

A Comparison of Population Abundance of the Rose-ringed Parakeet, *Psittacula krameri*, in the Two Roosts of Central Punjab, Pakistan

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ABSTRACT

Studies to ascertain the population abundance of the rose-ringed parakeet, *Psittacula krameri*, in the plantations of two metropolis viz. Faisalabad and Chakwal, for five months, January through May, 2005, provide information that in the roost I, in January, 2005, number of departing parakeets in the early morning and late afternoon hours, three hours each, showed that 104 ± 3.44 SE, the number returning was fairly low, 44 ± 1.08 ; in the afternoon, the number departing was 45 ± 1.21 , returning to the roost was 142 ± 3.77 . In February, for similar time durations, the departing and arriving parakeets in the morning were 89 ± 2.68 and 34 ± 0.60 , whereas in the afternoon, they were 21 ± 0.77 ; 181 ± 4.79 . For March, the number recorded was 141 ± 4.10 and 23 ± 0.73 and for afternoon 27 ± 3.11 , and 156 ± 4.57 . Similarly, in April and May, the number leaving in the morning were 86 ± 2.80 ; 131 ± 4.75 , while returning were 38 ± 1.18 ; 26 ± 0.78 . For the afternoon, the arriving parakeets in roost I were 143 ± 4.21 and 138 ± 5.21 , respectively. Observations in roost II, made in the same months, depict that the number of parakeets leaving the roost in the early morning hours were 66 ± 1.72 , 11 ± 0.43 , 88 ± 2.55 and 25 ± 0.70 , 155 ± 4.27 , $14 \pm 0.5575 \pm 3.26$, 19 ± 1.51 and 84 ± 2.71 , 31 ± 1.23 , respectively. The number returning to the roost for similar monthly samples were 17 ± 0.58 , 26 ± 0.99 , 14 ± 0.51 , 138 ± 4.26 , 55 ± 1.38 , 168 ± 5.07 , 7 ± 0.29 , 146 ± 11.2 and 10 ± 1.99 , 207 ± 5.32 , respectively. Findings of the present studies suggest that there seemed an enhanced activity of the parakeets in the early morning hours following the nightly rest. Certain trees species like *Salmaalina malabarica*, *Dalbergia sissoo*, *Terminalia arjuna*, *Ficus bengalensis* and *Eucalyptus* spp. are being used by the parakeets year after year, thus, more or less establishing permanent roosting sites to perform different diurnal activities viz. foraging and perching on temporary roosts, to find appropriate cover, to carry out courtship displays and moreover, to locate for the suitable breeding sites. Roost I, being larger in its dimensions, harbored more parakeets and as such, to perform the diurnal activities to a maximum.

Key Words: Rose-ringed parakeet; Roost; Population; Tree species; Population abundance

INTRODUCTION

The rose-ringed parakeet, *Psittacula krameri*, is considered as a worst bird pest throughout the Indian sub-continent (Ali *et al.*, 1981; Shafi *et al.*, 1986; Gupta *et al.*, 1998) and its population has also been recorded from some parts of South Asia, Europe, North America and some regions of Africa (Roberts, 1991). Four sub-species viz. *P.k. krameri*, *P.k. parvirostris*, *P.k. borealis* and *P.k. mannillensis* have been recognized in various parts of the world. Of these, *P.k. borealis* is common in Pakistan and India (Butler, 2002). The parakeet has become naturalized in many countries throughout the world and is considered as a serious avian pest (Forshaw, 1989; Junipur & Parr, 1998). Despite the fact that the rose-ringed parakeets have been widely introduced, a little work has been done on their biology. The bird is reported to inhabit tall and old trees in the light timbered areas. Most of the parakeet roosts are located closer to the food crops therefore it hardly becomes a limiting factor. The parakeets form small flocks near a food source, but may also appear in hundreds at one point,

whenever there is no disturbance (Paton *et al.*, 1982; Khan, 2002). Introduction of canal irrigation and cultivations in most of the Indus plain in Punjab (Pakistan) have been considered important in providing better roosting and nesting opportunities to the parakeet and nutritious food (Ali & Ripley, 1969; Beg, 1978; Roberts, 1991).

