



## TAXONOMIC AND FAUNISTIC ANALYSIS OF THE DOMINANT ORDERS OF INSECT XYLOPHAGES IN THE SOUTHERN ARAL SEA REGION

Zhuginisov Tangirbergen<sup>1</sup>, Kaniyazov Suxrab<sup>2</sup>

Nagashibaeva Aygerim<sup>3</sup>, Bekbanov Atamurat<sup>4</sup>

Kubaev Jurabek<sup>5</sup>, Isaev Rahmanbergen<sup>6</sup>

<sup>1</sup>Doctor of Biological Sciences (DSc),

<sup>2</sup>Assistant

<sup>3</sup>Assistant

<sup>4</sup>Assistant

<sup>5</sup>Student (PhD) Department of Biology

<sup>6</sup>Student Department of Biology

Karakalpak State University named after Berdakh, Republic of Uzbekistan

### ABSTRACT

One of the main reasons for the increase in the number of xylophagous insects is the fact that almost the majority of the territory of the Southern Aral Sea region by geographic location consists of sandy-desert territories. Many historical and cultural objects of the republic were built on these territories. The occurrence of xylophagous insects in natural habitats of the Southern Aral Sea region varied depending on the location of tugai farms. In total, 24.2% of xylophagous insects belonging to 9 orders, 24 families were found in the tugai farms of the Southern Aral Sea region and 100% of the species belonging to the aforementioned group and family in the Nizhne-Amudarya State Biosphere Reserve.

**KEYWORDS:** Southern Aral Sea, territory, les, historical and cultural, Termites, species, ecological problems, sunflower stem.

### INTRODUCTION

Global climate change is leading to the adaptation of natural ecosystems by humankind and the development of urbanization, as well as the adaptation of entomofauna to anthropogenically developed areas and the increase in the scale of their damage. Especially in the ecosystem of natural tugai forests and in the developed areas, the increase in the volume of xylophage-insects is causing serious damage to timber-building materials.

The first information about xylophagous insects in Central Asia is associated with about 700 species of insects collected during the trip of the world-famous traveler Petr Petrovich Semenov to the Tien Shan mountains in the XIX century 1856-1857.

In addition, xylophage-insect species have

been recorded since the middle of the twentieth century [1]. In particular, detailed information on the prevalence of species of xylophagous insects *Aeolesthes sarta* (Sols.), *Hyleborussaxeseni* (Ratz.), *Carphoborus kueschkensis* (Socan.) In natural forests of the Kyrgyz Republic was mentioned, that is, among these species, the dominant species of the urban barbel (*Aeolesthes sarta*) was fully analyzed.

It was mentioned that the homeland of the urban barbel (*Aeolesthes sarta*) is Pakistan and Afghanistan, it is also common in the southern regions of Central Asia, Uzbekistan, Kyrgyzstan, Kazakhstan, Tajikistan and Turkmenistan. They were studied to be active from mid-April to late July with the onset of the spring season, depending on changes in air temperature [2, 3, 4, 5, 6].



In the southern Aral Sea region, which is a sharp continental desert region, with a hot climate and low atmospheric humidity, the problem of xylophagous insects has taken a serious turn, their harmful activity has been identified in many natural and anthropogenic ecosystems [7, 8, 9].

One of the main reasons for the increase in the number of xylophagous insects is the fact that almost the majority of the territory of the Southern Aral Sea region by geographic location consists of sandy-desert territories. Many historical and cultural sites of the Republic have been built in these territories.

In addition, it is important to identify the diversity of xylophagous insects in anthropogenically transformed territories, assess their damage to forests, settlements, administrative buildings, cultural and strategic sites, and improve methods of combating them.

