Scientific Papers. Series B, Horticulture. Vol. LX, 2016
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

EFFECT OF SOME "BIO-INSECTICIDES" USED AGAINST TWO SPOTTED SPIDER MITES (*TETRANYCHUS URTICAE* KOCH.) IN THE CUCUMBERS CROP UNDER PLASTIC TUNNEL CONDITIONS

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Abstract

Experiment was performed in the summer of 2015, in a cucumbers crop under high plastic tunnel conditions in order to determine the efficacy of some bio-insecticides in the control of two spotted spider mites (Tetranychus urticae) attack. Bio-products Oleorgan - 0.3% (saponified neem oil 40%), Konflic - 0.3% (Quassia amara 50%+saponified extract of different oils 50%), Canelys – 0.3% (cinnamon extract 70%), Kabon – 0.3% (potassium soap from vegetable oils 50%), Zicara – 0.15% (citrus peel extract and essential oils 70%), Lasser 240 SC – 0.05% (spinosad 24%) and Vertimec 1.8 EC – 0.08% (abamectine 1.8%) were applied single or mixed, repetitive or alternated in different variants. Were performed 6 applications. Intervals between treatments decreased from 7 to 3-4 days, depending of pest infestation level. Percent of attacked area/leaf and attack/plant established by visual estimation, and the harvest/plant were registered at the end of crop vegetation cycle. In addition, for a better appreciation of obtaining results were calculated the average attack and production increasing. Analyzing of the all parameters take into account showed that the most relevant of them proved to be the average attack (noticed as "general attack"), harvest/plant and harvest increasing. Yield data were statistical assured. Based on these parameters, best results (6.1%, 3.914 kg, and 224.8%, resp.) were obtained with a combination of spinosad 24% and abamectine 1.8% applied alternate. Appropriate values (6.4%, 3.076 kg, and 176.7%, resp.) were registered with product Oleorgan based on saponified neem oil 40%. Relatively good results (17.7%, 2.504 kg, and 143.8%, resp.) have been obtained by applying a mixture containing Oleorgan + Kabon + Canelys (0.3% each) alternately with another mixture: Konflic + Canelys + Zicara (0.3%; 0.3%; 0.15%). In the cases of spinosad 24% and untreated check, the three parameters take into account presented values of 75 and 92.5% resp., 2.248 and 1.741 kg, resp., and 130.8% (untreated check was reference). The study revealed that the saponified neem oil 40% applied alone had lower but appropriate performances to those of spinosad and abamectine alternately applied, proving a high acaricidal action, which promote it to be used in IPM and organic farming practices.

Key words*: bio-insecticides, plant extracts, plant oils, efficacy, cucumber, mites*

INTRODUCTION

The use of bio-insecticides based on plant extracts or metabolites of the various categories of bodies has experienced a revival in the past decade because of its positive impact on public and enviromental health. Plant species whose insecticidal action was known long time ago came to the attention of scientists, along with the start of investigations for finding new botanical source-species (Grdiša and Gršić, 2013). Despite their beneficial effect on the quality of the environment, bio-pesticides in general have several limiting characteristics (quick degradation in sunlight, air and moisture) that make them less agreed by large farmers communities, being recognized and used mainly in organic farming from developed countries. They have initiated extensive researches to identify their own botanical source-species and the formulation of their own bio-insecticides (Khater, 2012).

The present work aimed to establish the action spectrum and efficacy of some comercial bio-insecticides applied alone or mixed, repetitive or alternatively to control populations of two spotted spider mites (*Tetranychus urticae*) in a cucumber crop under high plastic tunnel.

MATERIALS AND METHODS

Experiment was performed in a cucumber crop (cultivar „Mirabelle F1") under high plastic tunnel, natural infested with two spotted spider

mites (*Tetranychus urticae* Koch.), during summer season, 2015 in Vidra-Ilfov, Romania. Tested bio-insecticides were: Oleorgan (saponified neem oil 40%), Konflic (*Quassia amara* 50% + saponified extract of different oils 50%), Canelys (*cinnamon* extract 70%), Kabon (potassium soap from vegetable oils 50%), Zicara (*citrus* peel extract and essential oils 70%), Lasser 240 SC (*spinosad* 24%) and Vertimec 1.8 EC (*abamectine* 1.8%).

