

РОЗДІЛ II. ЗООЛОГІЯ ТА ЕКОЛОГІЯ ТВАРИН

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ABOUT BIOLOGY AND ENTOMOFAGES ERMINE MOTH IN SHEKI-ZAQATALA REGION OF AZERBAIJAN

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In the paper it is presented comparative characteristics of biology of *Yponomeuta irrorella* and entomophagous in Sheki-Zaqatala region.

The results of researches (2001-2014 years) showed that in the gardens and forests in Sheki-Zaqatala region were found 5 species of ermine moths (*Yponomeuta malinellus* Zll., *Y. padellus* L., *Y. irrorellus* Hb., *Y. cognatellus* Hb., *Y. Plumbellus* Schiff). Their entomophages are also studied. It was found out, that they carry on them 25 species of parasites, which related to 7 families.

Key words: moths, vermin, biology, fruit, timber trees, crops

ПРО БІОЛОГІЮ ТА ЕНТОМОФАГІВ ГОРНОСТАЄВОЇ МОЛІ ШЕКІ-ЗАКАТАЛЬСЬКОЇ ЗОНИ АЗЕРБАЙДЖАНУ

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У роботі наводиться порівняльна характеристика біології горностаєвих молей та їх ентомофагів у Шеки-Закатальській зоні.

Результати наших досліджень (2001-2014гг.) виявили, що в плодovих і лісових масивах Шеки-Закатальської зони було виявлено 5 видів горностаєвих молей (*Yponomeuta malinellus* Zll., *Y. Padellus* L., *Y. Irrorellus* Hb., *Y. Cognatellus* Hb., *Y. Plumbellus* Schiff). Були вивчені їхні ентомофаги. Встановлено, що на них паразитує 25 видів паразитів, які відносяться до 7 родин.

Ключові слова: моли, паразити, біологія, плодови, лісові дерева, культури.

О БИОЛОГИИ И ЭНТОМОФАГАХ ГОРНОСТАЕВЫХ МОЛЕЙ ШЕКИ-ЗАКАТАЛЬСКОЙ ЗОНЫ АЗЕРБАЙДЖАНА

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В работе дана сравнительная характеристика биологии горностаевых молей и их энтомофагов в Шеки-Закатальской зоне.

Результаты наших исследований (2001-2014гг.) показали, что в плодovых и лесных массивах Шеки - Закатальской зоны было обнаружено 5 видов горностаевых молей (*Yponomeuta malinellus* Zll., *Y. padellus* L., *Y. Irrorellus* Hb., *Y. cognatellus* Hb., *Y. plumbellus* Schiff). Были изучены их энтомофаги. Установлено, что на них паразитирует 25 видов паразитов, относящихся к 7 семействам.

Ключевые слова: моли, паразиты, биология, плодовые, лесные деревья, культуры.

INTRODUCTION

Ermine moths from *Yponomeuta* Latr. family, along with the other harmful insects waste a lot of fruit and forest stands in regions of Azerbaijan. In related literature it is possible to meet a big number of works about these parasites, their entomophages, methods of pest control etc. [1-9]. Development of biological method of pest control has a special significance.

Caterpillars of Ermine moths can be defined by their latebrosus life style, by their minering of leaves, sprouts and living inside the burgeons or inside the web nests and contortuplicate leaves. By the nature of their feeding habits they are divided into monophages, oligophages and polyphages. Many species, such as apple moth, fruit moth, willow moth, spindle moth etc. have every important role in farming, because caterpillars of these species of moth during their massive reproduction can bring a serious harm to fruit forest trees and shrubberies, causing early dieback and falling of leaves, decrement of harvest, twigs and trees blight.

Earlier, 4 species of ermine moths (*Yponomeuta malinellus* Zll., *Y.padellus* L., *Y. irrorellus* Hb., *Y.rorellus* Hb.) were spotted by us in Nakhchivan and Ganja-Gazax regions of Azerbaijan. [10-12].

The purpose of present research was studying fauna of ermine moths and their entomophages in fruit and forest solid woods in Sheki-Zaqatala region of Azerbaijan.

MATERIALS AND METHODOS

As the basic materials for research, mainly, our own gathers and data were taken, which covered the most part of the region gardens, including lowlands and piedmont areas. Research was held during 2000-2014 years by fixed-route and stationary methods. Around 3500 assays were collected and worked on.

Collecting of materials and definition of species composition of their entomophages and their hosts were held by using common entomological methods. Special manual of the identification of etnofauna was used.

Stationary on live materials stages of growth of insect pests and entomophages were observed. In laboratory, the level of affection of hosts were defined, parasites and predators among eggs of caterpillars and chrysalis were selected and uncovered. When materials were collected and analyzed, microclimate conditions, relief, vegetation cover of every biotope according to height of areas in the region were taken into consideration. “Canon” digital camera, field thermometer, hydrograph, luxometr, microscope MBS-10, constant temperature cabinet “ISO – 9001”, beakers, retorts and cylinders were used.

