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Orthoptera (Insecta) fauna of the Kashkadarya region, Uzbekistan

A.A. NURJANOV[1,♥], M.ZH. MEDETOV[2], F.A. GAPPAROV[3], B.R. KHOLMATOV[2], I.I. ABDULLAYEV[4], N.KH. TUFLIYEV[3], F.A. NURJONOV[4]

[1]Department of Soil Science and Agronomy, Faculty of Bioengineering and Food Safety, Urgench State University. 14, 220100, Kh.Alimdjan str, Urgench, Uzbekistan. Tel./fax.: +998-62-2246700, ♥email: info@urdu.uz
[2]Laboratory of Entomology, Institute of Zoology, Academy of Sciences of the Republic of Uzbekistan. 100053, Bogishamol street, Tashkent, Uzbekistan
[3]Laboratory of Pasture Pests, Scientific Research Institute of Plant Quarantine and Protection. 4 Babur str., Kybrai, Tashkent, Uzbekistan
[4]Khorezm Mamun Academy. 220900, Markaz 1, Khiva, Khorezm, Uzbekistan

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Abstract. *Nurjaniv AA, Medetof MZH, Kholmatov BR, Abdullahyev II, Tufliyev NKH, Nurjonov FA. 2023. Orthoptera (Insecta) fauna of the Kashkadarya region, Uzbekistan. Biodiversitas 24: 112-121.* More than 30,000 different species of orthoptera insects, most of which are found in the tropics and subtropics, are known to exist in the world's fauna. The most extensive among the orthopteroids is the order Orthoptera, which includes more than 20,000 species of insects. Most are herbivores, while others are predators or have a mixed diet. Large size, jumping abilities, and open lifestyle make orthopteran characters accessible to many landscapes. Orthopterans play a significant role in the movement of the energy flow as an important link in biocenosis, connecting secondary consumers with producers. Many species of Orthopterans, especially grasshoppers, are dangerous pests of agriculture. Harm is especially noticeable from those locust species, which could make swarms. The research was carried out in various agro and natural landscapes to determine the species composition of orthopteran insects in the Kashkadarya region. A total of 1274 samples were collected from 11 coordinates in 10 different landscapes during the scientific trips. They comprised 657 females (51.4%), 403 males (31.6%), and 214 nymphs (16.7%). The distribution of 70 species belonging to 50 genera and 7 families of orthopteran insects is discussed in this research. Samples were taken from 6 coordinates in 6 types (cucurbits, orchards, alfalfa, mulberry, vineyards, and mung bean fields) of agro-landscapes and 6 coordinates in 4 natural (plains of the Karshi desert, hills, mountains, and saxaul forests) landscapes. The highest species diversity has been found in orchards, where 129 samples of 20 orthopteran species have been collected in the Guzar district of the Kashkadarya region. The Karshi desert was identified as the landscape with the lowest number of species, with 41 samples of 9 species collected. The average density of insects in the desert was 0.4 per square meter. Two species were found in all 12 coordinates of 10 different landscapes, and 11 were found only once in one coordinate.

Keywords. Agrocenosis, Caelifera, Ensifera, Karshi steppe, natural landscapes, species composition

INTRODUCTION

Orthopteran insects rank among the most important dwellers of grassland. Moreover, they can consume a considerable portion of phytomass and are included in the diet of several vertebrate and invertebrate animals. All this makes Orthopterans an essential component in a wide range of ecosystems, and their presence is necessary for maintaining the food chain. Therefore, specifying the current status and role of Orthopteran insects in natural ecosystems and agrocenosis in various regions throughout Uzbekistan is highly important from the scientific and practical aspects (Nurjanov 2020).

Orthopteroid insects play an important role in nature; they are essential in maintaining ecological balance, transforming plant biomass, and are an important link in the formation of populations of insectivorous animals. In addition, they are one of the important bio-diagnostic elements of reflecting changes occurring in natural and soil-climatic conditions. Therefore, it is possible to analyze the influence of man on the fauna of Orthoptera over the past, historically short period. An analysis of this issue in historical terms showed that the areas occupied by mass species of locusts throughout Uzbekistan have greatly decreased. That was mainly due to the creation of secondary agrobiocenoses (Latchininsky et al. 2013) under the influence of human economic activity affecting the nature around us, which also happened due to changes in the climatic aspect, in which the redistribution of moisture in natural irrigation systems plays a significant role (Nurjanov 2020).

The study of fauna and species composition of orthopteran insects of Central Asia began at the end of the 18th century. Then, for the first time, members of the expedition led by A.P. Fedchenko analyzed the materials for identifying the species of orthopteran insects (Hollier et al. 2015). During the conducted expedition, a rich zoological collection of unique animal examples was collected, and professional specialists were involved in its analysis. Collected materials on orthopteran insects were sent to the Museum d'Histoire Naturelle in Geneva to Saussure to analyze, and among the collected materials, cockroaches, mantis, as well as grasshoppers and crickets were analyzed in detail (Hollier et al. 2015).

