BIOLOGY, ECOLOGY AND INTEGRATED CONTROL OF THE SPECIES *Leucoptera scitella Zell. (*circular ore), IN THE APPLE PLANTATIONS FROM HUSI-VASLUI AREA

BIOLOGIA, ECOLOGIA ŞI COMBATEREA INTEGRATĂ A SPECIEI *LEUCOPTERA SCITELLA* ZELL. (MINIERUL CIRCULAR), DĂUNĂTOR ÎN PLANTAŢIILE 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 Leucoptera scitella Zell. (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 Leucoptera scitella Zel. (minierul marmorat), dăunător important în plantaţiile de măr din zona Huşi-Vaslui.*

INTRODUCTION

*Leucoptera scitella Zell. (*circular ore) is part of the Lepidoptera order, Lyonetiidae family, Leucopteridae subfamily, and it is spread all over Europe, being mentioned in speciality papers in Italy, Spain, the ex Iugoslavia, Bulgaria, Hungary, Polland, C.S.I. In our country, it was pointed out ever since 1957 in Suceava, Cluj and so on. Further on, this species extended also in the western orchards from our country, reaching in 1983 a maximum of pest, when ever since August it produced the leaflessness of the trees in various orchards.

Researches on biology, ecology and integrated control of this species were elaborated by Dobreanu Ecaterina (1937), Patrascu Elena (1963, 1968), Draghia I. (1986), Sandru I. (1985), Costescu C. (1986), Susea Sonica (1986); Popa P. (2000).

The egg is dirty-white, with the diameter of 0,3mm, has discoidal, bulky and bulging form, presenting though an easy central depression (Fero S.1961). The larva at its complete growth has 4-5 mm length, the body is short and bulk, easy spindle-shaped, with the latest abdominal segments narrowed, their colour is brown green, before their transformation into pupa; the head is dark, retractile, and the prothoraical board appears divided in two at all ages; presents 4 pairs of false abdominal feet, foreseen with 12 crockets. The pupa is reddish chestnut, of approximately 3 mm, sheltered in a silky, spindle-shaped cocoon, easily opened at both ends; for fixing with the substratum (bark, leaves, fruit), the larva makes and adding in form of "X". The cocoons may be disposed in groups, forming smaller or greater colonies, or they may be isolated.

RESULTS AND OBSERVATIONS

After the researches made by Dobreanu Ecaterina (1937), Patrascanu Elena (1963, 1968), Sandru I.(1985), Costescu C.(1986), Draghia I.(1986), Susea Sonica (1987), Serboiu Albertina (1988), Drosu Sonica (1993, 1996), Popa P.(2000), the circular ore can have 2-4 generations a year, more likely 3 generations and hibernates in the level of pupa in a cocoon in the fallen leaves, on the bark of the bulky branches or at the joining of 2 branches, or even in the soil under the soil clods.

In the conditions of Husi city-Vaslui, in 2004 the first adults appeared during the 16.IV-8.V period, at Σ $(t_n\text{-}t_0)$= 87,9°C. After their appearance, the butterflies start their activity especially during the day, being daytime; the flight is generally of 5-7 days, for the males and of 15-18 days for females.

After pairing, females deposit the eggs, isolated, on the inferior part of the leaves, adhering very well to the leaf epidermis, so that, after the hatching of eggs, the chorion of the egg remains during the entire period of the leaf evolution. On a leaf, there are deposited on an average, 50 eggs.

The hatching of the larva begins after 10-14 days, between 19.V-14.VI, for 25 days, at Σ $(t_n\text{-}t_0)$= 223,7°C, then they enter right into the foliar texture, at the contact point between the egg and the leaf cuticule. While the larva goes on to the leaf mesophyllum, in the egg there are deposited the faeces, which offer the abandoned egg a dark colour, fact which hides the moment of this phase development. Further on, the larva develops between the 2 epidermis, feeding itself with the texture between them. The larva evolution lasts on an average, 16 days, this being influenced by the weather conditions.

At its complete growth, larva abandons galleries going down with the help of a silky thread. The wind, or the air currents, offer them a swinging movement, helping them to fix. This way, depending on the support they run into, the larva fixes on the leaf, the fruit (especially in the pedunculate or calyx cavity), at the crossroad of the branches, under the trunk or the bulky branches bark(especially where there are wounds), on the weeds or the soil, when they developed into the leaves from the inferior branches of the trees and they did not find anything else when falling. Once the larva gets on the support, it fixes its place for good, hidden from the direct action of the sun, starts to create the cocoon, operation which lasts 1-2 days. In the cocoon, the larva transforms into pupa, level which needs 10-15 days for its growth.

In the ecological conditions from Husi city-Vaslui, *Leucoptera Scitella Zel* has 3 generations:G_1-April-June; G_2-June-August; G_3-August-September. Also, Sandru I (1983-1984) in Lovrin station, shows that this species may have 3-4 generations which come in turn from April to September.

The information obtained regarding the biological reserve of this species in the autumn of 2004-2005 from the apple plantations in the various cities from Husi-Vaslui area are shown in table 1.

Table 1

The biological reserve of the species *Leucoptera scitella Zell*. 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	22,6	19,8	28,2	34,2	26,5	25,1	27,30	26,36
Stanilesti	19,4	14,3	23,1	29,1	21,4	20,0	21,30	21,13
Munteni	17,2	12,1	21,0	27,0	19,2	18,0	15,13	22,03

This way, the biological reserve in Husi city was of 27,3% in 2004 and of 26,36% in 2005, and in Stanilesti and Munteni, for 2004, the registered biological reserve was of 21,30% and 21,13% respectively, and for 2005 this was of 15,13% and 22,03%

After the researches, they established that for 2004, the greatest biological reserve was in Husi (27,30%), followed by Stanilesti (21,30%) and Munteni (15,13%). In 2005, the greatest biological reserve was in Husi (26,36%), followed by Munteni (22,03%) and Stanilesti (21,33%). All these values are registered close to the economical pest limit (PED), which is of 50 ores/100 leaves.

