Representatives of *Lepidoptera* groups occurred in forestry and agricultural crops and their effective entomophages types

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Abstract. This article summarizes the data collected on the basis of several years of scientific and practical research, and identifies the bioecology of the main *Lepidoptera* family with high rates of economic damage to forest and agricultural crops, developmental stages, and species composition and systematics. Accordingly, several species of parasitic entomophages belonging to the families *Trichogrammatidae*, *Braconidae*, *Ichneumonidae*, *Chalcididae*, *Pteromalidae* were studied and systematically analyzed for species composition.

1 Introduction

The drastic changes in the world's ecology and environment, the rapid application of innovative technologies by man to nature, are leading to the complete extinction of the biocenosis creatures that are unique to that place [1]. This poses a serious threat not only to agricultural crops but also to forests. The forest is leading to the disruption of the biodiversity balance in the biocenosis, environmental pollution, and a sharp increase in some pests. As a result, "the negative impact of pests on world agriculture is estimated at \$ 1.4 trillion, accounting for 5% of global GDP" [2, 3-5] The conservation of biodiversity, the improvement of the system of biological control of pests is one of the pressing issues. Scientists around the world are conducting large-scale scientific research on many international fundamental, practical and innovative projects aimed at preserving forestry and agricultural products lost due to pests [1, 6-10].

Pests belonging to the main representatives of the *Lepidoptera* family were identified based on the damage they cause to agricultural crops. In particular, members of the family *Lepidoptera*, nightingales, moths, are the most widespread in the world [11, 12].

Only members of the *Noctuidae* family are included in the species of autumn and wild nightshades, which cause serious damage to vegetable crops [5, 12]. In addition, scientists have studied the corn stalk moth (*Ostrinia nubilalis* Hb.) which belongs to the family of moths. According to them, since this pest is omnivorous, it has been corrected to cause severe damage to crops such as corn, hemp, sesame, coarse hemp [13].

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In addition to the thousands of species of pests that cause major damage in the forest biocenosis, according to their research in the world's forests, more than 50,000 parasitic species of entomophagous pests in the forest, mainly *Trichogrammatidae*, *Scelionidae* *Ichneumonidae*, *Chalidae*, *Braconidae*, *Braconidae* eaten and they damage the imago, eggs, worms and fungi of forest pests [14].

Considering all the above, the purpose of the study is determine the bioecology of the main representatives of the genus *Lepidoptera*, which cause great damage to forest and agricultural crops, and their species composition. It also takes into account the parasitic entomophagous species of these pests, observes the formation of their balance between the pest and the parasite, and their systematic analysis. The importance of biological control in managing the number of pests in the biocenosis is infinite, and we aimed to study the fauna of entomophagous species belonging to the family *Hymenoptera* in managing the number of key representatives of the family *Lepidoptera*.

2 Materials and methods

During the research, entomological handles, special nets, various artificially prepared yeasts were used to collect pest imagos. Different stages of development of the *Lepidoptera* family collected from the biocenosis were collected and observed in several types in special containers.

The main representatives of the genus *Lepidoptera*, found in forest and agricultural agrobiocenosis, collected 720 butterflies, 65 eggs, 6800 worms of different ages, 71 fungi. During the experiment from the following microscopes: MBS-2; MBI-3; electron microscope Telsa-BS-613 (Czech); thermostat MEMMERT E05273 and other appliances were used [15, 16].

3 Results and discussion

Scientific research has been conducted in various biocenoses and on the local insect fauna. The main representatives of the genus *Lepidoptera* occurring in the forest biocenosis were determined. Preliminary observations were made on the species composition of pests belonging to the genus *Lepidoptera*, in which insects in the forest biocenosis were captured using special traps (Table 1).

Table 1. Main representatives of the genus *Lepidoptera* found in the forest biocenosis (Burchmulla forestry of Tashkent province 2018-2019. Credits: A. Gozibekov)

#	Latin name of the pest	English name of the pest	Damage rate
Eribidae family			
1	<i>Lymantria dispar</i> L.	Gypsy moth	+++
Tortricidae family			
1	<i>Tmetocera ocellana</i> F.	Bud moth	++
2	<i>Recarvaria nanella</i> Schiff	Lesser bud moth	+
3	<i>Carpocapsa pomonella</i> L	Codling moth	+++

4	<i>Grapholitha molesta</i>	Fruit moth	+++
Plutellidae family			
1	<i>Yponomeuta malinellus</i> Zell.	Apple ermine moth	++
2	<i>Coleophora hemerobiola</i> Fil	Fruit tree case moth	+
3	<i>Cemiosoma scitella</i> Zell	Leaf blister moth	++
Pieridae family			
1	<i>Aporia crataegi</i> L.	Black-veined white butterfly	++
2	<i>Cyaniris argiolus</i> L.	Holly blue butterfly	+++
3	<i>Zeuzera pyrina</i>	Leopard moth	++
Cymbidae family			
1	<i>Sarothripus musculana</i> Ersch	Asian walnut moth	+++

Note: The degree of damage is (++++) high, (++) average, and (+) low.

