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EFFICACY OF SOME NEW FORMULATIONS AND NEW INSECTICIDES IN CONTROLLING THE STRAWBERRY BLOSSOM WEEVIL (*Anthonomus rubi* Hbst.) ON STRAWBERRY

ABSTRACT. Effectiveness of some new formulations and new insecticides in controlling the strawberry blossom weevil (*Anthonomus rubi* Hbst.) was studied in 1996-1998 on strawberry plantations in central Poland. The plants were treated once just before flowering. The new formulation of deltamethrin as Decis EG 6.25 (11.4 and 15 g a.i./ha) and Decistab TB (11.4; 14.3; 15.2 and 18.8 g a.i./ha) gave a satisfactory control of the pest, similar to that obtained with its standard equivalent Decis 2.5 EC. New insecticides - acetamiprid (25 g a.i./ha), natural pyrethrum (40 g a.i./ha), tiachloprid (96 g a.i./ha) and a new formulation of diazinon as Diazol 50 EW (600 g a.i./ha) also provided a satisfactory control of the strawberry blossom weevil, similar to that provided by the standard insecticides such as fenitrothion (1125 g a.i./ha), etofenprox (90 g a.i./ha) and others.

Key words: strawberry, strawberry blossom weevil, *Anthonomus rubi*, chemical control

INTRODUCTION. Strawberry blossom weevil (*Anthonomus rubi* Hbst.) is one of the most important pests on strawberry plantations in many countries (Cross and Easterbrook, 1998; Blümel, 1998). Each year in Poland it may damage 10-30% or even more of strawberry flower buds (Łabanowska, 1991; 1997; Łabanowska and Gajek,1992; Łęska, 1964). The percentage of yield reduction depends on the proportion of damaged flower buds (Łęska, 1964). According to Terrattaz et al. (1995) the economic threshold level for this pest is at least 10% of destroyed flower buds. The number of such buds mainly depends on the cultivar, year and especially weather conditions during the spring (Łabanowska and Chlebowska, 1999). It is recommended to control this pest every year on most of strawberry plantations.

MATERIAL AND METHODS. Four experiments were carried out in 1996-1998 at the Research Institute of Pomology and Floriculture, Skierniewice, on two-three-year-old plantations of strawberry cv. 'Senga Sengana', located in central Poland. The trials were designed in a strip system. One plot consisted of four replications and comparised the area of about 67 m^2 (7 rows, each 10.5 m long). The insecticides were applied at a rate of 5 l of spraying liquid per plot (equivalent to 750 l per ha) just before bloom, when the weevils were feeding on leaves, i.e. on 20 May 1996, 17 May 1997 (Test I), 16 May 1997 (Test II) and 11 May 1998. The knapsack motor sprayer Turbine was used to apply the chemicals.

The effectiveness of insecticides was evaluated about 14 days after spraying. The percentage of clipped floral buds was counted on random samples of 50 flower clusters for each replication, equivalent to about 300 flower buds. Four samples represented each treatment. The data were statistically processed by an analysis of variance, separately for each year, using the arcsin percentage transformation. Duncan`s multiple range t - test at P=0.05 was used to evaluate the differences between the mean values.

The characteristics of insecticides applied in the experiments are presented in Table 1.

Table 1. Characteristics of insecticides used in experiments

Active ingredient [g/l/kg]	Commercial insecticide	Rate [l/kg/ha]	Rate [g a.i./ha]
Acetamiprid 200	Mospilan 20 SP	0.125	25
Beta-cypermethrin 50	Chinmix 5 EC	0.3	15
Chloropiryfos 500 + cypermethrin 50	Nurelle D 550 EC	1.5	750 + 75
Deltamethrin 25	Decis 2.5 EC	0.45; 0.6; 0.75	11.3; 15; 18.8
Deltamethrin 62.6	Decis EG 6.25	183; 240 g	11.4; 15
Deltamethrin 0.625 g/l, tab. (2.5 g)	Decistab TB	45.8; 57.25; 60.9; 75 g	11.4; 14.3; 15.2; 18.8
Diazinon 500	Diazol 50 EW	1.2	600
Etofenprox 100	Trebon 10 SC	0.9	90
Fenitrothion 500	Sumithion 500 EC	2.25	1125
Fosalone 350	Zolone 350 EC	2.5	875
Pyrethrum 40 + piperonylobutoksyd 160	Spruzit 04 EC	1.0	40 + 160
Tiachloprid 480	Calypso 480 EC	0.2	96

