SJIF Impact Factor: 6.260| ISI I.F.Value:1.241 Volume: 4 | Issue: 10 | October | 2019 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Peer Reviewed Journal

XYLOPHAGOUS INSECTS IN THE DEAD WOOD OF UZBEKISTAN

Zhuginisov Tangirbergen Isaevich
Doctoral candidate, Candidate of Biological Sciences, Department of Biology, Karakalpak State University, Nukus, Karakalpakstan, Uzbekistan

Lebedeva Nataliya Ivanovna
Senior Researcher, Candidate of Biological Sciences, Laboratory of Anti-parasitic preparations, Institute of Zoology Academy of Sciences Republic of Uzbekistan

Ganieva Zumrad Abduhakimovna
Senior Researcher, Candidate of Biological Sciences, Laboratory of Anti-parasitic preparations, Institute of Zoology Academy of Sciences Republic of Uzbekistan, Tashkent, Uzbekistan

Kaniyazov Suxrab Joldasbaevich
Independent researcher, Department of Biology, Karakalpak State University, Nukus, Karakalpakstan, Uzbekistan

Mirzaeva Gulnora Saydaripovna
Senior Researcher, Candidate of Biological Sciences, Head of Laboratory of Entomology, Institute of Zoology of Academy of Sciences Republic of Uzbekistan, Tashkent, Uzbekistan

ABSTRACT
In the territory of Uzbekistan 39 species of insects from 36 genera, 25 families and 10 orders were identified as inhabitants of dead trees and woodwork. The most harmful of them causing damages to wooden structures and inhabiting both natural and anthropogenic ecosystems are termites - Anacanthotermes turkestanicus and A. ahngerianus, Anobiidae - Anobium pertinax and A. punctatum, and longhorn beetles - Hylotrupes bajulus and Saperda octopunctata. Xylophagous insects invade unbarked and unprotected wood, such as that in the wooden structures of private houses, objects of cultural and historical heritage, and administrative and social buildings.

KEYWORDS: *Xylophagous insects, trees, natural, anthropogenic, ecosystems.*

INTRODUCTION

The class Insecta includes 20 orders related to wood. There are a large number of species of xylophagous insects that cause significant harm to wood used by humans. Larvae of beetles (*Coleoptera*), butterflies (*Lepidoptera*) and *Diptera* occupy a special place as insects damaging wood. What makes the problem graver is that the results of their activity show themselves some time after they settle in wood.

Because of their secretiveness (they live under bark and inside wood) it is very easy to overlook xylophagous insects when inspecting the wood visually. One can also easily fail to detect them even when the wood is transported for long distances. Inside the wood they are protected from the external environment and have no particular problems in adapting to the new conditions of the place the wood has been brought to.

Anthropogenic impact on the environment causes changes in the structure, composition and numbers of populations of insects, including xylophagous ones, which rapidly spread in forests and dead wood. In addition, xylophagous insects are brought in dead wood

inside residential, administrative, historical and strategic buildings, where they cause considerable damage to the structures.

However, except for termites, no special research into xylophagous insects damaging wattle-and-daub, stone and wooden structures, commercial wood and household utensils and living in dead trees and stumps, has been carried out in Uzbekistan until now [3].

First reports about wooden items damaged by xylophagous insects came in the late 20th century from the cities of Bukhara and Shakhrisabz, where they were found in wooden structures, and Khiva, where in the Ichan-Kala historical complex numerous flight holes and wormhole dust produced by Anobiidae were recorded, while individual wooden pillars and fragments of ceilings were covered with termites' mouldings [3, 4].

Around 30 insect species damaging commercial wood have been recorded in Uzbekistan. Most of them are beetles (order *Coleoptera* – over 20 species), while the others are individual species of termites (*Isoptera*), booklice (*Psocoptera*), *Hymenoptera* and *Thysanura*. According to Lebedeva et al. [4], the most harmful and commonest species among pests of commercial wood are *Hadrobregmus pertinax* (27.5%), *Anacanthotermes turkestanicus* (23.5%), *Cerambyx cerdo* (15.7%) and *Hylotrupes bajalus L.* (13.7%) [3, 4].

The goal of this work was to specify the species composition and population ecology of xylophagous insects inhabiting dead wood in Uzbekistan.