The rose-ringed parakeet is a serious pest to agricultural and horticultural interests in Pakistan. According to Khan and Hussain (1990), in the capital territory of Islamabad, damage to the maize cobs was 30%. In the un-guarded fields in Punjab, the damage might exceed 50% (Bashir, 1978). Losses inflicted by the parakeets to the sunflower have also been reported to be substantial in Punjab. Khan and Ahmad (1983) reported that 14 to 16% of the ripe floral heads in sunflower had been completely deprived of their seeds, while about 72% seeds were destroyed in the outskirts of Faisalabad (Beg, 1995). The rose-ringed parakeet is also a major crop pest in India, attacking a variety of grain products and fruit (Long, 1981; Lever, 1987; Reddy, 1998a, b; Mukherjee *et al.*, 2000). Some authors (Shivanarynan, 1980; Mukherjee *et al.*, 2000)

regard the rose-ringed parakeet to be the worst avian pest from the agricultural point of view. Reddy (1999) recorded a damage of about 80% maize cobs in Andhrapradesh, while Saini *et al.* (1994) provided information on depredation of 40% oil-seed crops in Himachal Pradesh.

A variety of methods have been employed and suggested by a number of workers to alleviate parakeet infestations at the agricultural or horticultural practices viz. trapping, shooting, auditory, visual and chemical repellents, poison baiting and habitat manipulation (Bruggers *et al.*, 1986; Feidler *et al.*, 1991; Beg *et al.*, 1995; Malhi *et al.*, 2000). According to Schafer Jr. (1991), use of plastic flaps may prove beneficial in control of avian pests over a limited scale. Use of drugs, endocrine disruptors, reproductive inhibitors, sonic devices, reflecting tapes and erecting fearsome models in the croplands, have all been extended in varying agro-ecosystems, with some or virtually no success. Regrettably, ecological, behavioral and accurate management of rose-ringed parakeet seems to be going on separate ways in South Asia. There needs to be a useful linkage among all the multidisciplinary aspects to form a comprehensive and sustainable control program. There appears to be a substantially lesser information regarding the role of the communal roosts in the life history of the rose-ringed parakeets and number, exact size and distribution of roosting sites in selected agro-ecosystems are wanting in the Indo-Pak sub-continent.

Hypothesis. In the present investigations, it was hypothesized that a comparison of two roosts of the rose-ringed parakeet in Central Punjab would be useful in not only assessing the relative abundance of the parakeets in the two habitats, but also provides a foundation for the future with a view to inhibit and manage depredations of this bird pest among the croplands in Pakistan in an ecological and sustainable manner, to alleviate substantial economic losses to the national economy.

MATERIALS AND METHODS

Studies on comparing the population abundance in two rose-ringed parakeet roosts were extended for a period of five months (January, 2005 till May, 2005) in Faisalabad and Chakwal. The roost I was located in University Campus in Faisalabad, while the roost II, was located in the plantations of Chakwal College, Chakwal, approximately 200 km away. The roost I was harboured by trees such as *Dalbergia sissoo*, *Salmalia malabarica*, *Cedrella toona* and *Eugenia jambolina*. Except *S. malabarica*, all other trees served as parakeet nests, which was exclusively used as the roost. The University campus provides an enriched flora (experimental crops) throughout the year and as such in the wake of almost no limitation of food, the animal fauna, in particular the birds, is also diverse in nature.

The roost II was located in the cultivations of Chakwal Degree College, comprising *S. malabarica*, *D. sissoo*, *Eugenia jambolina* and *Cedrella toona*. Like that of the

roost I, *S. malabarica* was the main roost here as well, whereas other trees served as parakeet nests. In roost II, area of cultivation was considerably shorter than roost I. Time of observations on parakeet leaving and returning in roost I was evenly divided for 15 min. for three hours, each in the morning and afternoon intervals, for two days in a week. In roost II, with the same time intervals, observations were recorded on a week holiday. All observations started at about sunrise and lasted continuously for three morning hours. In the afternoon, studies comprised three hours, initiated at late afternoon and ended at about sunset. Parakeet movement patterns involved the exit from their roosts in the early morning hours for varying purposes viz. foraging, finding potential nests, possible mates and some other behavioral displays viz. to emit pleasure and distress calls, mobbing around a potential predator, short flights within and away from the principal roost, allo-preening (both by male & female parakeets) and allo-feeding. Prior recording the data, field was visited and an approximate area of observation, about 200 m was stipulated on one side of the roost only. Studies in both the sampled roosts were conducted from a particular point in the field. All the observations were aided by the field binoculars (Philips, 7 x 50 mm) to get a clear view, wherever needed.

