EFICACITATEA BIOLOGICĂ A UNOR PRODUSE NOI, ÎN COMBATEREA MOLIEI PIELIȚEI FRUCTELOR (*ADOXOPHYES RETICULANA Hb*.) ÎN CONDIȚIILE BAZINULUI POMICOL VOINEŞTI

THE BIOLOGICAL EFFICIENCY OF SOME NEW PRODUCTS, IN THE COMBAT OF THE FRUIT SKIN MOTH (*ADOXOPHYES RETICULANA Hb*.) UNDER THE CONDITIONS OF THE VOINEŞTI TREE GROWING ZONE

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Abstract

***Adoxophyes reticulana* Hb., the summer fruit skin moth, has adapted recently to the intensive apple tree cultures of the Voineşti zone. The grub developed in the first phase on the young leaves, then attacked with priority the skin of the fruits. The most attacked cultivar is: Prima, Ionathan, Golden Delicious and Red Delicious. The damages are greater in the young orchards than in the aged ones. They present two generations per year during April – September period. The most important and damaging is the second generation. The use of pheromone traps contributes to establishing the optimal periods for the treatment with chemical products. The best results showed the product AFFIRM SG 095 conc. 0.26% + MINERAL OIL conc. 0.2%, studied in the period of the years 2009 – 2010 at the R.S.F.G. Voinesti, as compared with the "untreated witness" variant. The used product presents a high importance for obtaining an efficient production.**

Key words: fruit skin moth, biology, pheromone traps, attack, damages, combat.
Cuvinte cheie: molia pieliței fructelor, biologie, capcane cu feromoni, atac, daune, luptă.

1. Introduction

In the majority of the apple tree orchards of the Voineşti fruit growing zone, an alarming frequency increase of he fruit skin moth *Adoxophyes reticulana Hb*. attack was registered in the last years.

The principal reasons which generated this situation were the lack of winter treatments and the accumulation of an important biological reserve.

We must also mention the favourable evolution of the climatic conditions, which contributed to the attack spread on the majority of the apple tree cultivars.

Thus, in the period 2009 - 2010 in some apple tree plantations the attack frequency on the fruits before harvesting surpassed the value of 50%, the most attacked cultivars being: Prima, Jonathan, Golden Delicious, Red Delicious and others.

The researches were organized at the R.S.F.G. Voinesti in experimental and production orchards during the period 2009 – 2010 periods.

2. Material and methods

The experience was organized on a lot of the farm Nr.1 of the R.S.F.G. Voinesti, on the Jonathan breed.

The biology of the skin epidemic was followed up by repeated observations performed in the orchard and also with the help of ATRARET pheromone traps, placed in trees with attack - and was observed two times a week, both in the experimental orchards by treatments applied at warning, using different new products for the control of the insect and by periodical observations after treatment – and in private orchards.

The trees are grafted on the rootstock MM 106. The crown is free palmate, with planting distances of 4 x 3.5 m, the intervals between the trees being maintained with grass – and herbicides were used on the rows in order to control the weeds. The trees age was: 18 years. The tree number in a variant was 5 (a tree = a replication). The number of applied treatments was 4 (2 treatments / each generation).

The used treatment equipment: atomizer Sthil - 400.

The applied solution quantity: 1,500 l / Ha (5 l solution / tree).

The efficiency observations were performed at 6 – 7 days after each treatment, both on the young leaves, the yearly offshoots – and on the fruits in different development stages.

3. Results and discussions

The fruit skin moth (*Adoxophyes reticulana* Hb. sin, *Adoxophyes orana* Fish. non Rose.) belongs to the Lepidoptera order Tortricidae family. .

The pest's biology was studied by periodical visual observations performed in the orchard and also with the help of pheromone attractants.

The insect develops two generations per year during April – September. It hibernates as an incompletely developed grub (stage L_3), in a silky cocoon, in the trees crown, on the trunk or at the soil surface.

Early in the spring the grubs activate themselves, nourishing themselves in the interior of the fruit buds. In the "pink button" pheno-phase the first hibernating grubs were observed in the orchard. Arriving in the last grub phase (L_5), follows their cocooning in a silky cocoon – and the first butterflies appear at the end of May - the beginning of June. Under the conditions at the R.S.F.G. – VOINEŞTI, the flight start of the first generation was registered on the 25th of May 2009 and on the 1st of June 2010. (Table Nr.1)

The duration of each generation varies between 30 - 40 days, being much influenced by the temperature evolution (the biological threshold of the pest: 10^0 C). The eggs are deposed on the leaves, more rarely on the young fruits and the second generation appears in the first decade of August - and is more numerous and more damaging.

The use of pheromone attractors completed the method of visual observations, performed in the attacked orchards. Traps with the specific pheromone ATRARET were used, with a norm of 3 traps / Hectare, with two weekly readings. The pheromones were changed at each 45 days during the whole vegetation period. The observation period in the orchard: 15th of May – 31st of August. The reading of the captured male butterflies lead to the establishing of the following parameters of the insect's biology and of the treatments warning: 1) the presence of the pest species and the estimation of the population density; 2) the flying start and end of each generation; 3) the beginning of the eggs laying; 4) the optimal moments for the treatment applying. The first flying maximum coincides with the disclosing of the first grubs - the optimal moment for applying the first combat treatment of each generation. In the highly attacked plantations also a second treatment must be applied at an interval of 8 -12 days.

Attack mode and produced damages:

Adoxophyes reticulana Hb. attacks the vegetative floral buds, the young leaves, the tips of the yearly offshoots and finally the fruits in the last growing and maturation phases. .

