

# The Fauna Of Subgroups Of Long-Horned Orthoptera (Insecta, Orthoptera, Dolichera) In Flat Provinces Of Uzbekistan

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**Abstract:** *The territory of the Republic of Uzbekistan is a part of the province of Turan, the elements of natural complexes are distinguished by the plain, which are visible explicitly by near mountain and mountain areas. This article discusses the fauna of subgroups of long-horned orthoptera (Insecta, Orthoptera, Dolichera) in flat provinces of Uzbekistan.*

**Key words:** *fauna of subgroups, Insecta, Orthoptera, Dolichera, flat provinces of Uzbekistan*

## 1. INTRODUCTION.

According to the system of zoning by L. N. Babushkin, N. A. Kogay, the main part of the territory of Uzbekistan is in the province of Turan. L. N. Babushkin, N. A. Kogay divided Turan into plain, near mountain and mountainous two provinces. To the flat provinces they included Ustyurt, Lower Amudaryo, Qizilkum and Lower Zarafshon districts. Every district was divided into district centers and district centers into landscapes. Flatland of Uzbekistan differ in their landscape development and origin, and near mountain and mountain areas against present natural geographic peculiarities. The climate of the flat part is arid and summer is very hot. These conditions have effects on the covering of the soil and plants which differ in flat, near mountain and mountain areas.

In order to study the fauna of long-horned orthoptera we have collected samples from the arid areas with low precipitation, specifically flat provinces which include Ustyurt, Lower Amudaryo, Qizilkum and Lower Zarafshon districts (up to 400m. above sea level).

**The main part.** Arid areas of Uzbekistan were divided into natural and anthropogenic landscapes. The natural landscapes include the Ustyurt, Kyzylkum and Lower Amudarya, riparian woodlands of the biosphere reserve. To the anthropogenic landscapes were included the areas occupied by crops and irrigation facilities, which are engaged in agriculture. Based

on this, the composition of the species of orthoptera were analyzed in 4 landscape sections (Table 1).

According to the data there are 27 species belonging to 3 families of katydids and crickets have been identified in the flatlands of Uzbekistan. (Table - 1).

**Table – 1.**  
 The classification of katydids and crickets according to the region and landscape of the plains of Uzbekistan

№	Types studied	Regions and landscapes			
		Agrocenosis	Kyzylkum	Ustyurt	Riparian woodlands
<b>Tettigonioidae</b>					
1.	<i>Tettigonia caudate</i> Charp.	+++	+	+	++
2.	<i>Tettigonia viridissima</i> L.	++	+	-	+++
3.	<i>Conocephalus fuscus</i> Thunb.	++	-	-	-
4.	<i>Platycleis intermedia</i> Serv.	+++	+	+++	+++
5.	<i>Platycleis affinis</i> Fied.	+	-	+	+
6.	<i>Ruspolia nitidula</i> (Scop.)	++	-	-	-
7.	<i>Semenoviana plotnikovi</i> W	+++	+	-	-
8.	<i>Decticus albifrons</i> P.	+++	+	+++	-
9.	<i>Decticus verrucivorus</i> (Lin)	+++	+	++	-
10.	<i>Glyphonothus alactaga</i> Miram	+	-	-	-
11.	<i>Phaneroptera falcata</i> (Poda)	++	-	-	-
12.	<i>Caereocercus fuscipennis</i> Uv.	-	-	+	-
<b>Grylloidae</b>					
13.	<i>Gryllus bimaculatus</i> D	+++	-	-	-
14.	<i>Melanogryllus desertus</i> (Pall.)	+++	+	++	+++
15.	<i>Tartarogryllus tartarus</i> Sauss.	+++	+	+	-
16.	<i>Modicogryllus bordigalensis</i> (Latr.)	+++	+	-	++
17.	<i>Modicogryllus frontalis</i> (Fieb.)	++	+	-	+
18.	<i>Modicogryllus pallipalpis</i> (Tarb.)	+	-	-	
19.	<i>Gryllodinus kerkennensis</i> (Finot)	+	-	-	-
20.	<i>Turanogryllus lateralis</i> (Fieb.)	+	++	-	-
21.	<i>Velarifictorus bolivari</i> (Uv.)	-	+	++	+
22.	<i>Pteronemobius heydeni concolor</i> (W.)	-	+	-	-
23.	<i>Pteronemobius gracillis</i> (Jakovlev)	+	+	-	-
24.	<i>Bothriophylax semonovi</i> Mir	+	+	+	-
25.	<i>Oecanthus turanicus</i> Uv.	+++	+	-	-
<b>Gryllotalpidae</b>					

