

FAUNA AND ECOLOGY OF THE TRUE GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) OF EASTERN FERGANA

Muminova Kimsanoy Tuxtasinovna

Andijan state medical institute

Annotation: In this article, a wide scientific analysis of the fauna and ecology of true grasshoppers (Orthoptera: Acrididae) distributed in the eastern Fergana region was carried out. The study was carried out in 2021-2024 in different landscape zones of the Fergana Valley, with a total of 27 species identified. Grasshopper species have been classified into ecological groups and their distribution, seasonal population dynamics, and environmental factor effects have been studied. In this article, a wide scientific analysis of the fauna and ecology of true grasshoppers (Orthoptera: Acrididae) distributed in the eastern Fergana region was carried out. The study was carried out in 2021-2024 in different landscape zones of the Fergana Valley, with a total of 27 species identified. Grasshopper species have been classified into ecological groups and their distribution, seasonal population dynamics, and environmental factor effects have been studied. The results showed that species belonging to the xerophilous, mesophilous, hygrophilous, and agrophilous groups are closely linked to the landscape conditions of the region. It has been confirmed that temperature, humidity and anthropogenic factors play an important role in annual and seasonal fluctuations in population numbers. This research provides a scientific basis for improving the monitoring system of eastern Fergana grasshoppers and measures to combat pests in agricultural ecosystems.

Keywords: Eastern Fergana, true grasshoppers, Acrididae, fauna, ecology, population dynamics, xerophilic species, wet-loving species, agrophytic species, entomofauna, monitoring, pests.

Introduction

The Eastern Fergana region is one of the most biologically diverse areas of Uzbekistan, where geological structure, climatic conditions, and vegetation cover directly influence the formation of entomofauna. In particular, the wide distribution of true grasshoppers (Orthoptera: Acrididae) in this region, their ecological adaptability, and resistance to anthropogenic pressure make this group a highly significant scientific object of study. Grasshoppers play an important ecological role not only in natural ecosystems but also in agricultural systems. As phytophagous insects, they represent an essential link in trophic chains, while in certain years their population size increases sharply, causing notable damage to agroecosystems.

The Eastern Fergana Valley is characterized by distinct landscape variations—foothills, lowlands, riverbank wetlands, and semi-desert areas—which create broad ecological opportunities for grasshopper species. Research conducted in this region indicates high faunal diversity and distinct ecological strategies among species. However, scientific sources related to grasshopper fauna in this area remain limited, and reliable monitoring data are insufficient.

Studying the ecological characteristics of true grasshopper species is essential not only for identifying their regional distribution, but also for reducing the risk of invasive species, improving strategies for controlling agricultural pests, and understanding population dynamics,



feeding behavior, and habitat adaptability—topics that remain insufficiently examined in Eastern Fergana. This article aims to address these gaps.

The objective of this study is to conduct an in-depth scientific analysis of the fauna and ecology of true grasshoppers in Eastern Fergana, investigating their distribution, ecological groups, population characteristics, and the impact of anthropogenic factors.

Materials and Methods

The study was conducted between 2021 and 2024 in three main areas of the Eastern Fergana Valley: Beshariq, Uchko‘prik, and Rishton districts of Fergana Region. Field collection was carried out in spring, summer, and early autumn across three sampling periods. Grasshoppers were collected using a standard entomological net, hand collection, and phytocoenotic transect observations.

At each sampling point, specimens were collected within a 100×100 meter area and repeated three times. Identification of specimens was performed in the laboratory of the Zoology Department of the National University of Uzbekistan using modern taxonomic keys. Biomorphological analyses were carried out through microscopic examination.

Climatic indicators—temperature, humidity, wind speed, and precipitation—were obtained from the Fergana division of Uzhydromet. Vegetation cover data were based on geobotanical observations.

Seasonal fluctuations in grasshopper populations were monitored at 15-day intervals. Each species' ecological group was determined according to its habitat and feeding type.

Results

Fauna of True Grasshoppers in Eastern Fergana

A total of 27 species belonging to the family Acrididae were recorded during the study. Based on ecological groups, the species were classified as hygrophilous, xerophilous, mesophilous, and agrofit species. The most frequently observed species were *Calliptamus italicus*, *Oedaleus decorus*, *Dociostaurus maroccanus*, and *Locusta migratoria*.