## MATERIALS AND METHODS

The materials required for the research work were collected in 2009-2020. in the natural conditions of the Southern Aral Sea region, in the tugai farms of the Republic of Karakalpakstan and the Khorezm region, in the State Biosphere Reserve of the Lower Amudaryn and anthropogenically transformed territories, in the fortresses Akshakhan, Tashkirman (Beruniy district), Tuprokala, Kyrkyz, Ayazkala, (Ellikulinsky district) Uvois tog Gaur kala (Karaulyaksky district), Mizdakhan complex (Khojelinsky district), Shibily ota shrine, Ichan-Kala (Kegeilinsky district) of the State Inspection for the Preservation and Use of Cultural Heritage of the Republic of Karakalpakstan, on the territory of Orakbalga (Nukus city), in old residential buildings in the area of the city of Nukus, as well as in the territories of the historical museums of the Ichan Kala Juma mosque, Pakhlovon Mahmud, Stone courtyard in the city of Khiva, Khorezm region.

Field experiments were carried out in natural biotopes, on the territory of Nukus, Beruniy, Turtkul, Ellikkalinsky, Khojailisky, Shumanaysky, Kanlykulsy, Kungrad, Moinak, Kegeilinsky, Chimbaysky, Karaulyaksky, Takhtakupyr districts of the Republic of Karakalpakstan, in the forestry of the Lower Amu Darya State Biosphere Reserve. Xylophagous insects were collected from trees, shrubs and semi-shrubs by wrapping in cotton cloth using adhesive films; their species were also determined in laboratory conditions.

## RESULTS AND DISCUSSION

In the course of observations, the occurrence of xylophagous insects in natural habitats of the Southern Aral Sea region was different depending on the location of tugai farms. In total, 24.2% of

xylophagous insects belonging to 9 orders, 24 families were found in the tugai farms of the Southern Aral Sea region and 100% of the species belonging to the aforementioned group and family in the Nizhne-Amudarya State Biosphere Reserve.К

Very rare species of xylophagous insects have been identified in the southern regions of the Republic of Karakalpakstan - Beruni, Turtkul and Ellikkala.

Xylophagous insects *Isoptera* (Brullé, 1832), *Hodotermitidae*, *Anacanthotermes ahngerianus*, *A. turkestanicus*; *Hymenoptera* (Linnaeus, 1758), *Formicidae*, *Camponotus lameerei* are extremely widespread and registered as herd-forming species (Table 1).

In the northern districts of Nukus, Kegeili, Chimbay, Karaulyak and Takhtakor, on average, 14.4% of xylophagous insect species were recorded, and the following species found in other regions were not recorded at all: *Podura* (Lubbock, 1870), *Entomobryidae*, *Entomobrya atrocincta*; *Thysanura* (Borner, 1904), *Lepismatidae*, *Lepisma saccharina*; *Psocoptera* (Shiple, 1904), *Liposcelidae* (*Troctidae*), *Liposcelis divinatorius*; *Hemiptera* (Linnaeus, 1758), *Cixiidae*, *Hyalesthesobsoletus*; *Aradidae*, *Aradus corticalis*; *Coleoptera* (Linnaeus, 1758), *Scarabaeidae*, *Oxythyrea cinctella*; *Staphylinidae*, *Staphylinus erythropterus*; *Elateridae*, *Agriotes gurgistanus*; *Buprestidae*, *Buprestis rustica*, *Trachypteris picta*; *Dermestidae*, *Trogoderma versicolor*; *Tenebrionidae*, *Adelostomasulcatum*; *Cerambycidae*, *Aeolesthes sarta*; *Curculionidae*, *Sitophilus zeamays*; *Scolytidae*, *Scolitus mali*; *Hymenoptera* (Linnaeus, 1758), *Megachilidae*, *Megachile centuncularis*.

In the western regions - Khojaili, Shumanoi, Kanlykul, Kungrad, Muinak, species of xylophagous insects of the order *Podura*, *Thysanura*, *Isoptera*, *Psocoptera*, *Hemiptera* were identified, which accounted for an average of 27.9%.

