

CONTROL OF SAN JOSÉ SCALE (*QUADRASPIDIOTUS PERNICIOSUS* COMST.) FROM APPLE TREE PLANTATIONS AT THE FRUIT GROWING RESEARCH AND DEVELOPMENT STATION OF IAȘI

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ABSTRACT – Many pests are found in apple tree plantations, causing important damages if chemical treatments are not applied. One of these pests is San José scale (*Quadraspidiotus perniciosus* Comst), which is a key pest of apple tree plantations, found on the list of quarantine pests. Its appearance in apple tree plantations is tightly related to the climatic conditions, especially to temperature. This has a determining role in the pest evolution, which may lead to major damages or even to tree death. During 2005-2007, at the Fruit Growing Research and Development Station of Iași, we carried out investigations on the efficiency of some insecticides for the chemical control of San José scale (*Quadraspidiotus perniciosus* Comst). The trial was conducted at the Sîrca Farm, in an apple tree plantation (*Idared* Variety). We have tested the following products of plant protection, some of them being of the latest generation: Fyfanon 50 EC at a rate of 0.225%, Novadim 40 EC – 0.2% Reldan 40 EC-0.15%, Calypso 480 SC – 0.02%, Ecalux S – 0.1% and Pyrinex 48 EC –

0.02%. The tested insecticides belonged to the group of organophosphoric products and of inhibitors of insect metamorphosis.

Key words: pests, pesticides, efficiency, warning, control

REZUMAT – Combaterea păduchelui țestos din San José (*Quadraspidiotus Perniciosus* Comst.) în plantațiile de măr de la SCDP Iași. În plantațiile de măr se întâlnesc numeroși dăunători, care produc pagube importante, dacă nu se aplică tratamente chimice. Unul dintre aceștia este păduchele țestos din San José, *Quadraspidiotus perniciosus* Comst, care este un dăunător cheie al plantațiilor de pomi, menținut pe lista dăunătorilor de carantină. Apariția sa în plantațiile de măr este strâns legată de condițiile climatice, în special de temperatură. Această are un rol determinant în evoluția dăunătorului, fapt ce poate conduce la pagube majore sau chiar la pieirea pomilor. În perioada 2005-2007, la SCDP Iași, s-au efectuat cercetări privind eficacitatea unor insecticide în combaterea

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chimică a păduchelui țestos din San José (*Quadraspidiotus perniciosus* Comst). Experiența s-a organizat în ferma Sîrca, într-o plantație de măr, soiul Idared. Au fost experimentate următoarele produse de protecția plantelor, dintre care o parte de ultimă generație: Fyfanon 50 EC, în concentrație de 0,225%, Novadim 40 EC – 0,2%, Reldan 40 EC-0,15%, Calypso 480 SC – 0,02%, Ecalux S – 0,1% și Pyrinex 48 EC – 0,2%. Insecticidele testate fac parte din grupa produselor organofosforice și a inhibitorilor metamorfozei insectelor.

Cuvinte cheie: dăunători, pesticide, eficacitate, avertizare, combatere

INTRODUCTION

San José scale is spread worldwide, being one of the most important pests in fruit tree plantations from Romania (Georgescu, 2004; Georgescu, 2006). The damages caused by this pest are shown by fruit quality loss, tree weakness and vulnerability, resulting in tree premature death (Simeria and Nicorici, 1999; Simeria, 2001).

San José scale is controlled biologically and chemically. From the investigations carried out on the biological control of San José scale (*Quadraspidiotus perniciosus* Comst.), by means of *Chilocorus bipustulatus* L. and *Prosopaltella perniciosi* Tow. species, we drew the conclusion that the biological treatments could be introduced in schemes of integrated control and the chemical method is and will be the most efficient control means against

this pest (Șuta et al.1974; Minoiu and Lefter, 1987).

The goal of this scientific paper was the chemical control of San José scale, by using last generation products for plant protection.

MATERIALS AND METHODS

Investigations concerning the chemical control of San José scale (*Quadraspidiotus perniciosus* Comst.) were carried out at the Fruit Growing Research and Development Station of Iași, during 2005-2007. The experimental fruit growing plantation has in its structure the *Idared* Variety, apple trees being planted in 1992 and spaced at 4x2 m. The *cordon-trained trees* have used the *trellis* system.