MATERIALS AND METHODS

The biomaterial was collected in 2012-2016 in five regions of Uzbekistan - north-west (Khorezm province, Republic of Karakalpakstan), south (Surkhandarya and Kashkadarya provinces), east (Fergana and Namangan provinces), north-east (city of Tashkent and Tashkent, Jizzah and Syrdarya provinces) and centre (Navoi, Bukhara and Samarkand provinces). The biomaterial was found in the course of the visual inspection of dead trees in natural and anthropogenic ecosystems and wooden structures, from where they were extracted mechanically. After that they were taken to a laboratory where imagoes were produced. In addition, a completely new method of collecting xylophagous insects was used in the country's objects of cultural heritage: the wooden structures were wrapped in plastic bags, which were inspected once in three months to collect insects.

During the survey period the researchers inspected 1.535 wooden objects - wooden structures and items in private households, objects of cultural and historical heritage and administrative and social buildings and adjacent territories. The collected insects were identified based on their imagoes, larvae's excrement and the character of damages in the wood [1, 2, 5, 6, 7].

RESULTS AND DISCUSSION

Amid the biological material related in different ways to dead wood and collected in natural biocoenoses, residential houses and architectural monuments the researchers identified 39 species from 36 genera, 25 families and 10 orders (see the Table). It was established that 594 objects (38.7%) were damaged or populated by xylophagous insects.

Among the collected insects 9 species from 3 orders were identified as pests causing damage to commercial wood and threat to historical monuments in Uzbekistan:

- Order Isoptera – Termites:

- family Hodotermitidae – *Anacanthotermes turkestanicus* Jacobs. and *A.ahngerianus* Jacobs.

- Order Coleoptera:

- family Anobiidae – *Anobium pertinax* L., *A. punctatum* Deg., *Priobium carpini, Oligomerus brunneus.*

- family Cerambycidae – *Hylotrupes bajulus* L. and *Saperda octopunctata* Scop.;

- Order Hymenoptera:

- family Apidae – *Antophora sp.*

Wasp *Sclerodermus domesticum* L. from the family Bethylidae, order Hymenoptera, is also regarded as a pest damaging commercial wood. Some predator insects, such as *Myrmecophilus acervorum* from the order Orthoptera, *Hololepta plana* S. from the family Histeridae, *Staphylinus erythropterus* L. from the family Staphylinidae, *Phosphuqa atrata* (L.) from the family Silphidae, order Coleoptera, and *Camponotus lameerei* (E.) from the order Hymenoptera, also penetrate inside decomposing wood in search for live prey.

Table

Fauna and taxonomic diversity of xylophagous insects of dead wood in the biocoenoses of Uzbekistan (2012-2016)

№	Xylophagous insects				Population density in wooden objects		
	Order	**Family**	**Genus**	**Species**	**Architectural monuments**	**Private houses**	**Natural biotopes**
1	2	3	4	5	6	7	8
1	**Podura, или Collembola Lubbock, 1870**	Entomobryidae Lubbock, 1870	*Entomobrya* Rondani, 1861	*Entomobrya atrocincta* Schött, 1896	-	-	+
2	**Thysanura Borner, 1904**	Lepismatidae Latreille, 1802	*Lepisma* Linnaeus, 1758	*Lepisma saccharina* Linnaeus, 1758	-	+	+
3	**Isoptera Brullé, 1832**	Hodotermitidae Desneux, 1904	*Anacanthotermes* Jacobson, 1904	*Anacanthotermes ahngerianus* Jacobson, 1904	+	+	+
4	-//	-//-	-//-	*Anacanthotermes turkestanicus* Jacobson, 1904	+	+	+
5	**Orthoptera Latreille, 1793**	Myrmecophilidae Saussure, 1870	*Myrmecophilus* Berthold, 1827	*Myrmecophilus acervorum* (Panzer, 1799)	-	-	+
6	**Psocoptera Shipley, 1904 (Copeognatha Enderlein, 1903)**	Liposcelidae (Troctidae) Latreille, 1794	*Liposcelis* Motschulsky, 1852	*Liposcelis divinatorius* Müller, 1776	+	+	+
7	**Hemiptera Linnaeus, 1758**	Cixiidae Spinola, 1839	*Hyalesthes* Signoret, 1865	*Hyalesthes obsoletus* Signoret, 1865	-	-	+
8	-//-	Aradidae Spinola, 1837	*Aradus* Fabricius, 1803	*Aradus corticalis* Linnaeus, 1758	-	-	+
9	**Coleoptera Linnaeus, 1758**	Silphidae Latreille, 1807	*Phosphuqa* Latreille, 1807	*Phosphuqa atrata* (Linnaeus, 1758)	-	+	+
10	-//	Scarabaeidae Latreille, 1802	*Oxythyrea* Mulsant, 1842	*Oxythyrea cinctella* (Schaum, 1841)	-	-	+
11	-//-	Staphylinidae Lameere, 1900	*Staphylinus* Linnaeus, 1758	*Staphylinus erythropterus* Linnaeus, 1758	-	-	+
12	-//-	Anobiidae Fleming, 1821	*Anobium* Fabrcius, 1775	*Anobium pertinax* Linnaeus, 1758 (*Hadrobregmus pertinax*, (Linnaeus, 1758))	+	+	+
13	-//-	-//-	-//-	*Anobium punctatum* De Geer, 1774	+	+	-
14	-//-	-//-	-//-	*Anobium rufipes* Fabricius, 1792	-	-	+
15	-//-	-//-	*Priobium* Motschulski, 1845	*Priobium carpini* Herbst, 1793	-	+	-
16	-//-	-//-	*Oligomerus* Redtenbacher, 1849	*Oligomerus brunneus* Olivier, 1790	+	-	-