The territory of the Southern Aral Sea region has undergone significant changes in the structure, composition and number of xylophagous insects growing in biocenoses of anthropogenically transformed settlements, administrative buildings, cultural and strategic sites.



**Table 1**  
**The occurrence of xylophage-insects in natural habitats**

№	Types of xylophagous insects (order, family and species)	Tugai farms of the Southern Aral Sea region													Lower Amudarya State Biosphere Reserve
		Nukus	Beruni	Turtkul	Ellikqala	Khojayli	Shumanoy	Qanlikul	Kungirov	Moynak	Kegeyli	Chimboy	Karauzyak	Takhtakupir	
1	<i>Podura</i> , Entomobryidae, <i>Entomobrya atrocincta</i>	-	+	+	+	+	+	-	-	+	-	-	+	-	++
2	<i>Thysanura</i> , Lepismatidae, <i>Lepisma saccharina</i>	-	+	+	+	-	-	-	+	+	-	-	-	-	+
3	<i>Isoptera</i> , Hodotermitidae, <i>Anacanthotermes turkestanicus</i>	TTT	TTT	TTT	TTT	TT	T	-	TT	TTT	TTT	-	TT	TT	TTT
4	<i>A. ahngerianus</i>	TTT	TTT	TTT	TTT	TT	T	-	TT	TTT	TTT	-	TT	TT	TTT
5	<i>Psocoptera</i> , Liposcelidae(Troctidae), <i>Liposcelis divinatorius</i>	-	+	+	+	+	-	+	-	+	-	-	-	-	+
6	<i>Hemiptera</i> , Cixiidae, <i>Hyalesthesobsoletus</i>	-	+	+	+	+	+	+	-	+	-	-	-	-	+
7	<i>Aradidae</i> , <i>Aradus corticalis</i>	-	+	+	+	+	-	-	-	+	-	-	-	-	+
8	<i>Coleoptera</i> , Silphidae, <i>Phosphuga atrata</i>	-	+	+	+	-	-	-	+	++	+	-	+	+	++
9	<i>Scarabaeidae</i> , <i>Oxythyreacinctella</i>	-	+	+	+	+	-	-	+	+	-	-	-	-	++
10	<i>Staphylinidae</i> , <i>Staphylinus erythropterus</i>	-	+	+	-	+	-	-	+	+	-	-	-	-	+
11	<i>Anobiidae</i> , <i>An.Rufipes</i>	+	+	+	+	+	+	+	+	+	-	+	+	+	++



