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Editors' preface

> Nature is beautiful and science is exciting. The beauty of nature lies in detail and the message of science in generality. Exciting principles are best illustrated by well-chosen particulars.
> (adapted from S.J.Gould, Wonderful Life).

Curiosity drives research and biologists explore life; among them a group of special people is interested in lifestyles of woodlice. Terrestrial isopods are unique crustaceans inhabiting different habitats worldwide: from seashores to deserts and caves, as well as human homes. They form a community of decomposers together with bacteria, fungi and other animals, transforming organic matter to soil and other substrates.
For the last thirty years, woodlice fans have met on different occasions to exchange their ideas and research results on woodlice biology. A survey of the seven symposia on the Biology of Terrestrial isopods, held between 1983 and 2007, will be presented by H. Schmalfuss who says:

> »Photographs and anecdotes are intended to give a personal impression to show that we are a rather normal group of human beings who have chosen a somewhat extravagant group of organisms to work with.«

The first meeting on Biology of Terrestrial isopods was held in London in 1983, organized by Cloudsley Thompson, S. L. Sutton and D. M. Holdich and sponsored by the Zoological Society M. R. Warburg suggested the idea and presented a review on different aspects of isopod ecology. The second meeting was held in Urbino, Italy in 1987, organized by R. Argano, F. Ferrara, S. Taiti and H. Schmalfuss under the auspices of Consiglio Nazionale delle Richerche. The third meeting followed in 1990 in Poitiers, France and was organized by P. Juchault and P. Mocquard from Laboratoire de Biologie Animale de l'Université de Poitiers. More than 50 researchers and students shared the joy of seeing live woodlice displayed in the auditorium. The fourth meeting was organized by M. R. Warburg and E. Hornung in Technion, Haifa in 1997. In 2001 the fifth symposium was held in Iraklion, Greece, hosted by the Natural History Museum of Crete and organized by S. Sfenthourakis. The highlights of the meeting were field trips with enjoyable Greek landscape and woodlice diversity. The sixth meeting in 2004 with dynamic exchange of ideas and views on woodlice biology and ecotoxicology was hosted by University of Aveiro, Portugal, organized by S. Loreiro and A. Soares. In Tunis in 2007, the seventh meeting was hosted by University of Tunis and organized by F. Charfi-Cheikhrouha. We saw a mosaic of woodlice research from different countries.
This year the eighth meeting in Bled, Slovenia, brings together almost 70 participants contributing to knowledge on woodlice biology and exchanging ideas and experience in the fields of: systematics and biogeography; morphology and physiology; mineralized organic matrices; molecular biology and microbiology; evolutionary and developmental biology; ecology and ecotoxicology; woodlice and agro-systems.

In the last thirty years biology underwent large changes, discovering life in its different forms, deciphering genomes of many species, searching answers to environmental and climatic issues and educating people on how to conserve nature. Woodlice did not change during this

period, they are still here to be explored, described and used as experimental animals in laboratories worldwide, with a common goal: to keep life on the planet pleasant and sustainable. Let us come together at this meeting to share the joy of research and communication, and spread ideas and good will to younger generations.

We would like to thank all who participated with ideas and suggestions in planning and organizing the symposium. Special thanks to the members of the Programme and organizing committee for revisions of the manuscripts. This meeting is sponsored by the Slovenian Research Agency, The Crustacean Society, Micro+Polo d.o.o. (Leica), Scan d.o.o. (Jeol) and Alarix d.o.o..

Jasna Štrus
Chair

Primož Zidar
Co-chair

Bled, June 2011

Content

WOODLICE ASSEMBLAGES OF PLANTED AND NATIVE FORESTS IN CENTRAL ITALY

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ABSTRACT: Effects of reforestation on woodlice assemblages were studied in three ca. 20-year-old regenerating plantations and were compared to an old native mixed oak forest (*Quercus cerris* and *Quercus frainetto*) in Latium (central Italy). The three plantations were reforested with native tree species (holm-oak *Quercus ilex*, Turkey-oak *Quercus cerris* and downy-oak *Quercus pubescens*) in areas which had been previously used for agricultural purposes. Material collected by pitfall traps was used for comparison of species richness and structural parameters in the four forest types. One sampling site for each forest type was chosen, and each site was sampled monthly during a one year sampling. Our results show that the woodlice assemblages of the plantations were more simply structured with a low species richness and diversity while the native mixed forest shows slightly higher values with three exclusive species. The woodlice assemblages of the plantations in comparison to the native mixed oak forest are characterized by the dominance of a few more euriecious and vagile species, a condition typical of immature successional stages.

Keywords: Isopoda, Oniscidea, diversity, forest plantations, central Italy.

1. Introduction

Expanding woodlands into areas previously deforested and intensively used for agricultural purposes may be a goal of nature conservation (Finch, 2005). There are many studies on the effects of plantations and forest succession on species composition and diversity of soil arthropod communities, indicating that logging, reforestation and forest succession have important effects on the environment and different arthropod assemblages (Barrocas et al., 1998; Finch, 2005; Yu et al., 2008). Since the 1980s, extensive tree plantations have been established on fields cultivated in the past and then abandoned in the "Castel di Guido" farmland, near Rome. The aim of this study was to compare species richness, abundance and structural parameters of woodlice assemblages in three different about 20 years old monospecific forest plantations, and in a native mixed oak forest.

