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Ecology of Iranian Jerboa (*Allactaga firouzi* Womochel, 1978) (Rodentia: Dipodidae) and its Conservation Status in Isfahan Province, Iran

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Abstract: Little knowledge has been available so far about the conservational actions and ecological characteristics of Iranian jerboa in Iran. Recently an initial field survey was done at Southern of Shah-Reza in Isfahan Province. We determined that *Allactaga firouzi* forage on plant material such as *Anabasis aphylla* and *Artemisia aucheri*. Active period of this species have been recorded from March to November. Pregnant females were found only in June to July. Results showed that *A. firouzi* is not agricultural pest. Nowadays overgrazing by livestock and mining activities in its habitat are the most significant factors threatening the survival of this species in its habitat.

Key words: *Allactaga firouzi* · Data deficient · Ecology · Conservation · Iran

INTRODUCTION

Iran is located in the Palearctic realm and is considered the center of origin for many of the world's genetic resources. Although the natural resources of the country have been carelessly exploited over the long past, environmental deterioration has increased markedly in the past few decades [1]. *Allactaga firouzi* is one of the poorest known species of the genus *Allactaga* and jerboas in general. The small mammals have been neglected to some extent with the result that a number of species are in need of conservation [2]. Little knowledge has been available so far about the conservational actions and conservation situation of this species. Little information about the current distribution of this species has been published since the first initial survey except an article that explains its ecological peculiarities of *A. firouzi* [3]. This species as an endemic species of Iranian mammals was recorded for the first time in south of Shah-Reza in Isfahan Province [4]. The IUCN/SSC classifies the species as data deficient. The Red List data (including information on habitat requirements, threats that need to be addressed and conservation actions that are recommended) can be used to identify species that require specific conservation action and to help develop the conservation programmers and recovery plans. This jerboa was long considered to be a small-range endemic to Iran, but was recently synonymised with *A. hotsoni* [5]. Since, the ecology of *A. firouzi* in Iran is poorly known, the aim of in this study was to determine some characteristics of ecology, current threats and conservational efforts has done for this species in this locality.

MATERIAL AND METHODS

Study Area: Iranian jerboa is studied within an 1800 ha area in near Mirabad village 24km south of Shah-Reza in Isfahan Province. The study area is an unprotected area and located approximately 1 Km from a main road (Shah-Reza to Abadeh) with heavy traffic and used for grazing and recreation activities. The area is semi-arid; the mean annual temperature is approximately 12°C with mean monthly air temperature ranges from 33°C (in summer) to-17°C (in winter). The mean annual precipitation is about 68 mm. The area is on a flat plain

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with a gravel substrate and sparse, mountainous semi-desert vegetation. The vegetation was dominated by *Anabasis aphylla*, a small succulent shrub. Moreover; it consisted of a mixture of *Artemisia aucheri*, *A. siberi*, *Astragalus Canadensis*, *Peganum harmalla, Kochia dana* with a vegetation height of 20-40cm. There were no trees or shrubs existing in the study area. The earth consisted of hard-packed, gray, sandy-loam soil contained little organic material.

Data Collection: This research was conducted between May 2008 and June 2009. Approximately up to six continual days in each month were devoted to the survey. For this research, spotlight was used for observation. Observer spotlighted the area with 1/000/000 candle power search light. Spotlighting commenced 1houre after sunset and involved driving at a relatively low speed (15 Km/h), while an observer scanned a 10 m stripe on the right-hand side of the motor cycle. To control for population dynamics of Iranian jerboa, this study was conducted in total area, within all seasons and different weather conditions and repeated at the same time of night when activity of jerboas were considered to be at their peak after sunset. Due to the open nature of the habitat and because of bipedal locomotion in the jerboa, detection probability of this jerboa was high and no habitat features obstructed observation. The hand net with diameter 35cm was used for catching. After capture, individuals were sexed, weighted measured and released. The following standard external measurements were recorded: body length, tail length, hind foot length and ear length. Pair of *A. firouzi* (one male and one female) was kept in captivity in a cage 60×60×60 (length, width, height) for 8 months and information on the feeding of animals were recorded.

