



Ecological groups of Orthopteran insects (Insecta: Orthoptera) of the Fergana Valley

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Abstract

The article presents information on the biological diversity of orthopteran insects identified in natural and anthropogenic zones of the Namangan, Andijan and Fergana regions for 2017-2023, and their belonging to various ecological groups by life forms. According to the results of the study, it was established that the most common species in the ecological group of orthopteran insects by life form in the Fergana Valley are facultative chortobiont (18.3%), eremobiont (17%), thamnobiont (9.1%), spikelet chortobiont (9.1%). In other ecological groups, the proportion of species is set at 1-4.5%.

Keywords: Fergana Valley, ecological group, species composition, orthoptera, herpetobiont, facultative chortobiont, thamnobiont, eremobiont, spiny chortobiont, fissurobiont, petrobiont, geobiont

Introduction

There are more than 20,000 species of insects worldwide, including about 520 species and subspecies in the countries of Central Asia and the Republic of Uzbekistan. Uzbekistan has always attracted the attention of researchers with its extremely rich entomofauna and biological diversity. Insects are common inhabitants of the animal world and have a significant negative impact on various sectors of the economy [7]. It is important to emphasize the role of insects in the spread of transmissible diseases of animals and humans. Today, the damage caused by insects can be safely attributed to socio-economic problems.

When studying insect ecology, it is important to first consider the varieties of insects living in natural conditions, as well as the basic functional laws of their development at various levels. It is necessary to study their vital characteristics and habitats, biological diversity, as well as the features of their distribution between landscapes. It is necessary to classify insects by life forms, taking into account abiotic and biotic factors. It is important to pay special attention to the mechanisms that affect the dynamics of the population, vital activity and fertility of insects, as well as the significance and development of entomophages in these processes.

The works of famous foreign researchers such as K. Gartz (1975), R. Sivanpillai (2008), F.E. Zauner (2015), S.K. Gupta and K. Chandra (2017), as well as other scientists, are devoted to the study of fauna, species diversity, distribution and measures to combat harmful insects [3, 4, 12, 13].

The studies conducted by A.A. Bei-Bienko and A.A. Bekuzin (1966), L.L. Mishchenko (1972), F.N. Pravdin (1978), A.V. Lachininsky, M.G. Sergeev and others (2017), as well as M.K. Childebaev (2017), provide information on the fauna, taxonomy of species and ecology of orthopteran insects in the territory of the CIS countries [1, 2, 6, 9, 11, 15].

Information on the species composition, classification, ecology and zoogeographic distribution of orthopteran insects in Uzbekistan is presented in the works of N.K. Ergashev (1968), M.Yu. Medetov (2018), A.A. Nurzhanov (2023) and other authors. Measures to combat harmful

insects are discussed in the works of F.A. Gapparov (2002) and A.A. Nurzhanov (2023) [7, 8, 10, 16].

Materials and research methods

Research was conducted in various regions of the Namangan, Andijan, Fergana regions of Uzbekistan in 2017-2023. The main part of the district territory consists of mountainous and foothill areas. In this place, the foothill region occupies a much larger area compared to neighboring regions. Standard entomological methods were used to collect the material. Accordingly, the number of species per 1 m² of area was recorded using an entomological trap.

Insect samples were collected using general entomological methods and methods developed for the genus. The collected insect samples were placed on entomological mattresses and labeled with brief information about the name, coordinates, duration, and landscape of the study site. To determine the taxonomic status of insects, the guides "Locusts of Kazakhstan, Central Asia and identification territories" [6] were used for locusts, and "Patterns of distribution of orthopteran insects of Northern Asia" [14] were used for grasshoppers and crickets.

In addition, a number of identification guides were used to determine the species. Collection materials were prepared from specimens of the identified species. The coordinates of the material collection sites were determined using Maps.me and Google Earth. To compare the orthopteran insects of the region, the degree of similarity of the fauna species was determined using the P. Jaccard similarity coefficient and cluster analysis was performed.

Research results and their discussion

From 2017 to 2023, the classification of insects by their life forms, including 88 species of orthopteran insects in the Namangan, Andijan and Fergana regions, was carried out based on the methodology proposed by F.N. Pravdin.

The research also used data from the work of A.V. Lachininsky and other authors [6]. The main life forms of orthopteran insects in the studied region were classified into 15 groups (see Table 1 and Fig. 1).

