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**MONITORING OF STEM PEST POPULATIONS (*SCOLYTINAE*)
WHICH STRIKES THE ENDEMIC SPRUCE SHRENK
IN ZAILIYSK ALATAU**

Abstract. The article presents data of the monitoring population of stem pests (*Scolytinae*) and their entomophages in the forests of the Trans-Ili Alatau in the Ile-Alatau State National Natural Park.

As a result of the monitoring of stem pests (*Scolytinae*), the species composition of bark beetles and entomophages was established on the endemic of Schrenk spruce in Zailiysky Alatau. Of the possible foci of outbreaks of mass reproduction of stem pests are withering spruce trees found in a number of gorges. In this regard, it is necessary to continue monitoring the population of stem pests (*Scolytinae*) on the endemic of the Schrenk spruce in the TRANS-ili Alatau.

Keywords: Shrenk's spruce, bark beetles, entomophages.

Introduction. Shrenk's spruce or Tianshan spruce – endemic species and easily vulnerable rock for the mountains of Central Asia, the importance of which in the protection of the slopes of the TRANS-ili Alatau from erosion can not be overestimated. In addition, Shrenk's spruce an attraction for tourists. Spruce spruce have a whole set of stem pests (xylophagous) that includes a great variety of common forms, and are region-specific insects [1-6].

Windstorms which were in 2011 in the Ile-Alatau national natural Park led to an outbreak of stem pest reproduction and the formation of long-lasting foci and raised a serious question about the need to monitor pest populations.

Preservation Shrenk's spruce as an endemic and vulnerable species of Zailiysk Alatau is an urgent task not only for the Republic of Kazakhstan, but also for the entire world community. For Kazakhstan, it is important to preserve and increase the forest area of the Republic, which provides primarily the preservation of existing forests for future generations.

Research methods. Monitoring for identify the species composition of xylophagous insects Shrenk's spruce in the mountains Zailiysk Alatau. Collection and accounting of insect numbers was carried out by standard methods used in forest entomology and forest pathology [7-10].

To determine species composition and abundance of rodents on each plot are established, pheromone traps of two types: barrier and triangular after every 7-10 days collected insects for collect. On the site are selected 1-2 model trees, stumps, lying trees and drying up for inspection for the presence of xylophages. On a felled and cleared of branches the tree along the trunk make prolisky a width of about 10 cm and determine the species composition and number of pests, noting the place of settlement of them.

In the middle of settlements of each type should be take the palette (pad) 10 dm² (50x20 cm). On such pallets by counting uterine moves determine the density of the settlement, and by counting the input channels or marriage chambers (for polygamous bark beetles) determine the number of families of bark beetles. On pallets also take into account the number of young generation of bark beetles, counting the number of young beetles before departure and pupae under the bark or flight holes on the bark after departure of the younger generation. All these data are transferred to 1 dm² of the surface of the barrel.

Materials for the identification of the main types of entomophages-xylophages are carried out by manual collection, reconnaissance, detailed and other surveys, systematic records of insects.

Research result. As a result of the research, the species composition of bark beetles ((Scolytinae) on the endemic of the Tien Shan spruce in the mountains of the Zailiysk Alatau (table 1) was revealed.

Table 1 – Species composition of bark beetles (*Scolytinae*) in the mountains of TRANS-ili Alatau, 2018

The species and systematic position		Frequency
The Order Coleoptera	Coleoptera	
The bark of Hauser, Kyrgyz mountain beetle	<i>Ips hauseri</i> Reitt.	+++
Woodworm chastity	<i>Ips sexdentatus</i> Boerner	+
Bark beetle-double	<i>Ips duplicatus</i> Sahlberg	++
Bark beetle fires	<i>Orthotomicus suturalis</i> Gyllenhal	++
Engraver Baikal	<i>Pityogenes conjunctus</i> Reitter, (<i>P. baikalicus</i> Eggers)	+
The micrograph of the Kyrgyz	<i>Pityophthorus kirgisticus</i> Pjatnitzky	++
Lobed purple or small spruce lubed	<i>Hylurgops palliatus</i> Gyllenhal	+
Notation: + – singular; ++ – constantly; +++ – often and countless.		

Of the registered species of bark beetles (*Solytinae*) dominated bark beetle (*Ips hauseri* Reitt), which is included in the list of particularly dangerous forest pests of the Republic of Kazakhstan. Prefers conditions of moderate light and trees at the age of 2 kalassa and more. It inhabits areas of thick and transitional crust, although it can populate the entire trunk. Winter in a stage of a bug in old courses, under bark of stumps and trunks, mainly lying. Years stretched starts from may (lower forest zone) to late June (upper zone). We have determined the density of the settlement of bark beetles of the Tien Shan spruce of the Ile-Alatau GNPP (table 2).

