

NOVE MOŽNOSTI ZATIRANJA NAVADNE HRUŠEVE BOLŠICE (*Cacopsylla pyri* L., Homoptera Psyllidae) V OBDOBJU ZAČETKA RASTI

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²Crompton crop protection

IZVLEČEK

Gojenje hrušk v sodobnih plantažah je povzročilo značilne spremembe v tehnologiji pridelovanja in omogočilo razmah škodljivcev, ki v preteklosti niso bili tako pomembni in ki lahko značilno vplivajo na kakovost pridelka. Eden od škodljivcev, ki so v sodobnih pridelovalnih razmerah pridobili na pomenu je navadna hruševa bolšica (*Cacopsylla pyri* L., Homoptera, Psyllidae). Osnovna škoda, ki jo ta škodljivec povzroča, nastane zaradi izsesavanja poganjkov, drugotna pa nastane zaradi obilnega izločanja medene rose (izločki in slabo prebavljen rastlinski sok), s katero so obdane ličinke. Medena rosa je ugodno gojišče za glivice sajavosti, ki se razvijajo na njej in skazijo videz plodov, dodatno pa so ti izločki obrambno sredstvo ličink pred negativni vplivi iz okolja, tudi pred delovanjem insekticidov, ki jih uporabimo proti njim. Zatiranje bolšice otežuje majhen izbor močno učinkovitih pripravkov in njena sposobnost hitrega pridobivanja odpornosti proti insekticidom, ki jih pogosto uporabljamo. Cilj raziskave je bil preučiti možnosti zatiranja bolšice v spomladanskem obdobju z uporabo novih dodatkov pripravkom, v primerjavi s standardnimi pripravki. Poskus na lokaciji Ljutovo (severna Srbija) je bil zasnovan v skladu s standardom EPPO (No. 4 / 1982). Pred začetkom škropljenj smo na drevesih označili štirikrat po 10 enoletnih poganjkov (dolžina približno 20 cm) na katerih smo prešteli vse nimfe, ločeno stadije L₁₋₃ in ločeno stadije L₄₋₅. Razmerje med stadiji L₁₋₃ in L₄₋₅ je bilo 84,51% proti 15,49%. Aplikacijo insekticidov smo opravili 7. maja 2003. Oceno učinkovitost pripravkov smo naredili 10. in 17. maja. Pri ocenjevanju smo prešteli žive in mrtve ličinke različnih stadijev. Preučevali smo naslednje pripravke: Dimilin SC-48 (0,024%) + omočilo Silwet L-77 (0,05%), Mitac-20 (0,3%, primerjalni standard) in Dimilin SC-48 (0,024%) + omočilo Belol (0,25%, primerjalni standard). Izračun stopnje učinkovitosti pripravkov smo opravili po metodi Henderson-Tilton in z uporabo analize probit vrednosti. Pri kombinaciji pripravka Dimilin in omočila Silwet smo ugotovili zelo visoko učinkovitost za zatiranje ličink L₁₋₃ že po treh dneh. Pri pripravku Mitac in pri kombinaciji pripravka Dimilin z oljem Belol smo ugotovili značilno manjšo učinkovitost (pod 80%). Vse tri kombinacije so imele v času 10 dni po aplikaciji visoko učinkovitost (95%) tudi proti ličinkam višjih stadijev. Glede na ugotovljeno stopnjo učinkovitosti lahko vse tri pripravke še vedno priporočamo za uporabo, pri tem, da jih je potrebno uporabiti proti najmlajšim stadijem nimf.

Ključne besede: hruška, zatiranje, *Cacopsylla pyri*, insekticidi, diflubenzuron, amitraz

ABSTRACT

RECENT POSSIBILITIES OF CONTROL *Cacopsylla pyri* L. (Homoptera, Psyllidae) AT THE BEGINNING OF VEGETATION