RESULTS AND DISCUSSION

In the gardens and forests in Sheki-Zaqatala region were found 5 species of Ermine moths (*Yponomeuta malinellus* Zll., *Y.padellus* L., *Y. Irrorellus* Hb., *Y.cognatellus* Hb., *Y.plumbellus* Schiff.) and their entomophages are also studied. It was found out, that they carry on them 25 species of parasites. Which related to 7 families (table 1 is given below).

The results of our researches showed that embryonic development of all species of ermine moth runs not at the same time. Embryonic development of all species of moths is not a simultaneous process. Apple Ermine moth, fruit moth, willow moth, spindle moth and *Yponomeuta irrorella* finishes this process in two or three weeks after oviposition. This time newly born caterpillars don't leave their cuirass, but live there till the spring of the next year. First days of their life they eat egg shells, from where they came out through the bottom part of membrane of cuirass and then stay under the cuirass of core. When temperature falls below 10 caterpillars under the cuirass live up the process called aestivation till spring. And then, cuirass, which covers caterpillar, protects it from environmental influences. Eggs of Large spot moth don't have such a protecting cuirass, that's why diapauses of this species passes in a phase of egg and last till spring (may) of the next year. Embryonic development of this specie is happening in spring and as soon as caterpillar comes out, it started to look for the meal. In spring, young larva of apple moth, fruit moth, willow moth, spindle moth and *Yponomeuta irrorellus* gnaw several (2-5) round holes in cuirass or upbear the cuirass from the edge in such a way, so they would be able to get out of it.

Table 1 – The entomophages of Ermine moths in Sheki-Zaqatala region

№	Family and species	Hosts						
		Selected from	Apple moth	Fruit moth	Willow moth	Spindel moth	Large spot moth	Yponomeuta irrorellus
	Family Ichneumonidae							
1	<i>Nythobia armillata</i> Grav	caterpillar	+	+	+	+	+	+
2	<i>N. contracta</i> Brisch	*	-	+	+	+	+	-
3	<i>Agrypon</i> sp	chrysalis	+	-	-	+	+	+
4	<i>Herpestomus brunneicornis</i> Grav.	“ * “	+	+	+	+	+	+
5	<i>Pimpla turionella</i> L.	“ * “	+	+	+	+	+	+
6	<i>P. spyria</i> F.	“ * “	-	+	+	+	+	-
7	<i>Jtoplectis curopator</i> F.	“ * “	+	-	-	+	-	+
8	<i>J. alternans</i> Grav.	“ * “	-	-	+	+	-	-
9	<i>J. maculator</i> Grav.	“ * “	+	-	-	-	+	+
10	<i>Schizopyga</i> sp.	caterpillar	+	+	-	+	-	-
11	<i>Chorinacus tricarinator</i> Hall	“ * “	+	+	+	+	+	
12	<i>Pristomerus vulierator</i> Grav.	“ * “	+	+	+	+	+	+
	Family Braconidae							
13	<i>Bracon hebetor</i> Spin.	caterpillar	-	-	-	+	+	+
14	<i>B. varigator</i> Spin	“ * “	+	-	-	-	+	+
15	<i>B. colpophorus</i> Wesm.	“ * “	+	-	-	+	-	-
16	<i>Ascogaster</i> sp.	chrysalis	-	+	+	-	-	-
17	<i>Apanteles</i> sp.	caterpillar	-	+	-	+	+	+
	Family Encyrtidae							
18	<i>Ageniaspis fuscicollis</i> Dalm	caterpillar	+	+	+	+	+	+
	Family Elopidae							
19	<i>Tetrastichus evonymellae</i> Bch.	caterpillar	+	+	+	+	+	+
20	T. sp	chrysalis	+	+	+	+	+	+
	Family Callimomidae							
21	<i>Monodontomerus aereus</i> Wik.	chrysalis	-	+	+	+	-	-
	Family Elasmidae							
22	<i>Elamus albipennis</i> Thoms.	caterpillar	+	+	+	-	+	+
	Family Tachinidae							
23	<i>Nemorilla floralis</i> Fall.	chrysalis	+	+	+	+	+	+
24	<i>Euzysthaea scutellaris</i> R-D.	“ * “	+	-	-	+	+	+
25	<i>Pseudosarcophaga mamillata</i> Pand	“ * “	+	+	+	+	+	+

Ermine moth caterpillars on different stages of development are leading a different life style. So, some of them in their early years can behave free, the others have latebrosus life. As free life holders can be called fruit moth, which from the beginning of their first years till pupation could be found in nests between leaves. To those of latebrosus life style leaders refer apple moth, willow moth, spindle moth, which after leaving under the cuirass in pour the leaf and mining it with colonies. In contrast to them, caterpillars of Large spot moth and *Yponomeuta irrorellus* miner not leaves but sprouts. Even more, they are mining not with colonies but one by one.

