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THE HABITAT USEAGE OF THE IRANIAN JERBOA (*Allactaga firouzi* Womochel 1978)

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Abstract

Naderi G., Hemami M.R., Mohammadi S., Karami M., Kaboli M., Khalatbari M.: The habitat useage of the Iranian jerboa (*Allactaga firouzi* Womochel 1978). Ekológia (Bratislava), Vol. 29, No. 4, p. 460–463, 2010.

In this study, we used the quadrate method to investigate microhabitat utilization by Iranian Jerboa in the south of Isfahan province, Iran. To investigate microhabitat selection in activity sites (outside the burrows) we compared habitat characteristics in 75 square plots in activity sites and the same number of plots in 500 meters away from activity plots in random directs as paired plots. We detected significant differences among used microhabitat variables by the species and available microhabitat characteristics as determined by Wilcoxon ($Z = 7.051$; $P < 0.001$) and Paired T test ($t = 15.7$; $df = 74$ $P < 0.001$). The species was associated with microhabitat characteristics whose values differed markedly from the overall available habitat.

Key words: *Allactaga firouzi*, habitat use, activity sites, Iran

Introduction

The Iranian Jerboa is one of the rarest rodent species in the world, since it had been reported exclusively from a single type locality (Fig. 1) all over the world (Womochel, 1978). Because of its restricted geographical distribution and habitat degradation, it had been classified as Critically Endangered in the IUCN Red List. Since there is a paucity of published information regarding the current status and basic ecology of the Iranian jerboa, its conservation status was changed to the "Data Deficient" category in late 2008 (IUCN, 2009). There are many factors that affect small mammal's vital rates and natural selection should favor those that time their activities in a manner that maximize lifetime, foraging and reproductive suc-

Fig. 1. Iranian Jerboa in its habitat (Photo by Gh. Naderi).

cess. Many investigators have inferred from their data that microhabitat features, such as vegetation structure, cover and height, relative humidity and soil properties are important community variables affecting desert rodent abundance (M'Closkey, Fieldwick, 1975). Studies on patterns of habitat use by mammals are important for understanding the mechanisms involved in their distribution and abundance. For small mammals, patterns of habitat selection reflect a variation in the availability of resources in space and time scales (Stapp, 1997). These animals use some microhabitats more frequently than others, suggesting that the animals perceive that these microhabitats differ somehow in quality (Simonetti, 1989). The aim of this study was to determine major habitat factors that effect habitat use of *Allagtaga firouzi*.

Material and methods

Study area

We conducted the study between April 2007 and February in 2009, in the small semi desert habitat located 15 kms from the south of Shahreza, in the Isfahan Province of Iran (31°56'–31°43' N and 51°53'–52°02' E). It is located about 2000 m a. s. l. and covers an area of approximately 2200 ha. The climate of the area is markedly seasonal with a dry season between May and September (<10% of the annual precipitation). Temperature is different day and night and season-to-season, with mean monthly min. -17.4 °C and max. 38.0 °C, typical of a semi desert climate, and a mean annual rainfall of 55.2 mm.

In this area the physiognomy presented a total non-woody shrub plant cover, ranging between 40 and 45%, a canopy generally between 5 and 25 cm height and a ground layer with a cover of pebble, coble and sand. We could distinguished four major habitat types in the studied area, including *Anabasis aphylla* type, *Artemisis siberi* type, *Peganum harmala* type, and uncovered soil or with very sparse vegetation.

At first we studied individual density differences in different habitat types via completely random transects. To this end, we counted the individuals' numbers in transects with 7 m wide in total habitat. Since we recorded each individual observed point with GPS, it was possible to calculate density in different habitat types. To investigate microhabitat selection in activity sites, we compared habitat characteristics along trails of each site and paired plots with general habitat characteristics of the study area. For such comparisons, we characterized the available microhabitat structure by measuring microhabitat variables of 75 used plots, and the same number in paired unused plots randomly selected from the transects. We characterized the selected microhabitat structure by measuring the same microhabitat variables from plots in used points and unused plots. For these paired plots we kept a distance of 500 m between these them.

