Impact of the fat dormouse (*Glis glis* Linnaeus 1766) on hazel orchards in the area of Alta Langa and Belbo, Bormida, Uzzone Valleys (province of Cuneo, Italy): a preliminary assessment of agricultural damage

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DOI: 10.5073/jka.2011.432.057

Abstract

In the summer of 2008, the fat dormouse (*Glis glis* Linnaeus 1766), pest animal in the Langhe agricultural territory (Province of Cuneo, Italy), was studied with the aim of understanding its night invasion and feeding exploitation capacity on hazel orchards, in order to assess the resulting loss of marketable hazelnuts. Using 9 hazel orchards as study samples, dormice density, damage in cultivations and exploitation time were calculated and the results obtained were correlated. Damages happened mainly between July (when fruits start to grow) and late August (when fruits are harvested). Density (estimated by 18 nocturnal survey sessions) reached values between 4.13 and 247 vocalizing animals/hectare in the central hours of the night. The fruits loss, evaluated taking into consideration 33 plots placed inside the cultivations, accounted for 61% of the total of collected hazelnuts. Density and damage values were connected with the physical features of hazel orchards, their position in relation to wooded areas and the study period.

Keywords: *Glis glis*, hazel orchards, hazelnuts, damage, nocturnal survey, density, fruits loss

Introduction

In the Langhe territory (Province of Cuneo, Italy), over the past few years, the fat or edible dormouse (*Glis glis* Linnaeus 1766), normally present in wooded areas, has become a pest species for agriculture. It is responsible for enormous damages on hazelnuts crops which are typical cultivations of Piedmont. The decreased productivity of faulty hazel orchards required a specific study aimed at understanding dormice feeding behavior in agricultural areas.

Materials and methods

The research was carried out in the summer of 2008 (from late June to late September) in 9 hazel orchards (with different sizes and distances from wooded areas, located in five typical Langhe villages). The following cultivation parameters were analyzed: age and rows of hazel trees, spacing among these plants, number of cultivation sides bordering on wooded areas, closure of the leaf canopy of hazel groves, number of contacts between hazel trees and other trees of the wooded area. These cultivations were used as study samples for the assessment of dormice density inside the cultivations and neighboring wooded areas (Burgess et al., 2003).

The same hazel orchards were also studied in order to evaluate the loss of hazelnuts, due to feeding and fruit handling by rodents.

The dormice density was estimated by means of 18 sessions of nocturnal survey, based on detection of vocalizing animals along 2 to 4 transects, inside both the hazel orchards and the ecotonal orchard-wood zone (total transects: 210), in three standard times per night (22.30-24.00; 1.30-3.00; 4.30-6.00) (Hoodless and Morris, 1993; Jurczyszyn, 1995).

The damage was evaluated using 33 plots on the ground (plots mean area: 19.8 m^2). The plots varied in number in every hazel orchard and they were arranged gradually away from the ecotonal zone. From July to September 2008, 44,847 hazelnuts were collected in the plots and divided into the following categories: “gnawed”, “untouched” (but fallen prematurely due to dormice handling), “decayed/not grown” and “ripe” (ready for harvesting). The first three categories described the loss of marketable fruits.

Results

On average, the density values (D = number of dormice/hectare) were 1.5 to 36 times higher in hazel orchards than in wooded margins. The peak dormice activity was reached in central hours (mean value of D: 106) and between the end of July and the first half of August (D minimum value: 4.13, on July 23rd; D maximum value: 247, on August 15th). These values, recorded in specific areas for a limited period of time, are not comparable with those recorded in nature (0.6 to 36 dormice/ha) (Kryštufek et al., 2003).

The fruits loss accounted for 61% of collected hazelnuts (27,523 damaged fruits out of 44,847 total fruits). Gnawed hazelnuts represented about a quarter of this percentage. The ripe fruits yield was <40%. The mean number of gnawed fruits was high in the plots close to the ecotonal zones and it diminished as distance from the wooded areas increased (correlation coefficient $r=-0.62$; $p<0.01$).

Several features of hazel orchards (i.e. distance from wooded areas, number of sides bordering on wooded areas, closure of the leaf canopy of hazel trees) and the study period (more or less the advanced growth phase) were statistically correlated with density (multiple correlation coefficient $R=0.93$; $p<0.05$) and damage values (multiple correlation coefficient $R=0.80$; $p<0.05$).

Damage values were also correlated with dormice density values (correlation coefficient r varying from 0.66 to 0.81), although data were insufficient for a correct statistical correlation.

Discussion

The data analysis emphasized the relevance of ecotonal orchard-wood zones: in these zones, branches providing contact between hazels and wooded areas trees represent preferential transition points for dormice during the night invasions of cultivations (Capizzi et al., 2007). Information on these contact points and other orchard features are important for mapping possible environmentally benign strategies for the reduction of fruits loss: buffer zone around hazel orchards (“no-tree zone”), physical barriers, chemical deterrents, live trapping and translocation of dormice in minor-risk areas. These strategies differ in cost, arrangement time and maintenance; therefore, their effectiveness should be tested.

References

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