

AN ANALYSIS OF THE ORDER ORTHOPTERA DIVERSITY FROM THE VLORA REGION ECOSYSTEMS, SOUTHWESTERN ALBANIA

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ABSTRACT

The order Orthoptera is the most varied group of insects in the Polyneoptera group. The species belonging to the Order Orthoptera serve as pests of crops, as well as significant consumers, prey for predators, and indicators of environmental changes. Some species of the Order Orthoptera have developed wings while some other species have reduced wings. The species of the order Orthoptera have the organ of excretion present. This work aims to conduct a taxonomic analysis of species belonging to the Order Orthoptera in various environments within the Vlora region in Southwestern Albania. This study describes 15 species belonging to two families, namely Tettigoniidae and Acrididae. The Acrididae family has the most significant species variety, with ten species accounting for 66.66% of the total. The Ploça station encounters the most significant species richness, with ten species, which accounts for 66.66% of the total. Based on our data, this station offers more favorable conditions for Order Orthoptera species.

Keywords: orthoptera, insects, biocenosis, habitat, biodiversity, Vlora, South Western Albania.

INTRODUCTION

The order Orthoptera stands out as the most diverse group of insects found within the lower Neoptera, commonly referred to as the Polyneoptera (Leubner et al., 2017; Grimbaldi, 2015; Cigliano et al., 2017). This specific order encompasses a wide variety of species, each displaying a remarkable range of wing development – some showcasing fully formed, functional wings, while others are entirely wingless, adapting uniquely to their environments.

Within Orthoptera, certain families are equipped with specialized hearing organs, aiding their communication and interaction within their ecosystems (Naskrecki, 2013). Additionally, some species, such as mole crickets, pygmy mole crickets, and false mole crickets, illustrate interesting adaptations in their anatomy; their front legs are uniquely structured for burrowing, allowing them to navigate subterranean habitats efficiently. In contrast, the front and middle legs of most Orthoptera species are robust and well-developed, designed predominantly for walking across varying terrains.

A defining feature of many Orthoptera species is their modified hind legs, which are particularly specialized for leaping. This adaptation not only facilitates movement over considerable distances but also plays a crucial role in their escape from predators (Naskrecki, 2013). While they can occasionally pose challenges to agriculture and crops, Orthoptera species fulfill essential ecological roles. They act as important consumers within their food webs, serve as a vital food source for a wide array of predators, and function as indicators of shifts in environmental conditions (Sageer et al., 2023; Bazelet, 2011; Gangwere, 1997; Belovsky, 2017).

Moreover, Orthoptera contributes significantly to biocenosis, bridging the gap between primary producers and secondary consumers, which is crucial for maintaining ecological balance (Nurjaniv et al., 2023). This study adopts a comprehensive approach to delve into the taxonomic and ecological characteristics of Orthoptera species inhabiting the Vlora region. This area, characterized by its hilly and mountainous topography, provides a rich and varied habitat that supports the diverse biological cycles of these remarkable insects.

MATERIALS AND METHODS

During June - September 2023, expeditions were carried out in three different habitats in the area of Vlora: Ploça, Xhyherina, and Dëllenja, and species of the Order Orthoptera were collected.

The collection of species was carried out in the morning from 9⁰⁰ - 14⁰⁰, depending on the climatic conditions. Entomological nets were used for species collection. We have determined GPS (coordinates), altitude above sea level, and location for each station. We also kept notes on the vegetation and any unique characteristics of the species. The collected species were preserved with ethanol (to maintain the color) (Halimi et al., 2023; Kasalo et al., 2024). These species were used for taxonomic determination in laboratories; they were observed with a magnifying glass, with a stereomicroscope (Perfex Sciences), and using the taxonomic determination keys for these species, from the publications for the countries bordering Albania, as well as previous publications for the Order Orthoptera in Albania (Csiki, 1922; Ebner, 1910; Lemonnier – Darcemont & Darcemont, 2015; Subashaj et al., 2024).

RESULTS AND DISCUSSIONS

The taxonomic study reveals the existence of 15 distinct species within the fascinating Order Orthoptera, which includes a wide variety of grasshoppers (Table 1).

Field research conducted across three diverse locations - Ploça, Xhyherina, and Dëllenja - unveiled a rich array of these species. Specifically, the Tettigoniidae family is represented by five unique species, while the Acrididae family encompasses a larger grouping of ten species, showcasing the vibrant biodiversity within this ecological community.