After a hundred-year gap, in connection with the process of development of the Karshi steppe, the study of species composition of orthopteran insects distributed in this area has been conducted again (Latchininsky et al.

2001; Latchininsky 2013). The next research was carried out in the newly developed areas of the Karshi desert during 1967-1970, and the distribution of 59 species belonging to 36 genera across stations was determined. In the course of the research, it has been studied 6 species of superfamily Tettigoniodea, 10 species of superfamily Grylloidea, 2 species of Gryllotalpidae, and 41 species of superfamily Acridoidea, from the researched area. Furthermore, to study the distribution of species in biotopes, specimens collected from edges of water basins, sedges, cotton, vegetable fields, meadows of spiky plants, old plantations, steppes, hills, lands rich with ephemerals, and mountain hills (Ergashev 1985).

During this period, scientific work on studying the species composition of grasshoppers in Uzbekistan began to be carried out internationally (Latchininsky et al. 2001; Latchininsky et al. 2007; Sivanpillai and Latchininsky 2008). It should be noted that the research results were published in many local journals and discussed at conferences but not fully announced abroad. Similar scientific works were carried out in Indonesia and Kazakhstan (Leksono et al. 2020; Temreshev and Makezhanov 2020; Leksono et al. 2021).

Gapparov (2014) studied the species composition of Orthopterans in the Karshi steppe and the role of destructive species of Acrididae. By the 2000s, many scientific studies were conducted to study and control pest locusts (Sivanpillai and Latchininsky 2008; Hunter et al. 2016; Nurjanov 2019; Sergeyev et al. 2022). But fundamental research on the study of the fauna of the orthopteran insects in the Kashkadarya region was not carried out since 1983. The last scientific work was carried out in 1982 on the study of insects in the Karshi steppe by Ergashev (1985). After 34 years, in 2016, the fauna and species composition of the Kashakdarya region was researched within the framework of the government project of Researching fauna of orthopterans of the Republic of Uzbekistan by scientists of the laboratory of entomology of the Institute of Zoology (Turaeva et al. 2019; Bazarbaeva and Medetov 2022).

In 2016 fundamental research on the fauna of orthopterans of Uzbekistan was conducted at the Institute of Zoology of the Scientific Academy of the Republic of Uzbekistan. Orthopteran insects were studied between April and August 2016-2017. Samples were collected from the following sites for Orthopteran insects, including alfalfa fields, orchards, vineyards, mulberry plantations, legume fields, cucurbits, saxaul (*Haloxylon* sp.) plantations, steppes, mountains, and various kinds of landscape (Turaeva et al. 2019; Nurjanov 2020).

MATERIALS AND METHODS

Kashkhadarya region is located in the southern part of Uzbekistan in the basin of the Kashkadarya River on the western slope of the Pamir-Alai Mountains. The area of the region is 28,400 km^2. The climate is continental, dry, and subtropical in places. The coordinates of the region are between 38°50′ N and 66°05′ E.

The region borders Surkhandarya from the southeastern part, and these air currents are blocked due to high mountain ranges. The first line of this unique barrier forms the Karatepa ridge, which is 2000 to 2500 meters above sea level. It is followed by an even higher demarcation line - the Hisar Mountains and its numerous ridges. At high mountain ranges, moist airflow is trapped and cooled. The moist condenses into snow and rain, forming rivers' source.

The climate of the east, where mountainous are present in the Kashkadarya basin weather is moderately humid. However, in the plain regions, the weather is even colder during winter and dry and hot during summer. The valleys and the lower regions of the mountain are covered with thickets, where maple, almond, and spruce grow in the upper parts, and in some places, real forest formation was observed. In plain high-altitude regions above 2000 to 2500 meters above sea level, tulips, *Iris sogdiana*, and giant candle-shaped eremurus plant species form high mountain meadows. These meadows serve as excellent summer pastures (Newton 2005; Khujanazarov et al. 2019; Khujanazarov 2021).

Karshi desert is located at the narrowest part of the Kitab-Shakhrisabz basin, where the Guzardarya flows into the Kashkadarya on the left (called Upper Karasuv in its lower reaches). These plains consist of dry deltas or outflow cones of the Kashkadarya and are known as the Karshi desert. In its central part, along both sides of the river, there is a waterless valley. The area of the desert is 13,000 square kilometers.

