

THE STUDY ON EFFECTIVENESS OF *AMBLYSEIUS SWIRSKII* AT.-H PREDATOR IN CONTROL OF ONION THRIPS *THRIPS TABACI* IN PEPPER CROP

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Abstract. The paper presents results on the effectiveness of *Amblyseius swirskii* At.-H. (Arachnida, Mesostigmata, Phytoseiidae) releases in control of onion thrips *Thrips tabaci* on pepper cultivars collection in tunnels, at the Vegetable Research and Development Station Bacau, Romania, during 2015 - 2016. The trials of *A. swirskii* in thrips control were performed at the following release rates: 500,000; 700,000; 900,000 and 1 million mites/ha. Each variant area had 45 square meters. The results showed a different effectiveness of *Amblyseius swirskii* releases in reducing the thrips attack according to the release rate. In variant with 500,000 mites/ha, the degree of attack was reduced from 15.4% in the first decade of August, to 1.5% in the third decade of September. Increasing of mite predator release rate at 700,000 exemplars/ha, had a powerful downward dynamic during the last decades of August and first decades of September. The release rate of *A. swirski* with 900 thousand or one million exemplars/ha had a greater efficacy in the last decade of August and September, reaching 92.43% in variant with one million mites/ha. These results were obtained in the conditions of upward dynamic of thrips attack degree in control trial (25.1% until the first decade of September). The data presented showed that, the reducing of thrips attack degree by release of *A. swirskii* mite on pepper crop is effective in August - September when the release rate was between 700,000 - 1,000,000 exemplars per ha.

Key words: onion thrips, predator releases.

INTRODUCTION

Amblyseius swirskii is a beneficial predatory mite from Eastern Mediterranean region. It is natives in: Israel, Italy, Cyprus, Greece and Egypt. Here it can be found on crops such as apples, apricot, citrus, vegetables and cotton. This predator, feeds on pest species as *Bemisia tabaci*, *Trialeurodes vaporariorum*, *Frankliniella occidentalis* or pollen and plant exudates (EPPO, 2013).

It was first released in 1983 in North America for control of citrus pests in California. Since 2005, it was used as biological control agent of mites, thrips and whiteflies in greenhouse and nursery crops. Now is currently reared and sold commercially in Austria, Belarus, Belgium, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Israel, Italy, Jersey, Morocco, Netherlands, Norway, Poland, Spain, Turkey, UK, USA, China, Japan, Argentina, etc. (Arthurs et al., 2009; Cedola & Polack, 2011; EPPO, 2013; Kade et al., 2011; Sato & Mochizuki, 2011; Chen et al., 2011).

A. swirskii species is used to control thrips in greenhouse vegetables (cucumber, pepper and eggplant) and some ornamental crops (Buitenhuis et al., 2010; Messelink et al., 2006). *A. swirskii* is not susceptible to diapause and it can be used in periods with temperatures that exceed 22°C. The mites are released directly in the crops in bran or vermiculite carriers sprinkled on the leaves or substrates, or may be broadcast via air blast

(Buitenhuis et al., 2010; Opit et al., 2005). The release rates are 25-100 mites per m² depending on pest species, pest density and crop. The effectiveness of *A. swirskii* as a biological control agent may be reduced when multiple pest species are present (Kumar et al., 2016). Another research showed that predator provided better control on the foliage of pepper plants, compared with the flowers. Similar results were obtained by Kakkar et al. (2016) in cucumber crops, where *A. swirskii* fed preferentially and controlled melon thrips on leaves, but didn't provide effective control of common blossom thrips from cucumber flowers.

The paper aim was to evaluate the biological control of onion thrips, *Thrips tabaci* in peppers with the predator mite *Amblyseius swirskii* (Arachnida, Mesostigmata, Phytoseiidae).

MATERIALS AND METHODS

During 2015-2016 years, tunnels experiments were performed at the Vegetable Research-Development Station Bacau, in order to evaluate the biological control of onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) in peppers with *Amblyseius swirskii* At.-H. (Arachnida, Mesostigmata, Phytoseiidae).

