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METHOD OF ANALYSIS FOR POPULATION LIMITATION OF THE LEPIDOPTERA PEST IN FRUITERS (LEPIDOPTERA: TORTRICIDAE) IN SIBIEL VILLAGE, SIBIU CITY IN CONDITIONS OF YEAR 2013

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Abstract

In the present work is described an experiment in Sibiel, made in an apple orchard of 1,50 ha surface, which was kept under observation in order to combat the Cydia pomonella L. pest. It was used a pheromone trap as a combat method, for the application of the plant treatments in time.

***Key words*:** *Cydia pomonella L, ecosystem, factors, Lepidoptera*

INTRODUCTION

The codling moth (*Cydia pomonella*) is a member of the *Lepidopteran* family *Tortricidae*. They are known as an agricultural pest, their larva being the common apple worm or maggot. It is native to Europe and was introduced to North America, where it has become one of the regular pests of apple orchards. It is found almost worldwide. It also attacks pears, walnuts, and other tree fruits [8,9,10,11].

In our country *Cydia pomonella* L. „the apple worm" is one of the most important pest of the apple tree, which can be found in every fruit-growing area where this fruit-growing species are cropped[13].

In the soil and climate conditions that we can encounter in Sibiu, pest *Cydia pomonella* L. has two generations per year, generations against which is absolutely necessary to apply plant treatments at the right moment, with chemical substances that are approved, or biological treatments (using pheromone traps, natural predators, vegetal biological concoction, biological products based on *Bacillus thuringiensis*, light traps, belt traps). In order to achieve economic control of the „apple worm" it is very important forecast the mass appearance of the adult pest.

In order to warn about the plant treatment against pest *Cydia pomonella* L. in the present experience, it was used the complex method of warning, in which were gathered the data about insects` biology, the flight dinamics (after catches on pheromone traps), the climate conditions that are specific to the area which was studied, phenological phases of the soils, the existing biological protection [4,5,6].

As a control method for this specific pest we used sexual pheromone traps beacause these traps can be used as a means of biological control as well as a means of establishing the right moment of the butterflies appeareance in spring and also to monitor the biological evolution of the pest in natural conditions, in order to apply the plant treatments at the right moment. In Romania, the sexual feromon atraPOM is synthesized by the "Raluca Ripan" Institute of Chemistry in Cluj-Napoca, from where it was purchased by the Phytosanitary Direction of Sibiu.

MATERIALS AND METHODS

This larva (Figure 1) is the infamous "worm in the apple" of cartoon and vernacular fame; it is not related to the earthworm.

The codling moth is greyish with light grey and copper stripes on its wings, and has an average wingspan of 17 mm. The females lay

eggs on fruit or leaves and the black-headed yellow larvae attack the fruit immediately upon hatching. Each larva burrows into the fruit, eats for around three weeks, then leaves the fruit to overwinter and pupate elsewhere. Most nourishment is obtained by feeding on the proteinaceous seeds [13].

Fig. 1. Larva *Cydia pomonella* L. (original)

The experience has been installed in a private orchard in Sibiel village, which is in Sibiu county, more specifically in a apple orchard of 1.50 ha, in which was monitored the evolution of ther biological stages of the *Cydia pomonella* L. pest. For this surface it was necessary to lay out just one trap with pheromones. To be mentioned the fact that in this orchard were not applied any other chemical treatments for any other apple tree crops pest before. Codling moth infestations are often managed with pesticides. Successful synthesis of codlemone, the codling moth female sex pheromone blend, has led to behavior-based monitoring and management. Pheromone traps are used to capture male moths for monitoring and setting which is the time of first flight for codling moth[3].

Biofix is used with weather data to run degree day models which predict with excellent accuracy the phenology of the population in the field, thereby allowing growers to time their management actions to target codling moth when they are most susceptible[17]. A kairo one, which is a feeding attractant, can be used to capture males and females. Mating disruption can be used to effectively manage codling moth populations in many cases. Mating disruption involves the use of a pheromone-impregnated release device, typically made of plastic or rubber. Dispensers are distributed throughout the orchard and emit female pheromone at a high, relatively constant rate[1]. The mechanism by which mating disruption affects males is poorly understood; it may increase the time required for males to find females, thus reducing fecundity, or it may simply mask the position of females (Figure 2) to searching males, reducing mating substantially. The codling moth is not a great candidate for biological pest control, as the larvae are well protected within the fruit for the majority of development [14]. However, their eggs are susceptible to biological control by *Trichogramma* wasps. The wasps deposit their eggs into codling moth eggs, and the developing wasp larvae consume the moth embryo inside[2]. Another method for control and sampling, trunk banding, consists of wrapping a corrugated cardboard strip around the tree trunk. Larvae making their way down the tree to pupate after exiting the infested fruits will use bands as pupation sites. Bands may then be removed and burned[15].

