

## Predatory bugs in hazelnut orchards of Piedmont and Sardinia (Italy)

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### Abstract

The hazelnut agro-ecosystem is generally characterized by a high complexity and a relative stability in space and time, also due to its abundant arthropod fauna including several groups of beneficial organisms. Therefore the research was conducted to investigate the predatory insects belonging to Heteroptera on hazelnut in Piedmont (NW Italy) and in Sardinia. In 2005, predatory Heteroptera were fortnightly sampled in nine hazel groves: six intensively cropped in Piedmont and three unmanaged in Sardinia. Presence-and-Absence data achieved during field-surveys were analyzed applying the centroid clustering method. Predatory bug communities of Piedmont and Sardinia formed separate clusters. In both regions, the family Miridae was the most abundant and rich in species, with nine and eight species in the agro-ecosystems of Piedmont and Sardinia, respectively. Few species of the families Anthocoridae and Nabidae were collected: in most cases, they occurred occasionally and in low amounts in the investigated orchards.

**Key words:** field-sampling, Miridae, Anthocoridae, Nabidae, clustering analysis.

### Introduction

Hazelnut is one of the oldest known crops, widespread in latitude and altitude throughout Europe, the Caucasus, western Asia, North Africa, and America. There are many hazelnut species, but the most commonly cultivated is *Corylus avellana* L., native of Europe. Large numbers of insects and mites have been recorded in the hazelnut orchards of Europe, Turkey, and North America, but only a few species can be considered as serious pests (Viggiani, 1994a; Tuncer and Ecevit, 1997; AliNiasee, 1998; Tuncer *et al.*, 2001). In fact the hazelnut agro-ecosystem is generally characterized by a high complexity and a relative stability in space and time, also due to its abundant arthropod fauna including several groups of beneficial organisms which need to be protected (AliNiasee, 1998). Although different mites and insects are recorded on hazelnut, the knowledge of their ecology and how this diversity is kept in nature are quite limited. In particular, the present research was carried out to investigate the predatory insects belonging to Heteroptera in different hazel groves in Piedmont (NW Italy) and in Sardinia Island.

### Materials and methods

From late May to early August 2005, fortnightly field-surveys were carried out in hazel groves: six intensively cropped in Piedmont (NW Italy) and three unmanaged in Sardinia. Predatory bugs were sampled by beating the foliage of eight branches per plant (2 branches per side) of five plants per orchard on a white canvas (700×700 mm), early in the morning. All captured insects were placed into glass tubes and brought to the laboratory, where they were counted and determined. Presence-and-Absence data were classified using Marczewski-Steinhaus distance, as a dissimilarity measure, and applying the centroid clustering method (Pielou, 1984).

### Results and discussion

Predatory Heteroptera captured on hazelnut orchards of Piedmont and Sardinia are reported in table 1. As it is evident in the dendrogram produced by clustering the Presence-and-Absence data matrix of the table 1 (figure 1), predatory bug communities of Piedmont and Sardinia form separate clusters.

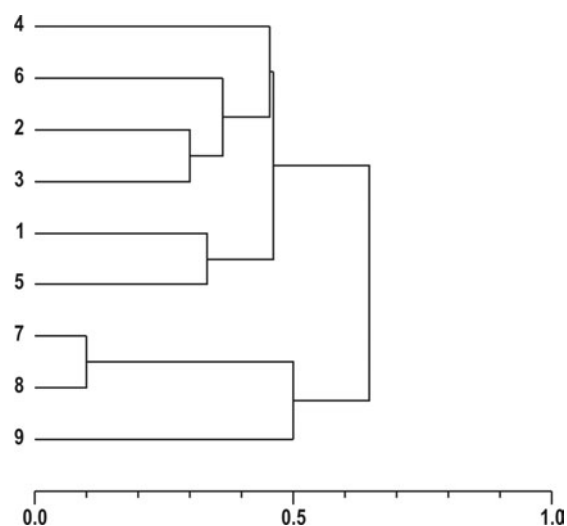
In both regions, the family Miridae was the most abundant and represented, with nine and eight species in the agro-ecosystems of Piedmont and Sardinia, respectively. Some of them, such as *Compsidolon salicellum* (Herrich-Schäffer), *Deraeocoris lutescens* (Schilling), *Heterotoma meriopterum* (Scopoli), *Malacocoris chlorizans* (Panzer), and *Phylus coryli* (L.), were collected in both regions, whereas other species were typical of each area.