12	<i>Anobium pertinax</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	++
13	<i>Elateridae, Agriotes gurgistanus</i>	-	+	+	+	+	+	-	+	+	-	-	-	-	+
14	<i>Buprestidae, Acmaeoderella sp.</i>	-	+	+	+	++	+	+	+	+++	-	-	-	-	+++
15	<i>Buprestistrustica</i>	-	+	+	+	++	+	+	+	+++	+	-	-	-	+++
16	<i>Trachypteris picta</i>	-	+	+	+	+	+	+	+	++	-	-	-	-	++
17	<i>Dermestidae, Anthrenus picturatus</i>	+	+	+	+	+	+	-	+	+	-	+	-	+	++
18	<i>Trogoderma versicolor</i>	-	+	+	+	-	-	+	+	+	-	-	-	-	+
19	<i>Histeridae, Hololepta plana</i>	+	+	+	+	+	-	+	+	+	+	-	-	+	+
20	<i>Tenebrionidae, Adelostoma sulcatum</i>	-	+	+	+	+	-	+	+	+	-	-	-	-	+
21	<i>Cerambycidae, Cerambyx cerdo</i>	-	+	+	+	+	-	+	+	+	+	+	+	+	++
22	<i>Aeolesthes sarta</i>	-	+	+	+	+	+	+	+	+	-	-	-	-	+
23	<i>Saperda octopunctata</i>	-	+	+	+	+	+	+	-	-	-	+	-	-	++
24	<i>Curculionidae, Sitophilus zeamays</i>	-	+	+	+	-	-	-	+	+	+	-	-	-	+
25	<i>Sciaphobus squalidus</i>	+	+	+	+	+	+	+	+	+	-	-	+	-	++
26	<i>Scolytidae, Scolytus mali</i>	-	+	+	+	+	-	+	+	+	-	-	-	-	+
27	<i>Hylastesater</i>	+	+	+	+	-	-	-	+	+	-	+	-	-	+
28	<i>Ips typographies</i>	-	+	+	+	+	+	-	+	++	+	-	+	+	++
29	<i>Phloeosinus sp.</i>	-	+	+	+	+	+	+	+	+	+	+	-	-	++
30	<b>Lepidoptera,</b> <i>Cossidae, Cossus cossus</i>	+	+	+	+	+	+	+	+	++	+	+	+	+	+++
31	<b>Hymenoptera,</b> <i>Apidae, Antophora sp.</i>	+	++	++	++	++	+	+	++	++	+	+	++	+	++
32	<i>Xylocopa valga</i>	+	++	++	+++	++	+	+	++	++	+	+	++	+	+++
33	<i>Megachilidae, Megachile centuncularis</i>	-	+	+	+	+	+	+	+	+	-	-	-	-	++
34	<i>Bethylidae, Sclerodermus domesticum</i>	-	+	+	+	+	-	+	+	+	-	+	+	-	+
35	<i>Formicidae, Camponotus lameerei</i>	T	T	T	T	T	T	T	T	T	T	T	T	T	TTT
36	<b>Diptera, Stratiomyidae, Hermetia illucens</b>	-	+	+	+	+	+	-	-	+	-	-	-	+	++
<b>Умумий кўрсаткич (сони)</b>		<b>11</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>29</b>	<b>21</b>	<b>21</b>	<b>29</b>	<b>35</b>	<b>13</b>	<b>11</b>	<b>13</b>	<b>13</b>	<b>36</b>

**Note:** + - very rare species (1 meeting with insects from 50 trees); + - rare species (50 / 4-10); - +++ - permanent species (50 / 11-20 ...); and T are group-forming species (T-very rare, TT-medium and TTT-common.)



In the world of insects, 20 families of xylophagous insects associated with dried wood are known, of which 42 species of xylophagous insects of 9 families are registered in Uzbekistan, of which Insecta are found in the South Aral Sea region: *Coleoptera*, *Isoptera*, *Lepidoptera*, *Hymenoptera*, *Diptera*.

The secretive lifestyle of many xylophagous insects of these families develops inside dried wood, protected from external abiotic, biotic and anthropogenic factors and adapted to the damaged tree.

Under natural conditions, xylophagous insects are known for their beneficial and harmful properties, that is, it causes rotting of shrubs, trees and leaves dried under the influence of external environmental factors, the larvae hatched from the eggs of harmful insects gnaw the xylem and dry growing trees.

Such cases were identified in 2014-2015. on the territory of the Lower Amudarya State Biosphere Reserve, the harmfulness of the representatives of the order *Coleoptera*, *Isoptera* was also determined.

In natural conditions and in anthropogenically-transformed territories, the degree of encounter of insect xylophages in the buildings has been studied.

In the South Aral Sea region on the territory of the Republic of Karakalpakstan, in the fortresses Akshakhan, Tashkirman (Beruniy region), Tuprokal, Kyrkyz, Ayazkala, (Ellikuli region), Uvois tog Gaur kala (Karauzyaksky region), Mizdakhan complex (Khodelinsky region), shrine, Shibilichin -Kala (Kegeilinsky district) of the State Inspectorate for the Protection of Cultural Heritage and the Use of Cultural Heritage of the Republic of Karakalpakstan, as well as on the territories of historical museums of the Ichan Kala Juma mosque, Pakhlovon Makhmud, Stone yard in the city of Khiva, Khorezm region, 10 species of xylophagous insects belonging to 5 units, 6 families.