Fig. 2. Females *Cydia pomonella* L. (original)

The trap was laid out in the shape of a apple tree head at a height of 1.6 meters above the ground, at the beginning of the third decade of April 2013, before the appearance of *Cydia pomonella* L.

In general, in order to give a correct warning of the plant treatments there should be used 3 or 4 pheromone traps per ha, laid out at about 50 meters between them

THE TRAP- for the pheromone– (Fig. 3) consists of two plastic elements which fold out and symmetrically assemble by dint of a reinforcing steel or even plastic. Thus folded like this the two valvae have the knob toward the exterior, providing a , a relatively closed

space, the distance between them is about 3-4 cm. The inner surface of the vulva is provided with a special adhesive film, non-drying, odorless, and off color.

The Sexual Attractant CAPSULE is a impregnated cork. The sexual attractant capsule is placed on the inner bottom of the trap with the building pit upward.

On this pheromone capsule are attracted the Lepidoptera males because the sexual attractant is the pheromone that the females discharge in the period when she is sexually.

In the period of time in which were made observations there were taken into account the following:

There were used clean tweezers (sterile) for placing the capsule in the trap and for eliminating the captured males.

The placing of the capsule with pheromone on the trap (plastic material or adhesive) was made directly on the crop in the moment of attaching it to the tree [7].

Fig. 3. The Trap for the pheromone (original)

The replacement of the capsule with pheromone and the lower bottom was made in 6 weeks from the settlement. There were eliminated from the crop the capsules and the effetes bottoms.

The pheromone capsules were kept in the refrigerator before they were laid out.

Catch record – was made tree times a week (Monday, Wednesday, Friday). The butterflies were eliminated from the glue at every observation in order not to influence the following observations. If there were recorded more captures, and the botom with glue was dirty this was replaced with another one.

RESULTS AND DISCUSSIONS

Data interpretation– the warning of the first treatment was given depending on the maximum flight of the monitored generation, meaning between 3 and 4 days in reference to the flight curve, and also to the climate conditions (Table 1).

The plant treatment will be made undelayed in the following 2-3 days in the biologic phase of the pest. In this period of time will be combated the adults as well as the eggs that have been deposited, and the following treatment will be done 10 days later, after the first one is finished, against that specific generation (G-I or G-II). At the second treatment for the next generation are controlled the adults as well as the deposited eggs in this period of time that are in a phased called "the red ring".

In the big orchards, where the plant treatments are done "at warning", the treatments against this pest are segregately done on lots, depending on the existing biological save, meaning for captures on an average/ trap/ week.

At 2-3 captures on a average/ trap./ week corresponds a risk attack(frequence attacked fruits) of de 2%.

"Warning Bulletin" for the first generation was given on 20th of May 2013, with the optimum period to make the chemical treatment is 22nd-26th of May 2013. Recommended substances were: Sinoratox 35CE 0,1%, Carbetox 37 CE 0,4%, Calypso 480SC 0,02%, Cipertrin 10EC 0,015%.

Table 1.The climatic data in Sibiu

Mont	Atmospherical Temperature ^{0}C				Atmospherical Humidity %		Atmospherical Condensation L/MP
	Max	Min.	Med. 2012	Med. last 10 years	Med 2013	Med. last 1o years	
April	25.1	-1.6	10.9	10.0	68	70	78.4
Mai	27.1	3.5	14.0	15.3	76	69	56.8
June	30.2	8.6	18.1	18.4	78	75	64.8
July	33.7	7.8	20.0	19.8	81	77	188.4

CONCLUSIONS

For the second generation of the pest the "Warning Bulletin" gave in 13th of June 2013, the optimum period for making the chemical treatment starting with 15th-19th of June 2013.

Recommended substances: Karate Zeon 0,015% and Actellic 50EC 0,05%.

To be mentioned that for both generations of the pest was recommended to repeat the plant treatment at 8-10 days after the first one is finished.

Centralizing data on the registered captures at the pheromone trap in order to apply the plant treatment against the *Cydia pomonella L* pest.

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