RESULTS

Investigations were extended to compare the population abundance of rose-ringed parakeet in two roosts in Faisalabad and Chakwal from January through May, 2005. Information regarding the parakeet leaving and returns in roost I for the sampled months for the morning and afternoon hours is provided in Fig. 1.

In January, the parakeets started leaving the roost at least 15 min before the sunrise, while the time duration was nearly 10 min for the other months of study. It is apparent that in between the morning's first departure and afternoon's last arrival, some brief movements of the parakeets were also recorded, mainly in the form of short flights in and out of the roost and the nearby tree groves within the roost I. It is worth pointing out that the parakeets used only a little and specific area as 'nocturnal roost' at night. During the daytime, the whole of the area located in the proximity to the nocturnal roost was treated as a 'diurnal roost' and to extend social activities.

They included pair formation, allo-feeding, preening, searching or examining a tree cavity to make a suitable nest, potential nest cavities, mobbing the predators, with the intra and inter-specific tussles around the nest cavities.

Results of the present studies also depict that the number of departing parakeets generally showed a peak numerical strength before the sunrise, at later stages, the number gradually declined. In the morning, maximum number occurred leaving the roost I in February, perhaps the parakeets were preparing for breeding in the succeeding months (March & April) and in active pursuit to find suitable

Fig. 1. Total numbers (leaving and returning) rose-ringed parakeets (January through May) in the immediate vicinity of roost I in the morning and afternoon hours

