Trakya University Journal of Scientific Research
Series B, Volume 2, No 2, 75 -78, 2001
ISSN 1302 647 X

ECOLOGY OF THE GARDEN DORMOUSE (*Eliomys quercinus*) IN THE ALPINE HABITAT

Sandro BERTOLINO & Italo CURRADO

ABSTRACT. The ecological flexibility of the garden dormouse (*Eliomys quercinus*) enables it to live from the sea level in the Mediterranean area up to 2000 m a.s.l. Here we present data on some ecological characteristics of this species in alpine habitats. A dense rocky cover and a well developed shrub layer inside woodlands are favourable to the presence of good populations of dormice, while a continuous herbaceous layer is unfavourable. Due to the severe weather condition of the alpine areas, the garden dormouse is active only for 5-6 months, from May to September (October); this short period allows only one yearly reproduction. Winter mortality is the main factor that affects the survival of dormice on the Alps, while predation is negligible.

Key words: Garden Dormouse, *Eliomys quercinus*, Alps, ecology, habitat selection, mortality.

MEŞE FARESİNİN (*Eliomys quercinus*) ALPİN HABİTATLARDAKİ EKOLOJİSİ

ÖZET. Meşe faresinin *(Eliomys quercinus)* ekolojik esnekliği ona Akdeniz topraklarında deniz seviyesinden başlayan ve 2000m yüksekliğe kadar uzanan alanlarda yaşama olanağı verir. Bu çalışmada bu türün alpin habitatlardaki bazı ekolojik karakterleri sunulmuştur. Ormanlar içinde iyi gelişmiş bir çalılık örtü ve yoğun kayalıklarla kaplı bir alan meşe fare populasyonlarını barındırma açısından elverişli habitatlar iken geniş otluk alanlar uygun bir habitat değildir. Alpin bölgelerde hüküm süren ağır hava koşulları nedeniyle meşe faresinin Mayıs ayından Eylül (ya da Ekim) ayına kadar süren sadece 5-6 aylık bir aktif devresi vardır. Bu kısa aktif devre ona yalnız yılda bir kere üreme fırsatı verir. Kış ölüm oranı Alplerde meşe faresinin yaşamını etkileyen en önemli faktördür. Buna karşın yırtıcılardan kaynaklanan ölüm pek önemli değildir.

Anahtar sözcükler: Meşe faresi, *Eliomys quercinus,* Alpler, habitat seçilimi, ölüm oranı

INTRODUCTION

The garden dormouse (*Eliomys quercinus*) has a widespread distribution in the Palaeartic Region, where it colonizes different habitats and can inhabit coniferous and mixed forests as well as hilly and cultivated land (1). The ecological flexibility of this species enables it to live from the sea level in the Mediterranean area up to 2000 m a.s.l. in the Alps (2, 3). Such a wide distribution must correspond to an ecological flexibility, that is probably related to the omnivorous diet and the possibility to enter hibernation in winter.

The aim of this work is to draw a picture of some ecological characteristics of the garden dormouse in alpine habitats.

METHODS

In order to study the ecological adaptation of the garden dormouse to the alpine habitat, we carried out a three years study by means of the Capture-Mark-Recapture method. Furthermore, we looked into the literature for information on the ecology of the species in alpine habitats.

DI.VA.P.R.A. (Protection and Exploitation of the Agricultural Resources Department) Entomology and Zoology. Via L. da Vinci 44, 10095 Grugliasco (TO), Italy.
Phone +39 011 6708535, Fax +39 011 6708586 , E-mail: bertolin@agraria.unito.it

RESULTS AND DISCUSSION

Habitat selection

Habitat selection of the garden dormouse has been investigated in some research conducted in different areas, mainly in the Alps (3, 4, 5, 6).