**Akshakhan fortresses, Tashkirmon of Beruniy district, Tuprokkala fortress, Kirikkiz Ellikkali district, Ayazkala fortress, Kumbaskan of Turtkul district, Zhampikkala Karauzyak district:**

*Isoptera* (Brullé, 1832), *Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*, *A. ahngerianus*.

**Sultan Uvois tog Gaur kala of the Karauzyak district;**

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*, *A. ahngerianus*.

*Coleoptera* (Linnaeus, 1758), *Dermestidae* (Latreille, 1804), *Anthrenus picturatus*, *Cerambycidae* (Latreille, 1802), *Hylotrupes bajulus*.

**Mizdahkan complex of Khojeli district:**

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*.

*Coleoptera* (Linnaeus, 1758), *Anobiidae* (Fleming, 1821), *Anobium punctatum*, *A. pertinax*, *Cerambycidae* (Latreille, 1802), *Saperda octopunctata*.

*Hymenoptera* (Linnaeus, 1758), *Megachilidae* (Latreille, 1802), *Megachile centuncularis*.

**Shibliy shrine from Kegeilinsky district:**

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes ahngerianus*, *A. turkestanicus*, *Psocoptera* (Shiple, 1904), *Liposcelidae* (*Troctidae*) (Latreille, 1794),

**Ichan kala of Kegeilinsky district:**

*Hodotermitidae* (Desneux, 1904), *A. turkestanicus*.

*Anobiidae* (Fleming, 1821), *Anobium punctatum*, *A. pertinax*, *Oligomerus brunneus*, *Dermestidae* (Latreille, 1804), *Anthrenus picturatus*.

**Ichan kala Zhuma masjid, Pakhlovon Mahmud historical memorial museums of the city of Khiva, Khorezm region:**

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*, *A. ahngerianus*.

*Psocoptera* (Shiple, 1904), *Liposcelidae* (*Troctidae*) (Latreille, 1794), *Liposcelis divinatorius*.

*Anobiidae* (Fleming, 1821), *Anobium pertinax*, *A. punctatum*, *Oligomerus brunneus*; *Dermestidae* (Latreille, 1804), *Anthrenus picturatus*; *Cerambycidae* (Latreille, 1802), *Hylotrupes bajulus*, *Saperda octopunctata*.

*Hymenoptera* (Linnaeus, 1758), *Megachilidae* (Latreille, 1802), *Megachile centuncularis*, *Xylocopa* (Latreille, 1802), *Xylocopa valga*.

Аҳоли уй жойлари ва хонадон атрофларидан (Нукус ш. Ороқ болға поселкаси, эски Автовокзал худи, Нукус т. Орнек ОФЙ) умумий 5 туркум, 15оилага оид 24 тур ксилофаг-хашаротлар кайд этилди.

**Orak balga village of Nukus city:**

*Thysanura* (Borner, 1904), *Lepisma* (Linnaeus, 1758), *Lepisma saccharina*.

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*, *A. ahngerianus*.

*Psocoptera* (Shiple, 1904), *Liposcelidae* (*Troctidae*) (Latreille, 1794), *Liposcelis divinatorius*.

*Coleoptera* (Linnaeus, 1758), *Phosphuqa* (Latreille, 1807), *Phosphuqa atrata*, *Anobiidae* (Fleming, 1821), *Anobium pertinax*, *A. punctatum*, *Priobium carpini*; *Elateridae* (Leach, 1815), *Agriotes gurgistanus*.

**The territory of the old bus station in the city of Nukus:**

*Coleoptera* (Linnaeus, 1758), *Buprestidae* (Leach, 1815), *Acmaeoderella* sp., *Buprestis rustica*, *Trachypteris picta*, *Melanophila picta*, *Cratomerus intermedius*; *Dermestidae* (Latreille, 1804), *Anthrenus picturatus*, *Trogoderma versicolor*; *Tenebrionidae* (Latreille, 1802), *Adelostoma sulcatum*.