RESULTS

Behavior and Activity: *A. firouzi* was determined to be an active animal and eager to explore surrounding habitat in the field and movement of it is more rapid. It is also very docile in captivity. We did not hear any sounds and loud noises or disturbances do not wake them, during day were taking a rest. They became active about 2-3 hours after sun sank. In captivity did not store food and did not hibernate. The number of animal seen during the one night observation periods varied (0-5) as did the number caught (0-3). The population of this species seemed to have become dense in months of August and September. The distribution pattern of the jerboas was typically solitary. In most instances they were seen singly, but occasionally as pairs.

Feeding: There was no stored food at the nest chamber of all type of burrows, only we found in tunnels of summer and winter types (n=10), some of dry foliage and foliages of *A. aphylla* and *A. aucheri*. The stomach contents of five individuals were examined and it was determined that *A. firouzi* feeds on plant material during its activity. In captivity it was determined that *A. firouzi* fed on sunflower seeds, cucumber, carrot and drunken water, but in their natural habitat free water is rarely available and they must be well able to obtain their requirements from vegetation and the oxidation of carbohydrates.

Reproduction: Pregnant females were found only in June to July in 2008. In this period 3 of the adult females examined were pregnant. There was considerable weight variation in these females (68 to 86g). All pregnant females had large nipples. We found five youngest in 20 July. The average weight of young was 50g (Table 1).

Active Period: Iranian jerboa is a small nocturnal rodent, active ends simultaneous dusk. Maximum activity for this species was recorded in 18 August 2008 that at 5:00 am. Active period of *A. firouzi* includes the March to first half November; we could not find any specimens from second half November to March 2008. This condition may be a characteristic of hibernating animals.

Co-Occurring Rodent Species: We determined one peak in population in August 2008. In summer density increased in plain when young leave from maternal nest.

Table 1: Body measurements (mm) and weights (g) of five young of *A.firouzi*

Young	Body length	Tail length	Hind foot	Ear length	Weight
1	98.46	132.12	54.31	32.16	45.21
2	105.10	139.46	46.62	38.43	48.60
3	93.21	146.38	48.55	34.68	53.10
4	101.30	150.12	49.50	36.84	50.79
5	99.16	141.82	52.10	33.71	52.67
Mean (mm)	99.44	141.98	50.21	35.16	50.07
±SD	4.34	6.87	3.02	2.49	3.24

We counted 5-10 individual at an area of 1000 m^2. This jerboa was recorded only with *Meriones persicus* Blanford, 1875 and *Hystrix indica* Kerr, 1792. because the area was unprotected it was poor in diversity of plant species and vegetation cover.

Current Concerns: Biodiversity of the Iranian plateau is being rapidly depleted as a direct and indirect consequence of human actions. The main factor affecting this single and very limited habitat occupied by this species is related to the anthropogenic transformation of the environment. This jerboa is one of most important species of this study area. Presence of this species that is data deficient and its distribution that limited to single locality in the world causes more important of its habitat. Unfortunately nowadays mining activities and recreational activities in habitat are the most significant factors threatening the survival of *A. firouzi* in its habitat. Also, buildings, roads and heavy traffic machines in the zone have become a critical environmental challenge and needs careful management efforts in order to conserve the habitat of this endemic species in Iran. We found 3 jerboas were to be killed in road accidents.