At each sampling plot, we measured seven microhabitat variables that could potentially be influencing the spatial distribution of the species (Naderi et al., 2009). For such microhabitat measurements we plotted a 10×10 m square area surrounding the sampling points and we measured the following microhabitat characteristics: Percentage of canopy cover at crown level (total cover) estimated with the aid of a squared hard paper frame (25x25 cm), bare soil percent cover (BSC), pebble and cobble percent cover (PEB and COB respectively), *Anabasis aphylla* percent cover (AAC), and *Peganum harmala* and *Artemisia siberi* percent cover (PGH and ASC respectively). We considered the arithmetic mean of the measures of each variable as the value of the variable for the used sites and its paired plots. The normality of distribution was analyzed by a one-sample Kolmogorov-Smirnov test and variables were transformed using the square root transformation in the case of no normality (Zar, 1996). For the selection of microhabitats variables that best described differential microhabitat characteristics among classes, we used a paired T-test. Overall, the differences in microhabitat use between different habitat types were determined by the Wilcoxon nonparametric test.

Results and discussion

Our results showed that there are significant differences in individual density between different habitat types so that the highest density were recorded in bare soil and *Anabasis* type. We detected significant differences among observed microhabitat variables of the species and available microhabitat characteristics as determined by Wilcoxon analysis ($Z = 7.051$;

Table 1. Wilcoxon test results for used and unused sites in different habitat types.

Habitat types	Z	Sig.
Bare soil	7.051	< 0.001
Anabasis	1.849	0.065
Peganum	3.705	< 0.001
Artemisia	5.049	< 0.001

Table 2. Paired T test analysis results for all plots.

Variables	Observation mean (SE)	Paired mean (SE)	Paired t (df)	P
BSC	43.40 (1.39)	18.4 (0.8)	15.7 (74)	< 0.001
COB	3.00 (0.34)	7.38 (0.53)	-7.115 (74)	< 0.001
PEB	21.39 (1.26)	17.76 (1.08)	2.32 (74)	0.022
ASC	3.97 (0.36)	28.09 (1.11)	-19.587 (74)	< 0.001
AAC	20.49 (1.00)	6.34 (0.55)	12.664 (74)	< 0.001
PHC	5.15(0.57)	1.82(0.23)	11.2(74)	0.02

Abbreviations: Bare soil (BSC), Cobble (COB), Pebble (PEB), *Artemisia siberi* percent cover (ASC), *Anabasis aphylla* percent cover (AAC), *Peganum harmala* percent cover (PHC).

$P < 0.001$) and (Table 1) paired T-test (Table 2) ($t = 15.7$; $df = 74$ $P < 0.001$). The species was associated with microhabitat characteristics whose values differed markedly from the overall available habitat.

Our results are in agreement with the general pattern described for habitat use of other Jerboas. Studies on habitat utilization indicate that this species is also a macrohabitat specialist (Naderi et al., 2009). Our results suggested that *Iranian Jerboa* cannot be found in microhabitats with low bare soil cover and high cobble or boulder percent cover, as well as habitat types other than *Anabasis aphylla* or mixed types such as *Anabasis- artemisia*.

The association of small rodents with vegetation variables, which provide greater cover from above, has been shown in other studies (Murúa, González, 1982). Our study is in agreement with this pattern; the species seemed to prefer areas with higher uncovered than the covered areas, which is probably related to protection against predators. As studied showed that microhabitat features affecting desert rodent abundance (M'Closkey, Fieldwick, 1975), we can infer that site selection for burrow constructing is also affected by such variables, and burrow density is related to individual abundance as well. Iranian Jerboa were found out to be feeding on *Anabasis aphylla* plant matter (Naderi et al., 2009). Our results indicated that this species preferred locations for feeding with higher food availability, as well as enough uncovered soil, especially for lowering predation risk. As shown, microhabitat features are different in used sites from other parts of the habitat, and this result is in agreement with previous findings (Simonetti, 1989).

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