The collection of insect specimens was carried out using general entomological methods and methods developed for collecting orthopterans. To collect insects, mainly used the sweep netting method. In this method, the collection of insects was carried out in the following way: the handle holds with one hand in such a position that the last part of the stick reached at least to the elbow. The ring part is perpendicular to the ground surface, bush, or tree trunk. The handle moves rapidly across the plant. In this case, the force of the handle hitting the plant is of great importance. The handle has to be moved at a certain speed that does not give a shaking shock to insects and does not give them time to escape to the ground. On the contrary, even in case of a very fast sweeping, branches could be broken, and parts of the plant that get together with insects will fall into the trap, damaging the insects. Therefore, from an empirical point of view, it is required to choose an average impact force when performing sweeping (Newton 2005; Golub et al. 2012).

The sample collection duration consisted of an hour; when sampling started countdown timer was set for one hour. If the sampling process stopped before 1 hour due to scarcity of plants, then the population was calculated mathematically to find the population number in 1 hour. While collecting samples through the herbaceous cover, sweeping movements were performed while walking, taking two sweeps, one for the right and one for the left, for each step. In this case, each sweep with the handle on one side is counted as one strike. When collecting insects on shrubs and trees, sweeping provides without movements, in that for each catch, attention will be paid to cover new zones of the plant bush (Pravdin 1978; Golub et al. 2012).

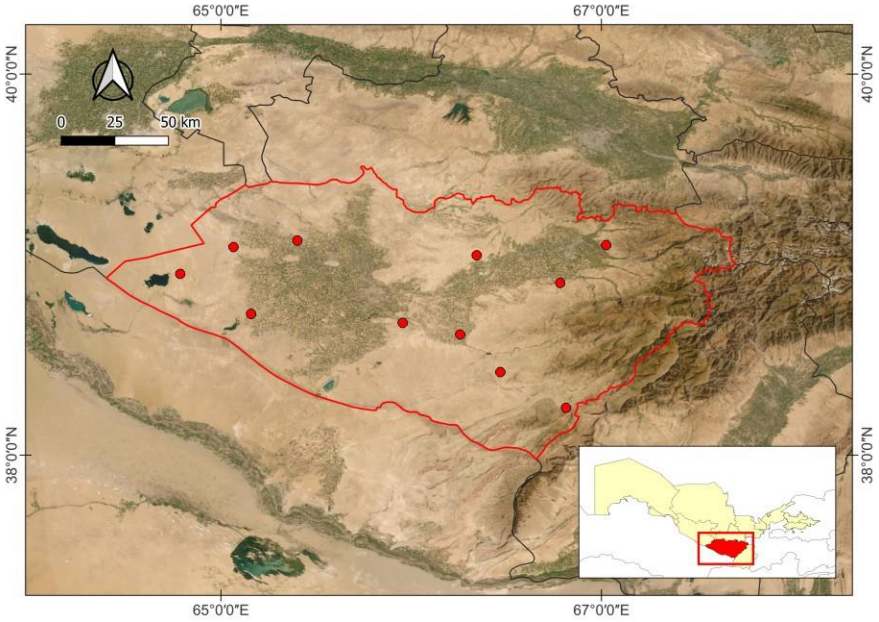

Figure 1. Coordinates the study site of the Kashkhadarya region, Uzbekistan

Caught samples were collected by hand or using an exhauster and glass tube. When collected samples need to be placed into a refrigerator, the whole material in the sweep net is placed in an insect-proof bag attached to the ring of the sweep net by shaking. In this case, insects will be frozen in the bag under laboratory conditions to preservatives.

All collected samples were processed in the laboratory of Entomology, Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan. Insects were identified according to Latchininsky et al. (2001).

These abbreviations used to specify the abundance of solitary species: sg: single individuals (1-3 individuals collected per hour); rr: rare species (4-10 individuals collected per hour); cs: common species (11-20 individuals collected per hour); as: abundant species (21-100 individuals collected per hour).

In Guzar District, the insects were collected in 8 different sites, in Mubarak and Kitab Districts in 3 sites each, and in Karshi and Dehkanabad Districts in 2 sites in each district. Each site was located at least 20 kilometers from the others. Collected insects have determined the frequency of males, females, and nymphs. Also, species composition has been specified.

GPS navigators GARMIN were used to determine the coordinates of our routes and sample sites. Coordinates were analyzed in Google Earth Pro (ver. 7.3.4.8642) and QGIS 3.16.

RESULTS AND DISCUSSION

Results

Based on the analysis of the obtained data, we determined that in the course of the research, we collected a total of 1274 specimens (Table 1). They comprised 657 females (51.4%), 403 males (31.6%), and 214 nymphs (16.7%). The ratio of females to males was 1.6 to 1.0. Nymphs were dominated in spring collections (Figure 1.).