In the forest biocenosis, our research to identify the main representatives of the Lepidoptera family has yielded results. 5 species of *Lepidoptera* were found in the garden biocenosis.

Studies have identified pest species that can cause significant economic damage to the apple tree. In the agrobiocenosis, the parasite-entomophagous relationships of the *Lepidoptera* family play an important role in maintaining the rhythm of the parasite-host relationship. As a result of abrupt changes in environmental factors, the balance between them is disturbed, leading to a mass increase of the host. Subsequent studies revealed 5 species of *Noctuidae* of *Lepidoptera* family and 2 main species of *Pyralidae* in Buka, Bekabad, Orta Chirchik and Yukori Chirchik districts of Tashkent province (Figure 1 and Table 2).

Fig.1. Infection of corn with the pest *Ostrinia nubilalis* Hb. (Tashkent province, 2019)

Table 2. Representatives of the main families and species of the genus *Lepidoptera* found in the corn agrobiocenosis of Tashkent province (2016-2019)

#	Latin name of the pest	English name of the pest	Damage rate
Noctuidae family			
1	<i>Helicoverpa armigera</i> Hbn	Cotton bollworm	+++
2	<i>Agrotis rotis segetum</i> Den	Turnip moth	+++
3	<i>Mythimna vitellina</i> Hb.	Aletia	+++
4	<i>Agrotis exclamationis</i> L	Heart and dart moth	++
5	<i>Agrotis ipsilon</i> Hufn	Black cutworm	+
Pyralidae family			
1	<i>Ostrinia nubilalis</i> Hb	Maize borer	+++
2	<i>Ostrinia kasmirica</i> Moore	European maize moth	++

Note: The degree of damage is (+++) high, (++) average, and (+) low.

The main species of the *Noctuidae* family in maize are *Helicoverpa armigera* Hbn, *Agrotis segetum* Den et Schiff, and *Mythimna vitellina* Hb. The most common and relatively rare species were *Agrotis exclamationis*, and *Agrotis ipsilon* Hufn species. However, with a population density of these dominant species, *Agrotis segetum* Den et (10.2%), *Helicoverpa armigera* Hbn, and *Mythimna vitellina* Hb. (54.1%) species were distinguished.

Representatives of the *Pyralidae* family, the main 2 species *Ostrinia nubilalis* Hb and *Ostrinia kasmirica* Moore, were found to cause serious damage to 65-70% of the yield of corn due to the growing season (Table 3).

Table 3. Parasitic entomophagous species of the genus *Hymenoptera* of the genus *Lepidoptera* occurring in forest and maize agrobiocenoses

#	Types of parasites	Pest type	Nutrition sources
1	Trichogrammatidae family	Tiny wasp pests	Larvae
1.1	<i>Trichogramma ostriniae</i> Hb <i>Trichogramma dendrolimi</i>	-//-	-//-
2	Braconidae family	Tiny wasps	Own mature worms, beetles
2.1	<i>Therion circumflexum</i> L	-//-	-//-
2.2	<i>Apanteles telengai</i> Tobias	-//-	-//-
2.3	<i>Bracon hebetor</i> Say	-//-	-//-
2.4	<i>Cotesia melanoscela</i>	-//-	-//-
2.8	<i>Microctonus aethiopoides</i>	-//-	-//-
3	Ichneumonidae family	-//-	-//-
3.1	<i>Pimpla turionellae</i>	-//-	-//-
3.2	<i>Pimpla instigator</i>	-//-	-//-
3.3	<i>Apechthis compunctor</i>	-//-	-//-
3.4	<i>Apechthis capulifera</i>	-//-	-//-

3.5	<i>Theronia atalantae</i>	-//-	-//-
3.6	<i>Stilpnus tenuipes</i>	-//-	-//-
3.7	<i>Lymantrichneumon disparis</i>	-//-	-//-
4	Chalcididae family	Chalcidid moths	Own worms, larvae
4.1	<i>Brachymeria intermedia</i>	-//-	-//-
4.2	<i>Rhaphitelus maculatus</i> Wlk	-//-	-//-
5	Eupelmidae family	Chalcidid moths	Own worms, larvae
5.1	<i>Anastatus japonicus</i>	-//-	-//-

Observations were made on corn fields over the years, and the occurrence of the above pests was summarized and averaged. Specialized parasite of this pest *Trichogramma ostrinae* Hb type is propagated by Tashkent State Agrarian University and Scientific Research Center for Biological Protection of Plants (Figure 2).