The pest biology depends on climatic conditions. One of the limitative factors of pest spreading and evolution is temperature (*Table 1*) (Beșleagă et al., 2006; Cârdei, 1995).

Six products of plant protection were tested: V1 - Fyfanon 50 EC (a.i. Malathion) – 0.225%; V2 - Novadim 40 EC (a.i. Dimethoate) – 0.2%; V3 - Reldan 40 EC (a.i. Chlorpyrifos methyl) – 0.15%; V4 - Calypso 480 SC (a.i. Thiocloprid) – 0.02%; V5 - Ecalux S (a.i. Quinalphos + Dimethoate) - 0.1% and V6 - Pyrinex 48 EC (a.i. Chlorpyrifos) – 0.2%.

Phytosanitary treatment warning was carried out according to the ecological criterion. We carried out observations concerning the biology (especially, the appearance of the first mobile larvae) and the evolution of temperature corresponding to the pest biological threshold.

CONTROL OF SAN JOSÉ SCALE FROM APPLE TREE PLANTATIONS

Table 1 – Mean, minimum and maximum temperatures recorded at the Fruit Growing Research and Development Station of Iași, during 2005-2007 (March-September)

Month	Air temperature °C								
	2005			2006			2007		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
III	2.5	-12.0	21.0	2.1	-12.8	23.4	8.1	-2.0	21.6
IV	10.1	-3.0	24.3	11.2	1.3	23.0	11.0	0.8	24.7
V	16.0	5.2	31.6	15.4	3.7	32.4	19.6	0.0	38.8
VI	18.5	9.8	30.2	19.5	7.7	32.8	23.1	12.5	36.5
VII	21.6	12.2	36.1	21.5	10.2	32.3	25.2	11.4	40.0
VIII	20.5	11.4	34.6	21.0	10.4	34.0	22.0	11.3	37.1
IX	16.6	6.2	31.4	16.4	6.8	28.4	16.0	4.3	26.7

For controlling San José scale, two chemical treatments were applied at each generation. Phytosanitary treatments were done with the Osella-type spraying pump and the solution quantity was of 2,000 l/ha. The efficiency of products was expressed in % of attacked fruits.

RESULTS AND DISCUSSION

Having in view that the biological threshold of San José scale is of 7°C, while daily mean temperatures were during June-August, between 18.5°C and 23.1°C and daily maximum temperatures were over 25°C, we found out that the climatic data recorded during 2005-2007 (*Table 1*) favoured the pest development. Mean and maximum temperatures were higher in 2007 (the mean temperature of 25.2°C and the maximum one of 40°C), compared to 2006 (the maximum temperature of

34.0°C) and 2005 (the maximum temperature of 36.1°C).

Based on the biological and ecological data, we have established the warning periods for applying chemical treatments.

Data from *Table 2* showed that in 2005, the first mobile larvae appeared at the first generation on June 8, the warning period being between 13 and 16 June, while at the second generation, the first mobile larvae appeared on July 27 and the warning period was between 1 and 5 August.

In 2006, the first mobile larvae appeared on June 5 and the warning treatments were done between 10 and 15 June (G I), while at G II, the first larvae were found on July 22, the warning treatments being done between 25 and 30 July.

Table 2 - Data on the appearance of larvae and warning periods for treatment application at the Fruit Growing Research and Development Station of Iași

Year	First generation (G I)		Second generation (G II)	
	Date of the appearance of first larvae	Warning period	Date of the appearance of first mobile larvae	Warning period
2005	8 June	13-16 June	27 July	1-5 August
2006	5 June	10-15 June	22 July	25-30 July
2007	29 May	1-4 June	12 July	17-21 July

In 2007, the appearance of first mobile larvae at the first generation was recorded on May 29 and warning was carried out between 1 and 4 June, while at G II, the first mobile larvae appeared on 12 July, warning being carried out between 17 and 21 July.

We found out that, because of favourable climatic conditions to the evolution of *Quadraspidiotus perniciosus* Comst., in 2007 mobile larvae appeared earlier than in years 2005 and 2006.

The results concerning the efficiency of used insecticides for

controlling San José scale at the Fruit Growing Research and Development Station of Iași are shown in *Table 3*. Thus, in 2005, the following products showed the best results: Reldan 40 EC (0.15%), Calypso 480 SC (0.02%) and Ecalux S (0.1%).