Table 1: Entomological groups of orthopteran insects in the Fergana Valley based on their life forms

№	Life forms	Species	Quantity	
			Number of species	%
1	Herpetobiont	<i>Tetrix bolivari</i> Saul., <i>Tetrix subulata</i> L., <i>Tetrix tartara tartara</i> (I. Bol.), <i>Tetrix tartara subacuta</i> B.-Bien.	4	4.5
2	Facultative hortobiont	<i>Platycleis intermedia</i> (Aud.-Serv.), <i>Ruspolia nitidula</i> (Scop.), <i>Pyrgomorpha bispinosa deserti</i> B.-Bien., <i>Duroniella gracilis</i> Uv., <i>Duroniella kalmyka</i> (Ad.), <i>Epacromius tergestinus</i> (Charp.), <i>Aiolopus thalassinus thalassinus</i> F., <i>Aiolopus oxianus</i> Uv., <i>Aiolopus simulatrix</i> (F. Walk.), <i>Hilethera turanica</i> Uv., <i>Dociostaurus</i> (s.str.) <i>tartarus</i> (Stshelk.), <i>Dociostaurus</i> (s.str.) <i>maroccanus</i> (Thnd.), <i>Dociostaurus</i> (S.) <i>kraussi kraussi</i> Ingen., <i>Dociostaurus</i> (S.) <i>kraussi nigrogeniculatus</i> Serg. Tarb., <i>Notostaurus albicornis</i> (Ev.), <i>Omocestus haemorrhoidalis haemorrhoidalis</i> (Charp.).	16	18.3
3	Hortobiont	<i>Pteronemobius heydeni concolor</i> (Walk.), <i>Oxya fuscovittata</i> (Marsch.), <i>Tropidopola turanica turanica</i> Uv., <i>Calliptamus italicus italicus</i> L., <i>Calliptamus turanicus</i> Serg. Tarb., <i>Calliptamus barbarus cephalotes</i> (Costa), <i>Calliptamus coelesyriensis carbonarius</i> Uv.	7	8
4	Tamnobiont	<i>Tettigonia caudata</i> Charp., <i>Tettigonia viridissima</i> L., <i>Anacridium aegyptium</i> (L.), <i>Heteracris littoralis littoralis</i> Ramb., <i>Heteracris adpersa</i> (Redt.), <i>Heteracris pterosticha</i> (F.d.W.), <i>Eyprepocnemis unicolor</i> Serg. Tarb., <i>Miramiola pusilla</i> (Mir.).	8	9.1
5	Eremobiont	<i>Helioscirtus moseri</i> Sauss., <i>Pyrgodera armata</i> F.d.W., <i>Mioscirtus wagneri</i> (Kitt.), <i>Oedipoda miniata miniata</i> (Pall.), <i>Oedipoda caerulescens</i> L., <i>Oedipoda fedtschenkoi fedtschenkoi</i> Sauss., <i>Acrotylus insubricus</i> (Scop.), <i>Sphingonotus halocnemi</i> Uv., <i>Sphingonotus elegans</i> Mistsh., <i>Sphingonotus nebulosus discolor</i> Uv., <i>Sphingonotus octofasciatus</i> (Aud.-Serv.), <i>Sphingonotus maculatus maculatus</i> Uv., <i>Pseudosphingonotus savignyi</i> (Sauss.), <i>Sphingoderus carinatus</i> (Sauss.), <i>Bryodemella tuberculata tuberculata</i> (Fabr.).	15	17
6	Spikelet hortobiont	<i>Ramburiella foveolata</i> (Serg. Tarb.), <i>Ramburiella turcomana</i> (F.d.W.), <i>Mesasippus kozhevnikovi</i> (Serg. Tarb.), <i>Chorthippus</i> (s.str.) <i>albomarginatus karelini</i> (Uv.), <i>Chorthippus</i> (s. str.) <i>dichrous</i> (Ev.), <i>Chorthippus</i> (G.) <i>apricarius</i> (Lin.), <i>Glyptobothrus meridionalis</i> Mistsh., <i>Glyptobothrus biguttulus</i> L.	8	9.1
7	Fissurobiont	<i>Velarifictorus bolivari</i> (Uv.), <i>Modicogryllus bordigalensis</i> Latr., <i>Modicogryllus frontalis</i> (Fieb.), <i>Melanogryllus desertus</i> Pall., <i>Tartarogryllus tartarus</i> Sauss., <i>Turanogryllus lateralis</i> (Fied.), <i>Gryllus bimaculatus</i> Deg.	7	8
8	Petrobiont	<i>Atrichomethis semenovi</i> (Zub.), <i>Pezotmethis tartarus tartarus</i> (Sauss.), <i>Pezotmethis ferghanensis</i> (Uv.), <i>Sphingonotus kirgizicus</i> Mistsh.	4	4.5
9	Cryptobiont	<i>Eremogryllodes semenovi</i> (Mir.), <i>Bruntridactylus tartarus</i> Sauss., <i>Xya variegata</i> Latr.	3	3.4
10	Flying Migrant	<i>Locusta migratoria migratoria</i> L.	1	1.1
11	Herbivorous	<i>Semenoviana plotnikovi</i> (Uv.), <i>Conophyma semenovi semenovi</i> Zub., <i>Conophyma sokolovi decorum</i> Mistsh.	3	3.4
12	Hortobiont	<i>Acrida oxycephala</i> (Pall.), <i>Truxalis eximia</i> Eichw., <i>Gonista sagitta</i> (Uv.).	3	3.4
13	Underground geophiles	<i>Decticus verrucivorus</i> (Lin.), <i>Decticus albifrons</i> F., <i>Oedaleus decorus</i> (Germ.).	3	3.4
14	Geobiont	<i>Gryllotalpa unispina</i> Sauss., <i>Gryllotalpa grullatalpa</i> L.	2	2.3
15	Specialized phytophile	<i>Conocephalus fuscus</i> Thunb., <i>Oecanthus turanicus</i> Uv., <i>Ochrilidia hebetata kazaka</i> (Serg. Tarb.), <i>Euthystira brachyptera</i> (Ocsk.).	4	4.5
Total:			88	100