Pear psylla is economically a very important pest because it attacks nursery plants and young stems of the pear causing stagnation in growth and deformation of the shoots. The secondary damages occurred as a consequence of the honeydew production and the appearance of fungi that colors all colonised fruit organs black. The fruit infested by this insect are sensitive to rost damage and their following year's yields are endangered. The trial was set up in the locality

of Ljutovo. The number of the pear psylla was monitored on the top shoots in length of 20 – 25 cm. Before the treatment, the branches were marked with labels and the larvae counted. Specially noted were the larvae L_{1-3} and L_{4-5} . Larvae L_{1-3} were represented by 84,51 %, and larvae L_{4-5} by 15,49 %. The treatment was performed on 7 May 2003. Every individual treatment was replicated four times. The following products were used Dimilin SC 48 + Silwet L – 77 (0.024 + 0.03%), Dimilin SC 48 + Belol (0.024 + 0.25%) and Mitac 20 (0.3%). During the trial no other products were applied. The efficacy evaluations were performed on 10 and 17 May 2003. The tested combination of Dimilin SC 48 + Silwet L – 77 demonstrated very high efficacy three days after treatment for the control of pear psylla larvae L_{1-3} . Ten days after treatment all of the tested products demonstrated very high efficacy (over 95%) for the larvae L_{1-3} and L_{4-5} . Three days after treatment all of the tested products for the larvae L_{1-3} control demonstrated higher efficacy (over 100 %) than the standard products Dimilin SC 48 + Belol (0.024 + 0.25%) and Mitac 20 (0.3 %). Ten days after the testing, all tested products demonstrated same level of efficacy on larvae L_{1-3} and L_{4-5} in comparison to the standard Dimilin SC 48 + Belol (0.024 + 0.25%).

Key words: pear psylla, monitoring pear psylla larvae, efficacy, insecticides, Dimilin SC 48, Mitac 20, Silwet L-77

1. IZVOD

Kruškina buva je ekonomski veoma značajna štetočina jer uzrokuju sušenje pupoljaka, cvetova i mladih plodova izazivajući deformacije i zaostajanje rasta letorasta. Sekundarne štete nastaju kao posledica lučenja medne rose na kojoj se razvijaju gljive čađavice. Voćke napadnute ovom vrstom su sklone izmrzavanju i ugrožen im je rod za narednu godinu. U cilju suzbijanja ove vrste postavljen je ogled u lokalitetu Ljutovo. Brojnost kruškine buve praćena je na vršnim letorastima dužine 20 – 25 cm. Pre tretiranja obeležene su grane i prebrojane larve, posebno L_{1-3} i L_{4-5} . Larve L_{1-3} bile su zastupljene sa 84,51 % a larve L_{4-5} sa 15,49 %. Tretiranje je izvedeno 7. maja 2003 godine, u četiri ponavljanja. Za tretiranje korišćeni su sledeći preparati: Dimilin SC 48 + Silwet L – 77 (0,024 + 0,03 %), Dimilin SC 48 + Belol (0,024 + 0,25) kao standard i Mitac 20 (0,3%). U toku izvođenja ogleda nije bilo primene drugih preparata. Ocene su vršene 10. i 17. maja 2003 godine. Na osnovu efikasnosti ispitivanih preparata u suzbijanju larvi L_{1-3} kruškine buve preparati Dimilin SC 48 + Silwet L – 77 tri dana posle tretiranja ispoljili veoma visoku efikasnost u odnosu na netretiranu kontrolu, a deset dana posle tretiranja svi ispitivani preparati ispoljili su veoma visoku efikasnost preko 95 % u suzbijanju larvi L_{1-3} i L_{4-5} . Ispitivana kombinacija preparata Dimilin SC 48 + Silwet L – 77 (0,024 + 0,03 %) u suzbijanju larvi L_{1-3} kruškine buve, tri dana posle tretiranja ispoljila je veću efikasnost u odnosu na standardne preparate Dimilin SC 48 + Belol (0,024 + 0,25 %) i Mitac 20 (0,3 %). Deset dana posle tretiranja, ispitivana kombinacija preparata ispoljila je isti nivo efikasnosti za larve L_{1-3} i L_{4-5} kao i standardni preparati Dimilin SC 48 + Belol (0.024 + 0.25%).

Ključne reči: kruškina buva, praćenje larvi kruškine buve, efikasnost, insekticidi, Dimilin SC 48, Mitac 20, Silwet L-7

1. INTRODUCTION

PEAR PSYLLA, *Cacopsylla pyri* L. (Homoptera, *Psyllidae*) is the economically most significant pest of the commercial pear orchards. The situation of the market during the II World War caused considerable changes in the structure of the planted fruit and production technology, and that caused the forming of ecologically unstable biotop, so called biocenosis (Stanković, 1984). Such production conditions was in favour to the development of agricultural pests of great influence to yield quality.

From the mid-60's, with the raising of commercial pear orchards (Mišić *et al.*, 1994), economically the most significant pest in our orchards is the pear psylla.