Table 2 – Density of the settlement of bark beetles of the Tien Shan spruce of the Ile-Alatau GNPP (on average per pallet) in 2018

Type of pest	Indication	The density of the settlement
The bark of Hauser <i>Ips hauseri</i> Reitt.	The number of mother galleries	3,2
	The number of mating chambers	0,9
Woodworm chastity <i>Ips sexdentatus</i> Boerner	The number of mother galleries	0,3
	The number of mating chambers	0,1
Bark beetle-double <i>Ips duplicatus</i> Sahlberg	The number of mother galleries	0,4
	The number of mating chambers	0,2
Bark beetle fires <i>Orthotomicus suturalis</i> Gyllenhal	The number of mother galleries	1,1
	The number of mating chambers	0,3
Engraver Baikal <i>Pityogenes conjunctus</i> Reitter, (<i>P. baikalicus</i> Eggers)	The number of mother galleries	12,6
	The number of mating chambers	3,2
The micrograph of the Kyrgyz <i>Pityophthorus kirgisticus</i> Pjatnitzky	The number of mother galleries	11,3
	The number of mating chambers	2,1
The bark <i>Hylurgops palliatus</i> (Gyllenhal)	The number of mother galleries	0
	The number of mating chambers	0

In General, the density of the settlement and the number of marriage chambers of bark beetles is not high, the sanitary condition of forests is stable except for fallen and cluttered areas. The number of the young generation of bark beetles in the Ile-Alatau GNPP is given in table 3.

Table 3 – The Number of the younger generation of bark beetles in the forests of the Ile-Alatau national Park in 2018

Вид	Average number of young generation per 1 sq. dm
The bark of Hauser – <i>Ips hauseri</i> Reitt.	11,2
Bark beetle-double – <i>Ips duplicatus</i> Sahlberg	12,1
Woodworm chastity – <i>Ips sexdentatus</i> Boerner	1,8

The table shows that the state of the younger generation population is relatively low, but requires constant monitoring. Given the importance of the dominant species of bark beetle (*Ips hauseri* Reitt.) we studied the features of the distribution of uterine moves (table 4).

The greatest number of uterine passages is usually observed in the region of 0-0.1 L, i.e. at the beginning of the settlement area.

Table 4 – dependence of the density of settlement of the bark of Hauser – *Ips hauseri* Reitt. from bark thickness (cm)

Number of uterine moves per 1 dm	Thickness of bark, cm	Relative humidity of wood, %
1,02	1,73	45,3
1,14	1,67	47,1
1,05	1,2	50,8
1,02	1,08	51,8
1,24	0,91	51,4
1,01	0,7	53,1
0,95	0,78	52,6
0,85	0,66	55,1
0,68	0,57	53,4
0,64	0,51	54,4
1,40	0,3	48,1

The data in the table show that the highest density of Gauzer bark beetle (*Ips hauseri* Reitt.) In 2018 was observed in the zone with relative wood humidity during the settlement period, on average 47.1%, and bark thickness - 1.67 cm, although the number of uterine moves remains quite high (more than 1) with a humidity of 45.3-53.1% and a bark thickness of 1.73-0.7 cm.

Monitoring of bark beetles was carried out using pheromone traps - barrier and triangular type. This year from the bark beetle family (Scolytinae) were caught: coniferous timber tree (*Triptodendron linatum* Ol.), Gauzer bark beetle (*Ips hauseri* Reitt.), Bark beetle double (*Ips duplicatus* Sahlb.), Common engraver (*Pityogenes chalcographus* L.), *Pityogenes* ch. (*Pityophthorus kirgisticus* Pjat.).

In total, 552 insect specimens and 15 spider specimens were collected, of which 267 were bark beetles. Among which the Gauzer bark beetle prevailed (*Ips hauseri* Reitt.). In the total collection of insects is 41.8%.

In 2019, on freshly felled trees from the wind, where root rot was observed at an altitude of 1560 meters above sea level. The density of the settlement of bark beetles (engravers, micrographs) in 10 pallets was collected; 87 specimens were collected adults and 142 copies larvae, their species is established.

In the regulation of the number of bark beetles are important entomophages. The recorded entomophages of the order Coleoptera include representatives of 12 families, 13 genera, 14 species; Diptera: 2 families, 2 genera, 2 species (table 5) and Hymenoptera (Hymenoptera) include 2 families, 6 genera, 9 species and Hemiptera include 3 families, 4 genera and 4 species (table 6).

In the period of our research found the predator from the order Hemiptera (Hemiptera) bed bug baby – *Scolopocelis pulchella* Zetterstedt which in Kazakhstan has not been reported that is a new species in the TRANS-ili Alatau.