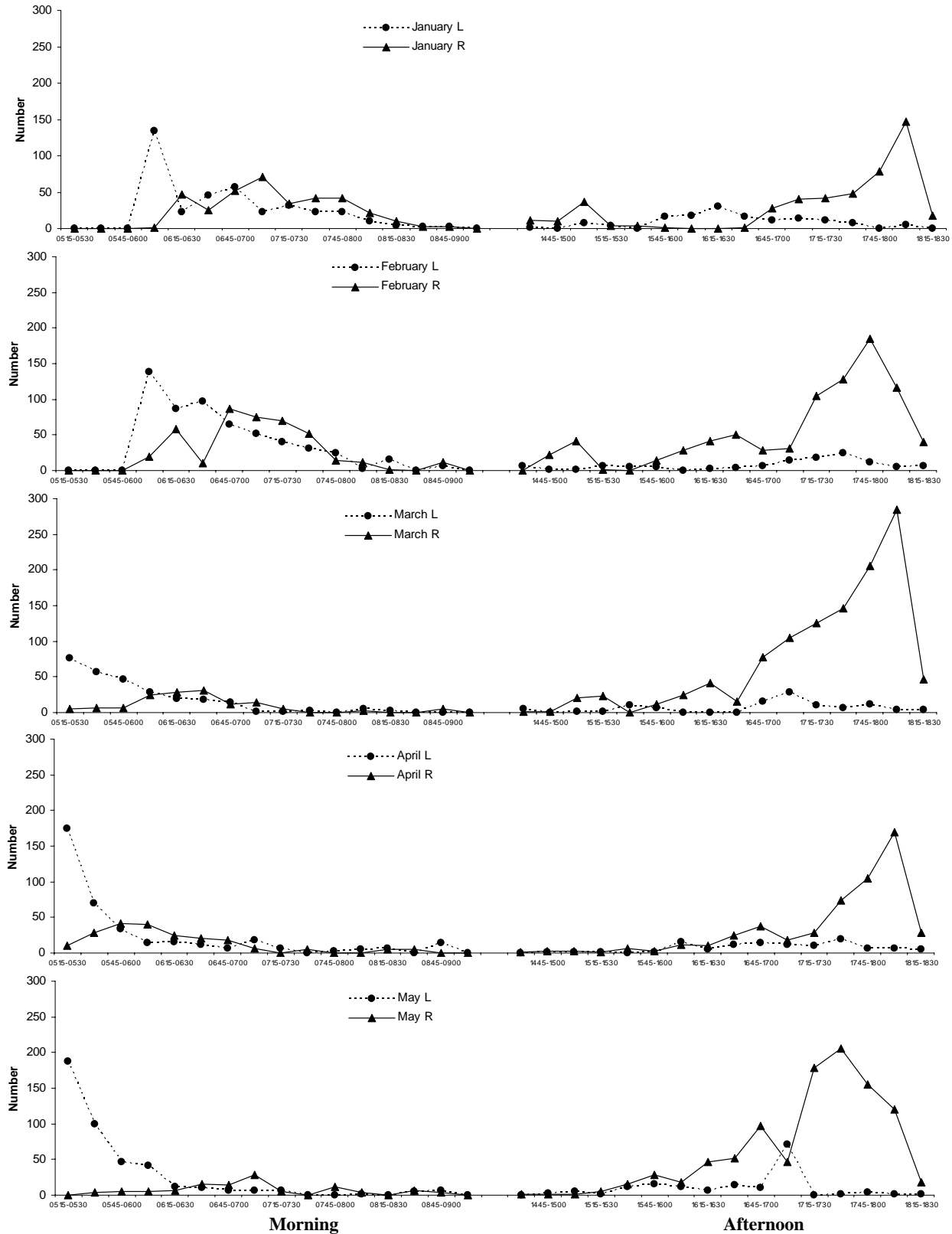
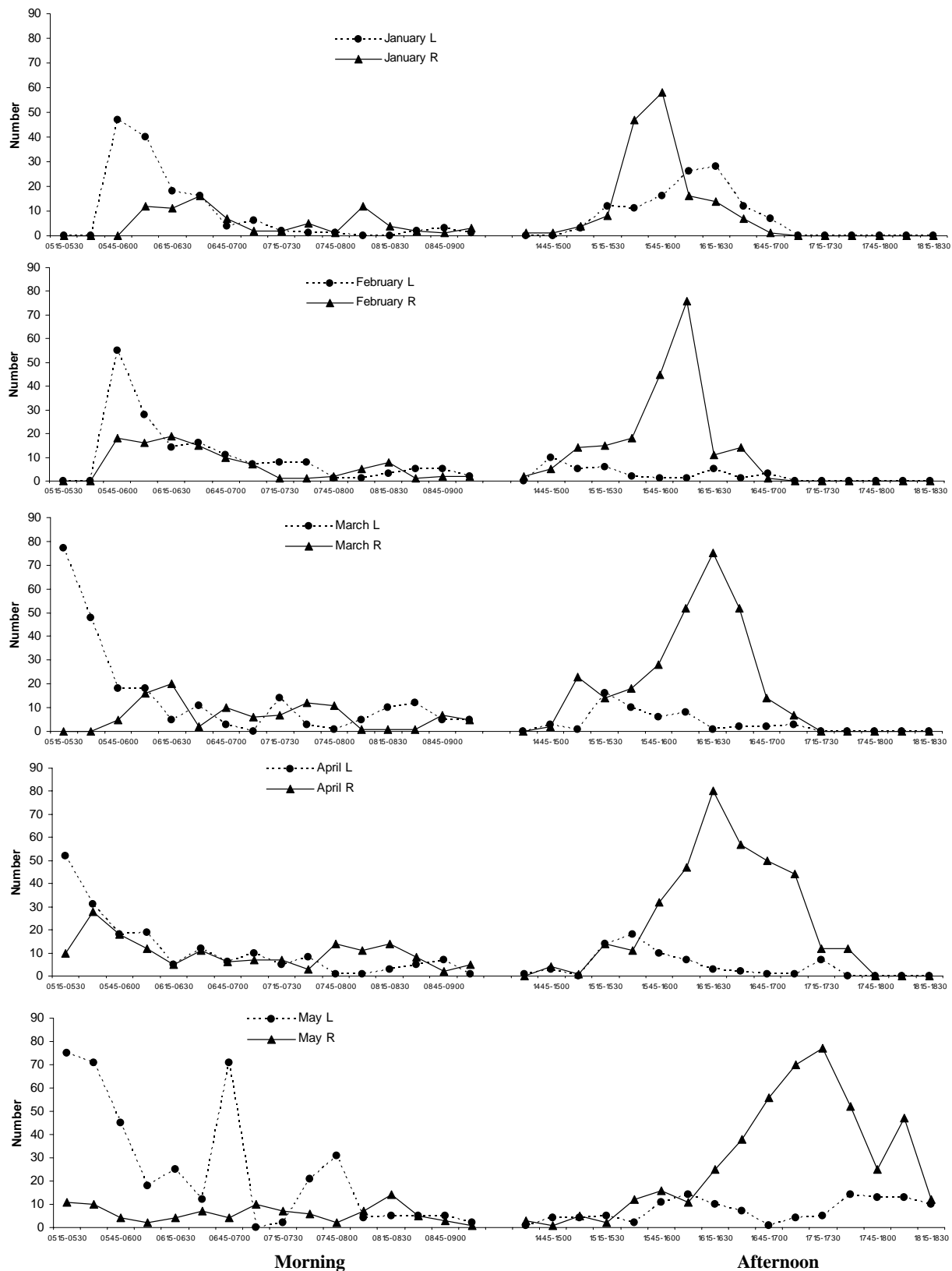