26.	<i>Gryllotalpa unispina</i> Sauss.	+++	-	+	+
27.	<i>Gryllotalpa grullatalpa</i> L.	++	+	-	-
		24	17	11	9

Note: + - very rarely spread types (from 1 to 3 insects within an hour); ++ - rare types (from 4 to 10 insects within an hour); +++ - regular types (from 11 to 20 insects within an hour).

The biggest number of them, specifically 24 types (88,8 %) were spread in agrolandscapes, 17 types (62,9 %) in desert, 11 types (40,74 %) in Ustyurt province and 9 types (33,33 %) in riparian woodlands. Out of all types only *Platycleis intermedia* Serv. was studied and it was spread in both natural and agrolandscapes. It was found that the species such as, *Decticus verrucivorus* (Lin), *Melanogryllus desertus*, *Velarifictorus bolivari* (Uv) were spread at least in 4 and the types of *Semenoviana plotnikovi* W, *Tartarogryllus tartarus* Sauss, *Modicogryllus bordigalensis*, *Modicogryllus frontalis*, *Bothriophylax semonovi* Mir, *Grullatalpa grullatalpa* L, were spread in 3 regions.

Some species of (*Ruspolia nitidula* (Scop.), *Phaneroptera falcata*(Poda), *Oecanthus turanicus*Uv.) were adapted to survive in only agroecosystems, and the species of *Caereocercus fuscipennis* is spread only in Ustyurt flatland. Other species like *Tettigonia caudate* Charp., *Platycleis intermedia* Serv., *Decticus albifrons* P., *Melanogryllus desertus* are known to be common in their own region.

These species of *Glyphonothus alactaga* Miram., *Phaneroptera falcata*(Poda), *Modicogryllus pallipalpis* were identified to be very rare. As a result of the work carried out to study long-horned orthopterans in agrolandscapes, their number was identified as much higher in this landscape (Tables 2 and 3). Their distribution by agrolandscapes is shown in Table 2.

In order to study the distribution of orthopterans in agrolandscapes the samples were collected from the gardens, vineyards, cotton fields, surrounding irrigation outlets, grain fields (wheat, corn), melon fields, vegetable fields, as well as other mung bean fields, alfalfa fields with other mixed crops. Thus, to learn about the patterns of distribution of orthoptera insects in agrolandscapes, they were analyzed according to five agroecosystem sections.

According to the data collected, 24 species of orthopterans belonging to three families were widely spread in agroecosystems. There are 17 species (70.83%) of orthopterans that are widespread in the gardens and vineyards, the species such as, *Platycleis intermedia* Serv., *Decticus albifrons* considered to be regular in this agroecosystem, and the species of *Tettigonia caudata*, *Tettigonia viridissima*, *Semenoviana plotnikovi*, *Decticus verrucivorus*, *Melanogryllus desertus*, *Modicogryllus pallipalpis*, *Gryllodinus kerkennensis* were found to be rare species, and also *Platycleis affinis*, *Glyphonothus alactaga*, *Phaneroptera falcata* and others are known to be very rare species. Additionally, other species such as, *Conocephalus fuscus*, *Ruspolia nitidula* and 5 other species are not widespread in this agroecosystem.

Other studies of agroecosystems as a result of a similar analysis of the species composition of orthoptera show that the types of katydids and crickets are spread accordingly, 17 species in the gardens (70.8%), 15 species in cotton agroecosystem (62.5%), 14 species in grain agroecosystem (58.3%), 11 species in vegetable agroecosystem (45.8%), and 16 species in alfalfa fields (66.6%). (Table 2).

Table 2.