The effectiveness of *A. swirskii* in control of *Thrips tabaci* was studied in collection of pepper cultivars, in tunnels. When the attack degree of thrips exceeded 17%, the predatory mites were released in the 4 variants. The research was done from the summer to early autumn. The maximum day temperature was between 28-32°C with peaks up to 40°C. The trial of *A. swirskii* in thrips control was performed at the following release rates: V1-500,000 mites/ha; V2-700,000 mites/ha; V3-900,000 mites/ha; V4-1 million mites/ha. A variant (V5) without mites released was used as control. Each variant area had 45 square meters.

The effectiveness of the predator mites was determined by decadal observations of the attack on the plant, and monitoring the pest population of onion thrips.

The observations were accomplished every 10 days from August to September. The attack estimation was evaluated using the following indicators: frequency of attack (F%), intensity of attack (I%) and degree of attack (DA%). The effectiveness processing of *A. swirskii* in thrips control was performed by the Sun - Shepard method.

The obtained results are very useful in integrated pest management control in organic agriculture in order to increase the ecological pest control practices in vegetable crops.

RESULTS AND DISCUSSIONS

Attack degree of onion thrips *T. tabaci* on pepper plants in experiments with different release rates of *A. swirskii* mites is showed in table 1.

Table 1. Degree attack of *T. tabaci* on pepper plants in conditions of release of *A. swirskii* mites

Variant No.	Release rate of mites (exemplars/ha)	Attack degree (%)					
		August decade			September decade		
		1	2	3	1	2	3
V1	500,000	15.4	11.2	6.2	3.5	3.1	1.5
V2	700,000	17.2	10.1	4.9	3.5	2.9	1.5
V3	900,000	13.5	9.8	4.7	3.4	3.0	1.3
V4	1,000,000	14.9	9.1	4.7	3.1	2.8	1.4
V5	Control (no release)	12.4	15.2	20.4	25.1	23.3	18.5

The results presented showed a different effectiveness of different release rates of *A. swirskii* in reducing the thrips attack. In first variant, the attack degree of onion thrips was

reduced from 15.4% in the first decade of August to 1.5% in the third decade of September (Figure 1).

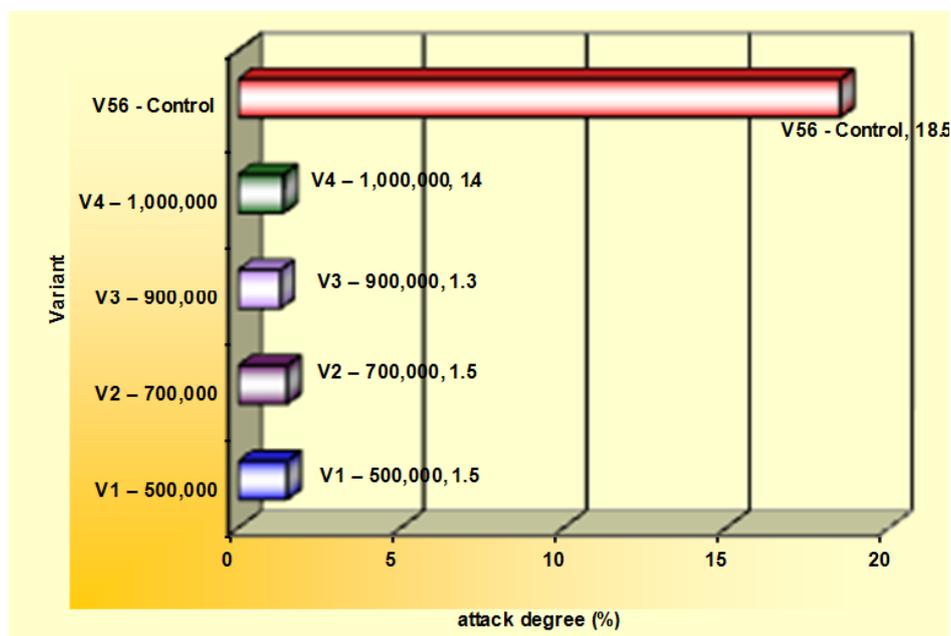


Figure 1. The attack degree (%) of *T. tabaci* on pepper plants in the last decade of September

Increasing of release rate of mite predator at 700,000 exemplars per ha, had a powerful downward dynamic during the last decades of August and first decades of September. The release rate of *A. swirski* with 900 thousand and one million exemplars per ha decreased the attack degree of onion thrips at a level of 1.3% in variant V3 and at a level of 1.4% in variant V4. These results were obtained in the conditions of upward dynamic of thrips degree attack in control variant (25.1% until the first decade of September). The effectiveness of different release rates of *A. swirski* against the onion thrips on pepper plants is presented in figure 2.