The pear psylla causes the primary damages by feeding itself, and the secondary by producing large quantities of honeydew which hinders harvest and larvae control, increases the expenses of fruit cleansing and lowers the sales, thus presenting a limiting factor in further expansion of pear-raising as an important branch of fruit production. That is why the protection of the pear is considered as an imperative.

The control of pear psylla is very difficult, on one hand because of the small number of efficient insecticides, and on the other because of the possibility that a resistant breed may be formed, with the application of the products containing same active ingredients.

By monitoring the presence of the pear psylla population in the spring period of the vegetation and testing the possibilities of its control, understanding the biology of the pest is facilitated as well as the possibility of better and, from the ecological standpoint, more acceptable form of control.

For the control of pear psylla, Broad Spectrum Chemicals (BSCh) has been used, so called hard insecticides, which, apart from the target pests, destroyed much of the useful entomofauna. The intensive production of pears today, especially in Europe, is based on Integrated Fruit Production (IFP), that is to bringing the chemicals, especially insecticides, down to the minimum (Tanasković, 1996).

In order to solve the basic problems of pear growing and to prevent further clearing of pear orchards there was an international colloquium held in Toulouse, 27 – 29 September 1983, it was focused on the problems of the pear psylla control. Recommended measures of control were: to avoid agrotechnical measures which influence the thickness of the pear; to avoid the thickest breeds when raising orchards because they are the most frequent sources of the spreading of the pear psylla; in the protection of pear the chemical measures serve only as correction within the limits of integral production, using only carefully selected pesticides (Tanasković, 1996).

The research comprises: monitoring the presence of pear psylla larvae before and after the treatment with insecticides.

The goal of the paper was to establish the most suitable moment for control and the efficacy of the applied products for the spring testing, in comparison to the untreated control as well as with the registered standard combination.

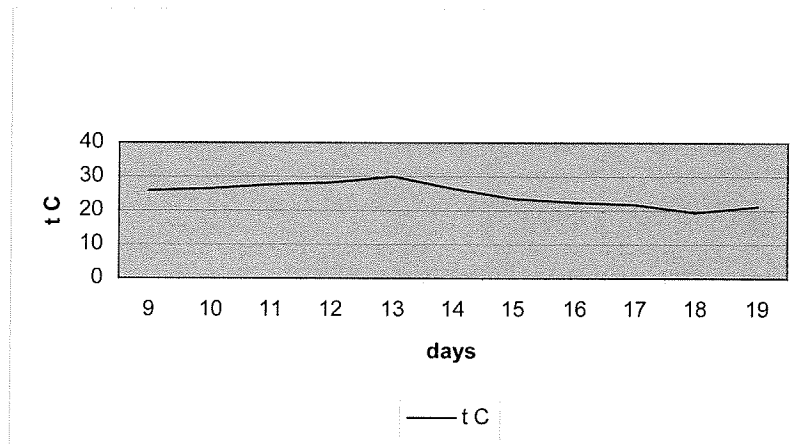
2. MATERIAL AND METHODS

The trial was set up in the locality of Ljutovo (northern Serbia), according to European and Mediterranean Plant Protection Organization EPPO No. 44 (1982), in order to evaluate efficacy of the insecticides for control of the pear psylla.

The orchard in Ljutovo is raised on an umber steppe with the sand beneath. It is about 20 years old. The total area of the plot is 10 hectares. The size of the base plot was 4 x 10 shoots, with pear psylla attack.

2.1. Meteorological data

The temperatures for the trial period are on Graph 1. During the trial there was no precipitation.



Graph 1. Temperature conditions during the trial

2.2. Monitoring the number of pear psylla

The number of the pear psylla was monitored on the top shoots in length of 20 – 25 cm. Before the treatment, the branches were marked with labels and the larvae counted. Specially noted were the larvae L_{1-3} and L_{4-5} . The treatment was performed on 7 May 2003. Every individual treatment was replicated four times. At the time of the treatment the pear was in phase 69 to 70 according to BBSH scale (Mitić, 2002). Larvae L_{1-3} were represented by 84,51 %, and larvae L_{4-5} by 15,49 %.

The efficacy evaluations were performed on 10 and 17 May 2003. Previously collected material was observed in a laboratory when the number of the living pear psylla larvae (L_{1-3} and L_{4-5}) was noted.

Efficacy was calculated according to the Henderson – Tilton formula (Wetzel 1948).