The distribution of the species of katidyds and crickets according to agrolandscape of the plains of Uzbekistan

№	Studied species	1*	2	3	4	5
<b>Tettigonioidae</b>						
1.	<i>Tettigonia caudata</i> Charp.	++	+	++	++	++
2.	<i>Tettigonia viridissima</i> L.	++	+	++	+	++
3.	<i>Conocephalus fuscus</i> Thunb.	-	+	-	-	-
4.	<i>Platycleis intermedia</i> Serv.	+++	+	++	++	++
5.	<i>Platycleis affinis</i> Fied.*	+	-	+	-	-
6.	<i>Ruspolia nitidula</i> (Scop.).*	-	+	-	-	+
7.	<i>Semenoviana plotnikovi</i> W	++	-	-	+	-
8.	<i>Decticus albifrons</i> P.	+++	-	++	+	+
9.	<i>Decticus verrucivorus</i> (Lin)	++	+	-	-	++
10.	<i>Glyphonothus alactaga</i> Miram	+	-	-	+	-
11.	<i>Phaneroptera falcata</i> (Poda)	+	-	+	-	+
<b>Grylloidae</b>						
12.	<i>Gryllus bimaculatus</i> D	+	+	+	+	+
13.	<i>Melanogryllus desertus</i>	++	++	++	++	++
14.	<i>Tartarogryllus tartarus</i> Sauss.	-	-	+	-	+
15.	<i>Modicogryllus bordigalensis</i>	+	++	+	-	+
16.	<i>Modicogryllus frontalis</i>	-	+	-	-	+
17.	<i>Modicogryllus pallipalpis</i>	++	-	-	-	-
18.	<i>Gryllodinus kerkennensis</i> (Finot)	++	+	+	+	-
19.	<i>Turanogryllus lateralis</i> (Fied.)	-	+	-	-	-
20.	<i>Pteronemobius gracillis</i>	-	-	-	-	+
21.	<i>Bothriophylax semonovi</i> Mir	-	+	+	-	-
22.	<i>Oecanthus turanicus</i> Uv.*	+	++	-	+	++
<b>Gryllotalpidae.</b>						
23.	<i>Gryllotalpa unispina</i> Sauss.	+	+	++	++	+
24.	<i>Gryllotalpa grullatalpa</i> L	+		+		+
<b>Total:</b>		17	15	14	11	16

Note: + - very rare species; ++ - rare species; +++ - common species.

\*1 - garden, mulberry orchad, vineyard; 2- cotton field; 3- grain field (wheat, corn); 4- melon field, vegetables fields, mung bean; 5- alfalfa, mixed crops.

Our observations have shown that the number of orthoptera in the agrocenosis has always been higher than in natural biocenosis. In the field of legumes, especially in mung bean fields 6 species of long-horned orthoptera were found. 41 samples were collected. The main part of the collected insects were in their imago stage. Larvae of only 2 species were spread.

**Long-horned insects of the Kyzylkum desert.** The Kyzylkum Desert occupies a large part of the Turan lowland, between the Syrdarya and the Amudarya. It is bordered from the south to the southeast by Zarafshan valley and the Nurata mountain range, the Amudarya oasis to the southwest, the Aral Sea to the northwest, and the Syrdarya oasis to the north and northeast. The total area of the desert is 300 thousand km<sup>2</sup>.

Administratively, most of the Kyzylkum area belongs to Uzbekistan, to a lesser extent, the north-eastern part is in Kazakhstan territory. Its main part is Central Kyzylkum which consists of sandy deserts. Alluvial deposits are common in the northern part. The south-east and south-west of Kyzylkum consist of gypsum deserts. In the south part of the Aral Sea, Kyzylkum consists of mainly gravelly or sandy desert areas.

It is a well-known fact that desert landscape differs from other landscapes by its antiquity. This region, which has long maintained its peculiar characteristics under the influence of humanity, has undergone radical changes since the twentieth century as a result of the population growth and constantly increasing material and spiritual needs. In the south-western Kyzylkum region, plant formations, such as ephemeral - ephemeroïd-wormwood, black saxaul-wormwood, white saxaul - like *Calligonum triste* are widely spread.

In each formation or station there are widespread species of orthopterans that are fed on the plants common in this area. There are a number of known research works dedicated to the study of the Kyzylkum entomofauna (Pravdin, 1965., Davletshina et al. 1985) and they are important in identifying the fauna of orthoptera of Kyzylkum, in studying biodiversity of the species and developing their cadastre. The data obtained on species composition, life forms and the amount of distribution of orthoptera insects of the south-western Kyzylkum are given in the Table 3.