DISCUSSION

Little information about the current distribution of the *A. firouzi* has been published since the first initial survey by Womochel [8]. Darvish *et al.* [6] stated that *A. firouzi* is geographically separated from *A. hotsoni* by a chain of Boanat Mountains in south east of Isfahan Province [6]. Also, they indicated that it is limited to semi-arid desert of Isfahan [3]. Recently we found it on a flat plain south of Shah-Reza near Mirabad village. Burrows of this species including three types burrow: temporary, summer and winter burrow [7]. Burrows of most *Allactaga* species have the same structure and differ only in size and depth [8]. Burrows that we excavated had a complex organization and we determined neither of the burrows contained food storage chambers. Absence of the stored food in the excavated burrows showed that animals eat heavily during the night. This means that Iranian jerboa accumulates fat to survive during cold weather, because it was no store food in excavated burrows. Most species of *Allactaga* are facultative hibernators and enter hibernations only at low temperature of environment [8]. Çolak and Yiğit [9] also determined that there were no food storage chambers in the burrows of *A. elater*. Results showed *A. firouzi* similar to *A. elater* and *A. euphratica* feed on plant material and don't store food for hibernation. Our findings indicate that *A. firouzi* breed once a year and maximum fertility occurs in June to July. Çolak and Yiğit [9] stated young of *A. elater* were born in May. They determined that the period of March to July is breeding season for *A. euphratica* in Turkey [9]. Likewise, in spite of patrolling and setting traps in the farmlands, no instance of species was found and talk with the native inhabitations and farmers indicated the fact that this species did not exist in those fields. The main threats to this species in its locality are anthropogenic. Habitat degradation, disturbance and lack of management of this area are probably the most important factors causing decline of the species. We also suggest the development and implementation of national action plans for the species and for the conservation of its habitat. Public awareness campaigns aimed at local communities, nongovernmental organizations and politicians will increase knowledge of the species and provide a baseline for protecting it. Conservation actions towards this species must be grounded on a detailed knowledge about its ecology. This information would provide a baseline for effective management and protection of this endemic species in Iran. Future research should focus on understanding densities, habitat requirements and extent of genetic differentiation of among populations of this species. Our data highlight the importance of flat area in south of Shah-Reza in Isfahan Province to Abadeh in Fars Province, which may harbor a larger species diversity than is currently known, including regional endemics such as Iranian jerboa.

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REFERENCES

1. Fisher, W.B. 1990. The Cambridge History of Iran, Vol. 1 Cambridge University Press.
2. Armitage, K.B., 1981. Sociality as a life-history tactic of ground Squirrels. Oecologia, 48: 36-49.
3. Naderi, G.H. M.R. Hemami. B. Riazi and A. Alesheikh, 2009. Notes on ecological peculiarities of Iranian jerboa, *Allactaga firouzi* Womochel, 1978 (Mammalia: Dipodidae). J. Zoology in the Middle East, 47: 21-28.

4. Womochel, D.R, 1978. A new species of *Allactaga* (Rodentia: Dipodidae) from Iran. J. Fieldiana Zool., 72: 65-73.
5. Shenbrot, G.I., 2009. On the conspecificity of *Allactaga hotsoni* Thomas, 1920 and *Allactaga firouzi* Womochel, 1978 (Rodentia: Dipodidae). Mammalia, 73: 231-237.
6. Darvish, J.T., M. Hajjar, Moghadam Matin, F. Haddad and S. Akbary rad, 2008. New species of five-toed jerboa (Rodentia: Dipodidae) from North-East Iran. Iranian J. Sci, Iran, 19(2): 103-109.
7. Mohammadi, S., M. Kaboli. M. Karami and G.H. Naderi, 2010. Burrow Systems of Iranian jerboa (*Allactaga firouzi* Womochel, 1978). Acta Zoologica Mexicana, 26(2):457-463.
8. Shenbrot, G.I., V.E. Sokolov. V.G. Heptner and Y.M. Kowalskaya, 2008. Jerboas, Mammals of Russia and adjacent regions. Science Publishers Inc. Enfield, USA.
9. Çolak, E and N. Yiğit, 1998. Ecology and biology of *Allactaga elater, Allactaga euphratica* and *Allactaga williamsi* (Rodentia: Dipodidae) in Turkey. Turkish J. Zool., 22:105-117.