parakeets leaving (L) from and returning (R) to the nocturnal roost and its immediate surroundings at the old Campus of University of Agriculture, Faisalabad**

Time period	Jan. 12 & 13		Mar. 13 & 14		Apr. 23 & 24		Jun. 26 & 27		Oct. 23 & 24	
	L	R	L	R	L	R	L	R	L	R
04:55-05:25	-	-	-	-	174	10	285	04	-	-
05:25-05:55	-	-	-	-	66	39	48	18	-	-
05:55-06:25	-	-	-	-	39	66	16	46	-	-
06:25-06:55	-	-	139	10	17	61	09	38	177	01
06:55-07:25	134	01	87	62	20	22	06	27	68	39
07:25-07:55	23	47	97	10	18	28	11	26	33	118
07:55-08:25	46	27	65	87	09	21	02	10	18	64
08:25-08:55	57	52	53	75	10	09	01	05	02	20
08:55-09:25	23	71	40	74	01	02	-	03	02	07
09:25-09:55	32	36	35	51	01	03	-	02	08	02
09:55-10:25	23	42	25	39	04	-	-	-	-	-
10:25-10:55	23	42	04	13	01	01	-	-	-	-
10:55-11:25	10	21	16	17	04	-	02	-	-	-
11:25-11:55	04	09	-	-	06	01	-	-	02	-
11:55-12:25	03	03	-	-	04	05	-	-	-	-
12:25-12:55	02	02	09	-	01	01	02	-	-	-
12:55-13:25	03	03	10	09	09	04	-	01	-	-
13:25-13:55	-	04	25	21	03	02	02	-	-	-
13:55-14:25	-	06	31	19	08	01	-	01	-	-
14:25-14:55	16	07	51	22	08	08	02	02	-	-
14:55-15:25	86	45	25	33	26	08	01	02	01	-
15:25-15:55	218	33	72	66	26	06	01	01	107	04
15:55-16:25	98	68	83	63	54	15	10	02	143	07
16:25-16:55	20	402	104	68	128	34	39	05	06	39
16:55-17:25	-	185	129	63	121	70	13	104	-	173
17:25-17:55	-	05	73	100	85	238	55	64	-	09
17:55-18:25	-	-	26	160	08	97	03	65	-	-
18:25-18:55	-	-	-	04	-	-	-	198	-	-
18:55-19:25	-	-	-	-	-	-	-	07	-	-
Total	821	1111	1199	1066	848	752	508	631	567	483
± SE	13.3	18.8	8.3	8.99	8.72	10.1	14.2	9.95	18.0	15.6
Sunrise	07:05		06:30		06:28		05:03		06:15	
Sunset	17:18		18:10		18:44		19:06		17:29	

in the proximity of the nocturnal roost may be used as a diurnal roost, such social activities as pair formation, allofeeding and preening, searching, examining or modifying a tree cavity into a suitable nest, potential nest cavities, mobbing predators and intra and inter-specific tussles near the nest cavities. The whole wooded area around the nocturnal roost was designated as the 'communal roost' which is relatively more permanent than a nocturnal roost which is located within the former. A communal roost may be used for decades. The number of departing parakeets generally peaked before sunrise. After the dawn peak of departures in January, the number of departing parakeets declined rapidly by about sunrise time after which the parakeets kept on leaving the roost in varying numbers till 11:25 h. From 11:25 to 14:25 h, the number of parakeets ranged from 0 to 4 per 30 min counting period. After 14:25, the number of outflying parakeets increased and peaked between 15:25 and 15:55 h. After this peak, the number of parakeets leaving the roost rapidly declined and finally stopped after 16:55 h. In March, at about sunrise the parakeets left the roost in large numbers and then the number rapidly declined. From 11:25 to 12:55 h no parakeet was recorded leaving the roost. After 12:55 the picture changed as the afternoon foraging movements started. The number of departing parakeets increased but not regularly till 16:25. From 16:25 to 17:25 a large number of parakeets left the roost. After 18:25, no departing parakeet was recorded. In April, generally a similar pattern of movement was observed; the major differences being, a) the parakeets started leaving much earlier than in March and b) during the period extending from 08:55 to 14:25 departing birds, though in small numbers were observed leaving the roost. After 14:25, the number of departing parakeets progressively increased till peak departures were recorded between 16:25 and 17:25. After 18:25,

