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An Estimation of Rose-Ringed Parakeet (*Psittacula krameri*) Depredations on Citrus, Guava and Mango in Orchard Fruit Farm

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ABSTRACT

This paper presents information on the depredations of rose-ringed parakeet (*Psittacula krameri* Scopoli) on citrus, guava and mango in an experimental fruit orchard, Faisalabad, Pakistan. As one of the worst vertebrate pests, rose-ringed parakeet obliterates not only the farm crops, but also the horticultural practices substantially with considerable economic losses. For citrus, there were significant differences for the two sample means ($P<0.05$), while for mango, a non-significant difference ($P>0.05$) was recorded. For guava, the differences of means were also non-significant ($P>0.05$) in the morning and evening durations. It was concluded that less depredations took place at the unripe stages of the fruits, but an increase in fruit weight at the ripening stages, the damage was amplified. Reliance on the traditional and effective pest management methods has no effective impact to reduce parakeet depredations and therefore, encourages in the incorporation and an intelligent use of non-chemical and environmentally sustainable management strategies for crops, to minimize such depredations and resultant economic losses. © 2012 Friends Science Publishers

Key Words: Rose-ringed parakeet; Depredation; Orchards; Citrus; Guava; Mango

INTRODUCTION

The rose-ringed parakeet (*Psittacula krameri* Scopoli), commonly known as the parrot, belongs to the order 'Psittaciformes' and family 'Psittacidae'. Its sub-species inhabiting Pakistan is *Psittacula krameri borealis* (Whistler, 1986; Roberts, 1991). In its native range, the parakeet occurs in the light timbered vegetation, cultivated farms, rural and urban canal side plantations, city road avenues, roadside forest plantations, besides the university and college campuses (Paton *et al*., 1982).

The parakeet has acquired the status a serious vertebrate pest for the agricultural and horticultural crops (Shafi *et al*. 1986; Khan & Beg, 1998), with suitable roosts and nests among trees as, *Salmalia malabarica*, *Terminalia arjuna*, *Cedrella toona*, *Dalbergia sissoo*, *Eugenea cumini* and *Eucalyptus* spp, occurring in both rural and urban habitations (Iqbal *et al*., 2001). It has a wide feeding niche, and as such obliterates the food crops substantially, thus causing not only damage, but also considerable economic losses (Roberts, 1991). Fruits and vegetables form an important part of the economy of Pakistan. This is evinced from the fact that, over the last five years, the area under fruit cultivation has expanded by about 22.7%, and fruit production has increased by about 20% (Anonymous, 2004a). Concomitantly, a loss of about Rs. 150 million was also recorded due to depredatory activities by various birds (Anonymous, 2004b).

The rose-ringed parakeet serves as the worst vertebrate pest of Pakistan not only damages the food sources, but also causes considerable economic losses to farmers and national economy. Its destruction is more in Central Punjab, which easily is the hub of agriculture. In post independence, sufficient plantations were grown to promote agriculture, which over the years became large and tall trees with a beneficial impact on the roosts and nests of several birds along the canal sides and roadside forests (Shafi *et al*., 1988; Sarwar *et al*., 1989; Khan & Beg, 1998; Khan, 2002).

Citrus (*Citrus reticulata*), an invaluable and most popular fruit in Pakistan, accounts for approximately, 90% (OK) of the world's citrus, produced in Pakistan. It is also exported to countries in Asia, and Europe. Grown over 197 hectares, frequently suffers due to the depredatory impact of birds, the major being that of the rose-ringed parakeet (Mehmood & Sheikh, 2006). The guava (*Psidium guajava*) is grown in all the four provinces of Pakistan, over 58.5 thousand hectares, and with a total production of about 470 thousand tons. Like citrus, it is also exported to Southern Asian countries (PARC, 2004). The mango (*Mangifera indica*), is considered as most approved fruit of the country.

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It is cultivated over 94 thousand hectares, and has an annual production of 916 thousand tons. It is progressively exported to parts of Asia and most of the Europe and North (Ministry of Agriculture, 2004).