Table 1. Faunal composition of grasshoppers in Eastern Fergana

Species name	Ecological group	Frequency (%)	Main biotope
<i>Calliptamus italicus</i>	Xerophilous	18.2	Dry steppes, semi-desert
<i>Oedaleus decorus</i>	Mesophilous	14.5	Grasslands, foothills
<i>Locusta migratoria</i>	Hygrophilous	12.7	Riverbanks, moist areas
<i>Dociostaurus maroccanus</i>	Agrofit	10.3	Croplands
<i>Aiolopus thalassinus</i>	Mesophilous	7.9	Wet meadows
<i>Aiolopus strepens</i>	Xerophilous	5.3	Dry uplands
<i>Acrida oxycephala</i>	Hygrophilous	6.4	Marsh surroundings
<i>Pezotettix giornae</i>	Mesophilous	4.6	Shrublands



Seasonal Dynamics of Grasshopper Populations

Nymphs were most abundant in spring (March–April), whereas adults dominated in summer (June–August). A decline in population size was recorded starting from the second half of August. Hygrophilous species showed peak activity in May–June.

Table 2. Seasonal population density (average values)

Month	Density (individuals/m ²)	Most active group
March	2.1	Hygrophilous nymphs
April	3.8	Mesophilous species
May	5.6	Hygrophilous and mesophilous
June	7.4	Xerophilous and agrofit
July	8.1	Xerophilous
August	6.9	Agrofit
September	3.2	Mixed groups

Influence of Ecological Factors

Climatic conditions strongly influenced grasshopper fauna. For instance, higher-than-average temperatures in summer 2022 resulted in the expansion of xerophilous species. In contrast, high humidity during spring 2023 increased the abundance of hygrophilous species.

Discussion

The grasshopper fauna of Eastern Fergana is rich and ecologically diverse, with species distribution closely linked to landscape structure, climate, and vegetation cover. The findings show that members of the Acrididae family are highly ecologically adaptable, and their population dynamics are influenced not only by natural factors but also by anthropogenic pressure, including agricultural activity and changes in land melioration.

A key finding of this study is the rapid growth of agrofit species in croplands, highlighting the need to improve biological control methods. For example, *Dociostaurus maroccanus* can cause substantial damage to cotton, wheat, and fodder crops during outbreak years.

Comparing ecological strategies of the species revealed that xerophilous species dominate during hot years, whereas hygrophilous species increase in years with higher precipitation. This suggests the importance of integrating climate forecasting into population management programs.

Vegetation diversity plays a crucial role for grasshopper communities. Species such as *Acrida oxycephala* are more common in marshy areas, demonstrating the direct influence of moisture on population structure. In contrast, the widespread distribution of *Calliptamus italicus* in upland zones reflects its strong adaptation to arid conditions. For example, extreme heat during summer 2022 caused the population size of this species to more than double.



Increased anthropogenic pressure—expansion of grazing territories, geochemical changes in croplands, and improper use of pesticides—has significantly affected grasshopper ecology. In some areas, over-application of pesticides reduced mesophilous populations but contributed to an increase in xerophilous species.

Overall, studying the ecological and faunal status of grasshoppers in Eastern Fergana is essential for ensuring the region's biological security, developing scientifically grounded pest management strategies, and maintaining the stability of natural ecosystems.

Conclusion

The Eastern Fergana Valley possesses a rich biological resource in terms of true grasshopper fauna. According to the results, 27 species were identified, and their ecological adaptability and distribution characteristics were classified scientifically. Xerophilous, mesophilous, agrofit, and hygrophilous species showed distinct associations with different landscape elements of the region. Seasonal population dynamics were closely linked to temperature, humidity, and anthropogenic factors.

This research is significant for developing a monitoring system for grasshoppers in Eastern Fergana, establishing protective measures for agroecosystems, and ensuring the long-term stability of natural ecosystems. The findings indicate the presence of potential invasive species in the region, emphasizing the need for continuous ecological monitoring.

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