Collection of the insects of this area of Kyzylkum was carried out under 5 conditions. Collection of the samples of the insects from ephemeral - ephemeroïd - wormwood, black saxaul-wormwood, white saxaul - *Calligonum triste*, precipices and using a light source.

According to the data, 7 species (77.77%) of the orthopterans found in ephemeral-ephemeroïd-sagebrush stations of Kyzylkum, 2 species (22.22%) in white saxaul-*Calligonum triste* station, 3 species (33.33%) in black saxaul - wormwood and the lower-slope areas and 5 species (55.55%) as a result of a light trap.

Table 3.  
 Species composition, life form, and quantitative number of long-horned insects in the southwestern Kyzylkum

№	Studied species	1	2	3	4	5
<b>Tettigoniidae</b>						
1.	<i>Platycleis intermedia</i> Serv.	++	-	+++	+	+
2.	<i>Decticus albifrons</i> P.	+	-	-	-	-
<b>Grylloidae</b>						
3.	<i>Melanogryllus desertus</i>	+	-	+	-	+++
4.	<i>Tartarogryllus tartarus</i> Sauss.	+	+	-	+	++
5.	<i>Modicogryllus bordigalensis</i>	+	-	-	-	+
6.	<i>Modicogryllus frontalis</i>	++	++	-	-	-
7.	<i>Turanogryllus lateralis</i> (Fied.)	+	-	-	++	+
8.	<i>Velarifictorus bolivari</i> (Uv)	-	+	-	-	-
<b>Gryllotalpidae</b>						
9.	<i>Gryllotalpa grullatalpa</i> L.	-	-	-	-	+++
<b>Total:</b>		7	3	2	3	5

Note: ephemeral-ephemeroid-sagebrush; 2- black saxaul - sagebrush; 3- white saxaul-Calligonum triste; 4- lower-slope areas; 5- collected with a trap of light.

Based on the distribution and density in biotopes, 3 species (33%) were identified as "very rare", 2 species (22%) "rare" and 4 (44%) "common species". According to the way of life, they belong to 12 groups, specifically cereal hortobiont, geobiont, herpetobiont, specialized phytophil, microtamniont, psam-mobiont, tamniont, flying migrant, eremobiont, facultative hortobiont, fissurobiont and petrobiont. Thus, there are 9 species of orthoptera belonging to 3 families and 8 generations in the south-western Kyzylkum.

**The orthoptera of the Ustyurt Plateau.** The Ustyurt Plateau is located in Kazakhstan and Uzbekistan. To the west is the Mangyshlak and Kara-Bogaz-Gol lakes, and to the east the Aral Sea and a large plain surrounded by the Amudarya delta. The area is 200,000 km<sup>2</sup>. The Ustyurt landscape consists of clay soils covered with the formation of wormwood, wormwood-salt plants and the south-eastern part consists of gravel-clay desert.

To study the fauna of orthoptera species of Ustyurt, for collection area of the samples of the species the flora of the landscape of natural plant formation was identified. In these areas, the distribution of a variety of vegetation across the desert, semi-desert and steppe regions is striking. In Ustyurt various plant formation complexes were formed on different types of soils, such as in biyurgun-boyalish complex, in wormwood thicket, in wormwood-keyreuk-biyurgun thicket, in typical biyurgun thicket, in saxaul and mixed tamarisk thicket. Such stations are a favorable environment for the development and reproduction of orthoptera.

An atmospheric temperature of this region fluctuates sharply and precipitation is not always sufficient for the growth of the plants, this in turn creates a peculiar microclimate environment in natural stations and such conditions impact periodically on the development and expansion of the insects.

Currently, there is insufficient information on insect fauna of Ustyurt and the researchers conducted were on the fauna of only some insect families. The samples collected were taken of orthoptera insects located nearby Kungirad-Beyneo highway in Ustyurt and research biostations of Ustyurt region. The results of the study are presented in Table 4.

According to this, in Ustyurt there are 11 species and subspecies of long-horned orthoptera belonging to 3 families and they are widely spread across 8 plant stations. There were 3 species of long-horned insects found in Biyurgun-boyalish complex, 3 species in wormwood station, 5 species in wormwood-keyreuk-biyurgun thicket, 4 species in biyurgun thicket, 1 species in saxaul woodlands, 4 species in mixed tamarisk thicket, 7 species in wheat fields and 10 species in alfalfa fields.