Of the major avian fruit pests in Pakistan, the rose-ringed parakeet undoubtedly, accounts for the maximum damage and substantial correspondingly, the substantial economic losses, in the unguarded locations (Khan & Ahmad, 1990; Khan & Beg, 1998). The situation does not appear to be very different in India with regard to fruit losses by the parakeet (Babu & Muthukrishnan, 1987; Chakarvoty *et al*., 1998; Gupta *et al*., 1998).

Management practices for the rose-ringed parakeet have been only undertaken scarcely, mainly in captivity (Butler, 2003), while in the field, they have remained wanting. Paucity of available information in the croplands not only with respect to the damage, but also managing the parakeet populations sustainably, required further concerted studies. Aim of such work would largely focus on incorporating sustainable methodologies for avian management in food crops. Present studies were therefore, aimed at anticipating large numbers of parakeet populations on three sampled fruits in the unguarded conditions, indicating a maximum probability of damage, and to suggest using some ecologically beneficial methods to reduce such depredations.

MATERIALS AND METHODS

Estimation of damage profiles of the rose-ringed parakeet on citrus, guava and mango were undertaken in the unprotected conditions, in a fruit orchard farm, Faisalabad for five months viz. March and April and June through August, and again in November and December, 2008. All fruits comprised half and acre in dimension, and were bordered by fodders, maize, sugarcane and wheat. In all, 50 guava, 17 mango and 77 citrus plants were growing here. Depredations on all three fruits were estimated through direct field observations, applying the probability sampling (Simple Random Sampling) method. For convenience, five guava plants were randomly selected and ascertained in terms of damage proportions, by the peculiar parakeet nibbling on both attached and dropped fruits. Data was recorded both in the morning and evening hours, and those depredated, were discarded and excluded from counts the following day. Direct field observations starting in the morning and yet again in the evening were watchfully recorded. Inflicted fruits were numbered, weighed and placed in polyethylene bags to record any gain or loss in fruit weight along with intensity of parakeet depredations.

Data obtained was statistically analyzed using t-test for comparison between morning and evening durations regarding damage percentage by parakeets. The effect of days on damage percentage and number of parakeets was worked out using simple linear regression analysis.

Table I: Morning and evening visitations of rose-ringed parakeet in a citrus fruit crop in an agro-ecosystem in Faisalabad, Pakistan

Variable	N	Mean	SE Mean	Minimum	Maximum
Morning	34	25.4	1.14	14.00	41.00
Evening	34	22.8	0.81	15.00	34.00
Total	34	48.2	1.77	31.00	75.00
Damaged fruits	34	4.2	0.279	2.000	8.000

Table II: Intensity of morning and evening parakeet depredations on mango for the study period in an agro-ecological system in Faisalabad, Pakistan

Variable	N	Mean	SE Mean	Minimum	Maximum
Morning	62	53.3	2.38	25.00	115.00
Evening	62	48.3	1.19	22.00	116.00
Total	62	101.6	4.05	58.00	
Damaged fruits	62	6.4	0.35	2.000	
Fruits weight (g)	62	484.8	17.90	147.0	
Weight per fruit	62	86.8	4.32	25.00	

RESULTS

Observations on citrus: Information on 34 observations for the parakeet visitations on citrus in the morning averaged 25.44, while in the evening, it was 22.80. In all, 143 fruits (citrus) were depredated by the rose-ringed parakeet, with a mean 4.2 (Table I). Diurnal damage to the fruits showed non significant differences ($P>0.05$) was analyzed by t-test (Table II).

The regression equation predicted for the parakeet visitations on citrus was $Y=174.9–0.46X$ (Y=number of visits; X=day of the year), while the coefficient of estimation R^2 (38.3%), indicated a negative relationship between the parakeet visits and the days of observation (Fig. 1) and therefore, an overall trends for the parakeet depredatory visits in the morning and evening were found to be invariably comparable (Fig. 2).