Collections made between 24-26 April 2016 showed that, in spring, nymphs comprise over half of all insects. Their development into adult forms results in a decrease in the number of nymphs in summer. Species that give several generations in a year were also encountered in the summer period sampling. The abundance of Orthopterans was not the same in all the sites we studied. The largest number of individuals collected per hour (129 individuals per hour) was recorded in an orchard in Guzar District on 28 August 2016. About the same quantity was registered in an alfalfa field in Mubarak District. The smallest number of insects (34-35 individuals per hour) was also collected in the Mubarak district in the saxaul plantation (Table 1).

The analysis of the species composition showed that 20 species of Orthoptera inhabited the orchards of the Guzar district (Table 2). Therefore, collected a total of 129 individuals' frequency was determined, where 65 females, 49 males, and 15 nymphs were identified. The data in Table 2 shows that the species predominating in orchards are *Calliptamus italicus italicus* (16.2%), *Aiolopus thalassinus* (13.1%), *Pyrgomorpha bispinosa deserti* (8.5%), *Duroniella gracilis* (7.7%). The portion of *Modicogryllus pallipalpis*, *Heteracris adspersa*, and *Chorthippus meridionalis* were less than 1%. We also came across species *Locusta migratoria migratoria* and *Dociostaurus maroccanus* from the superfamily Acridoidea, which are known as harmful and damaging insects to agricultural crops.

We recorded 15 Orthopteran species in an alfalfa field in Mubarak District (Table 3). A total of 103 individuals were collected in the alfalfa field, 58 of which were females, 42 males, and 3 nymphs. The predominant species were *Pyrgomorpha bispinosa deserti* (14.5%), *Dociostaurus maroccanus* (13.5%), *Melanogryllus desertus* (10.0%), *Duroniella gracilis* (10.6%). The population

density of species *Decticus verrucivorus* and *Calliptamus turanicus* were mentioned as singleton species.

The results of the research into the species composition of Orthopteran insects in the saxaul plantation are provided in Table 4. We came across 12 species belonging to the superfamily Acridoidea but did not find any grasshoppers or crickets. However, the following species clearly predominated the saxaul site: *Pyrgomorpha bispinosa deserti* (22.8%), *Dociostaurus maroccanus* (14.2%), *Dericorys albidula* (14.3%), *Dericorys tibilalis* (11.4%). These four species comprised 62.7% of all the Orthoptera insects recorded on the site. Saxaul monophagous pests *Dericorys albidula* and *Dericorys tibilalis* were quite common in these sites.

The species composition of Orthopterans recorded in the mountains, namely, the Kitab Pass area (Figure 2.), where situated in the Kitab-Shakhrisabz basin, is distinguished by the presence of species and subspecies from the genus *Conophyma* spp. There we came across such subspecies as *Conophyma semenovi semenovi*, *Conophyma sokolovi modestum*, and *Conophyma sokolovi decorum* (Table 5). The species dominating the mountain area are locust *Calliptamus turanicus* and grasshopper *Platycleis intermedia*. In these sites, we collected a total of 14 species.

Nine Orthopteran species in the steppe area of the Kashkadarya region have been identified. The predominant species in this zone is *Dociostaurus maroccanus*, which is abundant in the area and poses a danger to agricultural crops in steppes and foothills. Also, *Calliptamus turanicus* was recorded, comprising 21.9% (Table 6). Species from the genera *Dociostaurus* and *Dericorys* predominated in steppes, represented by three and two species, respectively. The density of the Orthopterans mentioned above in the site in question was 0.4 individuals per square meter.

Figure 2. Mountains of the Kashkadarya region, Kitab pass (Photo by M.J. Medetov)

Table 1. Information on the sites and short characteristics of the quantitative values of collected individuals of Orthopteran species

date	District	Landscapes	Insects per hour				Number of species
			♀	♂	n	Total	
20.04.2016	Mubarak	Saxaul	8	4	33	45	9
21.04.2016	Mubarak	Alfalfa	7	5	14	26	9
21.04.2016	Guzar	Orchards	12	7	22	41	9
28.04.2016	Karshi	Desert	5	1	22	28	7
29.04.2016	Guzar	Cucurbits	15	8	19	42	15
17.05.2016	Mubarak	Saxaul	25	8	2	35	12
18.05.2016	Mubarak	Alfalfa	29	14	6	49	14
18.05.2016	Guzar	Orchards	40	20	5	65	14
18.05.2016	Guzar	Orchards	43	38	33	114	16
18.05.2016	Guzar	Hills	32	27	2	61	12
18.05.2016	Dehkanabad	Hills	25	15		40	8
18.05.2016	Dehkanabad	Mountains	16	7	1	24	11
23.05.2016	Kitab	Vineyard	37	29	5	71	16
23.05.2016	Kitab	Mulberry	26	13	10	49	19
23.05.2016	Kamashi	Mung bean	26	15	8	49	18
24.05.2016	Kitab	Mountains	35	14	3	52	16
24.05.2016	Guzar	Cucurbits	30	24	3	57	21
24.05.2016	Karshi	Desert	30	11		41	9
27.08.2016	Mubarak	Saxaul	21	8	5	34	11
28.08.2016	Mubarak	Alfalfa	58	42	3	103	16
28.08.2016	Guzar	Orchards	72	44	3	119	16
28.08.2016	Guzar	Orchards	65	49	15	129	20
Total			657	403	214	1274	298

