Ecology of soil invertebrates in a dune ecosystem of Cyprus

V. Taraslia, S. Zotos & A. Legakis

Sect. of Zoology-Marine Biology, Dept. of Biology, University of Athens, Panepistimioupolis, 15784 Athens, Greece

Abstract: The soil arthropod fauna of a dune ecosystem in the southern coast of Cyprus was studied during one year using pitfall traps that were collected at monthly intervals. The main macroarthropod groups were ants, tenebrionid Coleoptera and Opiliones. The Shannon-Wiener diversity index shows intense temporal variation, with minimum values during winter and maximum during spring and summer when most of the species richness is observed. Temporally grouping monthly samples showed two periods, each divided into two seasons. During the cold period (November-March) species richness is significantly lower while during the dry and warm period (April-October) species richness is higher, especially for thermophilous groups that can adapt to sandy habitats and often move vertically in the soil towards more suitable conditions. The groups that are most abundant in numbers are present in areas with more dense plant cover in contrast with uncovered areas with intense sunlight.

INTRODUCTION

This project was carried out in a sand dune ecosystem at the southern parts of Lady's mile beach in Akrotiri peninsula. Sand dunes are usually formed in coastal areas by strong and permanent winds, which gather sand around small turf at the early stages of formation. The climate is a typical mesothermal Mediterranean-type with cold humid winters and hot dry summers. The flora in the area consists of small bushes, turf and some small trees.The most common species are *Juniperus phoenicea L., Thymus capitatus and Asparagus acutifolius*. The fauna consists of reptiles, amphibians small and medium-sized mammals, birds and many species of soil invertebrates.

MATERIALS AND METHODS

In order to study the soil invertebrate community of Akrotiri, we used 20 pitfall traps (plastic cups 14 cm in depth and 8 cm in diameter, filled with 1/3 ethylene glycol) for 13 months which were placed randomly in the area. The traps were emptied every month and the invertebrate specimens were identified to order apart from Coleoptera which were identified to family level. Data was used for various statistic parameters such as Shannon index, Evenness, G-test, ANOVA and Clustering using the Bray-Curtis coefficient for the similarity matrix.

RESULTS

A total of 10,679 invertebrates were caught in the traps belonging to 18 orders. The data were used in a G-test to define the extent of seasons. Four seasons were distinguished: autumn which lasts from November '07 to January '08, winter from February '08 to March '08, spring from April '08 to May '08 and summer from June '08 to October '08. Figure 1 shows total participation of all orders during the 13-month period of work. Figure 2 shows the participation of all invertebrates per month. Figure 3 shows the most dominant families of Coleoptera in the the area, of which 77% percent belonged to the family Tenebrionidae. Figure 4 shows the grouping of the pitfall traps according to the composition of the soil invertebrates during the 13-month period of work.

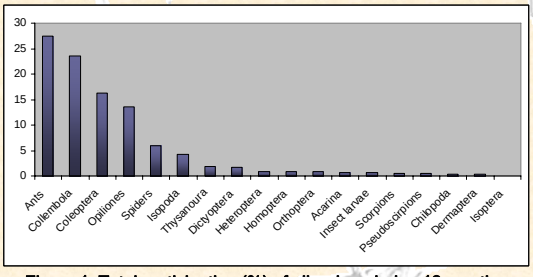

Figure 1: Total participation (%) of all orders during 13 months

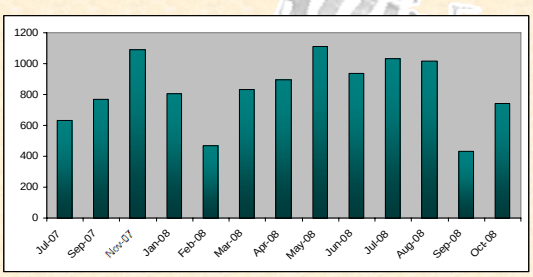

Figure 2: Total trapped invertebrates per month (30 days)

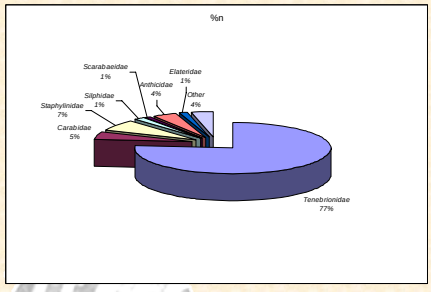

Figure 3: Dominant families of Coleoptera in the area (%)

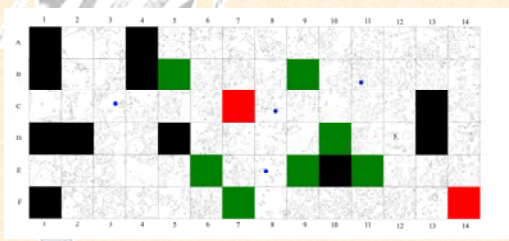

Figure 4: Grouping pf pitfall traps during 13 months of work

CONCLUSIONS

- The most abundant groups were ants, Coleoptera and Opiliones.
- November '07 and May '08 were the most abundant months.
- The most dominant family of Coleoptera in the area is Tenebrionidae.
- The Shannon index shows intense temporal variation, with lowest values during the cold season and increased values during the warm season.
- Clustering confirmed the G-test, showing two large seasons, a cold-one and a warm-one, with two sub-seasons each.
- Non-continuous sub-areas can be grouped according to the vegetation, the amount of plant cover, the amount of sunlight and the wind force.

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