

Short Communication

Some Observations on Fruit Used by Birds and Egyptian Fruit Bat *Rousettus aegyptiacus* on Qeshm Island, Southern Iran

HOSSEIN ZOHOORI^{1*}, BAHRAM H. KIABI², MAHMOUD KARAMI³,
NEMATOLLAH KHORASANI³, BIJAN F. DARESHOORI⁴ & MOHAMMAD H.
DAKHTEH⁴

1. Dept. of Environmental Science & Energy, Science & Research Branch of Islamic Azad University, Tehran

2. Dept. of Biology, Shahid Beheshti University, Tehran

3. Dept. of Fisheries & Environment, Tehran University, Karaj

4. Environmental Office, Qeshm Free Area, Hormozgan, Iran

* Correspondence Author. Email: h_zohoori@yahoo.com

Received 6 October 2007; accepted 21 October 2007

در این بررسی وضعیت جمعیت و پراکنش خفاش میوه‌خوار *Rousettus aegyptiacus* در ایران مورد بحث قرار گرفته و حضور آن را در نقاطی از جنوب ایران خصوصاً جزیره قشم تأیید شده است. بر پایه بررسی فضولات، محتویات معده، بقایای باقیمانده از میوه‌ها و مشاهده مستقیم، میوه‌های مورد تغذیه آن از ده گونه از درختان نیز مشخص شده است. برخی میوه‌ها مانند خرما (رقم‌های مختلف) و کنار که در حدود هشت ماه از سال در جزیره محصول دارند، مورد تغذیه انسان، خفاش و پرندگانی نظیر طوطی صورتی، بلبل خرما، پری‌شاهرخ و انواع گنجشک قرار می‌گیرند در این بررسی همپوشانی کمی بین خفاش میوه‌خوار و پرندگان مشاهده شده است.

Introduction

Qeshm Island in the Persian Gulf is a stepping stone between the two mainlands of Iran and the Arabian Peninsula. It has a hot-dry climate and low rainfall (average annual temperature is 27° and average annual rainfall 248 mm). It covers an area of 150,400 ha, making it the largest island in the Persian Gulf.

In the Qeshm mangrove forests (mainly *Avicenna marina*), the avifauna is very diverse, some species being winter visitors and others classed as residents. The main food resource of some bird species are the fruits and seeds found in Qeshm. People share the tastes of birds for the fruit of some trees such as date palm *Phoenix dactylifera* and Christ's thorn *Ziziphus spina-christi*.

The Egyptian fruit bat *Rousettus aegyptiacus* ranges from the eastern Mediterranean to southern Pakistan and Africa (Karataş *et al.* 2003). Published data on the distribution of Egyptian fruit bat in Iran show it occurs in some parts of southern Iran (Zohoori 2007)

mainly on Qeshm Island (Zohoori 2002a, 2002b, Zohoori *et al.* 2005, Zohoori 2007), in Jahrom (Lay 1967, Zohoori *et al.* 2004, Zohoori 2007) and in Baluchestan (Zohoori 2007).

The diet of Egyptian fruit bat has not been studied in Iran (DeBlase 1980, Etemad 1984), but some new data are reported from Syria (Shehab & Mamkhair 2004).

This survey reports on the diet of the Egyptian fruit bat and on how its preference for feeding on certain fruit trees on Qeshm Island is shared by several frugivorous bird species.

Methods

This survey was conducted from April 2004 to March 2006 on Qeshm Island (26°32'–26°57'N, 55°15'–56°15'E; area 1504 sq km), which is in Hormozgan province, southern Iran. We analysed the Egyptian fruit bats droppings and stomach contents (11 dead fruit bats – caught in fishing nets over date palms and one bat captured by hand net on a Christ's thorn) and also the remains of partly-consumed fruit, and



Figure 1. Remains of fruit eaten by Egyptian fruit bat *Rousettus aegyptiacus*.



Figure 2. Egyptian fruit bat *Rousettus aegyptiacus* droppings on leaves.

we added the data gathered from direct observations. All bird data came from direct observations (although four dead orioles were found). Traditionally, fruit trees are planted in gardens and date palm gardens surround houses, but they comprise only a tiny part of the habitat of this sizeable island. The feeding signs of Egyptian fruit bat (tooth marks or tiny holes on chewed fruits; red-coloured droppings) are very different from those of birds (the holes are different shapes) (Figs. 1–2), and although sometimes we observed birds and bats feeding on fallen fruit beneath the trees, these observations were temporally separated (fruit bats at night between mid-night to near sunrise versus bird in the day after sunrise to near sunset).

Results

Table 1 lists fruit trees visited by Egyptian fruit bat and bird species and those damaged by frugivorous species, this evidence being obtained from local people, our own observations, from Egyptian fruit bats caught in fishing nets and from feeding signs Egyptian fruit bats fed on the fruit of nine of eleven tree or plant species (Table 1). We did not observe any signs of feeding on fruits of tamarind *Tamarindus indica* L. or mangrove *Avicenna marina* (Forssk.) Vierh.

