BIOLOGY, ECOLOGY AND INTEGRATED CONTROL OF THE SPECIES *Phyllonorycter blancardella F* (marbled ore), PEST IN THE APPLE PLANTATIONS FROM HUSI-VASLUI AREA

BIOLOGIA, ECOLOGIA ŞI COMBATEREA INTEGRATĂ A SPECIEI *PHYLLONORYCTER BLANCARDELLA* F. (MINIERUL MARMORAT), DĂUNĂTOR ÎN PLANTAȚIILE DE MĂR DIN ZONA HUŞI – VASLUI

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Abstract. *In the paper there are presented the results of the researches regarding the spreading, morphology, biology, ecology and integrated control of the species Phyllonorycter blancardella F. (marbled ore), an important pest for the apple plantations in Husi-Vaslui area.*

Rezumat. *În lucrare se prezintă rezultatele cercetărilor asupra răspândirii, morfologiei, biologiei, ecologiei şi combaterii integrate a speciei Phyllonorycter blancardella F. (minierul marmorat), dăunător important în plantațiile de măr din zona Huşi-Vaslui.*

INTRODUCTION

Phyllonorycter blancardella F. (marbled ore) is part of the Lepidoptera order, Gracilariidae family, and it is spread all over Europe, Asia, U.S.A. and Canada, the attack being from insignificant in some orchards, to strong in others, where it raises real problems for its control. In our country, the marbled ore is present at most of the rosaceae. It was quoted by Dobreanu Ecaterina (1937), Patrascu Elena (1963, 1968), Draghia I. (1966, 1968, 1970, 1971, 1974, 1976), Susea Sonica (1987, 1993, 1996) and Hetug Maria (1981, 1986, 1994).

Butterflies have sizes of 8-9 mm; the fore wings are of yellow-bronze colour, with silver spots, edged with black. The longitude basic illegible has a black edge at the fore part, and on the sides there are 3 white comma type spots. The wing fringes are very developed.

The egg is yellowish white, elliptical, flat, with soft chorion, easy reticulated, with the diameter on an average of 0,225 amd 0,325 mm.

The neon larva is apodal, dorsal-ventral flattened, yellowish white colour, with the prominent head spatula shaped, easy transparent, having on top small but robust red mandibles. The larva of second and third age are also apodal, while those of forth and fifth age are totally different from the previous ones, by the presence of the thoracic feet and the false abdominal feet, as well as by the

cylindrical form of their body. Their length at the complete growth reches to 3,4-5,0 mm; the head is prognate.

The pupa is brown-yellow and is 3,3-4,0mm length and 0,75mm wide.

RESULTS OBTAINED

The observations on the biological cycle, in the ecological conditions from Husi-Vaslui area in 2005, emphasize that *Phyllonorycter blancardella F.* has 3 generations and hibernates in the level of pupa, within the gallery (the ore), in the fallen leaves.

The butterflies appear in early spring, beween the 10.IV-12.V, at $\Sigma (t_n-t_0)$= 78,1°C and fly in daytime for 16 days. After 3-4 days from their appearance they pair, and females deposit egg isolated, on the inferior part of the leaves, in a number of 15-25 eggs for 21 days $\Sigma (t_n-t_0)$= 111,2°C.

From these eggs comes out the larva, in period 1.V-6.VI, whose evolution lasts for about 25 days at $\Sigma (t_n-t_0)$= 195°C. The larva enters the leaf, punching the egg chorion in its adhesion point on the inferior part of the leaf. The larva feeds itself with the content of the epidermis cells and the mesophyllum. While the larva grows, the gallery (the ore) prolongs more and widens easily becoming step by step a specific way of attack for this species.

At its complete growth, the larva turns into pupa, in the period 26.V-15.VI, at $\Sigma (t_n-t_0)$= °C, level which lasts for about 14 days, and after that butterflies appears, and they will lead to the 2nd generation. The butterfly leaves the pupa exuvium by breaking through the inferior epidermis; it also stimulates the pupa exuvium, and this way, all the galleries abandoned by the adults have, at one end, the inferior epidermis broken through by the pupa exuvium.

The same way happens with the butterflies from the 2nd and the 3rd generation, appreciating that the 3 generations appear as it follows: G_1-April-June; G_2-June-July; G_3-August-September. We mention that in the speciality literature the marbled ore, in some propitious conditions may develop in 4 generations per year. After the researches regarding the biological reserve of this species, in the autumns from 2004-1005 from the apple plantations in Husi, it was of 23,16% in 2004 and 25,13% in 2005. In Stanilesti city, the biological reserve was of 20,83% in 2004 and of 20,30% in 2005. (table1)

Table 1

The biological reserve of the species *Phyllonorycter blancardella F.* in various cities from Husi-Vaslui area (2004-2005)

City	Biological reserve						Mean %	
	G_1		G_2		G_3			
	2004	2005	2004	2005	2004	2005	2004	2005
Husi	21,0	18,0	25,2	25,2	23,3	20,2	23,16	25,13
Stanilesti	19,1	16,2	23,1	22,1	20,2	17,1	20,83	18,46
Munteni	18,0	15,2	20,2	24,3	19,6	21,5	19,26	20,30

The greatest biological reserve was in Husi, followed by Stanilesti and Munteni. Because of the information in this period, in all the cities where the researches were made, the recommend measures for preventing the attack of this species and its maintenance under the economical pest level (PED), which is established to 30 ores/100 leaves.