Patriarca and Debernardi (3) recorded the habitat features and the presence of small mammals in areas where they conducted trapping activity in the Gran Paradiso National Park. A dense rocky cover and well developed shrub layer were favourable to the presence of good dormice populations; whilst the overstorey cover (if over 25%) and their species composition seems to have a minor influence. Considering the proportion of dormice caught in homogeneous sub-areas inside a trapping-grid of 4.6 ha, Bertolino and others (6) evaluated the habitat selection at this level. Every habitat, with different degree of vertical structural layer of vegetation and rocky cover, was used in proportion of their availability, except one with a high and continuous herbaceous layer and reduced rocky and shrub cover that was used less than expected. Le Louarn and Spitz (4) conducted their analysis at a micro scale, considering habitat characteristics at the trap-line level. Favourable to the presence of dormice were: presence of rock and stones, reduced and fragmented herbaceous layer, a not too dense low and high ligneous layer.

It is difficult to get a comprehensive picture from studies that look at a different habitat scale level. Anyway, the presence of rocks and stones, useful as refuges from predators and probably for nestling and hibernation, a reduced and not continuous grass cover, and a diversified ligneous layer, are factors that positively affect the abundance of the garden dormice in the alpine habitat.

Activity and hibernation

The severe weather condition of the alpine areas restricts the activity season of the garden dormouse to five months: from May to September (4, 7, 8). This short period allows only one yearly reproduction. Reproductive females suffer a weight loss associated with delivery and lactation and, in spite of their high growth rate in August, they need to be active for more time in September (9). In years of bad weather in September, the reproduction cost could involve a higher mortality rate in females.

Winter survival

The life-span in captivity of the garden dormouse is up to 5 years (10), but in nature animals seldom live more than 2-3 years (6, 11, 12). In alpine habitats the main factor that affects the survival of the garden dormouse is winter mortality. Survival during hibernation depends on fat reserves stored during the active season; in the alpine habitat, where the weather could be severe, winter mortality may reach a high value. Winter survival is generally evaluated considering the proportion of animals that are caught from one year to the other during trapping studies. It must be pointed out that this value corresponds more exactly to the survival of the animals on the trapping grid. Researchers do not know if animals have really died, if they emigrated to other areas or simply shifted their home range outside the trapping area. Adult winter survival of garden dormice on the trapping grid could fluctuate between low and medium values in the Alps (15-50%), and between low and high values at low altitude (17-67%) (5, 6, 13). Juveniles survival on the trapping grid is low in the Alps (22-32%), while it may be high (42-86%) in some plain areas (5, 6, 13). These differences could be due to a different dispersal rate, but a higher mortality during first hibernation in the Alps is very likely.

Predation

Myoxids are present in the diet of several predators at a low rate (14, 15). Only sometimes they could be preyed by owls and medium-sized Carnivora in a significant proportion (15, 16). To assess the influence of predation on the garden dormouse population in an alpine habitat, we evaluated the lifetime throughout the years of the animals caught in our study in Val Troncea. We considered only adults because juveniles are prone to dispersion. The losses of adults occured mainly in August and September and were related to the onset of hibernation. Only 3 individuals, out of 17 caught during 1996 (17.6%), disappeared from June to the beginning of August. These animals could have shifted their home range outside the trapping

grid, but two of them were stable in the area for more than one year, or could have died for predation or other reasons.

In the Alps, the low predation rate is probably related to the low density of the garden dormouse population and to antipredatory behaviour. Density found in different studies ranged from 1-2 individuals per hectar to 4-5 when the young joined the population (4, 6). In areas with orchards and houses the density became very high (5, 13), and probably in these cases dormice could be a more important resource for predators. The garden dormouse is less arboreal than other dormice (17) and it is frequently active on the ground (13). The selection of habitats with high rocky cover and developed shrubby vegetation (3, 4, 5, 6), as well as the possibility to refuges on trees, gives the dormice the possibility to escape predators (18, 19).