The efficacy difference of the applied insecticides is expressed in comparison to untreated control and standard products (Mitic-20 and Dimilin SC 48+Belol). The absolute values, middle values and standard deviation are set according to Hadživuković (1973). The importance of the differences in efficacy is determined by the analysis of the variance (ANOVA).

2.3. Insecticide application in spring

A knapsack atomizer “Stihl” was used for the treatment of the pear psylla larvae. The necessary amount of water per a measure unit of the area was 1000 l/ha. During the treatment, the day was sunny (average temperature was 24° C) and without wind.

The following products were used for treatment: Dimilin SC 48 + Silwet L – 77 – concentration 0.024 + 0.03%, Dimilin SC 48 + Belol – concentration: 0.024 + 0.25% and Mitac 20 – concentration 0.3%. During the trial no other products were applied.

Belol is an insecticide and an acaricide with ovicidal performance. Mitac-20 is a non systemic insecticide with contact performance. Dimilin SC-48 is a non systemic insecticide which influences larvae development (IGR) and less through contact. (Mitić and Petrić, 2003, Mitić 2002). The characteristics of the applied preparations are in Table 1.

Table 1. Characteristics of the applied preparations

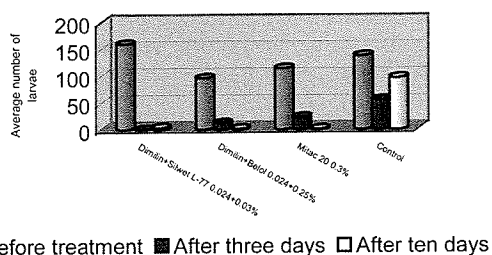
Preparation	Active substance (g/l)	Manufacturer	Concentration (%)	Formulation
Belol	mineral oil (800)	Vetzavod	0,25	EC
Mitac - 20	amitraz (200)	Bayer	0,3	EC
Dimilin SC - 48	diflubenzuron (480)	Crompton	0,024	SC
Silwet L - 77	polialkalenoxid	Crompton	0,03	-

3. RESULTS AND DISCUSSION

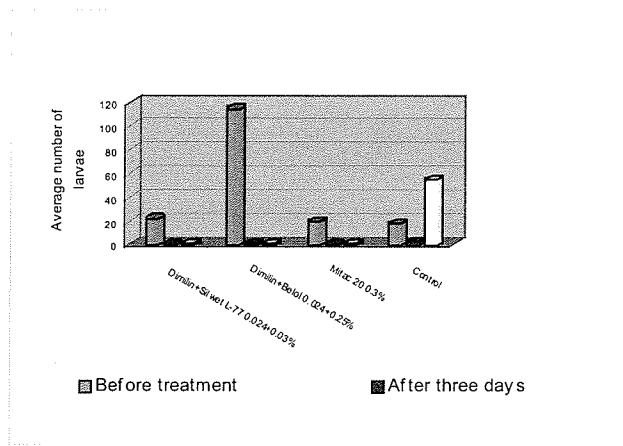
3.1. Number of pear psylla larvae during the experiment

The number of the pear psylla larvae (L_{1-3} and L_{4-5}) at the time of the trial in the locality of Ljutovo is shown on graphs 2. and 3.

From the Graphs 2 and 3 one can deduce that products caused the considerable reduction number of larvae (L_{1-3} and L_{4-5}). This alternation in the number of larvae is especially perceptible after the first evaluation.



Graph 2. The number of living pear psylla larvae L_{1-3} (Ljutovo, 2003)



Graph 3. The number of living pear psylla larvae L₄₋₅ (Ljutovo, 2003)

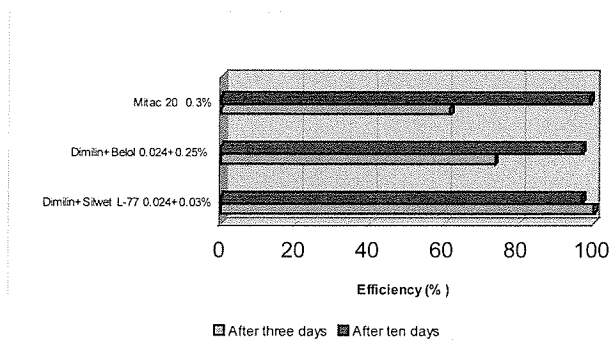
3.2. Efficacy of products used against the pear psylla in comparison with untreated control

The results of the efficacy of the products for the pear psylla in comparison with untreated control are shown on Graphs 4 and 5.