Table 2. The species composition and number of Orthopterans in orchards (Guzar District, 28 August 2016, individuals per hour, Coordinates: N 38°39′34.7., E 066°13′28.3)

Species	♀	♂	n	Total	%
Tettigonia viridissima	3	2		5	3.8
Platycleis intermedia	2	1		3	2.3
Melanogryllus desertus	1	2		3	2.3
Eumodicogryllus bordigalensis	1		3	4	3.1
Modicogryllus (Modicogryllus) pallipalpis			1	1	0.7
Oecanthus turanicus	5	3		8	6.2
Calliptamus italicus italicus	12	9		21	16.2
Calliptamus barbarus cephalotes	2			2	1.5
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	5	3	3	11	8.5
Acrotylus insubricus	4	2	3	9	6.9
Locusta migratoria migratoria	3	2		5	3.8
Acrida oxycephala	4	5		9	6.9
Truxalis eximia	3	4		7	5.4
Duroniella gracilis	6	4		10	7.7
Heteracris littoralis littoralis	3	2		5	3.8
Heteracris adspersa	1			1	0.7
Aiolopus thalassinus	8	6	3	17	13.1
Hilethera turanica	2			2	1.5
Dociostaurus (Dociostaurus) maroccanus	2	3		5	3.8
Chorthippus (Glyptobothrus) biguttulus		1		1	0.7
Total	65	49	15	129	100

Table 3. The species composition and number of Orthopterans in the alfalfa field (Mubarak District, 28 August 2016, individuals per hour, Coordinates: N 39°09′19.9, E 065°23′01.3)

Species	♀	♂	n	Total	%
Tettigonia caudata	4	3		7	6.7
Platycleis intermedia	5	1		6	5.8
Decticus verrucivorus	1			1	0.9
Gryllus (Gryllus) bimaculatus	2	3		5	4.8
Melanogryllus desertus	7	6		13	10
Gryllotalpa unispina	2			2	1.9
Gryllus (Gryllus) bimaculatus	1	1		2	1.9
Sphingoderus carinatus	4			4	3.8
Dociostaurus (Dociostaurus) maroccanus	8	6		14	13.5
Acrida oxycephala	5	4		9	8.7
Duroniella gracilis	6	5		11	10.6
Duroniella kalmyka	2	2		4	3.8
Calliptamus turanicus	1			1	0.9
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	7	5	3	15	14.5
Tetrix tartara tartara	3	2		5	4.8
Total	58	42	3	103	100

Table 4. The species composition and number of Orthoptera in a saxaul site (17 June 2016, individuals per hour; Coordinates: N 39°27′04.6., E 064°55′13.3., altitude above sea level - 256 m)

Species	♀	♂	n	Total	%
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	5	2	1	8	22.8
Melanotmethis fuscipennis	1			1	2.8
Dericorys albidula	3	2		5	14.2
Dericorys tibialis	2	2		4	11.4
Calliptamus turanicus	2			2	5.7
Calliptamus barbarus cephalotes	2		1	3	8.5
Acrotylus insubricus inficitus	1			1	2.8
Ramburiella (Palaeocesa) turcomana	1			1	2.8
Dociostaurus (Dociostaurus) maroccanus	4	1		5	14.2
Dociostaurus (Dociostaurus) plotnikovi		1		1	2.8
Dociostaurus (Stauronotulus) kraussi kraussi	3			3	8.5
Dociostaurus (Stauronotulus) kraussi nigrogeniculatus	1			1	2.8
Total	25	8	2	35	100

Table 5. The species composition and number of Orthopterans in the mountains (Kitab Pass). Kitab District, June 24th, 2016, individuals per hour, location: N 39°07′27.8, E 066°56′16.4

Species	♀	♂	n	Total	%
Asiotmethis heptapotamicus	2	2		4	7.6
Pezotmethis tartarus	1			1	1.9
Pezotmethis nigrescens	3			3	5.7
Conophyma semenovi semenovi	3	2		5	9.6
Conophyma sokolovi modestum	2			2	3.8
Conophyma sokolovi decorum	1	2		3	5.7
Calliptamus turanicus	5	3		8	15.3
Oedipoda caerulescens	3			3	5.7
Acrotylus insubricus	1		1	2	3.8
Ramburiella (Palaeocesa) foveolata	3	2		5	9.6
Dociostaurus (Dociostaurus) maroccanus	3	1		4	7.6
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	2		2	4	7.6
Platycleis intermedia	4	2		6	11.5
Glyphonotus alactaga	2			2	3.8
Total	35	14	3	52	100