Table 1. List of species belonging to the Order Orthoptera in the Vlora region.

No.	Scientific name	Ploça	Xhyherina	Dëllenja
1	Family Tettigoniidae Krauss, 1902			
1	<i>Decticus albifrons</i> Fabricius, 1775		+	
2	<i>Poecilimon jonicus</i> Fieber, 1853	+		
3	<i>Acrometopa servillea macropoda</i> Burmeister, 1838	+		
4	<i>Decticus verrucivorus</i> Linnaeus, 1758	+		
5	<i>Pholidoptera femorata</i> Fieber, 1853	+		
2	Family Acrididae MacLeay, 1819			

6	<i>Acrotylus patruelis</i> Herrich-Schäffer, 1838	+		
7	<i>Acrida ungarica mediterranea</i> Herbst, 1786		+	+
8	<i>Calliptamus italicus</i> Linnaeus, 1758	+	+	+
9	<i>Locusta migratoria</i> Linnaeus, 1758		+	
10	<i>Aiolopus thalassinus thalassinus</i> Fabricius, 1781		+	
11	<i>Euchorthippus declivus</i> Brisout, 1848			+
12	<i>Chorthippus bornhalmi</i> Linnaeus, 1758	+		
13	<i>Omocestus rufipes</i> Zetterstedt, 1821	+		
14	<i>Paracaloptenus caloptenoides</i> Brunner von Wattenwyl, 1861	+		
15	<i>Acrotylus insubricus</i> Scopoli, 1786	+		

The taxonomic analysis reveals a significant finding regarding the insect populations in the studied habitats (Table 2, Figure 1). Specifically, the Acrididae family, commonly known as grasshoppers, encompasses a considerably larger species diversity than its counterpart. In these areas, ten distinct species of Acrididae account for an impressive 66.66% of the total species frequency. This suggests that these grasshoppers thrive in the conditions at the Ploça, Xhyherina, and Dëllenja stations, indicating a robust environmental preference or suitability.

Conversely, the Tettigoniidae family, which includes bush crickets and katydids, is represented by a more limited number of species. With only five species contributing to 33.33% of the total frequency, these insects appear less prevalent in the same ecological zones.

These findings have noteworthy implications, as they highlight the dominance of the Acrididae family in these specific habitats. This information is crucial for biodiversity conservation efforts and habitat management strategies in the Vlora region, underscoring the need to focus on factors supporting these grasshopper species' flourishing to maintain ecological balance.

Table 2. Distribution of species and species frequency according to family.

No	Family	Number of species	Species frequency (%)
1	Tettigoniidae	5	33.33
2	Acrididae	10	66.66

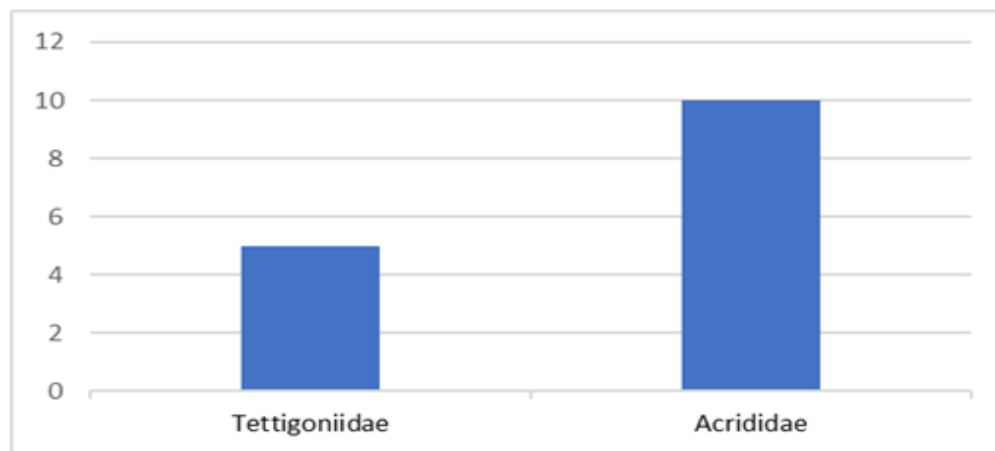


Figure 1. Number distribution of each species according to family.

