

Relationship between Food Resources and Brooding Site by Asiatic Houbara (*Chlamydotis macqueenii*) in Central Steppe of Iran

S. Aghainajafi Zadeh, M.R. Hemami., and F. Heydari

Abstract—Knowledge of food resource of the houbara which an endangered species would be a important step toward the preservation of this bird. Adequate study has not been done in this field and therefore the food sources of the houbara during the brooding season was studied in the central steppe of Iran. In order to determine the density of insect in plant communities the pitfall trap was used, positioned in five linear transects divided between plant communities and in two repetitions. The results showed that the among communities there was a significant difference in term of the number beetles and ants ($p=0.01$, $F_{2, 29}=4.66$) collectively. Also bush steppe habitat had a higher arthropoda density in comparison with the shrub steppe habitat. Considering that most houbara nests were found in the bush steppe habitat. It seems this habitat provides the most available food supply for the houbara chicks.

Keywords—Asiatic houbara bustard, Brooding season, Food resource

I. INTRODUCTION

ASIATIC houbara (*Chlamydotis macqueenii*) is a flagship species and belongs to the palaeartic fauna. In recent decades, owing to the degradation of its habitat, poaching and the practice of falconry, Houbara populations have been diminishing across the species range in such a manner that IUCN classified the species first as least concern (LR/LC), then as near threatened (LR/NT) and finally according to its current status as vulnerable (VU) (IUCN[7]). A few studies have suggested that breeding houbaras have a preference for areas with sparse vegetation or low vegetation density Combreau and Smith[4]; Mian [8]; Two studies have been carried out on the African houbara food resource in Morocco. Hingrat et al [5]-[6] show that Arthropod biomasses increased significantly in spring then decreased significantly in summer

S. Aghainajafi zadeh. Author is with the Department of Environment, Maybod branch, Islamic Azad University, Maybod, Iran (phone of corresponding author: +983117728502; e-mail: shirinaghanajafi@gmail.com).

M. R. Hemami. Author is with the Environment Department, Isfahan University of Technology, Iran, (e-mail: mrhemami@cc.iut.ac.ir).

F. Heydari. Author is with the Environment Department of Khatam province, Iran (e-mail: Heydari_doe@yahoo.com).

for beetles and in autumn for ants. No strong differences appeared between habitats within seasons, specially in spring, indicating a uniform distribution of food resources during the houbara breeding season. Habitat use differed between sexes in the breeding season. In spring when food resources were abundant and uniformly distributed in space, males preferred temporarily flooded areas and females preferred reg with tall perennials that offered both food and cover for brooding. The aim of this study was to assessing food resources (Arthropoda assemblages) which affect the bird's nesting-site and broods survival and is difference between habitats within brooding season hopefully, help the population management and increase the probability of survival for this vulnerable species.

II. METHODS

A. Study Area

The study was conducted in Harat, ($29^{\circ}50'30''$ N- $54^{\circ}23'54''$ E) with an area of 8000 ha where is located in the Southern steps of the Yazd province. The climate is warm and dry (30° c on average on july, and 2° c on average in January) with annual precipitation about 100mm. mostly falling in spring and winter. There is no permanent surface water in area except, Artesian well in north. The Landscape contains: mountains, hills and plateau and the substrate is predominantly clay and gravel. Plant species such as *Artemisia sieberi*, *Seidlitzia rosmarinus* (bush steppe habitat) and *zygophyllum atriplicoides* (Shrub steppe habitat) are dominant in the area. The vegetation is typically short (until 20 cm) with scattered tall shrubs (until 50-120 cm). Cultivated lands mainly includes herbaceous (alfalfa *Medicago sativa* and canola *Brassica napus*) and woody (pistachio *Pistacia vera*) land covers. Domestic sheep and goat and predators such as common fox (*Vulpes vulpes*) and jackal (*Canis aureus*) and prey birds (harrier *Circus* sp), (Golden eagle *Aquila chrysaetos*), little owl *Bubo bubo*) are present in the area. Gharatapeh is not currently a protected area. However, Harat Department of the Environment effectively controls the area to protect houbara populations.

B. Sampling

In the spring of 2005 the pitfall trap was used to determine, comparatively, the insect density of the plant community in the region of study. These traps constituted 300 plastic cups positioned in 5 linear transects 30 meters apart, divided between the plant community and used in two repetitions. One each transect 10 traps positioned distanced 30 meters apart. The traps were filled with water and alcohol and positioned such that the trap rim revealed the ground and allowed insects to be trapped easily, also the positioning decrease the probability of the cups being unearthed by predators. In this method the probability of being trapped was equal for both diurnal and nocturnal insects. Over the span of one month, once every few days due to speedy evaporation of the trap liquid. The traps were examined, the specimens trapped taken out with pincers and divided with regards to the plant community and categorized at species level with the help of Isfahan center for the study of Natural resiliences. During the period 2003 through 2005 houbara nests in Harat region were identified Sampling. Whenever the female bird flew away to distance itself from its nest, the vehicles were stopped and the search was continued by the group on foot across a space of some hundreds of meters in diameter near the flight and especially in its contrary direction. If and after the nest was found its precise location was determined by GPS. Finally 23 of nest found in study area.

c. Analysis

We compared mean number of insects between community by analysis of variance. SPSS software(version16) was used. Mean number of insect and nest in each habitat was shown by Excel.