continuation of table

№	Xylophagous insects				Population density in wooden objects		
	Order	Family	Genus	Species	Architectural monuments	Private houses	Natural biotopes
1	2	3	4	5	6	7	8
17	-//-	Elateridae Leach, 1815	*Agriotes* Eschscholtz, 1829	*Agriotes gurgistanus* (Faldermann, 1835)	-	+	+
18	-//-	Buprestidae Leach, 1815	*Acmaeoderella* Volkovitsh, 1979	*Acmaeoderella* sp. Volkovitsh, 1979	-	+	+
19	-//-	Dermestidae Latreille, 1804	*Anthrenus* O. F. Müller, 1764	*Anthrenus picturatus* Solsky, 1876	+	+	+
20	-//-	-//-	Trogoderma Dejean, 1821	*Trogoderma versicolor* (Creutzer, 1799)	-	+	+
21	-//-	Histeridae Gyllenhal, 1808	*Hololepta* Paykull, 1811	*Hololepta plana* (Sulzer, 1776)	-	-	+
22	-//-	Tenebrionidae Latreille, 1802	*Adelostoma* Duponchel, 1827	*Adelostoma sulcatum* Duponchel, 1827	-	+	+
23	-//-	Cerambycidae Latreille, 1802	*Cerambyx* Linnaeus, 1758	*Cerambyx cerdo* Linnaeus, 1758	-	+	+
24	-//-	-//-	*Aeolesthes* Gahan, 1890	*Aeolesthes sarta* (Solsky, 1871)	-	-	+
25	-//-	-//-	*Hylotrupes* Audinet-Serville, 1834	*Hylotrupes bajulus* Linnaeus, 1758	+	+	-
26	-//-	-//-	*Saperda* Fabricius, 1775	*Saperda octopunctata* Scopoli, 1772	+	+	+
27	-//-	Curculionidae Latreille, 1802	*Sitophilus* Schönherr, 1838	*Sitophilus zeamays* Motschulsky, 1855	-	-	+
28	-//-	-//-	*Sciaphobus* K. Daniel, 1904	*Sciaphobus squalidus* Gyllenhal, 1834	-	-	+
29	-//-	Scolytidae (Ipidae) Latreille, 1806	*Scolitus* Geoffroy, 1762	*Scolitus mali* (Bechstein, 1805)	-	-	+
30	-//-	-//-	*Hylastes* Erichson, 1836	*Hylastes ater* (Paykull, 1800)	-	+	+
31	-//-	-//-	*Ips* De Geer, 1775	*Ips typographies* (Linnaeus, 1758)	-	-	+

continuation of table

№	Xylophagous insects				Population density in wooden objects		
	Order	**Family**	**Genus**	**Species**	**Architectural monuments**	**Private houses**	**Natural biotopes**
1	2	3	4	5	6	7	8
32	**-//-**	-//-	*Phloeosinus* Chapuis, 1869	*Phloeosinus sp*.	-	+	+
33	**Lepidoptera Linnaeus, 1758**	Cossidae Leach, 1815	*Cossus* Fabricius, 1794	*Cossus cossus* (Linnaeus, 1758)	-	+	+
34	**Hymenoptera Linnaeus, 1758**	Apidae Latreille, 1802	*Anthophora* Latreille, 1803	*Antophora* sp. Latreille, 1803	-	+	+
35	**-//-**	-//-	*Xylocopa* Latreille, 1802	*Xylocopa valga* Gerstäcker, 1872	-	-	+
36	**-//-**	Megachilidae Latreille, 1802	*Megachile* Latreille, 1802	*Megachile centuncularis* (Lin., 1758)	+	+	+
37	**-//-**	Bethilidae Ashmead, 1893	*Sclerodermus* Latreille, 1809 (*Scleroderma Oken,* 1817)	*Sclerodermus domesticum* Klug, 1809	-	+	+
38	**-//-**	Formicidae Latreille, 1802	*Camponotus* Mayr, 1861	*Camponotus lameerei* (Emery, 1898)	-	-	+
39	**Diptera Linnaeus, 1758**	Stratiomyidae Latreille, 1804	*Hermetia* Latreille, 1804	*Hermetia* sp.	**-**	-	+
Total:		**25**	**36**	**39**	**10**	**22**	**35**