As for the attack frequence (F%) observed in the same cities from Husi-Vaslui area, in 2004-2005, they obtained the following data (table 2)

Table 2

The frequence of the attack (F%) of the species *Phyllonorycter blancardella F* in different cities from Husi-Vaslui area, in 2004-2005

City	Biological reserve						Mean %	
	G_1		G_2		G_3			
	2004	2005	2004	2005	2004	2005	2004	2005
Husi	12,4	17,2	14,6	18,2	17,6	19,2	15,40	18,20
Stanilesti	10,8	15,1	11,2	16,1	15,3	18,1	13,36	16,43
Munteni	9,6	14,2	12,1	15,4	14,6	11,8	12,10	13,80

The frequence of the attack in Husi city was of 15,04% in 2004 and of 18,2% in 2005. In Stanilesti it was of 13,36% in 2004 and of 16,43% in 2005. Also, in Munteni, the attack frequence was of 12,10% in 2004 and of 13,80% in 2005. Like the case of the biological reserve, the greatest attack frequence was registered in Husi, followed by Stanilesti and Munteni.

As for the attack way, the attacked plants are pointed out besides apple and other species as the pear and quince tree, with no great importance. In the apple plantations, on important attacks, this ore may lead to the complete shed of the trees, with impacts upon the wood lignification. The attack is specific, the larva from the first ages gnaw a gallery of about 20mm, long and narrow, easy devious, which describes an irregular oval. Further on, the larva gnaws devious galleries within this oval, till from the confluence of all the galleries comes out a great one, with an irregular spot shape, oval, limited by the leaves ribs. The larva of the 4^{th} and 5^{th} age, increase the gallery and appear on the superior epidermis, a little bulging, with the mesophyllum punctiform gnawed, in a mosaic shape, so that on the inferior face of the leaf the larva may consume the mesophyllum, the epidermis staying intact and transparent like pyelitis. These line the ores with white, thin, silky threads, which makes the galleries more wide. On the leaf we may find 1-50 ores.

The control of the species *Phyllonorycter blancardella F.* is quite difficult, if we take into account the prolification, the great number of generations, the hidden way of life, the staggered appearance of the butterflies in spring and the spreading in almost all the apple plantations, collecting in one year biological reserves reported with a quite big frequence.

For a chemical control they did treatments with 5 products (table 3), the application in lots having a surface of 540 square meters. In a variant they used traps with specific sexual ferromones (Atrablanc), 18 traps/hectare, and another variant was untreated, being used as a witness.

After the observations, they saw that the lot with the best results was that where they used ferromones Atrablanc type, where they obtained productions of 25,8 tones/hectare. Among the tested products they all were efficient, but the best results were realized with the product Calypso 480SC.

Table 3

The efficiency of some products in the control of *Phyllonorycter blancardella F.* marbled ore in Husi-Vaslui area in 2005

Num -ber	Product name	Active substance	Concen-tration (%)	Frequence %			Production t/ha
				G_1	G_2	G_3	
1	Vantex 60CS	Cihalotrin range	0,01	10,4	15,4	14,2	25,4
2	Laser 240 SC	Spinosad	0,04	9,8	14,2	13,1	25,3
3	Calypso 480SC	Tiacloprid	0,02	8,2	12,6	11,4	26,2
4	Milbeknock EC	Milbenectin	0,05	10,6	16,4	14,8	25,3
5	Pieta	Acetamiprid	0,02	9,4	13,3	12,7	25,7
6	ATRASCIT trap	18 traps/hectare	-	9,9	13,0	12,2	25,8
Untreated witness				19,6	27,3	23,2	22,3

CONCLUSIONS

1. The marbled ore (*Phyllonorycter Blancardella F*), in the ecological conditions from Husi-Vaslui area, in 2005 registered 3 generations: G_1- April-June; G_2-June-July; G_3-August-September, and hibernates in the level of pupa in the fallen leaves.
2. The biological reserve and the greatest attack frequence of this species was signaled in Husi 23,16% in 2004 and 25,13%in 2005, followed by Stanilesti, with 20,83% in 2004 and 18,69% in 2005 and by Munteni with 19,26%, in 2004 and 20,30% in 2005. It is the same thing with the attack frequence.
3. Among the tested products, the best efficiency was registered by the product Calypso 480SC (0,02%), with a production of 26,2 t/ha, as well as the traps with ferromones Atrablanc type, with a production of 25,8t/ha, realizing a benefit between 3,3-3,7t/ha.

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