Table 6. The species composition and number of Orthopterans in the Karshi steppe. Karshi District, 24 June 2016, individuals per hour. Coordinates: N 39°00′29.7., E 065°59′30.6.; altitude above sea level - 439 m; density - 0.4 individuals per square meter, 37 individuals per hour

Species	♀	♂	Ny.	Total	%
Velarifictorus (Velarifictorus) bolivari	2		0	2	4.8
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	5		0	5	12.1
Dericorys albidula	1		0	1	2.4
Dericorys tibialis	3	2		5	12.1
Calliptamus turanicus	6	3	0	9	21.9
Acrotylus insubricus		1		1	2.4
Dociostaurus (Dociostaurus) maroccanus	8	4	0	12	29.2
Dociostaurus (Dociostaurus) plotnikovi	2			2	4.8
Dociostaurus (Stauronotulus) kraussi kraussi	3	1	0	4	9.7
Total	30	11		41	100

Discussion

According to Ergashev (1985), the species composition distributed in the Karshi steppe was 57, of which 17 species belonged to 15 genera and 3 families of katydids (Ensifera), and 40 species belonged to 25 genera from 4 families of short-horned (Caelifera) grasshoppers were collected. Therefore, we established that the insects we collected in the Kashkadarya region comprised 70 Orthopteran species (Tables 7 and 8). Comparing Ergashev's (1985) work showed that 6 species (*Conocephalus discolor*, *Semenoviana plotnikovi*, *Eumodicogryllus chivensis*, *Pteronemobius (Pteronemobius) heydenii concolor*, *Stenonemobius (Stenonemobius) gracilis*, *Bothriophylax semenovi*) of katydids were not found in our collections, and 9 species of short-horned grasshoppers (*Tetrix tartara subacuta*, *Atrichotmethis semenovi*, *Ramburiella (Palaeocesa) foveolata*, *Eremippus persicus*, *Chorthippus biguttulus meridionalis*, *Chorthippus biguttulus pamiricus*, *Oedipoda fedtschenkoi fedtschenkoi*, *Sphingonotus (Sphingonotus) maculatus maculatus*, *Sphingonotus (Sphingonotus) nebulosus violascens*) were also not found in our collections. From the other hand, 4 species of Ensifera (*Decticus verrucivorus*, *Glyphonotus alactaga*, *Velarifictorus (Velarifictorus) bolivari*, *Gryllotalpa gryllotalpa*) and 23 species of Caelifera (*Melanotmethis fuscipennis*, *Asiotmethis heptapotamicus*, *Pezotmethis nigrescens*, *Pezotmethis tartarus*, *Dericorys albidula*, *Dericorys tibialis*, *Conophyma semenovi semenovi*, *Conophyma sokolovi decorum*, *Diexis varentzowi*, *Heteracris pterosticha*, E*gnatioides desertus desertus*, *Egnatius apicalis*, *Aiolopus thalassinus*, *Helioscirtus moseri*, *Dociostaurus (Stauronotulus) kraussi kraussi*, *Oedaleus decorus*, *Oedaleus senegalensis*, *Pyrgodera armata*, *Oedipoda caerulescens*, *Acrotylus insubricus*, *Sphingonotus (Sphingonotus) miramae*, *Sphingonotus (Sphingonotus) nebulosus*, *Sphingonotus (Sphingonotus) satrapes*) were collected during our survey which was not found in Ergashev's (1985) collection.

The analysis of the species composition of orthopterans inhabiting agrocenosis and adjacent natural landscapes in the Kashkadarya region showed that 27 species inhabited the agrocenosis and 27 species in natural landscapes. The largest number of species was recorded in orchards.

As a result of our research, we identified 70 Orthopteran species from 50 genera and 7 families in

various agrocenosis and natural landscapes adjacent to them in the Kashkadarya region. It has recorded 44 species in natural landscapes and 40 species in agrocenosis. Considering the species provided in literary sources, the total number of species inhabiting the region amounts to 57. The species diversity and abundance of Orthopterans in agrocenosis were the largest in June and August.

Calliptamus turanicus and *Pyrgomorpha bispinosa deserti* were found in all 12 coordinates of 10 different landscapes, but *Melanotmethis fuscipennis, Asiotmethis heptapotamicus, Pezotmethis nigrescens, Conophyma semenovi semenovi, Conophyma sokolovi decorum, Diexis varentzowi, Egnatioides desertus desertus, Egnatius apicalis, Helioscirtus moseri, Ramburiella turcomana, Notostaurus albicornis albicornis, Notostaurus albicornis turcmenus, Eremippus simplex simplex, Chorthippus biguttulus meridionalis, Hilethera turanica, Oedaleus decorus, Oedaleus senegalensis, Pyrgodera armata, Oedipoda caerulescens, Sphingonotus halocnemi, Sphingonotus miramae, Sphingonotus nebulosus, Sphingonotus satrapes, Sphingonotus rubescens rubescens, Sphingonotus savignyi* were found once by one coordinates.