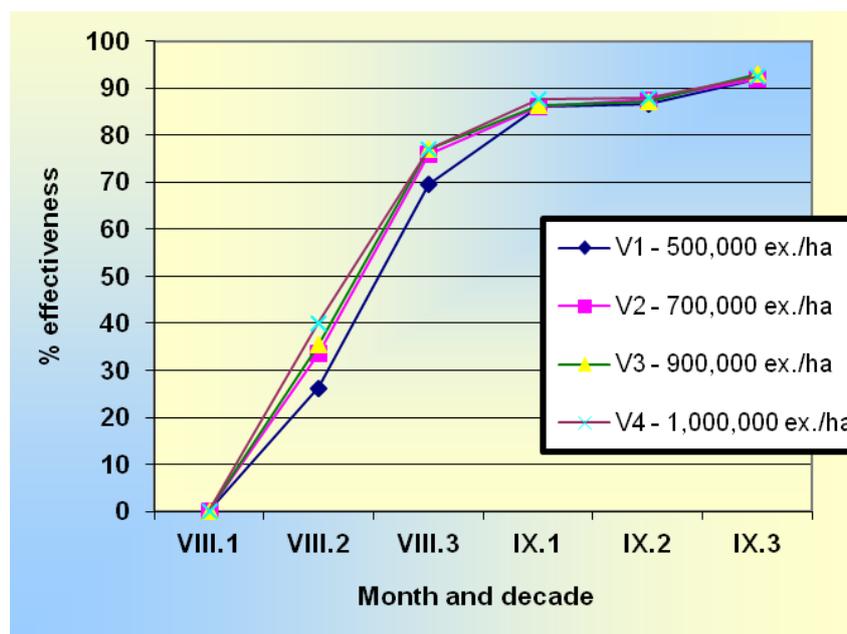


Figure 2. Effectiveness of *Amblyseius swirskii* in control of onion thrips on pepper plants

The effectiveness of *A. swirski* mites against onion thrips *T. tabaci* was as follows:

In variant V1: 26.3%, in second decade of August; 69.6% in third decade of August; 86.1% in first decade of September; 86.7% in second decade of September and 91.9% in last decade of September;

In variant V2: 33.5% in second decade of August; 75.9% in third decade of August; 86.1% in first decade of September; 87.6% in second decade of September and 91.8% in last decade of September;

In variant V3: 35.5% in second decade of August; 76.9% in third decade of August; 86.4% in first decade of September; 87.1% in second decade of September and 92.9% in last decade of September;

In variant V4: 40.1% in second decade of August; 76.9% in third decade of August; 87.6% in first decade of September; 87.9% in second decade of September and 92.4% in last decade of September.

The presented data showed that reducing trips attack degree by release of *A. swirskii* mite on pepper plants is effective in August - September using the release rates between 700,000 and 1,000,000 exemplars per ha.

CONCLUSIONS

The trials of ecological control of pests were performed in the fields of the Vegetable Research and Development Station in Bacau, during 2015 - 2016. In the variant with a release rate of 500,000 mites per ha, the degree of attack of onion thrips was reduced from 15.4% in the first decade of August, to 1.5% in the third decade of September. In the variant with 700,000 mites per ha, a powerful downward dynamic of attack degree of onion thrips was observed during the last decades of August and first decades of September. These results were obtained in the conditions of upward dynamic of thrips attack degree in control (25.1% until the first decade of September).

The reducing trips degree attack by release of *A. swirskii* on pepper plants is effective in August - September using the release rates between 700,000 and 1,000,000 mites per ha.

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