Observations on mango: For the 62 observations on mango in morning and evening, it was apparent that, the damage ranged between 53.30 and 48.32, respectively while the total such depredations were found to be 6.4 Average mango fruit weight recorded was 484.8 g (Table II). Data revealed no significant differences ($P>0.05$) among depredated fruits in morning and evening hours ($u_1=u$), while the F-test showed that, the means proved statistically significant ($P<0.05$) of the of the parakeet depredations.

Estimation of the predication equation also indicated a sufficiently strong coefficient of regression R^2 (56.2%) for the parakeet visitations (Y) on mango, $Y=25.5-0.12X$ (damage percentage; Fig. 3). The damage trend for the morning and evening as expressed in relation to increase in fruit size was determined using the equation:

$Y=-183.5+1.65X$ (Fig. 4).

Observations on guava: For 34 days of observations mean parakeet visit in the morning was 25.4%, while for the evening it was 22.8%. Of 1855 damaged guava fruits

Fig. 1: A regression line (negative relationship) indicating the trend of parakeet visitations on a citrus fruit farm in an agro-ecological system in the study area

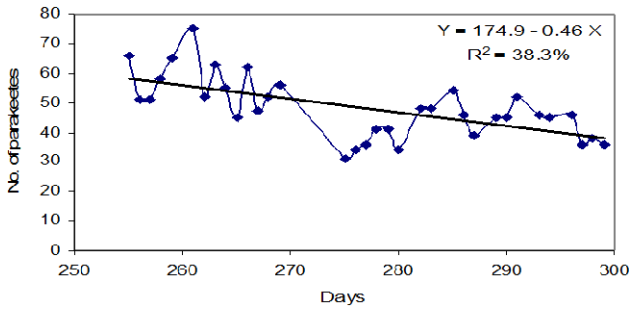
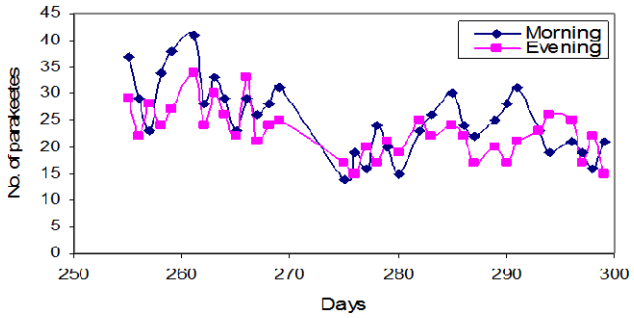


Fig. 2: Daily rhythms of parakeet depredations in the morning and evening hours of observation



examined, average damage proportion was 50.1, while the average fruit weight was 18.33 g, while for the evening, it was 23.32 g. Of 1855 damaged guava fruits examined, average damage proportion was 50.1±5.18, while the average fruit weight was 18.33±0.71. Statistically, there was no-significant difference (P>0.05) for both morning and evening parakeet visits to the field.

The regression equation, Y= -0.1859X + 32.992, referred to a negative relationship (R^2 0.287) indicating a negative relationship for the parakeet visits to the field in morning and evening durations (Fig. 5).

DISCUSSION

Present studies indicated that there was substantial rose-ringed parakeet damage on three sampled fruit orchards on a large landscape. Maximum depredations occurred in the early morning and again in late evening. In both instances, following the nightly roost rest, and before departing for their roost in the evening, the depredating tenacity seemed higher in the absence of management devices. There was also a fairly less expenditure of energy as there was a shorter distance to travel from and to the roost.