Table 4

The distribution of long-horned orthoptera on Ustyurt flatland by plant communities

№	Studied species	Teams							
		1	2	3	4	5	6	7	8
<b>Tettigoniidae</b>									
1.	<i>Tettigonia caudata</i> Charp.	-	-	-	-	-	-	-	+
2.	<i>Platycleis intermedia</i> Serv.	+	+	+	+		+	++	++
3.	<i>Platycleis affinis</i> Fied.	-	-	-	-	-	-	+	+
4.	<i>Decticus albifrons</i> P.	+	+++	+	+	-	-	++	++
5.	<i>Decticus verrucivorus</i> (Lin)	+	++	++	++	-	-	++	++
6.	<i>Caereocercus fuscipennis</i> Uv.	-	-	+	+	-	-	++	++
<b>Grylloidae</b>									

7.	<i>Melanogryllus desertus</i>	-	-	-	-	-	+	+	+
8.	<i>Tartarogryllus tartarus</i> Sauss.	-	-	-	-	-	++	+	+
9.	<i>Velarifictorus bolivari</i> (Uv)	-	-	+	-	+	+	-	-
10.	<i>Bothriophylax semonovi</i> Mir	-	-	-	-	-	-	-	+
<b>Gryllotalpidae.</b>									
11.	<i>Grullotalpa unispina</i> Sauss.	-	-	-	-	-	-		+
		3	3	5	4	1	4	7	10

Note: 1-Biyurgun-boyalish complex; 2-wormwood thicket; 3-wormwood-keyreuk-biyurgun thicket; 4-biyurgun thicket; 5-saxaul woodlands; 6-mixed tamarisk thicket; 7-wheat fields; 8-alfalfa fields.

### The influence of natural climatic conditions of the Ustyurt plateau on the development of orthopteran insects.

To study the impact of natural climatic conditions on the Ustyurt Plateau on the development of orthoptera insects, the data on the development dynamics of this group of insects was collected from 2009 to 2016 and was continuously compared and analyzed with annual indicators of natural climatic conditions in Ustyurt flatland. Perennial data on the amount of precipitation, atmospheric temperature, the density and the number of orthopterans in Ustyurt flatland are given in Figures 1 and 2.

According to the data, the amount of precipitation in Ustyurt flatland had been steadily increasing from 2009 to 2016. If the average annual rainfall was 19.5 mm. in 2009, by 2016 the figure grew up to 152.8 mm. and the amount of precipitation increased by 7.8 times during that period. Also, during that time, the highest amount of precipitation was observed in 2015 (168.6 mm.) and the lowest in 2012 (55.3 mm.) and (71.8 mm.) in 2014. Although there were no significant dynamic changes of negative or positive indicators of atmospheric air temperature detected, an indicator of winter air temperature in 2012 and 2014 was the lowest.