RESULTS AND DISCUSSION. In 1996 the most of the used insecticides showed a very high effectiveness – over 92% (Tab. 2). The results obtained with the new formulation of deltamethrin as Decistab TB were similar to the standard insecticides such as Decis 2.5 EC (deltamethrin), fenitrothion and others. The proportion of clipped flower buds on treated plants was very low, below 1%. A relatively lower effectiveness was obtained with the new formulation of diazinon as Diazol 50 EW, which reduced damaged buds by about 83%.

In 1997 in Test I, the highest effectiveness: over 90% reduction of the pest, was provided by the insecticides from the new group: acetamiprid and tiachloprid, as well as the standard preparation Decis 2.5 EC and fenitrothion (Tab. 2). A satisfactory control of the strawberry blossom weevil was obtained with the new formulations of deltamethrin as Decistab TB and Decis EG 6.25, with natural pyrethrum as Spruzit 04 EC and also with beta-cypermethrin as Chinmix 5 EC. All of them reduced the proportion of damaged flower

buds from 83.6 to 89.3%. The results were statistically similar to those provided by the standard insecticides containing deltamethrin and fenitrothion. A smaller reduction of infestation resulted from a lower rate of the new EG formulation of deltamethrin (11.4 g a.i./ha) and diazinon (78.6-77.4% efficacy, approximately). About 16% of flower buds were destroyed by the pest on untreated plants. In 1997, in the other experiment (Test II), all the tested insecticides showed similar results: 82-89% reduction of damaged buds. On all treated plants the proportion of such buds was 2.4-4.0%, while over 22% of them were recorded in the control.

Table 2. Efficacy of new formulations and new insecticides in controlling the strawberry blossom weevil (*Anthonomus rubi* Hbst.), expressed as a percentage of damaged flower buds

Commercial insecticide	Rate [l/kg/ha]	1996	1997		1998
			Test I	Test II	
Calypso 480 EC	0.2	-	1.4 abc	-	0.3 a
Chinmix 5 EC	0.3	-	2.6 cd	2.4 a	0.8 ab
Decis 2.5 EC	0.45	-	0.8 a	-	-
Decis 2.5 EC	0.60	-	1.7 abc	-	-
Decis 2.5 EC	0.75	0.3 a*	-	2.7 a	-
Decis EG 6.25	183 g	-	3.4 d	-	-
Decis EG 6.25	240 g		2.3 bcd	-	-
Decistab TB	45.8 g	-	2.6 cd	-	-
Decistab TB	57.25 g	0.8 ab	-	-	-
Decistab TB	60.9 g	-	1.7 abc	-	-
Decistab TB	75 g	0.4 a	-	-	-
Diazol 50 EW	1.2	1.9 b	3.6 d	3.4 a	1.1 bc
Mospilan 20 SP	0.125	-	1.0 a	-	0.9 b
Nurelle D 550 EC	1.5	0.4 a	-	-	-
Spruzit 04 EC	1.0	-	1.7 abc	3.1 a	1.7 c
Sumithion 500 C	2.25	0.4 a	1.2 ab	4.1 a	-
Trebon 10 S C	0.9	0.8 ab	-	-	-
Zolone 350 EC	2.5	0.8 ab	-	-	-
Control (untreated)	-	11.2 c	15.9 e	22.3 b	7.5 d

* The means followed by the same letter do not differ significantly at P=0.05 according to Duncan's t - test

In 1998, the best control of strawberry blossom weevil was obtained with tiachloprid, over 95% reduction. Good efficacy was also provided by beta-cypermethrin and diazinon (89.3-85.4%). The lowest reduction of damages was obtained with natural pyrethrum (77%). In the control, affected buds reached 8%.