When dividing orthopteran insects into groups based on their life form, there are 2 species and 2 subspecies - herpetobionts (mesophiles that feed on organic matter); 11 species and 5 subspecies are facultative hortobionts (species that live on the soil surface, in open areas); 2 species and 5 subspecies are hortobionts (species that differ in body structure, adapted to life in spikelet plants); 8 species are thamnobionts (species that live on trees and shrubs); 10 species and 5 subspecies are eremobionts (species associated with the moist soil surface in open areas); 5 species and 3 subspecies are spikelet hortobionts; 7 species are fissurobionts (species that live under cracks in soil pits); 4 species are petrobionts; 3 species of cryptobionts (adapted to living in rodent nests), 1 species of flying migrants; 1 species and 2 subspecies of herbivorous hortobionts; 3 species of glass-spikelet hortobionts (species feeding on reeds and sedges in coastal groves); 3 species of underground geophiles; 2 species of geobionts (species living in the upper layers of soil); and it was also established that 3 species and 1 subspecies belong to

specialized phytophile (species adapted to living in the uppermost tier of grasses and lawns) ecological groups.

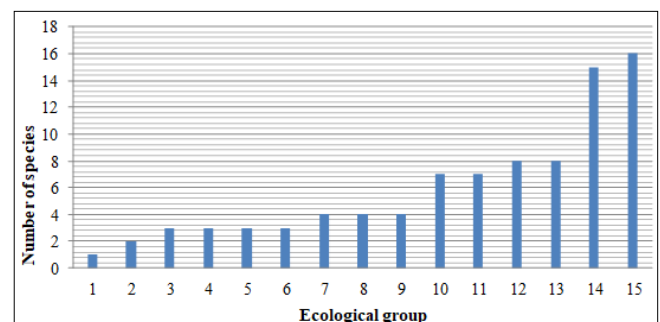


Fig 1: Ecological groups of orthopteran insects by life forms in the Fergana Valley and the number of species

Ecological groups of species by life form: 1-Flying migrant, 2-Geobiont, 3-Cryptobiont, 4-Herbivorous hortobiont, 5-Glass-spikelet hortobiont, 6-Underground geophile, 7-

Herpetobiont, 8-Petrobiont, 9-Specialized phytophile, 10 - Hortobiont, 11-Fissurobiont, 12-Thamnobiont, 13-Spikelet chortobiont, 14-Eremobiont, 15-Facultative chortobiont.

Eremobionts occupy the largest share in terms of the number of species and include 15 representatives, and facultative orthobionts have 16 species. Orthobionts and fissurobionts have 7 representatives each, while thamnobionts and spiny orthobionts contain 8 species each. The remaining groups have from 1 to 4 species.

Conclusion

As a result of the study and analysis of the collected materials, 88 species and subspecies of orthopteran insects identified in the Fergana Valley were grouped by life form. Frequently encountered species include facultative chortobionts (species living on the soil surface, in open areas - 18.3%), eremobionts (adapted to life on the surface - 17%), thamnobionts (species adapted to life in trees and shrubs - 9.1%), spikelet chortobiont (species feeding along river banks in forests, reeds and sedges - 9.1%), chortobiont (species adapted to life in spikelet plants of various body structures - 8%), fissurobionts (species living under soil pits and cracks - 8%), and the proportion of species belonging to other ecological groups was 1-4.5%.

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