Results

The variance analysis test revealed that there is a meaningful difference between the above mentioned plant community in terms of the number of beetles and ants collectively ($p= 0.01$, $F_{2, 25}= 4.66$) (graph. 1). Graph 2 shows that the average number of insects in the bush habitat (Artemisia and Seidlitzia community) is bigger than that of the shrub habitat (Zygophyllum community). Graph 3 shows the number of houbara nest for each habitat and reveals the preference of the bird for producing chicks in the bush habitat over the other habitat. Our results showed that most houbara nests were found in Artemisia and Seidlitzia communities where the sources of food

(Arthropoda) were more plentiful in comparison with the Zygophyllum community. The main foods source of houbara chicks during the first few weeks is constituted by invertebrates. It seem in the location of our study the female bird choose sites with adequate food supply and coverage to produce its offspring. In this region of Iran, in the winter the houbara situates itself in field and feed on vegetable protein with the start of mating season, however, the bird levels the farmland in the favour of the steppe and therefore

choosing a location for breeding becomes relate to the existence of adequate food sources (Insects). The results of this study in agreement with those of Hingrat et al. Who carried out studies on houbara food sources in Morocco and concluded that the amount of available food sources determines the female houbaras choice of brooding site in in this area.

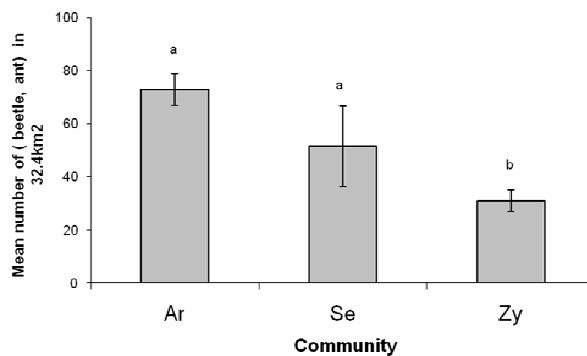


Fig. 1 Mean ± SE number of ants and beetles in each habitat.

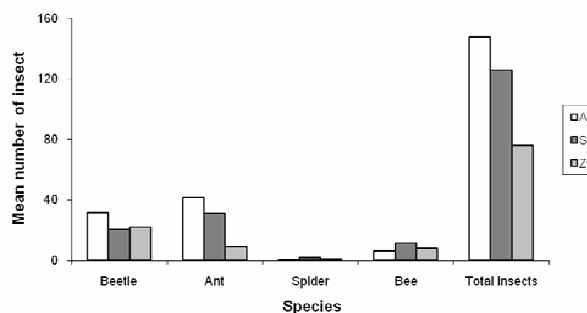


Fig 2 Mean ± SE number of total insects in each habitat

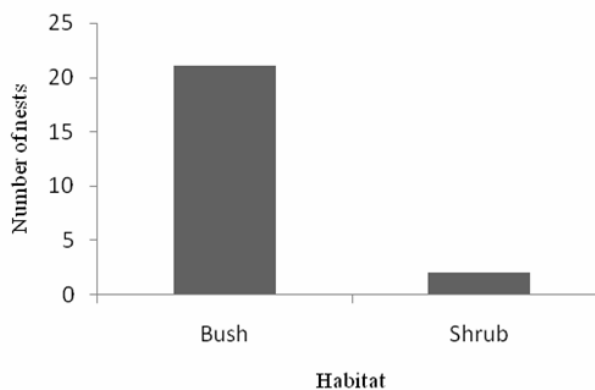


Fig. 3 Number of nests in Bush and Shrub steppe habitat

III. DISCUSSION

Our results revealed most of the nest found in bush steppe habitat that from availability of food resource is higher from shrub steppe habitat. Main food of chicks is invertebrate in first several weeks of life. In our study houbara selected brooding site based on feeding and hiding cover. In winter houbara concentrated in Alfa Alfa fields and feed on vegetable protein. In brooding season houbara leaved fields

and scattered in steppe. Results of a study by Yang et al [9] suggested that density of shrub and grass cover were the main determinates of houbara breeding habitat selection. We think in our study beside above variables, availability of insects was important factor. Brooding site was related to food resource availability. Our results is in agreement with study of Hingrat et al that revealed abundance of Arthropoda was affect in brooding selection by houbara.

REFERENCES

- [1] Aghainajafi zadeh., S et al., 2010. Wintering habitat use by Asiatic houbara bustard in central steppe of Iran. *Journal of Arid Environment*. 74: 912-917.
- [2] Aghainajafi zadeh, S. 2009. Breeding habitat use by Asiatic houbara bustard in central of Iran. The second European congress of conservation biology, Prauge.
- [3] Aghanajafi Zadeh, Sh., 2009. The Ecology of Houbara bustard (*Chlymidotis macqueenii*) in Yazd province. Iran. Ph.D. Thesis. Islamic Azad University. Science and Research branch.
- [4] Hingrat, Y., Ysnel, F., Saint-jamle, M., Lecuziat, J., Beranger, P.M and Lacroix, F., "Assessing habitat and resource availability for an endangered bird species in eastern Morrocco". *Biodiversity and Conservation*. J., vol. 16, pp. 597-620, 2007.
- [5] Hingrat, Y, Saint-Jamle, M., Ysnel, F. (2007). Habitat use and mating system of the houbara bustard (*Chlmydotis undulata undulata*) in a semi desert area of north Africa: implication for conservation. *Journal of Ornithology*, 148: 39-52.
- [6] IUCN Red List of Threatened Species. 2008. IUCN. [http:// www.redlist.org](http://www.redlist.org)
- [7] Mian, A., 2003. On biology of houbara bustard (*Chlmydotis undulate macqueenii*) in Balochistan, Pakistan: animal population sharing habitat. *Journal of Biological Science* 3, 782-796.
- [8] Yang, W.K., Qiao, J.F., Combreau, O., Gao, X.Y., Zhong, W.Q. (2003). Breeding habitat selection by the Houbara Bustard *Chlmydotis macqueenii* in Mori, Xinjiang, China. *Zoological studies*, 42(3):370-475.