The ecological study investigating species diversity across various habitats, as depicted in Table 3 and illustrated in Figure 2, reveals some fascinating insights into the biodiversity present in the surveyed locations. Among these, the Ploça station stands out as the most biodiverse habitat, showcasing an impressive array of life. This station is home to 10 distinct species, leading to a notable species frequency of 66.66%.

The abundant biodiversity at Ploça can be attributed to a harmonious blend of favorable environmental conditions, including its rich soil, varied topography, and abundant resources that collectively foster a thriving ecosystem for multiple life forms.

In contrast, the Xhyherina station, while contributing to regional biodiversity, supports only five species. This results in a lower species frequency of 33.33%. Although Xhyherina maintains a commendable level of biodiversity, it pales compared to the vibrancy at the Ploça station.

Meanwhile, the Dëllenja station presents a starkly different picture; with only three documented species, translating to a mere 20% in species frequency, it appears to lack the ecological richness necessary to sustain a broader array of wildlife. This significant disparity in species presence suggests that the environmental conditions at Dëllenja may not be conducive to a varied biological community.

The Ploça station's unique characteristics, including its diverse landscapes, ample food sources, and a variety of microhabitats, play a crucial role in establishing it as the most hospitable environment for species belonging to the Order Orthoptera. These elements highlight the urgent need to conserve such biodiverse regions, as they are vital for maintaining ecological health, resilience, and the overall balance of our natural world.

Table 3. Number of species according to studied stations.

No	Sampling station	No. of Species	Species Frequency (%)
1	Ploça	10	66.66
2	Xhyherina	5	33.33
3	Dëllenja	3	20

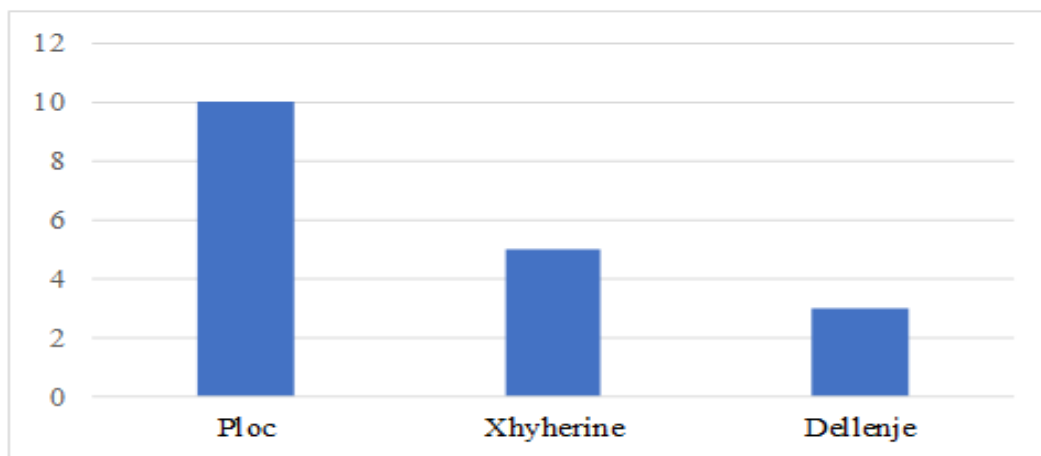


Figure 2. Distribution of species according to studied stations.

CONCLUSIONS

- This research presents a thorough ecological exploration of the diverse species belonging to the Order Orthoptera in the picturesque Vloca region, focusing on the unique habitats of Ploça, Xhyherina, and Dëllenja. Our study reveals that this vibrant region hosts an impressive total of 15 distinct Orthoptera species, organized into two primary families: Acrididae and Tettigoniidae.
- Among these, the Acrididae family showcases the highest level of species diversity, featuring an assortment of 10 different species. This family's adaptability and variety contribute significantly to the ecological richness of the area. On the other hand, the Tettigoniidae family, with its more limited representation of 5 species, offers a glimpse into the subtler nuances of the Orthoptera order.
- The Ploça station emerges as a remarkable hotspot for Orthoptera, boasting a flourishing diversity of 10 species that thrive in exceptionally favorable conditions. The rich vegetation and optimal environment create an ideal habitat for these insects. In contrast, the habitats of Xhyherina and Dëllenja exhibit considerably lower species diversity, primarily due to human-induced influences that have disrupted their natural ecosystems. This disparity highlights the importance of preserving such habitats to maintain biodiversity within the Order Orthoptera.

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