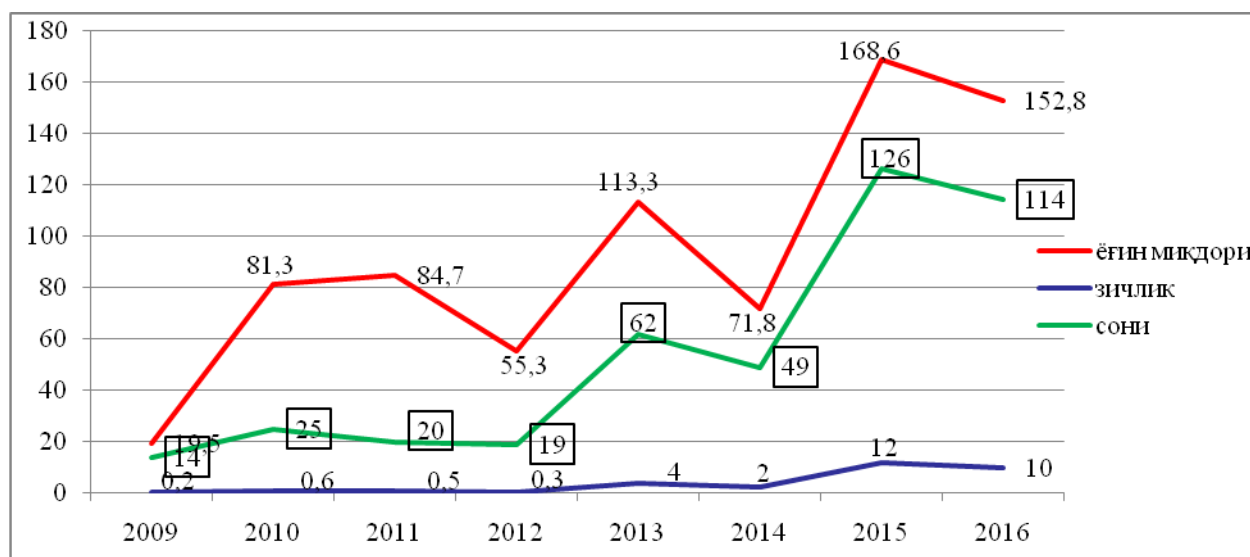


Figure 1.

The amount of precipitation in Ustyurt flatland, the density and the number of orthoptera.

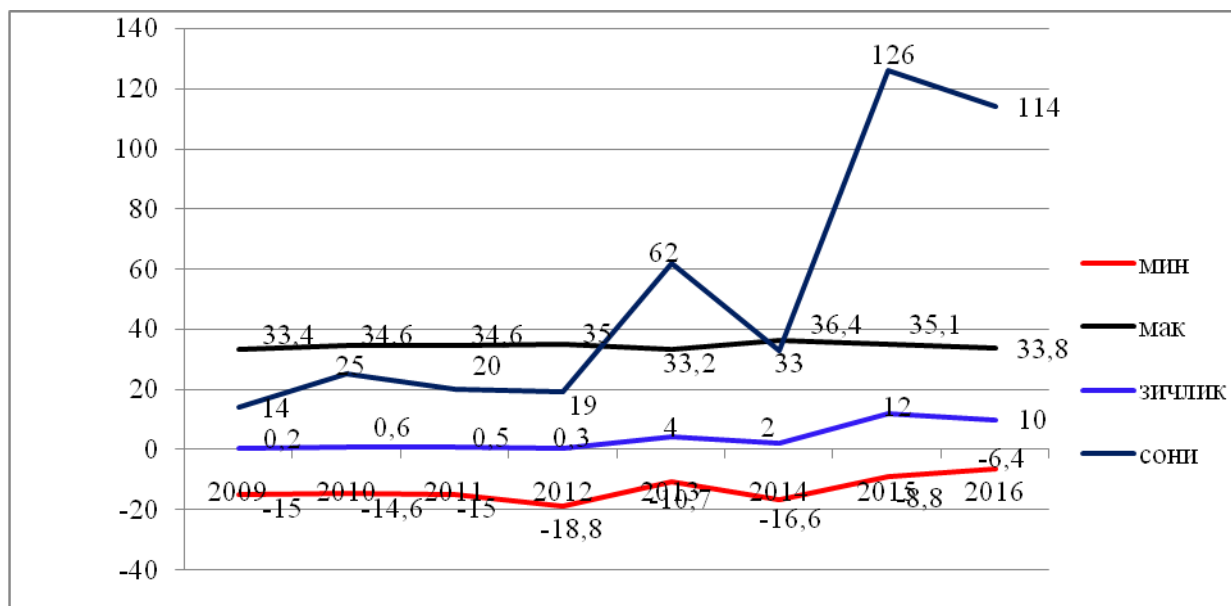


Figure 2.

Atmospheric temperature in Ustyurt flatland, the density and the number of orthoptera.

According to the data obtained, the density and the number of orthoptera depends on climatic conditions of Ustyurt planes. It depends on average precipitation amount and negative air temperature indicators, specifically their density decreases as a result of severe cold winter or their density and number increase in high precipitation periods.