Fig. 2. Total numbers of rose-ringed parakeets as recorded for morning and afternoon hours in roost II



nest cavities. In March, the rhythm of parakeet movements were not as frequent, might be due to the breeding behavior. In April and May, more or less a comparable number was recorded leaving the roost I in the morning, while the returning parakeets were more in April.

In the afternoon, usually the departures from the roost I were not frequented, while the returning parakeets were large. In present investigations, maximum parakeets returning to the roost I took place in March, in all 1130 birds came back to the roost, whereas the minimum numbers 457, were recorded in April (Fig. 1). Returns were high in March, could be attributed to the elevated birds searching for the potential nest cavities and spend more time in foraging. The number reduced in April, following a fall in the searching activities. May, considered as dry hot month, the parakeets finally seem to settle the recruitment of the young as a newly emerged flock. Thus, with the more parakeet numbers, the returning parakeets augmented to the communal roost.

Information on the parakeet diurnal rhythms in roost II is provided in (Fig. 2). Compared with the former, roost II was smaller in dimensions. For the morning hours of leaving, numbers of parakeets were highest in May and least in January. The roost II, located at a considerable height than that of roost I. In the afternoon, the returns were maximum in May, possibly following a successful coitus formation and recruitment of the new fledglings in the flocks, both the male and female parakeets were actively involved in bringing the nutritious food to the fledglings, in particular of the hot and dry summer spells, to foster their survival.

DISCUSSION

It is evident that for both the rose-ringed parakeet communal roosts, variations with regard to numbers of parakeets occurred with respect to location and tree species and numbers. Roost I was undoubtedly, larger than the II with respect to area and population of trees. Some of the trees viz. *Eugenia jambolina*, *Terminalia arjuna* and *Cedrella toona* carried cavities most of which served as potential parakeet nests in roost I, while the numerical dominance of such trees in roost II was considerably less. Interestingly, *Salmalia malabarica*, in the present studies, did not contain any nest, but served as the main roosting site for the rose-ringed parakeet.

A communal roost with old and suitable trees in the study area, located in close proximity to the parakeets, served as a favorable roosting site to the rose-ringed parakeets. It is of interest to point out that such a roost provides an easy access to the nutritious food crops viz. oil-seeds and ripening wheat and maize, along with mango and date-palm groves, to the parakeets in the breeding season. When the brooding females also start to make short trips to the nearby fields to fetch food for the young in the closing stages of the breeding season, they bettered the food

fetching ability by the males, to possibly enhance the survival of the chicks.

Leaving of the parakeets from both roosts took place at early morning hours before the sunrise. In the beginning, there were large sized parakeet flocks left both the roosts and later with the progression of daylight, their exit from the roosts slowed down. Seemingly, time of parakeet departure was related with the length of the day, as in cold months of January and February, the leaving of birds started sometime after the sunrise, but their number declined sharply following the daylight. For March and April, also the breeding season of the parakeets, numbers of birds leaving the roosts in the morning at about sunrise were substantial, possibly not only looking for the appropriate nests, but for fetching the nourishing diet for the chicks.

The rose-ringed parakeet has a wide feeding niche viz. cereals, farm crops and a variety of orchards. According to several authors, the depredations carried out by the rose-ringed parakeet amount to millions of rupees in India and Pakistan (Shafi *et al.*, 1986; Sushil & Kumar, 1994; Gupta *et al.*, 1998; Khan, 2002). In the canal-irrigated farmlands, multi-cropping farming seems fairly common and majority of the crops are cultivated within a smaller area. Whereas, it may appear advantageous to the farmers to avert covering lengthy distance, provides ample opportunities to the birds, rodents and boars to consume food items without a stress. Un-protected fields also suffer from significant losses from rose-ringed parakeets (Malhi *et al.*, 2000). The rose-ringed parakeets use certain trees viz. *Salmalia malabarica*, *Terminalia arjuna*, *Cedrella toona* and *Dalbergia sissoo*, for establishing their potential roosts and nests for many years. It is not known exactly as to why such tree species are being used for roosts and nests. Possibly, the parakeets prefer using them due to suitability of their yap. Another explanation might be that all such trees have matured for many years in the canal irrigated forest plantations in the present study area, provide safe cover to the parakeets in terms of roosting and nesting niches.