Table 1 shows that particular fruit, especially those of date palm and Christ's thorn are favoured by birds, the feeding rates being estimated from the extent of droppings and the amount of partly-consumed fruit. From a

number of sources of evidence – local people, birds tangled in fishing nets, feeding signs and direct observations, Rose-ringed Parakeet *Psittacula krameri*, White-eared Bulbul *Pycnonotus leucotis* and Golden Oriole *Oriolus oriolus* fed mostly on dates and *Passer* spp. on dates and the fruit of Christ's thorn).

Discussion

Egyptian fruit bats feed on a wide variety of soft fruits, buds, and young leaves, as well as nectar and pollen. There are at least 24 species of tropical and subtropical plants that it has been recorded as consuming (Kunz 1982). A study in Africa showed that the Egyptian fruit bat feeds entirely on fruit (Thomas & Fenton 1978). In Syria it feeds mainly on kaki *Diospyros chinensis* and Japanese plum (Chinese loquat *Eriobotrya japonica* (Shehab & Mamkhair 2004), while date palm and Christ's thorn are thought to be its main food in Iran (Zohoori 2007).

Table 1 shows that the major food sources of the Egyptian fruit bat on Qeshm Island are date palm and Christ's thorn, probably because the island's varieties of these species fruit in eight months of the year. Together they constitute the bulk of the bat's diet as well as that of Ring-necked Parakeet, White-eared Bulbul and the sparrows. Although the feeding niches of the fruit bat and these three birds overlap broadly in Qeshm Island, the bat's niche is much broader because it supplements its diet with seven other plant species.

Short Communications

Table 1. Fruits eaten by Egyptian fruit bats *Rousettus aegyptiacus* and bird species on Qeshm Island from April 2004 to March 2006. FB=Fruit bat, RP=Rose-ringed Parakeet *Psittacula krameri*, WB=White-eared Bulbul *Pycnonotus leucotis*, GO=Golden Oriole *Oriolus oriolus* and SS= sparrows *Passer* spp. N=Number of tree, Area size of plant coverage based on Ghahreman *et al.* (2000).

| Fruit(s) Month | Area size (ha) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|--|-------------------|------------------|------------------|-------------------------|--------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------------|------------------|------------------|
| Date palm <i>Phoenix dactylifera</i> L. | 200.000 | - | - | FB, RP, WB, SS | FB, RP, WB, GO, SS | FB, RP, WB, SS | FB, RP, WB, SS | FB, RP, WB, SS | FB, RP, WB, SS | FB, RP, WB, SS | FB, RP, WB, GO, SS | - | - |
| Christ's thorn <i>Ziziphus spina- christi</i> (L.) Desf. | 0.100 | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS | - | - | - | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS |
| Chinese jujube <i>Ziziphus jujube</i> Mill. | 0.010 | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS | - | - | - | FB, RP, SS | FB, RP, SS | FB, RP, SS | FB, RP, SS |
| Tropical almond <i>Terminalia catapa</i> L. | 0.100 | - | - | FB | FB | - | - | - | FB | FB | - | - | - |
| Banyan fig <i>Ficus bengalensis</i> L. | 5N | - | - | - | - | - | FB | - | - | - | - | - | - |
| Common mesquite <i>Prosopis juliflora</i> (Swartz) DC | 150.000 | - | - | - | - | FB | - | - | - | - | - | - | - |
| Chinaberry <i>Melia azedarch</i> L. | 0.001 | - | - | - | - | - | FB | FB | FB | - | - | - | - |
| Neem <i>Melia [Azdirachta] indica</i> (Adr. Juss) D. Brandis | 0.001 | - | - | - | - | - | FB | FB | FB | - | - | - | - |
| Sebesten plum <i>Cordia myxa</i> L. | 0.010 | - | - | FB | FB | - | - | - | - | - | - | - | - |
| Tamarind <i>Tamarindus indica</i> L. | 50N | - | - | - | - | - | - | - | - | - | - | - | - |
| Mangrove <i>Avicenna marina</i> (Forssk) Vierh. | 20000.000 | - | - | - | - | - | - | - | - | - | - | - | - |

Table 2. Numbers of Egyptian fruit bats *Rousettus aegyptiacus* and bird species observed on fruit on Qeshm Island.

