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BIODIVERSITY STUDIES IN DIFFERENT GRAPEVINE CULTIVATION SYSTEMS

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ABSTRACT

The establishment of a more diverse community of organisms in a certain territory is surrounded by the existence of several methods for minimizing the negative side effects of human activities, maximizing diversity, and improving the viticultural landscape.
Biodiversity can be measured by a number of indicators: frequency, relative abundance, dominance, constancy, fidelity, and fairness.
In the present work, the main species existing at ground level are presented, monitored with the help of Barber traps in order to determine if there are changes in the agro-ecosystem of the vine culture.
In the 2021-2022 period, the objectives of faunal research were achieved by analysing the state of the agro-ecosystem of the vine culture and specifying the groups of invertebrates, in order to be taken conservation and protection measures.

INTRODUCTION

Biodiversity contributes, to a lesser or greater extent, to the solution of some problems of human society and of some environmental problems. The effects of different populations ensure the optimal functionality of natural and anthropogenic ecosystems (Bavaru et al. 2007).

In a viticultural ecosystem, diversity is represented by the number of species and interspecific relationships with implications in the productivity of the agroecosystem (Șchiopu et al. 2002).

Anthropogenic ecological units are considered unstable ecosystems, with precise interdependencies between the different trophic chains where climate and soil factors play an important role (Zamfirescu 1977, Botnariuc et al. 1982).

At the level of agricultural ecosystems, due to the improper management of the means of production by humans, there is a reduction in biological diversity (Godeanu 2013).

MATERIAL AND METHODS

The objectives of the study carried out in different experimental fields, in the Murfatlar vineyard, were the following:

- identification of the groups of invertebrates that make up the viticultural ecosystems,
- studying the living conditions of organisms,
- relating agricultural practices to ecological diversity.

The experiments were carried out in the conditions of the dry area of Dobrogea, with average annual precipitation of 400 mm, on a chernozem type soil, from 2021 to 2022.

In order to carry out the studies, observations were made in the field, regarding the structure and evolution of the entomofauna in the viticultural ecosystems, within the framework of two technological variants: ecological technology and conventional technology.

The study focused on invertebrate biodiversity in the grapevine plantation located within the Murfatlar Viticulture and Winemaking Research-Development Station.

The equipment and materials we used to carry out the research were:

- microscope
- crystallizer
- tweezers
- entomological needles
- plastic containers
- ethyl alcohol 35%
- formalin
- camera
- determinant for invertebrates

For the inventory of invertebrates, we installed three traps each in the studied agroecosystems, and at an interval of 10 days the traps were replaced, read and interpreted.

Invertebrates were identified both macroscopically and microscopically, and their classification was done at the level of family, order or class. A comparison of the structure of the animal communities was carried out by comparing the two different faunas.

The collected biological material was preserved in sanitary alcohol, sorted and determined on the two analyzed areas.

For data processing, we calculated the following indicators: relative abundance and ecological diversity.

We used the obtained data to characterize the ecological agricultural system as a living environment for the different types of organisms that were encountered.

RESULTS AND DISCUSSIONS

The viticultural ecosystem is populated by a fauna particularly rich in insect species with an important role in ensuring the stability of agroecosystems (Perju 1995).

In viticultural ecosystems, the decomposition of organic waste has an important effect on the structure of the community (Simionescu et al. 2010).

The obtained results highlight the importance of choosing the culture system for the vine depending on the climate and soil conditions.

In the vine crops, there were identified 1588 specimens of invertebrates. The most common species of insects belong to hymenoptera, with 588 specimens.

Table 1

Abundance of invertebrate species
from the culture of the grapevine, the conventional field

Taxonomical group	Relative abundance
Coleoptera	33,92
Hemiptera	8,51
Araneae	6,02
Isopoda	10,13
Lepidoptera	3,52
Himenoptera	13,65
Diptera	18,20
Miriapoda	3,67
Ixodida	0,29
Ortoptera	1,61
Dermaptera	0,73

Regarding the epigean fauna, coleopterans living on the surface of the soil and spiders were the most abundant predators captured in the traps (Table 1).

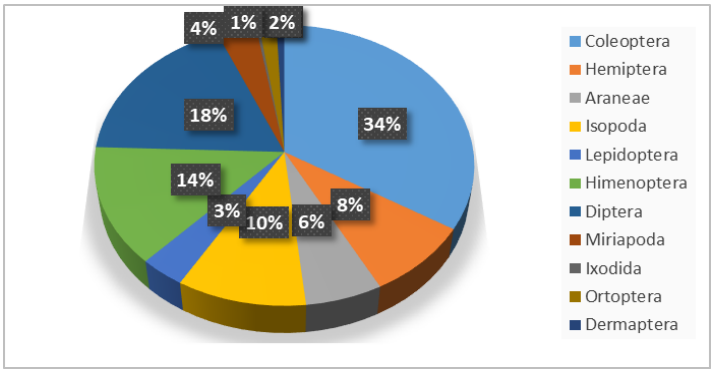

Figure 1. Qualitative composition in conventional grapevine culture

In the biocenosis of the vine culture, the insects from the order Coleoptera proved to be the most numerous, followed by diptera and hymenoptera (Figure 1).

Table 2

Abundance of invertebrate species
from grapevine culture, ecological field

Taxonomical group	Relative abundance
Coleoptera	22,71
Hemiptera	2,86
Araneae	2,97
Isopoda	0,11
Lepidoptera	1,43
Himenoptera	54,57
Diptera	14,44
Miriapoda	0,11
Ixodida	0,55
Ortoptera	0,22
Dermaptera	0,33

During the growing, observations were made on the conventional grapevine culture system and there were identified eleven groups of invertebrates that make up the biocenosis of the vine culture (Figure 2).

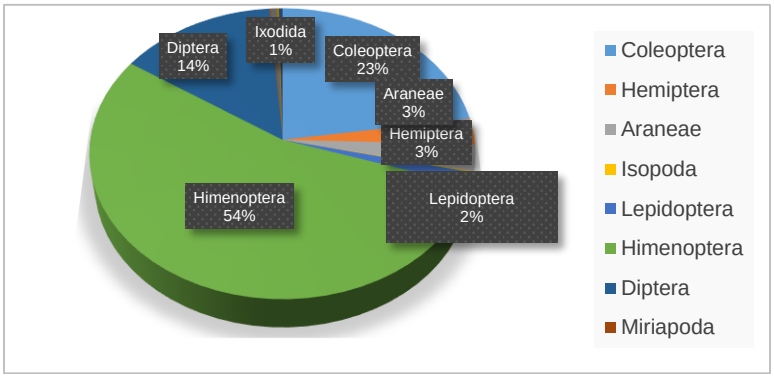

Figure 2. Qualitative composition in organic grapevine culture

Analyzing the insect fauna encountered in the grapevine culture ecosystem, it was found that the most numerous were hymenoptera (495 specimens).

CONCLUSIONS

The organic grapevine culture within the Research and Development Station for Viticulture and Winemaking Murfatlar, presents the highest abundance of Hymenoptera, which are beneficial species for soil health.

The two vine lots show differences in the structure of the biocenoses, both qualitatively and quantitatively due to the varied configurations of the elements of the climatic factors.

Based on what was observed and mentioned previously, we can conclude that the organic grapevine culture represents a balanced ecosystem, characterized by a great health of the soil, associated with a great biological diversity as energy losses are reduced.

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