Note: + - occurring in the object; - - not occurring in the object

Representatives of 8 orders were identified as the utilisers of dead material developing in decomposing wood: 1. Podura or Collembola – springtails: *Entomobrya atrocincta* Schött; 2. Thysanura: silverfish *Lepismas accharina* L.; 3. Psocoptera – booklice: *Liposcelis divinatorius* M.; 4. Hemiptera – bugs: *Hyalesthes obsoletus* Sign.; *Aradus corticalis* L.; 5. Coleoptera – beetles: *Oxythyrea cinctella* (Schaum), *Agriotes gurgistanus* (F.), *Acmae oderella* sp., *Anobium rufipes* F., *Adelostoma sulcatum* from the family Tenebrionidae; *Sitophilus zeamays* M. and *Sciaphobus squalidus* G., *Scolitus mali* (Bech.), *Hylastesater* (P.), *Ips typographies* (L.), *Phloeosinus sp.*; 6. Lepidoptera: *Cossus cossus* L.; 7. Hymenoptera: *Xylocopa valga* G.; 8. Diptera: *Hermetia* sp.

Megachile centuncularis (Lin., 1758), *Anthrenus picturatus* S. and *Trogoderma versicolor* (C.) use passages made by beetles, *Xylocopa valga* G. and Anthophoridae as breeding sites.

CONCLUSION

Currently, in the territory of Uzbekistan 39 species of insects from 36 genera, 25 families and 10 orders are identified as inhabitants of dead trees and woodwork. The most harmful of them causing damages to wooden structures and inhabiting both natural and anthropogenic ecosystems are termites – *Anacanthotermes turkestanicus* Jacobson, 1904 and *An. ahngerianus* Jacobson, 1904, Anobiidae – *Anobium pertinax* Linnaeus, 1758 and *An. Punctatum*, De Geer, 1774 and longhorn beetles – *Hylotrupes bajulus* Linnaeus, 1758 and *Saperda octopunctata* Scop. Xylophagous insects invade unbarked and unprotected wood, such as that in the wooden structures of private houses, objects of cultural and historical heritage, and administrative and social buildings.

REFERENCES

1. *Guide into the insects of the European part of the USSR. (1965). Moscow-Leningrad: Nauka, Vol. 2. Coleoptera and Strepsiptera. Edited by G.Ya. Bey-Bienko. 668 p.*
2. *Izhevsky S.S., Nikitsky N.B., Volkov O.G., Dolgin M.M. (2005). Illustrated guide into xylophagous beetles causing damage to forests and wooden material in the Russian Federation. – Tula: Grifi K, 220 p.*
3. *Khamraev A.Sh., Lebedeva N.I., Zhuginisov T.I., Abdullaev I.I., Rakhmatullaev A., Raina A.K. (2007). Food Preferences of the Turkestan termite Anacanthotermes turkestanicus (Isoptera: Hodotermitidae). Sociobiology. Vol. 50. No.2, New Orleans. pp.469-477.*
4. *Lebedeva N.I., Hamrayev A.Sh., Mirzayeva G.S., Ganiyeva Z.A., Zhuginisov T.I., Holmatov B.R., Rustamov K.D. (2014). Xylophagous pests damaging wooden structures and historical monuments. Bulletin of the Karakalpak State University, Nukus, Issue 4. pp. 21-25.*
5. *Mamayev B.M., Medvedev L.N., Pravdin F.N. (1976). Guide into the insects of the European part of the USSR. Moscow: Prosvescheniye. pp.103-187.*
6. *Plavilschikov N.N. (1994). Guide into insects. Moscow: Topikal. 548 p.*
7. *Toskina I.N., Provorova I.P. (2007). Insects in museums. (Biology. Infection prevention. Control). Moscow: Tovarischestvo nauchnykh izdaniy KMK. pp. 58-67.*