*Lepidoptera* (Linnaeus, 1758), *Cossidae* (Leach, 1815), *Cossus cossus*.

**Millage council of citizens Ornek Nukus region:**

*Hodotermitidae* (Desneux, 1904), *Anacanthotermes turkestanicus*, *A. ahngerianus*.



*Coleoptera* (Linnaeus, 1758), *Cerambycidae* (Latreille, 1802), *Hylotrupes bajulus*, *Saperda octopunctata*, *Cerambyx cerdo*; *Scolytidae* (*Ipidae*) (Latreille, 1806), *Hylastesater*, *Phloeosinus* sp.

*Lepidoptera* (Linnaeus, 1758), *Cossidae* (Leach, 1815), *Cossus cossus*.

*Hymenoptera* (Linnaeus, 1758), *Apidae* (Latreille, 1802), *Antophora* sp.; *Megachilidae* (Latreille, 1802), *Megachile centuncularis*; *Bethylidae* (Ashmead, 1893), *Sclerodermus domesticum*.

*Agriculture, Environment and Bioresearch* Vol. 5, No. 05; 2020., ISSN: 2456-8643., pp. 102-114.

## CONCLUSIONS

In general, it is known that anthropogenic transformation is the cause of a sharp massive increase in the number of xylophagous insects in the newly developed territories and in the houses of the population. This means that during construction work, unconsciously allowing the spread of xylophagous insects, imported wood materials cause the penetration of new types of pests into our country, that is, we need to observe the state of insect quarantine.

## REFERENCES

1. Баева В.Г. и др. Термиты (*Isoptera*) Таджикистана и меры борьбы с ними. - Душанбе, 1993. 38 с.
2. Кадырбеков Р.Х. О первых находках трех видов жуков-дровосеков в Северном Тянь-Шане // *Selevinia*. – 1996-1997. – Т. 4-5. – С. 246.
3. Кадырбеков Р.Х., Тлеппаева А.Т., Габдуллина А.У. Дополнение к фауне жуков-дровосеков (*Coleoptera*, *Cerambycidae*) Катон-Карагайского национального парка // *Selevinia*. - Алматы. - 2010. - С.38.
4. Митяев И.Д., Яценко Р.В. Насекомые вредители тамариска в Юго-Восточном Казахстане. – Алматы. – 2007. – 183С.
5. Романенко К.Е. Вредители защитных лесонасаждений Киргизии. Ф.-1981. -С.90-97.
6. Khamraev A.Sh., Lebedeva N.I., Zhuginisov T.I., Abdullaev I.I., Rakhmatullaev A., Raina A.K. Food Preferences of the Turkestan termite *Anacanthotermes turkestanicus* (*Isoptera: Hodotermitidae*). *Socbiology*, Vol. 50, No 2, (2007), pp. 469-478.
7. Ganieva Z.A., Kholmatov B.R., Karimov F., Zhuginisov T.I., Mirzaeva G.S. Habitat Plants and Foraging Preferences in Termites of The Genus *Anacanthotermes* // *International journal of scientific & technology research (IJSTR)*, India. 2019, - Vol. 8, Iss. 11, pp. 2863-2870. (№40, ResearchGate, IF=0,28; №3, Scopus SC=0,25).
8. Zhuginisov T.I., Lebedeva N.I., Ganieva Z.A., Kaniyazov S. J., Mirzaeva G.S. Xylophagous insects in the dead wood of Uzbekistan // *Journal« EPRAInternational Journal of Research and Development (IJRD)»*. –USA, Beltsville, 2019. Vol. 4, - №10. – P. 149-154. (SJIF: 6.260)
9. Ganieva Z. A., Kholmatov B.R., Akhmedov V., Zhuginisov T.I., Mirzaeva G.S., Mansurkhodjaeva M. Selection of feed substrate in the manufacture of antitermite baits. *International Journal of*