Table 5 – List of entomophages from the order of Coleoptera (Coleoptera) and Diptera (Diptera) in the mountain forests of the Ile-Alatau SSPP

Title		Occurrence
Ground beetle family Toslak crucifers, or cruciferous beetle	Carabidae <i>Amara ovata</i> F.	++
The Family Burying Beetles Mertvoe treherbert	Silphidae <i>Phosphuga atrata</i> L.	++
The Family Of Rove Beetles Station	Staphylinidae <i>Xantholinus</i> sp.	++
Staflin	<i>Placusa</i> sp.	++
A Family Of Beetles Toddler-plane	Histeridae <i>Hololepta plana</i> Sul.	++
Family Of Moulders Moults flat	Pythidae <i>Pytho depressus</i> L.	++
Family Petraki Ants	Cleridae <i>Thanasimus formicarius</i> L.	++
The Family Oskolki Uscatescu bandaged	Colydiidae <i>Bitoma crenata</i> F.	++
The Family Of Click Beetles The click beetle red-winged	Elateridae <i>Ampedus sanguineus</i> L.	+
Blood-spotted Nutcracker	<i>Ampedus sanguinolentus</i> Schr.	+
The Family Of Monotony Bestanca pokorova	Monotomidae <i>Rhizophagus bipustulatus</i> F.	++
Family Of Glitter Glittery wood	Nitidulidae <i>Epuraea limbata</i> F.	++
Family Of Darkling Moorish booger	Trogossitidae <i>Tenebroides mauritanicus</i> L.	+
The Family Of Malesci Malashka copper, or bronze	Malachiidae <i>Malachius aeneus</i> L.	+
The Family Of Ctyri Latria red	Asilidae <i>Laphria flava</i> L.	+
Family – Greenfinches Bark fly	Dolichopodidae <i>Medetera plumbella</i> Meigen, 1824	++

Table 6 – List of entomophages from the order of Hymenoptera (Hymenoptera) and Hemiptera (Hemiptera) in the mountain forests of the territory of the Ile-Alatau GNPP

Name		Occurrence
Ants family	Formicidae	
Red-breasted bore ant	<i>Camponotus herculeanus</i> L.	+
Tugai woodworm ant	<i>Camponotus lameerei</i> Emery	+
Black Lazius (Black garden ant)	<i>Lasius niger</i> L.	+
Mirmika Dzungar	<i>Myrmica dshungarica</i> Ruzsky	+
Mirmika red	<i>Myrmica rubra</i> L.	+
Sod ant	<i>Tetramorium caespitum</i> L.	+
Thin-headed Central Asian ant	<i>Formica mesasiatica</i> Dlus.	+
Brown ant	<i>Formica fusca</i> L.	+
The Braconids Family	Braconidae	
Highbone Rider	<i>Atanycolus genalis</i> Thom.	+
Family Predators Crumb *Bedbug baby	Anthocoridae <i>Scoloposcelis pulchella</i> Zett.	++
Predator Family Predatory bug	Reduviidae <i>Coranus subapterus</i> De Geer	+
Rinokor ringed	<i>Rhynocoris annulatus</i> L.	+
Family Shchitniki	Pentatomidae	
Armagh alder	<i>Arma custos</i> F.	+
*Baby bug – has not previously been reported on the Tien Shan of Kazakhstan.		

Conclusion. Since the trade turnover with foreign countries is growing and we have a high probability of importation of quarantine and invasive species that threatens the green spaces of Kazakhstan.

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**ІЛЕ АЛАТАУЫНДА ЭНДЕМИК ШРЕНКА ШЫРШАСЫНЫҢ
ДІҢ ЗИЯНКЕСТЕРІ (*SCOLYTINAE*)
ПОПУЛЯЦИЯЛАРЫНЫҢ МОНИТОРИНГІ**

Аннотация. Мақалада Іле Алатауы мемлекеттік ұлттық табиғи паркі аумағындағы Іле Алатау ормандарының дін зиянкестерімен (*Scolytinae*) олардың энтомофагтарының мониторингі баяндалған.

Іле Алатауындағы Шренк шыршасының дін зиянкестеріне (*Scolytinae*) жүргізілген мониторинг нәтижесінде қабықжегілер мен энтомофагтардың түр құрамы анықталынды. Зиянкестердің жаппай өршуі бір-қатар шатқалдарда шіріген ағаштарда кездесті.

Осыған байланысты Іле Алатау ормандарының дін зиянкестерімен (*Scolytinae*) олардың энтомофагтарының мониторингін жүргізу жұмыстарын жалғастыру қажет.

Түйін сөздер: Шренка шыршасы, қабықжегі, энтомофаг.

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**МОНИТОРИНГ ПОПУЛЯЦИЙ
СТВОЛОВЫХ ВРЕДИТЕЛЕЙ (*SCOLYTINAE*)
НА ЭНДЕМИКЕ ЕЛИ ШРЕНКА В ЗАИЛИЙСКОМ АЛАТАУ**

Аннотация. В статье приводится мониторинг за популяцией стволовых вредителей (*Scolytinae*) и их энтомофагов в лесах Заилийского Алатау на территории Иле-Алатауского государственного национального природного парка.

В результате проведенного мониторинга стволовых вредителей (*Scolytinae*) на эндемике ели Шренка в Заилийском Алатау установлены видовой состав короедов и энтомофагов. Из возможных очагов вспышек массовых размножений стволовых вредителей являются усыхающие деревья ели встречающиеся в ряде ущелий. В связи с этим необходимо продолжит мониторинг за популяцией стволовых вредителей (*Scolytinae*) на эндемике ели Шренка в Заилийском Алатау.

Ключевые слова: ель Шренка, короеды, энтомофаги.

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