Generally, all the insecticides tested provided a satisfactory control of strawberry blossom weevil.

Results obtained with deltamethrin (pyrethroid) are in agreement with a high efficacy of other pyrethroids in suppressing this pest (Łabanowska, 1997). Deltamethrin is one of the main insecticides to control *A. rubi* in Austria (Blümel, 1998). In the present study the results obtained with natural pyrethrum, as Spruzit 04 EC, were better than those reported from Austria, but the rate of plant infestation was much higher there (Blümel, 1998). Good results provided by acetamiprid from the new group of insecticides, confirmed its high effectiveness in controlling *A. rubi* on raspberry (Łabanowska et al., 2000).

CONCLUSIONS

1. New formulations of deltamethrin as Decis EG 6.25 (11.4 and 15 g a.i./ha) and Decistab TB (11.4; 14.3; 15.2 and 18.8 g a.i./ha) provided satisfactory in control of the strawberry blossom weevil, similar to the standard Decis 2.5 EC (11.3-18.8 g a.i./ha).
2. Very good control of this pest was obtained with the new insecticides acetamiprid as Mospilan 20 SP (25 g a.i./ha) and tiachloprid as Calypso 480 EC (96 g a.i./ha). These results were similar to the standard fenitrothion as Sumithion 500 EC.
3. Other insecticides – beta-cypermethrin as Chinmix 5 EC (15 g a.i./ha), natural pyrethrum as Spruzit 04 EC (40 g a.i./ha), new EW formulation of diazinon as Diazol 50 EW (600 g a.i./ha) gave satisfactory results, similar or slightly lower in comparison to the standard products.
4. Some of the newly tested insecticides such as acetamiprid, tiachloprid, natural pyrethrum, as well as fosalone and etofenprox should be useful to control the strawberry blosom weevil on strawberry plantations under the rules of Integrated Fruit Production (IFP).

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REFERENCES

Blümel S. 1998. Efficacy of various insecticides for control of *Anthonomus rubi*. IOBC/WPRS BULL. 21: 103-105.

Cross J.V., Easterbrook M.A. 1998. Integrated management of flower pests of strawberry. IOBC/WPRS BULL. 21: 81-87.

Łabanowska B.H. 1991. Chemical control of the strawberry blossom weevil (*Anthonomus rubi* Hbst.) with some new insecticides. FRUIT SCI. REP. 18: 45-50.

Łabanowska B.H. 1997. Control of the strawberry blossom weevil (*Anthonomus rubi* Hbst.) on strawberry. J. FRUIT ORNAM. PLANT RES. 5: 157-162.

Łabanowska B.H., Chlebowska D. 1999. Strawberry blossom weevil - *Anthonomus rubi* Hbst. damage on strawberry cultivars. J. FRUIT ORNAM. PLANT. RES. 7: 147-151.

Łabanowska B.H., Gajek D. 1992. Control of strawberry blossom weevil (*Anthonomus rubi* Hbst.) with new insecticides. FRUIT SCI. REP. 19: 167-172.

Łabanowska B.H., Gajek D., Niemczyk E. 2000. Usefulness of Mospilan 20 SP in Integrated Pest Management of soft fruits. IOBC/WPRS BULL. 23: 137-140.

Łęska W. 1964. Badania nad biologią i szkodliwością kwieciaka malinowca (*Anthonomus rubi* Hbst. *Coleoptera, Curculionidae*). Skierniewice 1994, Ph.D. thesis, pp. 93.

Terrettaz R., Antonin P., Carron R., Mittaz C. 1995. Economic incidence of simulated damage by the weevil on the flowers of strawberry. An approach to the determination of a tolerance threshold. REV. SUISSE VITIC. ARBOR. HORT. 27: 361-363.