Comparing species composition in terms of landscapes shows that, in orchards spread, the biggest number of orthopterans (30 species). That is 43% of species in the region. On the other hand, the smallest number is recorded in vineyards (13 species).

Comparing the distribution areas of locusts reveals that 30 species, or 43% of the total, are found in gardens, where they are more widely distributed than in other areas. 13 species (18%) of orthopterans were found to be spread in vineyards, which were determined to have the lowest species diversity of any landscape type.

Table 7. The species composition of Tettigonidae and Gryllidae in agrocenosis and adjacent natural landscapes in Kashkadarya region

Family, genus, and species	Ergashev (1985)	Medetov (2016)	Agrocenosis						Natural landscapes			
			Alfalfa	Mung bean	Cucurbits	Orchards	Vineyards	Mulberry	Mountains	Hills	Steppe	Saxaul
Tettigoniidae												
Tettigonia viridissima	+	+			+	+	+					
Tettigonia caudata	+	+	+		+	+	+	+				
Conocephalus discolor	+	-										
Decticus albifrons	+	+			+							
Decticus verrucivorus	-	+	+	+	+	+	+	+	+	+		
Platycleis intermedia	+	+	+	+	+	+	+	+	+	+		
Semenoviana plotnikovi	+	-										
Glyphonotus alactaga	-	+					+		+	+		
Gryllidae												
Oecanthus turanicus	+	+			+	+						
Gryllus (Gryllus) bimaculatus	+	+	+	+		+	+					
Melanogryllus desertus	+	+	+	+	+	+						+
Eumodicogryllus bordigalensis	+	+			+						+	+
Modicogryllus (Modicogryllus) pallipalpis	+	+				+	+					
Eumodicogryllus chivensis	+	-										
Gryllodinus kerkennensis	+	+	+	+	+		+					
Velarifictorus (Velarifictorus) bolivari	-	+								+	+	
Pteronemobius (Pteronemobius) heydenii concolor	+	-										
Stenonemobius (Stenonemobius) gracilis	+	-										
Bothriophylax semenovi	+	-										
Gryllotalpidae												
Gryllotalpa unispina	+	+	+	+	+	+		+				
Gryllotalpa gryllotalpa	-	+	+			+		+				
Total	17	15	8	6	10	10	8	5	3	4	2	2

Table 8. The species composition and distribution of superfamily Acridoidea MacLeay, 1821 in agrocenosis and adjacent natural landscapes in Kashkadarya region