no parakeet was recorded leaving the roost. In June, the pattern of departure from the roost was generally similar to that of April except for the fact that the bulk of the parakeets had left for the morning foraging at dawn between 04:55 and 05:55. From 07:55 to 15:55, only 13 parakeets were recorded flying out from the roost at staggered times. From 15:55 to 18:25, comparatively small number of parakeets left the roost. In October, the rhythm of leaving the roost approximated the one observed in January. In October, from 09:55 to 14:25 only a few parakeets left the roost. From 14:25 to 16:55, a large number of parakeets flew out of the roost. After 16:55, no departing parakeet was recorded. In January, except for one individual, no parakeet was recorded to fly back to the roost from 06:55 to 07:25. After 07:25 h, the parakeets began returning to the roost in good numbers till 11:55 h after which this process continued till 14:55 but involving only a small number of parakeets. Later on the number of returning parakeets improved and a high peak was reached between 16:25 to 16:55 h. After 17:55 h, no parakeet was recorded returning to the roost. In March, the parakeets started returning to the roost after 06:25 and the process continued till 11:25. Generally, the number of returning parakeets was high during the period from 07:55 to 10:25. No returning bird was recorded between 11:25 and 12:55. From 12:55 the number of returning parakeets generally steadily increased till a high peak was recorded between 11:25 and 12:55. In April, the parakeets started returning to the roost much earlier than in the preceding two months although the length of the day in March was only 36 min shorter than in April. The process of arrivals at the roost continued till 09:55. Between 09:55 and 11:25 the process almost stopped. But it recommenced after 11:25 and continued till 18:25. The peak arrival was recorded between 17:25 and 17:55. In June, usually the hottest month of

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the year, the parakeets began flying out of the roost between 04:55 and 05:25 and some returned to it during the same time period. The process of the arrivals speeded up after 05:55 and continued till 09:55 after which there was a complete quiescence for three hours. After 12:55, the parakeets began coming to the roost but in exceedingly small numbers till 16:55 after which a large number of the parakeets returned to the roost. In October, when the day length was only 26 min shorter than in March, parakeets leaving the roost were recorded from 06:25 to 09:55. After 09:55, there was a long period of quiescence which ended by about 15:25 h. From 15:25 to 17:55 h, a total of 232 parakeets returned to the roost.

In the forenoons, generally the number of departures from the roost was greater than the number of returns to it. In March, April and June, the gap between the number of departures from and arrival at the roost was greater than in January and October. Contrary to this, the number of arrivals at the roost in the afternoon was either smaller or approximated the departures. The departure and arrival counts were high in March rather it was the highest of all the months (Gupta *et al.*, 1998; Paton *et al.*, 1982). The elevated levels of activity could have been due to frequent departures and arrivals of the small nest cavity searching parties between the morning and evening foraging bouts. The activity level was lower in April than that in March. Perhaps, the nest searching activity had subsided in this month (Dvir, 1985). The departing and returning activity with respect to the roost were at the lowest ebb in October. The reason for this could seemingly have been neither due to relative small population size, the length of the day, nor the weather conditions. The logical conclusion is that some change in the pattern of activity of the parakeets occurs in October. The most probable reason could be that a good number of the parakeets remained outside the communal roost for the greater part of the day perhaps in search of mates and nest cavities (White *et al.*, 1985; Garner, 1978).

A communal roost comprising old trees of the right type of species and located in close proximity to farmlands, orchards and fruit trees is an ideal one for the parakeets. During the breeding season such a roost provides the breeding parakeets an easy access to nutritious foods available in the nearby oil-seed and ripening wheat fields and in the mango and date palm groves. When the brooding females start foraging and feeding on their own towards the end of the brooding period they indirectly improve the food fetching efficiency of the males which might in turn improve the survival rate of the chicks (Heisterberg, 1984;

Bruggers *et al.*, 1986). It thus augments that the food crops should always be located away from the parakeet roosts and logically, to sneak the food, the parakeets would need to voyage to a fairly considerable distance which might not be useful from the energy budget of the parakeet. An apparent reason, for the non availability of the substantial information on the roosts, is the lack of such studies in Pakistan.

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