Caterpillars shed its skin in mines and at the beginning of the second age it comes out. Caterpillars of apple moth, willow moth, spindle moth after leaving their mines are coming out on the top of the young leaves and cover them with a cobweb to form a nest. Inside this nest caterpillars are destroying an areola of this leaf, leaving the bottom and top epidermis and threads of the leaf untouched. Caterpillars of the Large spot moth and *Yponomeuta irrorellus* after leaving the mine are starting to live alone on the bottom side of the leaf and gradually eat areola of the leaf. During their development process caterpillars shed their skin four times and pass five ages. Moth caterpillars pupate in different ways: some of them build a common nest, the others pupate separately alone. In a cobweb nest in a big amounts usually pupate apple moth caterpillars and they construct thick none transparent cocoons. Caterpillars of the 1st age are usually mining the leaves and stems of forage plant, then they eat it freely, forming web nests on the leaves of that plant. Pupae are set in single or stuck with each other cocoons in web nests. Hibernating caterpillars of the 1st age on the core of forage plant under the “shield”, which is made from excretion produced to cover egg laying. Due to its diet all the representatives of this family are phytophagous. Caterpillars of ermine moths weave a public web, where a big number of different caterpillars can grow (fig. 1). During their feeding they usually don't cause a big damage in agriculture, forest husbandry and crop husbandry, although some species are seriously harmful to fruit and forest plants. Allied moth has similar type of cocoon, which pupate in a web nest in small packages. The similar type of cocoons spindle moth caterpillars have, which pupate in a cobweb nest in not very large amounts. Caterpillars of willow moth and fruit moth are pupating alone in a big packless transparent nest, but at the same time each of the caterpillars of fruit moth build separate packless transparent double cocoon of oval shape. The caterpillars of other species of moths - Large spot moth and *Yponomeuta irrorellus* – never build a common nest and pupate separately. Nests of *Yponomeuta irrorellus* have transparent and pouch like shape, but Large spot moth caterpillars cocoon is transparent and have cigar like shape. Size of cocoons of different species varies from average 9 to 12,5 mm.



Fig. 1. Web-nests with pupae on the branches of the trees

Butterflies lead nocturnal life style. Butterflies can leave their cocoons at any time of the day. Relieved butterfly sits in the nest or changes the position, goes usually to the bottom side of the leaf or twig. Close to the afternoon butterflies become more active. Their flight is not straight, intermissive and short distant. Butterflies leave cocoons with advanced sexual organs, so mating becomes possible after a few days. Usually they lay eggs on the smooth cortex near the base of next year's sprouts or strias of the nearby burgeon of one or two years old twigs. First one or two eggs of butterfly are laid on the pile, next are laid in a tile shape and all are covered with quick-

dry slime which forms cuirass, as apple moth, fruit moth, spindle moth, *Yponomeuta irrorellus*. and willow moth have. But Large spot moths lay one or sometimes some eggs one by one in strias near the burgeons and don't cover them with slime.

Above mentioned species grow only in one generation. Caterpillars of apple moth after leaving cuirass till pupating eat leaves of spindle. Fruit moth eat leaves of cherry plum, plums, black thorn, cockspur, in the lack of meal it can migrate to apricot tree and eat its leaves.

Data on peculiarity of seasonal cycle of development and detailed research of biology of species, which have primary economical significance, will be a base for recommendations on defense of fruit plantations from harmful insects. Collected data could be used in further work on biological basis of defense measures.

In prospect of our researches the fauna of ermine moths in other regions of Azerbaijan would be studied, and methods of pest control in fruit gardens would be worked out.

CONCLUSIONS

1. It was defined, that apple moth, few spotted ermine moth, allied moth, *Yponomeuta irrorellus*, kent moth are monophages, but fruit moth is oligophages.

The significance of parasites as the regulators of population of 6 species of ermine moth apple moth, fruit moth, few spotted moth, allied moth, *Yponomeuta irrorellus* and kent moth was defined.

2. Among all selected parasites of Ermine moths the most efficient parasite is ageaniaspis (*Ageaniaspis fuscicollis* Dalm.), which was selected in a big amount. It was discovered that they infect harmful moths (70-75%). The next important in decreasing the number of Ermine moth population after ageaniaspis is parasite nythobia (*Nythobia armillata* Grav.). This parasite abolishes 35-40% of whole amount of infected host units. They are followed by *Pimpia turionella* L., *Herdestomis brubneicornis* Grav., *Chorinacus tricarinatus* Holmgr., *Pristomerus vulnerator* Grav., *Tetrastichus evonymellae* Bch., *Nemorilla floralis* Fall., *Pseudosarcophaga mamillata* Pand. According to perennial researches, these efficient species are widely spread in the gardens and forests of Sheki-Zaqatala region. They can be considered as the main bio-factor, which regulates the number of Ermine moths, therefore the biological method of using them in fight with Ermine moth was worked out.

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