As for the attack frequence (F%) observed in the same cities from Husi-Vaslui research area, in 2004-2005, this was as it follows (table 2).

Table 2

The frequence of the attack (F%) of the species *Leucoptera scitella Zell*. in different cities from Husi-Vaslui research area, in 2004-2005

City	Biological reserve						Mean %	
	G_1		G_2		G_3			
	2004	2005	2004	2005	2004	2005	2004	2005
Husi	12,5	17,4	14,0	15,6	13,2	16,2	13,23	16,40
Stanilesti	10,0	15,2	12,0	13,2	11,1	14,1	11,03	14,16
Munteni	8,60	13,1	10,0	11,3	9,20	12,0	9,26	12,13

The frequence of the attack of *Leucoptera scitella Zell*. in Husi city was of 15,04% in 2004 and of 17,72% in 2005, and in Stanilesti in 2004 it was of

11,03% and of 14,16%. Also, in Munteni, the attack frequence was of 9,26% and of 12,13% in 2005.

The difference of the attack frequence in the 3 cities where the researches were made, explains itself especially by the ecological conditions, which are, in a way, different (temperature, moisture, precipitations), which have a very important role in the evolution of this species, which, in some propitious conditions, may exceed the economical pest level PED.

As for the attack way, we see that it is specific for the leaves to be blighted by the larva, forming circular galleries (ores), with the diameter increasing as the larva grows, reaching to 6-7mm diameter. If many galleries are developed, these may combine covering a great part of the leaf. In a gallery there is only one larva that can grow, but there are exceptions when there can grow up to 6 larva in a gallery. At strong infestations, we may find more galleries (up to 20), where there are up to 100 larva. The ores on the leaf are greenish at the beginning, but then they become brown and they can be seen in the tree coronet, starting from the base, progressing to the top.

The integrated control of *Leucoptera scitella Zell*. Is done by agrophytotechnical, biological (parasites) measures, traps with specific ferromones, lighting and alimentary traps and by chemical measures.

- Agrophytotechnical measures: applied by collecting and burning the leaves which shelter the pupa in the cocoons during winter, followed by the autumn or spring ploughing, so to bury the leaves with pupa under the furrow. Also, measures of cultural hygiene, by scraping the trunks and the bulky branches of flacking bark where the pupa is found.
- Creating propitious conditions so to attract parasites from Hymenoptera order (Braconidae and Eriophidae), by seeding aromatic and medical plants in the orchard, plants which attract these species
- Knowing the economic pest level (PED) of this species of 30 mineson 100 leaves, we apply chemical measures. Our experiments were done with the products: Vantex 60CS(0,01%), Laser 240SC (0,04%), Calypso 480SC (0,02%), Milbeknock EC (0,05%), Pieta (0,02%) and traps with ferromones ATRASCIT type (18 traps/ha)-table 3.

The best efficiency of the chemical products used for the control of *Leucoptera scitella Zell*. were registered at the product Calypso 480SC (0,02%), leading to a production of 26,2 tones/hectare, followed by Pieta (0,02%) with a production of 25,7 tones/hectare and Vantex 60CS (0,04%), whose efficiency led to a production of 25,4 tones/hectare. Good results were also obtained with the products Laser 240SC (0,04%) and Milbeknock EC (0,05%), leading to a production of 25,3 tones/hectare but also with the ATRASCIT type traps, realizing a production of 25,8 tones/hectare, and the production benefits were between 3,3-4 tones/hectare, as opposed to their witness, where the production was of 22,3 tones/hectare.

Table 3

The efficiency of some chemical products in the control of the species *Leucoptera scitella Zell*. in 2004-2005 in Husi-Vaslui area

Product	Substance	Concen Tration (%)	Frequence %			Production t/ha
			G_1	G_2	G_3	
Vantex 60CS	Cihaltrin range	0,01	10,4	15,7	14,2	25,4
Laser 240 SC	Spinosad	0,04	9,8	14,2	13,1	25,3
Calypso 480SC	Tiacloprid	0,02	8,2	12,6	11,4	26,2
Milbeknock EC	Milbenectin	0,05	10,6	16,4	14,8	25,3
Pieta	Acetamiprid	0,02	9,4	13,3	12,7	25,7
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. In the ecological conditions from Husi-Vaslui area, *Leucoptera Scitella Zel*. has 3 generations: G_1- June-August; G_2-June-August; G_3-August-September, and hibernates in the level of pupa under the flacked bark of the trees, in the fallen leaves or in the soil.

2. The biological reserve for 2004 was between 19,13% in Munteni and 27,30 in Husi and in 2005, in Stanilesti it was of 21,13% and of 26,36% in Husi.All these values are registered close to the economical pest level which, at this species, is of 50 ores/100 leaves.

3. As for the attack frequence, in 2004, the greatest was in Husi (13,23%) and of 16,40% in 2005. In Munteni, for 2004, the attack frequence was of 9,62% and of 12,13% in 2005. The attack frequence is represented by the ecological conditions (temperature, moisture, precipitations) which also have a very important role in the evolution of this insect.

4. All the control, agrophytotechnical, biological measures (traps with ferromones ATRASCIT type, lighting and alimentary traps) as well as the chemical measures applied led to good results, realizing production benefits of 3,3-4,0 tones/hectare.

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