For citrus, there were comparable intensities of depredations in the morning and evening hours, while for guava and mango, there occurred fluctuations in the

Fig. 3: Regression analysis for parakeets visits to mango with the prediction equation

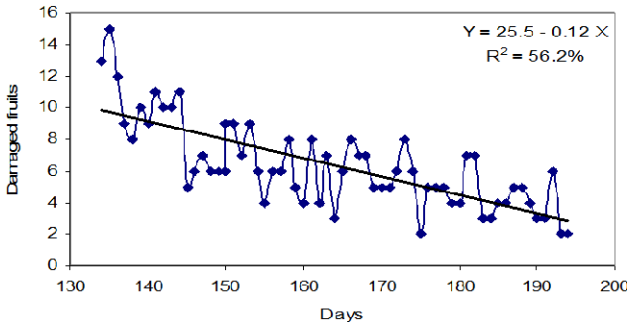


Fig. 4: Daytime parakeet visitations recorded on mango fruit orchard in the study area

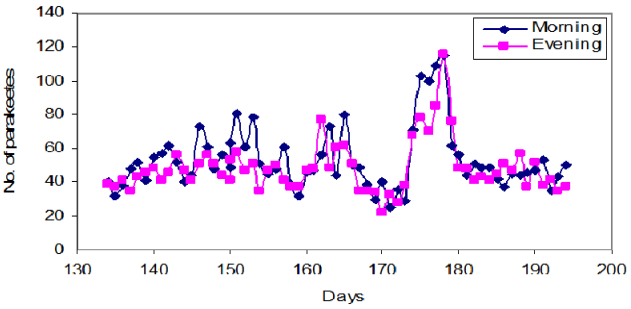
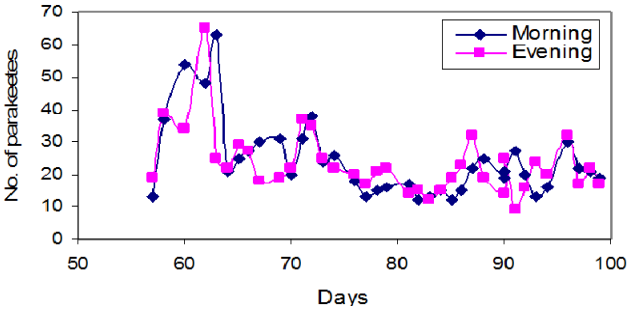


Fig. 5: Daily day light hours depredating trends recorded for the rose-ringed parakeet on guava



morning and evening times of parakeet visitations. Possibly, the parakeets spend their much of the time during daylight hours in and around their roosts, the hub of activities of many birds, and depart from the roosts at about sunrise in search for food, following the night quiescence, and return again to the roost, following the daylong activities. Similar reports regarding some other birds have also available (Mabb, 1997; Harms & Eberhard, 2003; Gordo, 2006). The parakeets invariably incurred a trouble free depredation, which might have been averted through the application of the management devices. Seemingly, there occurred significant variations among the four weeks in a month and those of the three sides of the field in terms of the bird visitations and corresponding damage, however non-significant interaction occurred among the monthly weeks

and sides of the field. The fact that parakeets cause damage to the fruit orchards is due to the wide feeding niche of this bird, focusing its feeding on cultivated and non-cultivated food items (Gupta *et al*., 1998). The introduction of canal irrigation in this region more than a century ago, well before the partition of Pakistan and India, has had a beneficial impact in terms of suitable roosting nesting and feeding efficiencies by many birds and mammals. Over the years, using traditional methods of crop protection in wake of extensive multiple cropping systems, although provided some respite to the farmers, but predominantly, their impact remained restricted (Dechant *et al*., 2003). Present scenario has continued in this region for a long time, (Sushil & Kumar, 1994; Gupta *et al*., 1998), with a considerable damage to crops and significant economic losses. Present studies also point out to the massive depredations to both mango and guava in attached and dropped conditions, while no control measures had been taken. Unquestionably, the parakeets preferred more maize and sunflower in nearby roosts and here obliteration was exceedingly intensive.

Focus on management of avian pests has received a far less attention in Pakistan and India, possibly due to aerial mode of life and the related complexities (Anonymous, 1995). As such, the control aspect requires more logical and environment friendly approach, to protect the chemically manifested agro-ecosystems. Sustainable methods viz. mainly the repellents, therefore, appear to be the favorable alternative to alleviate the productive food crops of the rose-ringed parakeet destruction.

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