Mirid bugs are characterized by a different feeding specialization, and among predators there are both zoophagous or zoophytophagous species, but all concur in controlling pest outbreaks on the crops. The species collected in the hazelnut agro-ecosystem ranged from strictly zoophagous *Deraeocoris* spp. and *Pilophorus perplexus* (Douglas et Scott) to zoophytophagous *M. chlorizans* and *Ph. coryli*, able to feed on small preys and on plants without causing any damage. Moreover, the feeding behaviour of some species, such as *C. salicellum*, abundant on hazelnut in both regions, or *Globiceps sphegiformis* Rossi, is not yet well-known and is worth further investigations.

Overall, the most abundant predatory bug in all investigated orchards was *M. chlorizans*; this zoophytophagous species has been already reported as a beneficial agent able to control outbreaks of small plant sucking arthropods, such as mites, aphids, whiteflies, and mealybugs (Viggiani, 1994b; Pantaleoni and Tavella, 2006). The species of the family Anthocoridae were different in the two regions: in Piedmont *Orius minutus* (L.) and *Orius vicinus* (Ribaut) were represented in equal quantities;

**Table 1.** Predatory Heteroptera captured on hazelnut in Piedmont and Sardinia in 2005.

Family and species	Groves of Piedmont						Groves of Sardinia		
	1	2	3	4	5	6	7	8	9
<b>ANTHOCORIDAE</b>									
<i>Cardiastethus fasciiventris</i> (Garbiglietti)							2	2	
<i>Orius minutus</i> (L.)	23	3	13		1	1			
<i>Orius vicinus</i> (Ribaut)			38	1		2			
<b>NABIDAE</b>									
<i>Aptus mirmicoides</i> (O. Costa)	2		1		6			1	
<i>Hymacerus apterus</i> (F.)						1			
<b>MIRIDAE</b>									
<i>Campyloneura virgula</i> (Herrich-Schäffer)							1	1	
<i>Compsidolon salicellum</i> (Herrich-Schäffer)	51	7	9		11	21	17	35	1
<i>Deraeocoris flavilinea</i> (A. Costa)		1	1						
<i>Deraeocoris lutescens</i> (Schilling)	1	1	72	26	1	6	12	7	1
<i>Deraeocoris ruber</i> (L.)					2				
<i>Globiceps sphegiformis</i> Rossi							6	5	2
<i>Heterotoma meriopterum</i> (Scopoli)	4						1	2	
<i>Malacocoris chlorizans</i> (Panzer)	37	16	84	42	14	43	42	43	93
<i>Mimocoris rugicollis</i> (A. Costa)							1	1	
<i>Phylus coryli</i> (L.)	2	8	4	3	3	5	20	33	24
<i>Pilophorus perplexus</i> (Douglas et Scott)	16	8		17		5			
<i>Psallus ambiguus</i> Fallén		1	5	5					



**Figure 1.** Dendrogram produced by applying centroid clustering to Presence-and-Absence matrix from table 1 and using, as dissimilarity measure, the Marczewski-Steinhaus distance.

in Sardinia only one species *Cardiastethus fasciiventris* (Garbiglietti) was found.

Only two species of the family Nabidae were sampled on hazelnut: *Aptus mirmicoides* (O. Costa) in both regions, and *Hymacerus apterus* (F.) only in Piedmont. However, both species occurred occasionally and in low amounts in the investigated orchards.

When not disturbed by chemical interventions, predatory bugs are abundant in the hazelnut agro-ecosystem and efficient in controlling outbreaks of several plant pest arthropods, such as mites, aphids, mealybugs, and moth larvae, throughout the growing season. According to AliNiazee (1998), integrated pest management on hazelnut (i.e. biological control, use of selective pesti-

cides) can cause an improvement in the activity of beneficial insects and, as a consequence, a reduction of different noxious pests; therefore, the hazelnut crop can be grown successfully and produced economically without the use of toxic broad-spectrum insecticides.

### Acknowledgements

The research was funded by the project CO.RI.BIO. "Ricerche biologiche finalizzate all'ottenimento di produzioni biologiche di qualità".

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