Each of treatment variant was organized in three replicates (20 plants/replication), liniar arranged. The treatment variants were:

1. Mixed bio-insecticides (Oleorgan 0.3% + Kabon 0.3% + Canelys 0.3% mixed and alternately applied with Konflic 0.3% + Canelys 0.3% + Zicara 0.15% mixed);
2. Laser 240 SC 0.05% alone, alternately applied with Vertimec 1.8 EC, 0.08% alone;
3. Oleorgan 0.3% alone, repetitive applied;
4. Laser 240 SC 0.05% alone, repetitive applied;
5. Untreated check.

The bio-insecticides water solutions were applied by spraying of plant leaves, using a manual pump.

It were applied 6 treatments during the vegetation season, intervals between applications decreasing from 7 days (at the beginning of pest infestation) to 3-4 days (in the top of pest development).

A single visual observation was performed 4 days after last treament by this way being estimated the percent of attacked area/leaf (sample size: 4 leaves/5 plants) and the percent of attacked area/plant (5 plants/replicate). Yield was registered also, during experimental period and statistical analyzed.

RESULTS AND DISCUSSIONS

Obtained results had confirmed the scientific researches (Martinez, 2001; Hummel and Kleeberg, 2001) showing the great efficacy of saponified neem oil 40% (Oleorgan) in the control of two spotted spider mites populations (fig. 1).

In this case had emphasized a compensatory effect between low value of the attack/leaf (6.2 %) and that easy greater of the attack/plant (6.5 %) which proves that attacked areas on leaves were small but the number of infested leaves on plant was greater (fig. 2).

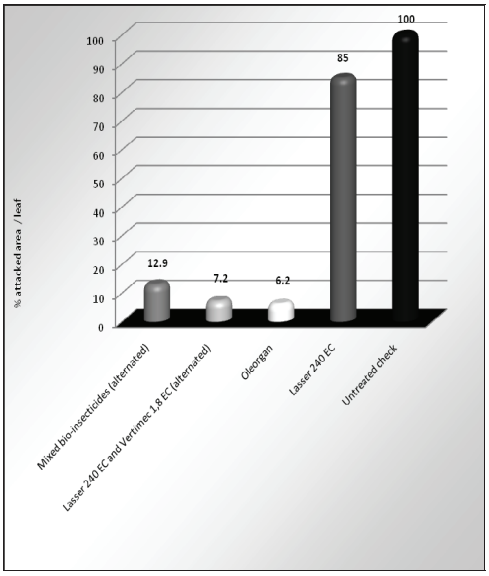

Figure 1. Effect of some "bio-insecticides" used in the control of mites on cucumbers crop under high plastic tunnel (attack/leaf)

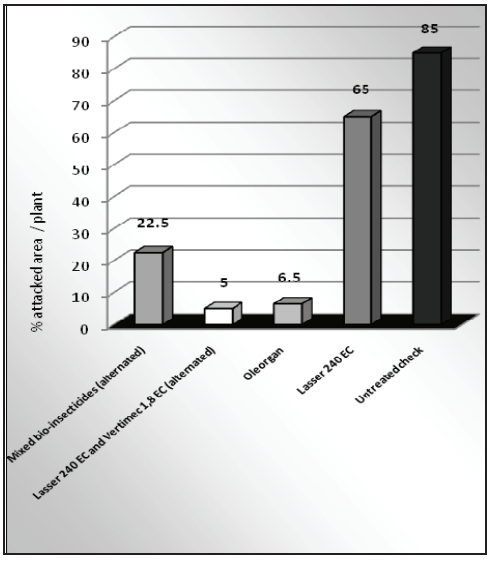

Figure 2. Effect of some "bio-insecticides" used in the control of mites on cucumbers crop under high plastic tunnel (attack/plant)

By alternating *spinosad* (Laser 240 SC) and *abamectine* (Vertimec 1.8 EC) applications the effect was opposite, the attacked areas on

leaves being greater while the number of infested leaves on plant was lower.
For a balanced appreciation of the obtained results it was calculated the average values of the two registered parameters noticed as "general attack" (fig. 3).