Results of the present study depict that the parakeets assembled at late afternoon and again dispersed before sunrise for varying activities. Thus, a roost can be considered as the hub of parakeet activities (Dvir, 1985; Iqbal, 1998). Movements of parakeets from and to the roost seem to continue approximately throughout the day (Roberts, 1991). Crops such as the oil-seeds (brassica & sunflower), growing nearby the roosts, are subjected to the worst bird depredations (Toor & Ramzan, 1974; Chakarvorty *et al.*, 1998). Maize and wheat, at the milky and mature stages, also suffer serious destruction from the parakeets. In roost I, at University of Agriculture, Faisalabad, availability of experimental farm crops and orchards remain throughout the year for the research purpose. As such, availability of food is not a limiting factor. The roost II was lesser in dimension, with relatively low timbered vegetation, thus, providing little roosting and nesting opportunities to the rose-ringed parakeets.

The results of the present study also represent that the communal roosts appear to be the best places for parakeet destruction, as they occur here in a fairly significant proportion. Use of aerial sprays are not likely to be useful, because of latter's proximity to the human habitations and canal irrigation toxicity. Crops viz. maize and sunflower ripening heads, coupled with citrus and guava groves, located nearby to the communal parakeet roosts, should be treated as decoy crops and used with appropriate avicides for achieving the control. But, such chemically treated food crops would likely to seriously affect the useful non-targeted species of animals. Pakistan considered as a developing country with an increasing population rate. Here, majority of the natural habitats are being transformed into the agro-ecosystems and also used as grazing grounds for livestock (Roberts, 1977; Anon, 1985). Under an intensive human population augmentation, there seems a considerable decline in the wildlife resources. Many of the surviving birds and mammals have attained the status of vertebrate pests in the croplands. The same can be said for many species of insects as well, being more diverse. Occurrence of these pests should be managed in an ecologically acceptable way so as to be of minimum deterrence to the sustainability of the enriched agro-ecosystems. Currently, there is a trend here to use the chemicals to manage the pest control in a relatively fast time, but this method barring with some success, by and large proves ecologically hazardous. Certainly, reverting to the relatively safe and effective biological control strategies, like using the nest cages installed among the croplands, bird gels, traps and placing the fearsome models among the cash crops, might be more time consuming, but rewarding with respect to achieving the sustainable avian control, along with the menace of other vertebrate pests.