Fig. 2. Reproduction of new species of trichogramma in biolaboratory

According to the results of scientific research conducted in 2010-2020, a variety of parasites and predatory entomophagous species were observed in the biocenosis of the country, and 66.4% of the total entomophagous composition was parasites. In the biocenosis, the parasite-host relationship of the Lepidoptera family is ensured to be continuous. Because if they have a parasite or host-relationship relationship, the population of a species can increase dramatically or become extinct altogether.

The main entomophagous species that effectively control the number of representatives of the family *Lepidoptera* are found in the family *Trichogrammatidae*, *Braconidae*, *Ichneumonidae*, *Chalcididae* and, *Eupelmidae*. (Figure 3).

Fig. 3. *Anastatus japonicus* parasite entomophagous type (Tashkent province, 2019)

Among the representatives of this parasitic entomophagous family are effective parasitic entomophagous of leafhoppers and cocoons. *Anastatus japonicus* belonging to the family *Eupelmidae* and *Brachymeria intermedia* belonging to the family *Chalcididae* have been identified and these species have not been thoroughly analyzed by scientists of our country [6; 7; 8; 9].

Based on the data provided in the literature of these three species of world scientists, as well as in the laboratory, the composition of the species was determined. There are many species of parasitic entomophages in the biocenosis of our country, which are still not fully understood. They are important in controlling the number of pests (Figure 4).

Fig. 4. *Brachymeria intermedia* parasite entomophagous type (Jizzakh province, 2019-2020)

There are 90 species of entomophagous parasites belonging to the family *Chalcididae*, known to us from the literature of world scientists. Not all of these species play an important role in managing the number of pests.

However, our research has shown that *Brachymeria intermedia* parasite entomophagy, another species that has not been previously recorded in our forest biocenosis and has not been studied in depth by our scientists, plays an important role in the effective management of an unequal number of silkworms. In the study, we brought this species to the biolaboratory in the fungi of unequal silkworms in the biocenosis of the State Forest Reserve of Zaamin district of Jizzakh province, and as a result of systematic analysis, we

identified this species as *Brachymeria intermedia*. This species was identified in 1864 by Professor Nees (Table 4).

Table 4. Leading parasite-entomophagous species of the *Hymenoptera* family in the biocenosis and their ratio and level of occurrence

#	Types of parasites	Detected leader type	Parasite/leader ratio	Incidence rate of parasite species
1	<i>Apanteles telengai</i> Tobias	<i>Ostrinia nubilalis</i> Hb	1:12	+++
2	<i>Microgaster mediator</i> Hal	<i>Ostrinia kasmirica</i> Moore	1:43	++
3	<i>Bracon radialis</i> Tel	<i>Syngrapha circumflexa</i> L.	1:36	++
4	<i>Rogas dimidiatus</i> Spin	<i>Agrotis exclamationis</i> L.	1:44	+
5	<i>Brachymeria intermedia</i>	<i>Lymantria dispar</i> L	1:18	++

Note: The degree of incidence is (+++) high, (++) average, (+) low.

Of course, in the biocenosis, it was observed that agricultural crops multiply rapidly and cause more damage due to the favorable conditions for the survival of the main pests. In order to reduce their numbers harmlessly, it will be necessary to create agrotechnical methods and a comfortable indoor environment that attracts their parasites and predators.

4 Conclusion

According to the results of many years (2010-2020) studies, we can say that the representatives of the *Hymenoptera* family are effective parasitic entomophagous in controlling the number of representatives of the Lepidoptera family.

The study revealed that 16 species of *Noctuidae* family were registered in the agrocnosis of Tashkent province, and 12 species of *Vraconidae* family were found in the management of the number of these species. This means that a large part of the number of nightingales can be effectively managed by members of the poaching family.

In forest and corn agrobiocenoses more than 100 species of the family *Trichogrammatidae*, *Braconidae*, *Ichneumonidae*, *Chalcididae*, which are effective entomophagous representatives of the family Lepidoptera, were observed. *Trichogramma evanescens* Westv *Trichogramma pinto*i Voeg *Trichogramma ostrinia*e Hb of the family *Trichogrammatidae*, which is a new species for the entomofauna of Uzbekistan, and species *Anastatus japonicus* belonging to the family *Eupelmidae* and a species belonging to the family *Chalcididae* B.

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