| Species Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <i>Rousettus aegyptiacus</i> | - | - | 20 | 15 | 15 | 8 | 4 | 6 | 14 | 20 | - | - |
| <i>Psittacula krameri</i> | 50 | 45 | 86 | 90 | 79 | 43 | 40 | 52 | 55 | 50 | 41 | 41 |
| <i>Pycnonotus leucotis</i> | - | - | 25 | 32 | 28 | 25 | 29 | 30 | 32 | 35 | - | - |
| <i>Passer/Petronia</i> spp. | 60 | 71 | 67 | 83 | 90 | 56 | 48 | 50 | 65 | 73 | 52 | 45 |
| <i>Oriolus oriolus</i> | - | - | - | 4 | - | - | - | - | - | 4 | - | - |

Thus Rose-ringed Parakeet, White-eared Bulbul and Golden Oriole and the sparrow spp. co-existed with Egyptian fruit bats as primary exploiters of this ecological niche. However during the study period, three sparrow species were observed, House Sparrow *Passer domesticus*, Yellow-throated Sparrow *Petronia xanthocollis* and Pale Rock Sparrow *Pe. brachydactyla*.

There was feeding overlap on the fruit of only of three tree species; dates, Christ's thorn and jujube – Egyptian fruit bats, Rose-ringed Parakeets and sparrows fed on Christ's thorn and jujube most of the year, except in June, July and August, probably because in that period they gorged on the ripe, sweet dates (Shehab & Mamkhaier 2004). When the date palms had no fruit, during November to February, all these species depended solely on *Ziziphus* fruits. The Egyptian fruit bats and Rose-ringed Parakeets have overlapped mostly from March to May and from September to October (Tables 1 & 2).

However the small areas of Christ's thorn and jujube trees (0.1 and 0.01 ha respectively) and low number of birds and bats (Table 2) were not significant enough to result in harsh inter-specific competition at those few times of day when both species were present, the bat being largely nocturnal. Because White-eared Bulbul and the sparrow species used the mid-canopy and lower layers, and because Golden Oriole is considered as a vagrant species on this island, there was no evidence of inter-specific food competition between any bird species or with the Egyptian fruit bat.

During this study, we noted that local farmers had covered some fruiting trees, such as date palm, with fishing nets or had hung pieces of plastic materials from tree branches. Our observations showed these precautions are useful methods of protecting fruit from attack of both bats and birds.

Acknowledgments: The authors would like to thank Mr. K. Kavousi and Mr. A.R. Mehrabian for botanical advice, Mrs. L. Abbasi for coordination of our work and especially Mr. A. Khaleghizadeh for his assistance with the manuscript.

REFERENCES

- DeBlase A.F. 1980. The Bats of Iran: systematics, distribution, ecology. *Fieldiana Zoology (N.S.)* **4**: i–xvii, 1–424, Chicago.
- Etemad E. 1984. *Mammals of Iran–Vol. 3*. Iran Department of the Environment, Tehran.
- Ghahreman A., Hamz'ee B. & Attar F. 2000. *Natural vegetation map of the Qeshm Island*. Qeshm Free Area Organization.
- Karataş A., Yiğit N., Çolak E. & Kankiliç T. 2003. Contribution to *Rousettus aegyptiacus* (Mammalia: Chiroptera) from Turkey. *Folia Zool.* **52(2)**: 137–142.
- Kunz T. 1982. *Ecology of Bats*. Plenum Press, New York.
- Lay D.M. 1967. A study of the mammals of Iran resulting from the Street Expedition of 1962–63. *Fieldiana Zoology* **54**: 1–282. Chicago.
- Shehab A.H. & Mamkhaier I.H. 2004. First record of the Egyptian Fruit Bat, *Rousettus aegyptiacus*, from Syria. *Zoology in the Middle East* **33**: 73–78.
- Thomas D.W. & Fenton M.B. 1978. Notes on the dry season roosting and foraging behavior of *Epomorphus gambianus* and *Rousettus aegyptiacus* (Chiroptera: Pteropodidae). *J. Zool.* **186**: 403–406
- Zohoori H. 2002a. New records of fruit bats (*Rousettus aegyptiacus*) in Qeshm Island, Iran. *Bat Research News* **43(4)**: 204. Potsdam, N.Y.
- Zohoori H. 2002b. Species diversity and distribution of bats in Qeshm Island. M.Sc. thesis, Dept. of Environmental Science & Energy, Science & Research Branch of Islamic Azad University, Tehran.
- Zohoori H., Khaleghizadeh A. & Rahimi H. 2004. New record of Egyptian roussette (*Rousettus aegyptiacus*) in southern Iran. *Bat Research News* **45 (4)**: 204.
- Zohoori H., Karami M. & Sharifi M. 2005. [A Scientific Report about Bats in Qeshm Island]. *Journal of Environmental Sc. & Technology* **23**: 69–75. [In Persian with English summary]
- Zohoori H. 2007. [A Study of Population Status & Distribution of Fruit Bat (*Rousettus aegyptiacus*) in Iran]. Ph.D dissertation, Dept. of Environmental Science & Energy., Science & Research Branch of Islamic Azad University, Tehran, Iran. [In Persian]