Family, genus, and species	Ergashev (1985)	Medetov (2016)	Agrocenosis						Natural landscapes			
			Alfalfa	Mung bean	Cucurbits	Orchards	Vineyards	Mulberry	Mountains	Hills	Steppe	Saxaul
Tetrigidae												
Tetrix subulata	+	+		+	+	+		+				
Tetrix tartara tartara	+	+	+	+	+	+		+				
Tetrix tartara subacuta	+	-										
Pyrgomorphidae												
Pyrgomorpha (Pyrgomorpha) bispinosa deserti	+	+	+	+	+	+	+	+	+	+	+	+
Pamphagidae												
Melanotmethis fuscipennis	-	+										+
Asiotmethis heptapotamicus	-	+							+			
Pezotmethis nigrescens	-	+							+			
Pezotmethis tartarus	-	+						+	+	+		
Arididae												
Dericorys albidula	-	+									+	+
Dericorys tibialis	-	+									+	+
Conophyma semenovi semenovi	-	+							+			
Conophyma sokolovi modestum	+	+						+	+	+		
Conophyma sokolovi decorum	-	+							+			
Diexis varentzowi	-	+								+		
Anacridium aegyptium	+	+								+	+	+
Calliptamus turanicus	+	+	+	+	+	+	+	+	+	+	+	+
Calliptamus italicus italicus	+	+	+			+						+
Calliptamus barbarus cephalotes	+	+				+						+
Heteracris adspersa	+	+				+						+
Heteracris littoralis littoralis	+	+			+	+						
Heteracris pterosticha	-	+					+	+				
Egnatioides desertus desertus	-	+									+	
Egnatius apicalis	-	+									+	
Atrichotmethis semenovi	+	-										
Acrida oxycephala	+	+	+	+	+	+	+	+				
Truxalis eximia eximia	+	+	+		+	+		+				
Duroniella gracilis	+	+	+	+	+	+						
Duroniella kalmyka	+	+	+	+	+							
Aiolopus thalassinus	-	+			+	+						
Helioscirtus moseri	-	+									+	
Ramburiella (Palaeocesa) foveolata	+	-		+	+				+	+		
Ramburiella (Palaeocesa) turcomana	+	+										+
Dociostaurus (Dociostaurus) maroccanus	+	+	+			+	+	+	+	+	+	+
Dociostaurus (Kazakia) tartarus	+	+		+		+		+				
Dociostaurus (Dociostaurus) plotnikovi	+	+									+	+
Dociostaurus (Stauronotulus) kraussi nigrogeniculatus	+	+							+	+		+
Dociostaurus (Stauronotulus) kraussi kraussi	-	+									+	+
Notostaurus albicornis albicornis	+	+									+	
Notostaurus albicornis turcmenus	+	+									+	
Eremippus persicus	+	-										
Eremippus simplex simplex	+	+									+	
Chorthippus (Glyptobothrus) biguttulus	+	+				+						
Chorthippus biguttulus pamiricus	+	-										
Hilethera turanica	+	+				+						
Locusta migratoria migratoria	+	+		+	+	+						
Oedaleus decorus	-	+								+		
Oedaleus senegalensis	-	+								+		
Pyrgodera armata	-	+									+	
Mioscirtus wagneri wagneri	+	+		+	+							
Oedipoda fedtschenkoi fedtschenkoi	+	-										
Oedipoda miniata	+	+				+			+	+		
Oedipoda caerulescens	-	+							+			
Acrotylus insubricus inficitus	+	+		+	+	+					+	+
Acrotylus insubricus	-	+				+			+		+	
Sphingonotus (Sphingonotus) maculatus maculatus	+	-										
Sphingonotus (Sphingonotus) halocnemi	+	+									+	
Sphingonotus (Sphingonotus) miramae	-	+								+		
Sphingonotus (Sphingonotus) nebulosus	-	+									+	
Sphingonotus (Sphingonotus) satrapes	-	+									+	
Sphingonotus (Sphingonotus) rubescens rubescens	+	+								+		
Sphingonotus (Sphingonotus) savignyi	+	+							+			
Sphingonotus (Sphingonotus) nebulosus violascens	+	-										
Sphingoderus carinatus	+	+	+		+							+
Total	40	55	10	12	15	20	5	11	15	14	20	16

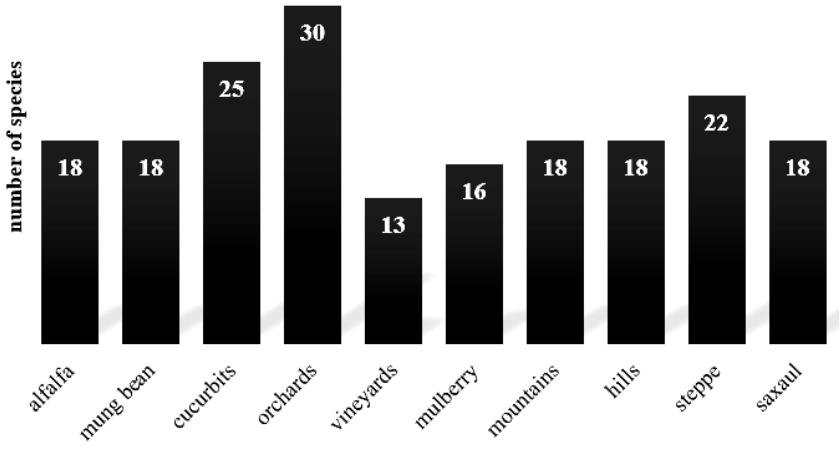

Figure 1. The number of species in various agro and natural landscapes of the Kashkhadarya region

In conclusion the species composition of orthopterans identified in the Kashkadarya region was 84 species belonging to 49 genera from 7 families of 6 superfamilies in 2 suborders. In addition, 20 species from 17 genera belong to ensifera, and 38 species from 32 genera belong to caelifera. *Conophyma sokolovi modestum* was recorded as endemic in Uzbekistan. On the other hand, the distribution area of *Conophyma semenovi semenovi* has expanded to the south. According to Ergashev's (1985) collection, 57 species have been identified, 40 belonging to short-horned grasshoppers and 17 katydids. When our scientific work was compared to Ergashev's (1985) data, it was discovered that 8 Caelifera and 6 Ensifera species, for a total of 14 species, had not been identified in our collection. Whereas 23 Caelifera species belonging to 16 genera from 2 families and 4 Ensifera species belonging to 3 genera from 3 families, for a total of 27 new species, were discovered for the first time in the region. The high number of new species discovered in the area (29%) can be attributed to a lack of previous fundamental research.

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