REFERENCES

1. Storch, G. *Eliomys quercinus* (Linnaeus, 1766) - Gartenschläfer. In: Niethammer, J. & F. Krapp (Ed). Handbuch der Saügetiere Europas. Band 1/I: Rodentia I. Wiesbaden: Akademische Verlagsgesellschaft: 208-225, 1978.
2. Amori, G., Cantini, M. & Rota, V. Distribution and conservation of Italian dormice. Hystrix Italian Journal of Mammalogy (n.s.) 6 (1-2): 331-336 (1995), 1994.
3. Patriarca, E. & Debernardi, P. Insectivora, Chiroptera, Lagomorpha, Rodentia and Carnivora of the Gran Paradiso National Park: Checklist and preliminary ecological characterization. Ibex J.M.E. 4: 17-32., 1997.
4. Le Louarn, H. & Spitz, F. Biologie et écologie du lérot *Eliomys quercinus* L. dans les Hautes-Alpes. La Terre et la Vie. 28 (4): 544-563, 1974.
5. Baudoin, C., Mann, C. & Taillard, C. Comparaison de la structure sociale et de l'organisation spatiale du Lérot dans les Alpes et dans le Jura. Coll. Nat. CNRS Biologie des Populations: 593-599, 1986.
6. Bertolino S., Viano C. & Currado, I. Population dynamics, breeding patterns and spatial utilisation of the garden dormouse *Eliomys quercinus* in an Alpine habitat. Journal of Zoology, 253: 513-521, 2001.
7. Mann, C.S. Etude du cycle annuel, de la démographie, de l'écologie et du comportement vis à vis de l'espace du lérot *Eliomys quercinus* dans le Briançonnais. Graduation thesis, University of Paris VI, 1976.
8. Bertolino, S., Currado, I., Azzollini, R. & Viano, C. Social organization, home range and movement of the Garden dormouse *Eliomys quercinus*. Nat. Croat. 6 (3): 303-312, 1997.
9. Bertolino S., Currado I. & Viano C. Weight growth and activity season length in the garden dormouse *Eliomys quercinus*: variation related to sex and reproductive condition. IIIth European Congress of Mammalogy, Abstract book, p. 72, 1999.
10. Baudoin, C. & Abdi, H. Une typologie des ages chez le lerot *Eliomys quercinus* (L.), au moyen de l'analyse factorielle des correspondances. Rev. Ecol. (Terre et Vie) 35: 173-181, 1981.
11. Kahmann, H. & Staudenmayer, T. Über das Fortpflanzungsgeschehen bei dem Gartenschläfer *Eliomys quercinus* (Linnaeus, 1766). Säugetierkundl. Mitt. 18: 97-114, 1970.
12. Baudoin, C. Organisation sociale et communications intraspécifiques d'un hibernant. Graduation thesis, University of Franche-Comté, Vol. I., 1980.
13. Vaterlaus, C. Der Gartenschläfer (*Eliomys quercinus* L.). Ökologie, Populationsstruktur und die Verbreitung in der Schweiz. Ph D Thesis, University of Basel, 1998.
14. Morris, P. Dormice. In: Corbet, G. & S. Harris (Ed). Handbook of British Mammals. London: Blackwell Science, 1991.
15. Scaravelli, D. & Aloise, G. Predation on dormice in Italy. Hystrix Italian Journal of Mammalogy (n.s.) 6 (1-2): 245-255 (1995), 1994.
16. Bertolino, S. & Dore, B. Food habits of the Stone Martens *Martes foina* in "La Mandria" Regional Park (Piedmont Region, Northen Italy). Hystrix Italian Journal of Mammalogy 1-2 (N.S.): 105-111, 1995.
17. Macdonald, D. & Barret, P. Mammals of Britain & Europe. Harper Collins Publishers, 1993.

18. Southern, H.N. & Lowe, V.P.W. The pattern of distribution of prey and predation in tawny owls territories. J. Anim. Ecol. 37: 75-97, 1968.

19. King, C.M. Interactions between woodland rodents and their predators. Symp. Zool. Soc. Lond. 55: 219-247, 1985.