Rolling the young leaves from the tips of the yearly offshoots, the skin moth seriously disturbs the vegetative growths, the wood maturation and the fruit bud differentiation for the next year. Starting with June – July, the attack on the offshoots tips and also on the fruits becomes evident and extremely serious. The high density of the pest's population, the duration and the outspreading of each biological stage and also the interleaving of the biological stages make the control much more difficult. The whole activity performed by this Lepidoptera spreads out on a period of about 150 - 170 days (April – September).

Measures and means of attack limitations:

The battle against the attack of the *Adoxophyes reticulana* Hb is difficult, due to several particularities, like:

a) the species is double-flying (with two generations / year);

b) its multiplication potential is very high;

c) the grubs of the summer generation, very well harboured in the leaves, roll off the yearly offshoots tips and are protected to a great extent against the action of the applied products.

According to the data furnished by the pheromone traps, the most important are the treatments during June. The tables 2, 3 present the results obtained at the R.S.F.G. Voinesti in the period of the years 2009 – 2010 in the experienced variants, treated with the product AFFIRM SG 095 + MINERAL OIL, as compared with INSEGAR 25WG (STD) - and the attack evolution at the "untreated witness".

After applying the treatments at warning (each 2 generations), the observations performed on the leaves, the fruits and on the yearly offshoots pointed out the following: at the first generation for the year 2009 – 3.5% leaves and 2.0% fruits with attack were registered at the treated trees – and for the year 2010 – 2.5% leaves and 3.0% fruits with attack, as compared with the untreated witness, where the attack was of 12.5% on the leaves and 7.3% on the fruits for the year 2009, respectively 16.5% attack on the leaves and 9.5% on the fruits for the year 2010.

After applying the treatments for the second generation at about a month before the harvesting moment, in these variants 2.5% attack on the leaves and 1.3% on the fruits for the year 2009 were noted, respectively 3.0% attack on the leaves and 2.0% attack on the fruits for the year 2010 – as compared with the untreated witness variant, where the attack for the year 2009 was of 15.5% on the leaves and 10% on the fruits, respectively 17.5% on the leaves and 11.0% on the fruits for the year 2010.

4. Conclusions

The fruit skin moth (*Adoxophies reticulana* Hb.) represents for the apple tree plantations of the Voineşti, Valea Dâmboviței tree growing zone, one of the pest species with a major incidence on the fruits quality and on their market value.

The apple tree cultivars with a maximum attack were: Prima, Jonathan, Golden delicious; the group Red Delicious.

The second generation is the most numerous and the most damaging.

The use of pheromone traps contributes to the establishment of the optimal treatment periods with chemical products.

For the strongly attacked apple tree orchards, the control strategy must comprise 1 winter or very early spring treatment (at un-budding), followed by a pre-floral treatment (at pink button), for the control of the hibernating grubs - and 3 - 4 treatments performed at warning during summertime.

The product AFFIRM SG 095 + MINERAL OIL, studied at the R.S.F.G. Voineşti during the period of the 2009 – 2010, remarked itself by a very good efficiency in limiting the attack, presenting a mortality comprised between 91 - 93% on the leaves and of 94 - 98% on the fruits, as compared with the "untreated witness" variant, where the mortality on the leaves was comprised between 65 - 69% - and of 85 – 88% on the fruits.

In order to avoid the resistance phenomenon at the products action and for a high protection of the useful insect species, an alternation / balancing of the piretroid and carbonate insecticides is recommended.

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Tables and figures.

Table 1. The capture situation of the *Adoxophies reticulana* Hb. By using of the pheromone ATRARET

2009-2010

Year/ generation		Month / Cap Nr../ decade	JUNE			JULY			AUGUST			Total captures / year
			1	2	3	1	2	3	1	2	3	
2009	I.	25.V - 08.VII	36	49	71	8	0	-	-	-	-	
	II	05.VIII – 31.VIII	-	-	-	-	-	-	20	59	35	278
2010	I.	01.VI – 10.VII	18	37	68	41	19	5	-	-	-	
	II	02.VIII – 31.VIII	-	-	-	-	-	-	28	71	40	327

Table 2. The biological efficiency a of some new products in the control of the species *Adoxophyes reticulana* at the apple tree

2009

Variant (product)	Conc. %	First Generation						Second Generation					
		LEAVES			FRUITS			LEAVES			FRUITS		
		Total Obs.	of which attacked		Total Obs.	of which attacked		Total Obs.	of which. attacked		Total Obs.	of which attacked	
			Nr.	%		Nr.	%		Nr.	%		Nr.	%
AFFIRM SG 095 + MINERAL OIL	0.26 0.25	200	7	3.5	150	3	2.0	200	5	2.5	150	2	1.3
INSEGAR 25 WG (STD)	0.03	200	11	5.5	150	5	3.3	200	8	4.0	150	4	2.6
Untreated witness.	-	200	25	12.5	150	11	7.3	200	31	15.5	150	15	10.0

Table 3. The biological efficiency of some new products in the in control of the species Adoxophyes reticulana at the apple tree

2010

Variant (product)	Conc %	First Generation						Second Generation					
		LEAVES			FRUITS			LEAVES			FRUITS		
		Total Obs.	Of which attacked		Total Obs.	Of which attacked		Total Obs.	Of which attacked		Total Obs.	Of which attacked	
			Nr	%		Nr	%		Nr	%		Nr	%
AFFIRM SG 095 + MINERAL OIL	0.2 0.25	200	9	4.5	200	6	3.0	200	6	3.0	200	4	2.0
INSEGAR 25 WG (STD)	0.03	200	12	6.0	200	8	4.0	200	10	5.0	200	8	4.0
AFFIRM SG 095 + MINERAL OIL	0.26 0.25	200	5	2.5	200	5	2.5	200	4	2.0	200	3	1.5
Untreated witness	-	200	33	16.5	200	19	9.5	200	35	17.5	200	22	11.0