The lower density and the number of orthoptera in 2012 and 2014 compared to the other years showed its direct relation to the decrease of atmospheric temperature in winter and at the same time the reduction in the amount of precipitation. If the air temperature in 2012 was cold - 18.8°, and the amount of precipitation was 55.3 mm., the density of orthoptera decreased from 0.5 to 0.3 / m<sup>2</sup>, and the number of insects collected per hour also decreased from 20 to 19, thus the difference of indicators in 2014 showed the decrease from 1.5 to 2 times; and the density of insects in 2014 decreased from 4.0 units / m<sup>2</sup> to 2.0 units / m<sup>2</sup> respectively, hence the number of insects collected per hour decreased from 62 units to 49 units. Therefore, in Ustyurt flatland, sharp changes in an atmospheric temperature and increase or decrease in the amount of precipitation can directly impact on the density and the number of orthopterans. An increase in average rainfall and a warmer winter can cause an increase in the density and the number of insects, and vice versa.

### Long-horned insects of Tugai.

Tugai region is riparian woodlands of the Lower Amudarya State Biosphere Reserve. The reserve consists of natural conditions for the development of orthoptera and formation of their fauna under tugai forest conditions.

There are no tugai forests in the study area that are larger than this reserve in terms of area.

The Lower Amudarya State Biosphere Reserve is located in Beruni and Amudarya districts of the Republic of Karakalpakstan, with a total area of 68,717.8 hectares. The area is divided into 3 zones: strictly protected zone (11,568.3 hectares), buffer zone (6,731.4 hectares) and transition zone (50,418.1 hectares).

There are 3 large tugai massifs in the preserved zone of the Lower Amudarya State Biosphere Reserve and they include Jumurtau, Baday tugai and Nazarkhan areas.



The nature of this area is very conducive to the development and reproduction of the insects. There were few research works conducted on insect fauna of the reserve and there are currently insufficient scientific basis to study species composition and the fauna of orthopteran insects.

In order to study the fauna of the Lower Amudarya State Biosphere Reserve, the database of the research conducted in 2018-2020 on the composition of the species, number density of the species, life forms and zoogeographic grouping of orthoptera insects was summarized (Table 5).

In the reserve area there were identified 9 species and subspecies of long-horned insects belonging to 6 generations. 4 species of them belong to the family of katydid, 4 species to cricket and 1 species to mole cricket. 2 of the species considered to be - very rare, 3 species are - rare, and 4 species are - common species. In terms of life form they belong to 4 zoogeographical groups and as for width and length range they belong to 5 groups.

Table 5.  
 Composition of species, life form, zoogeographical grouping and quantitative number of long-horned insects of the Lower Amudarya State Biosphere Reserve (2015-2020).

№	Species of orthoptera	The number	Life form	zoogeographical grouping	
				According to geographic width	According to geographic length
<b>Tettigonioidae</b>					
1	<i>Tettigonia viridissima</i>	++	Tamnobiont	Northern steppe	TransPaelearctic
2	<i>Tettigoniacaudate</i>	+++	Tamnobiont	Northern steppe	Europe - Central Siberia
3	<i>Platycleisintermedia</i>	+++	Tamnobiont	Northern steppe	Europe-Siberia
4	<i>Platycleisaffinis</i>	+	Facultative Hortobiont	Northern steppe	Europe-Siberia
<b>Grylloidea</b>					
5	<i>Modicogryllusbordigalensis</i>	+++	Fussarobiont	Southernsteppe	Europe-Siberia
6	<i>Modicogryllus frontalis</i>	+++	Fussarobiont	Steppe	Europe-Siberia
7	<i>Melanogryllusdesertus</i>	++	Fussarobiont	Steppe	Europe - Kazakhstan
8	<i>Velarifictorus bolivari</i>	+	Fussarobiont	Desert	Central Asia - Kazakhstan
9	<i>Grullatalpa unispina</i>	+	Geobiont	Semi-desert	Central Asia

There are 9 species of orthoptera insects recorded in the territory of the Lower Amudarya State Biosphere Reserve and in terms of life form they constitute 3 species of tamnobionts (species living in trees and shrubs); 4 species of fussarobionts (species living under the cracks and crevices in soil pits); 1 species of geobiont (species living in the upper layers of the soil) and facultative hortobiont.

In conclusion, there are 12 species of katidyd (Tettigoniidae) family, 13 species of cricket (Grylloidae) family and 2 species of mole cricket (Gryllotalpidae) family that were spread in the research area.

The biggest number of them, 24 species (88,8 %) are spread in agrolandscape, 17 species (62,9 %) in desert areas, 11 species (40,74 %) in Ustyurt province and 9 species (33,33 %) in tugai forests.

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