2. Materials & Methods

2.1 Study area
The farmland is located along the Tyrrhenian side of central Italy (Rome, Latium). It ranges from 10 to 80 m a.s.l. and extends for over 2,000 ha. Woodlice assemblages were sampled at four sites, each representing a different habitat: i) native mixed oak forest dominated by ***Q. cerris*** and ***Q. frainetto***, ii) plantation with Turkey-oak (***Q. cerris***), iii) plantation with holm-oak (***Q. ilex***), iv) plantation with downy-oak (***Q. pubescens***).

2.2 Sampling methods
Woodlice were sampled using pitfall traps (95 mm in diameter, 500 ml in volume) containing 150 ml of wine vinegar and sodium chloride. Eight traps were used for each sampling station, for a total of 32 traps. Traps were located ca. 15 m apart from each other in order to avoid the autocorrelation and depletion effect (Digweed et al., 1995; Baker and Barmuta, 2006). Pitfall traps were active from March 2009 to February 2010; all traps were emptied and refilled once a month.

2.3 Data analysis
The abundance of all collected woodlice was determined. The species richness (S) and the Shannon's diversity indices (H', H'max) were used as measures for community diversity. Community evenness was estimated by Pielou's index (J'). Overall values of S, H', H'max and J' were calculated for each site. Differences between sites were tested with a Kruskal–Wallis ANOVA test, taking the monthly values of S, H' and J' calculated for each site as replicates. When significant differences were found, subsequent Mann–Whitney U-tests were applied for pairwise comparisons among native forest and plantations.

3. Results & Discussion

3.1 Species diversity and abundance
A total of 1311 terrestrial isopod specimens belonging to 14 species were collected (Table 1). The total number of individuals collected per site ranged from a minimum of 253 in the mixed oak forest to a maximum of 403 in the downy-oak plantation. Dominant species in all the sites are *Chaetophiloscia elongata, C. sicula*, *Philoscia muscorum* and *P.* cf. *affinis*. In the three plantations there is a high degree of dominance restricted to

single species (*P. muscorum* in *Q. ilex*, *P.* cf. *affinis* in *Q. pubescens* and *P. sicula* in *Q. cerris*) while in the mixed forest there is the co-dominance of *C. sicula* and *P. muscorum*. The total number of woodlice species collected per site ranged from a minimum of five in the Turkey-oak plantation to a maximum of 12 in the mixed oak forest (Table 2). Shannon's index (H', H'max) and evenness (J') were higher in the native mixed oak forest. Kruskal-
Wallis ANOVA showed significant differences ($p<0.05$) among sites for S, H' and J'. Pairwise comparisons among native forest and plantations showed significant differences ($p<0.05$) for S and H' between the native forest and the Turkey-oak plantation and between the native forest and the holm-oak plantation.

3.2 Discussion

In the three plantation sites both the dominant species and most of the species with a lower occurrence are all euriecious and not restricted to forest habitats. The native forest site is characterized by the presence of a lower number of specimens and a larger number of species, some of them are specialized to forest habitats (e. g. *Cylisticus gracilipennis*, *Acaeroplastes delattinii* and *Porcellio pumicatus*). These results together with the values of the diversity indices show that the woodlice assemblages in the plantations are characteristic of immature successional stages in comparison with the mixed oak forest.

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Table 1. Abundance of woodlice specimens caught by pitfall traps in the different sites. Nat. = Native mixed oak forest; downy-oak = ***Q. pubescens*** plantation; Turkey-oak = ***Q. cerris*** plantation; holm-oak = ***Q. ilex*** plantation.

	Nat.	**downy-oak**	**Turkey-oak**	**holm-oak**
Chaetophiloscia elongata (Dollfus, 1884)	0	9	192	2
Chaetophiloscia hastata Verhoeff, 1929	7	2	0	0
Chaetophiloscia sicula Verhoeff, 1908	90	44	88	8
Philoscia cf. ***affinis*** Verhoeff, 1908	1	203	0	11
Philoscia muscorum (Scopoli, 1763)	64	78	33	255
Trachelipus arcuatus (Budde Lund, 1885)	4	3	0	1
Acaeroplastes delattini Verhoeff, 1951	8	0	0	0
Porcellionides pruinosus (Brandt, 1833)	14	0	14	38
Porcellio dilatatus Brandt, 1833	29	0	0	0
Porcellio laevis Latreille, 1804	2	0	10	0
Porcellio pumicatus Budde Lund, 1885	1	0	0	0
Cylisticus gracilipennis Budde Lund, 1885	3	64	0	0
Armadillidium vulgare (Latreille, 1804)	30	0	0	2
Armadillidium sp.	0	0	0	1
Total	**253**	**403**	**337**	**318**

Table 2. Number of species (S), Shannon's index (H', H'max), and Pielou's index (J') at different sites.

	S	**H'**	**H'max**	**J'**
Native mixed oak forest	12	1,785	2,485	0,718
***Q. pubescens* plantation**	7	1,345	1,946	0,691
***Q. cerris* plantation**	5	1,135	1,609	0,705
***Q. ilex* plantation**	8	0,74	2,079	0,356