In 2006, the best results were found when using Reldan 40 EC (0.15%) and Ecalux S (0.1%), where the efficiency was of 99.9%, while in 2007, the highest efficiency (99.9%) was recorded by Calypso 480 SC (0.02%) (*Figure 1*).

Table 3 – Efficiency of some insecticides used in controlling *Quadraspidiotus perniciosus* Comst. in Idared Variety, during 2005-2007, at the Fruit Growing Research and Development Station of Iași

Variant	Rate kg, l/ha	2005		2006		2007	
		% Attacked fruits	Efficiency	% Attacked fruits	Efficiency %	% Attacked fruits	Efficiency %
V1 – Fyfanon 50 EC	4.5	0.3	99.7	0.5	99.5	0.4	99.6
V2 – Novadim 40 EC	4	0.4	99.6	0.4	99.6	0.5	99.5
V3 – Reldan 40 EC	3	0.2	99.8	0.1	99.9	0.2	99.8
V4 – Calypso 480 SC	0.4	0.2	99.8	0.2	99.8	0.1	99.9
V5 – Ecalux S	2	0.2	99.8	0.1	99.9	0.2	99.8
V6 –Pyrinex 48 EC	4	0.3	99.7	0.3	99.7	0.4	99.6
UC– untreated control	-	34.5	65.5	40.2	59.8	40.2	59.8

CONTROL OF SAN JOSÉ SCALE FROM APPLE TREE PLANTATIONS

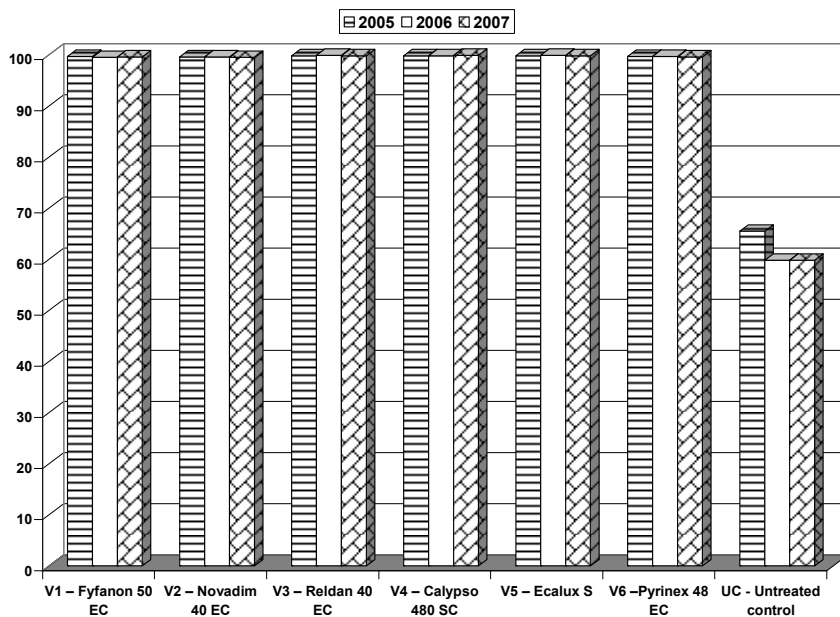


Figure 1 – Efficiency of some insecticides used in controlling *Quadraspidiotus perniciosus* Comst. in *Idared* Variety, during 2005-2007, at the Fruit Growing Research and Development Station of Iași

A good efficiency was also found in other products: Fyfanon 50 EC (0.225%), Novadim 40 EC (0.2%) and Pyrinex 48 EC (0.2%), where the percentage of attacked fruits was between 0.3 and 0.5%.

At the untreated control, we found 34.5% of attacked fruits in 2005, 40.2% in 2006 and 2007, showing that during 2006-2007 the climatic conditions were more favourable to pest evolution, than those from 2005 were.

CONCLUSIONS

The climatic data during 2005-2007 were very favourable to San José scale spreading and evolution.

The used products had a good to very good efficiency in controlling San José scale (*Quadraspidiotus perniciosus* Comst).

From the tested insecticides during the three years of experiences, the highest efficiency was found when using Calypso 480 SC, Reldan 40 EC and Ecalux S.

The application of the “2+2” control scheme has ensured a good control on San José scale in apple tree plantations.

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