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REFERENCES

- Ali, M.H., B.H.K. Rao, M.A. Rao and P.S. Rao, 1981. Bird (*Psittacula krameri*) damage to maize. *J. Bomb. Nat. His. Soc.*, 79: 201-4
- Ali, S. and R.D. Ripley, 1969. *A Handbook of the Birds of India and Pakistan*, Vol. I. Oxford University Press, Bombay, India
- Anonymous, 1985. *Atlas of Pakistan, Ministry of Environment and Planning*, Government of Pakistan, Islamabad, Pakistan
- Bashir, El. S.A., 1978. *Review of Parakeet Damage and Suggested Control Methods*. Seminar on Bird Pest problems in Agriculture, July 5-6, Karachi, Pakistan
- Beg, M.A., 1978. *Some Observations on the Biology of the Rose-ringed Parakeet*. Seminar, Bird Pest Problems in Agriculture, July 5-6, Karachi, Pakistan
- Beg, M.A., M. Inam, M.M. Hassan and A.A. Khan, 1995. Foraging behaviour of rose-ringed parakeet in sunflower protected by the reflecting tape. *Pakistan J. Agric. Sci.*, 32: 68-72
- Bruggers, K.E., R.F. Lebisky and D.E. Daneke, 1986. Blackbird roost dynamics at Miller's Lake, Louisiana: implications for damage control in rice. *J. Wildl. Management*, 56: 393-8
- Butler, C., 2002. Parrots of the World. *British Birds*, 95: 345-8
- Chakarvorty, A.K., K. Srihari, J. Chandraprakash, P.P. Reddy, N.K. Kumar and A. Vergheese, 1998. Management of Bird Pests in Oil-Palm Plantations in Karnataka. *Advances in IPM for Hort. Sci.*, 183-7
- Dvir, E., 1985. Ring-necked parakeets are trying to make it in Israel. *Nat. Israel Ltd.*, 10: 115-21
- Fiedler, L.A., M.W. Fall, R.L. Bruggers and W. Drgrazio, 1991. Rodent and Bird Problems in Agriculture and their Management in Developing countries. *Procedures 11th International Congress, Plant Protection*, 1: October 5-9, Manila, Philippines
- Forshaw, J.M., 1989. *Parrots of the World*. Blandford, London, England
- Gupta, M.K., B. Rajan and R. Baruha, 1998. Parakeet damage to sugarcane. *Indian J. Sugar*, 46: 961-7
- Iqbal, M.T., 1998. Roosts and roosting behavior of rose-ringed parakeet, *Psittacula krameri*, in croplands of Central Punjab. *M. Phil. Thesis*, P. 95. Department Zoology and Fisheries, University of Agriculture, Faisalabad
- Junipu, T. and M. Parr, 1998. *Parrots: a Guide to the Parrots of the World*. Pica, Robertsbridge, England
- Khan, H.A., 2002. Foraging, feeding, roosting and nesting behaviour of the rose-ringed parakeet (*Psittacula krameri*) in the cultivations of Central Punjab, Pakistan. *Ph.D. Thesis*, P: 152. Department Zoology and Fisheries, University of Agriculture Faisalabad
- Khan, A.A. and S. Ahmad, 1983. Parakeet damage to sunflower in Pakistan. *Procedures 9th Bird Control Seminar*, Pp: 191-5. Bowling Green State University, Ohio, USA
- Khan, A.A. and I. Hussain, 1990. Parakeet (*Psittacula krameri*) damage to standing maize crop in Pakistan. *Sarhad J. Agric.*, 2: 185-91
- Lever, C., 1987. *The Naturalized Birds of the World*. Harlow, New York
- Long, J.L., 1981. *Introduced Birds of the World: the Worldwide History, Distribution and Influence of Birds Introduced to New Environments*. Newton Abbot, London
- Malhi, C.S., 2000. Timings of Operation to Control damage by rose-ringed parakeet to maturing sunflower crops and their relationship with sowing times. *Int. J. Pest Control*, 42: 86-8
- Paton, P.W.C., C.R. Griffin and L.H. Macivor, 1982. Rose-ringed parakeet nesting in Hawaii: A potential agricultural threat. *Elepaio*, 43: 37-9
- Reddy, V.R., 1998a. Bird damage to maize crop on student's research farm at Rajendernagar, Hyderabad, Andhrapradesh. *PAVO*, 36: 77-8
- Reddy, V.R., 1998b. Studies on damage to sorghum by the rose-ringed parakeet, *Psittacula krameri*, at Rajendernagar, Hyderabad, Andhrapradesh. *PAVO*, 36: 79-80
- Reddy, V.R., 1999. Intensive damage to maize crop by rose-ringed parakeet at student's farm in a maize cultivated crop in Rajendernagar, Hyderabad, Andhrapradesh. *Ind. J. For.*, 3: 16-8
- Roberts, T.J., 1977. *Mammals of Pakistan*, Oxford University Press, London, England
- Roberts, T.J., 1991. *Birds of Pakistan*, Vol. I, Oxford University Press, London, England
- Saini, H.K., M.S. Dhindsa and H.S. Toor, 1994. Food of the rose-ringed parakeet, *Psittacula krameri*, a quantitative study. *J. Bomb. Nat. His. Soc.*, 91: 96-103
- Schaffer, Jr., E.W., 1991. Bird Control Chemicals-nature, mode of action, and toxicity. *CRC Handbook of Pest Management in Agriculture*, II: 599-610
- Shafi, M.M., A.A. Khan and I. Hussain, 1986. Parakeet damage to citrus fruit in Punjab. *J. Bomb. Nat. His. Soc.*, 83: 439-44
- Shivanarynan, N., 1980. *Role of Birds in Agriculture*. International Meeting on Wildlife Resources in Rural Development. July 7-11, Hyderabad, India
- Sushil, K. and S. Kumar, 1994. Seed damage to tree (*Terminalia arjuna*) by the rose-ringed parakeet, *Psittacula krameri*. *Indian J. For.*, 17: 151-3
- Toor, H.S. and M. Ramzan, 1974. The extent of losses to sunflower due to rose-ringed parakeet, *Psittacula krameri*, at Ludhiana, India. *J. Res., Pun. University*, 11: 197-9

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