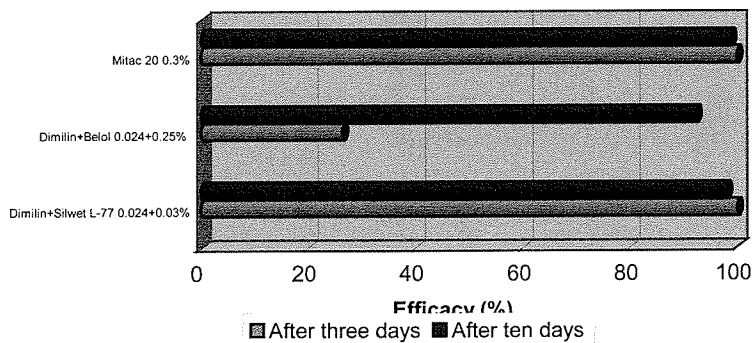
Based on the efficacy of the tested products for the pear psylla larvae L₁₋₃ control, on the third and tenth day after treatment, we see that products Dimilin SC 48 + Silwet L – 77 demonstrated very high efficacy three days after treatment. Three days after treatment of larvae L₁₋₃ Dimilin SC 48 + Belol and Mitac 20 was demonstrated lower efficacy than 80%.

Obtained results of the testing the products efficacy for larvae L₄₋₅ show that after three days of treatment, the most efficient ones were Dimilin SC 48 + Silwet L – 77 and Mitac 20. Lower efficacy was demonstrated by combination Dimilin SC 48 + Belol .

Ten days after treatment all of the tested preparations demonstrated very high efficacy (over 95%) for pear psylla larvae L₁₋₃ and L₄₋₅ .



Graph 4. Efficacy of the products for pear psylla larvae L₁₋₃ control after three and ten days (Ljutovo, 2003)



Graph 5. Efficacy of the preparations in pear psylla larvae L_{4-5} after three and ten days (Ljutovo, 2003)

3.3. Efficacy of products used against the pear psylla in comparison with standard products

The results of the efficacy of the products for the pear psylla in comparison with the standard products are shown in Table 2 and 3.

Three days after treatment all of the tested products for pear psylla larvae L_{1-3} control demonstrated higher efficacy (over 100 %) than the standard products Dimilin SC 48 + Belol and Mitac 20.

Three days after treatment all products tested for larvae L_{1-3} control were very efficient, in comparison to the standard products Dimilin SC 48 + Belol.

At the same time products Dimilin SC 48 + Silwet L – 77 are at the same level of efficacy as the standard product Mitac 20.

Ten days after the testing, all tested products demonstrated same level of efficacy on larvae L_{1-3} and L_{4-5} comparison to the standard products Dimilin SC 48 + Belol.

Table 2. Efficacy of the products in comparison to the standard products, first evaluation (Ljutovo, 2003).

Preparation	Conc. (%)	Standard 100			
		A		B	
		L_{1-3}		L_{4-5}	
Dimilin SC 48 + Silwet L-77	0.024+0.3	(99,9) 136.31	(99,9) 163.24	380.08	100
Dimilin SC 48 + Belol	0.024+0.25	(73,4) 100	-	100	-
Mitac 20	0.3	-	(61,3)100	-	100

Table 3. Efficacy of the products in comparison to the standard products, after ten days (Ljutovo, 2003).

Preparation	Conc. (%)	Standard 10			
		A		B	
		L ₁₋₃		L ₄₋₅	
Dimilin SC 48 + Silwet L-77	0.024+0.3	(96,9)100.03	(96,9) 98.15	(97,9) 106.16	(97,9) 99.14
Dimilin SC 48 + Belol	0.024+0.25	(96,8) 100	-	(92,3)100	-
Mitac 20	0.3	-	(98,7)100	-	(98,8) 100

4. CONCLUSIONS

After analyzing the data obtained by testing the efficacy of the products, it could be deduced that the all tested products demonstrated high efficacy for larvae pear psylla comparing to untreated control.

In the first evaluation, is noticed is high efficacy of Dimilin SC 48 + Silwet L – 77, on larvae L₁₋₃.

In the second evaluation the tested products showed a remarkable efficacy for larvae L₁₋₃, which is on a higher and equal level as the standard products are.

In the first and second evaluation results observe that Dimilin SC 48 + Silwet L – 77, was on the same level of efficacy for larvae L₄₋₅ in comparison to standard products.

5. LITERATURE

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