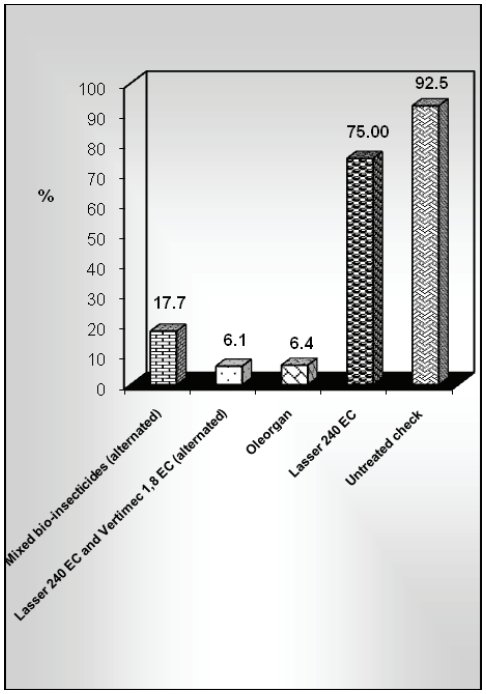

Figure 3. Effect of some "bio-insecticides" used in the control of mites on cucumbers crop under high plastic tunnel (general attack/plant)

They showed the similar effects of neem oil and alternatively treatments with *spinosad* and *abamectine* in the control of two spotted spider mites populations. Mixed bio-insecticides, alternatively applied gave good results also, by comparison with *spinosad* and untreated check.
Despite of appropriate results obtained with neem oil and spinosad/abamectine alternate application, the differences between the yields of these two variants were bigger (fig. 4) suggesting a certain negative influence of oil compound on cucumbers plants. However, all the four treatment variants experimented gave better results than untreated check regarding harvest/plant. The biggest yield difference comparing to untreated check was obtained with *spinosad*/*abamectine* alternate applications followed by *neem* oil, mixed bio-insecticides alternatively applied and *spinosad* repetitive applications (fig. 5).

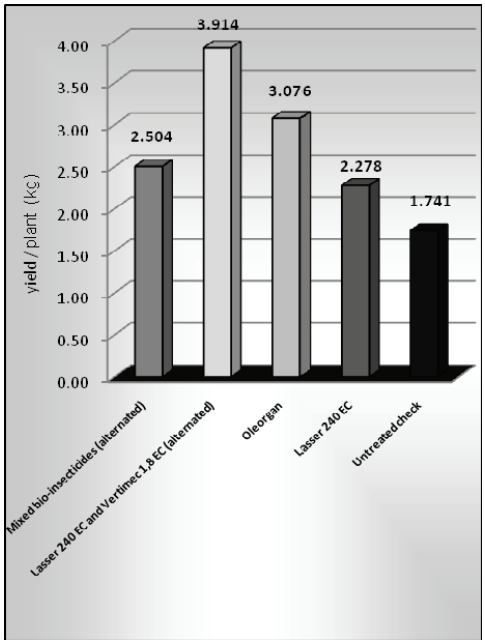

Figure 4. Harvest obtained in the cucumber crop treated with different „bio-insecticides"

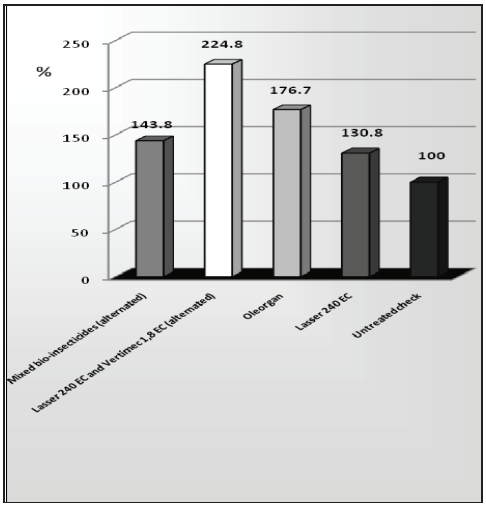

Figure 5. Harvest increasing at cucumbers crop treated with different „bio-insecticides"

Statistical interpretation of yield data were made by analysis of variance (table 1).

Table 1. Significance of yield differences between treated variants and untreated check

Variant	Yield (t/ha)	Yield (%)	Differences (t/ha)	Significance
1	31.73	143.8	+ 9.66	***
2	49.60	224.7	+ 27.53	***
3	39.00	176.7	+ 16.93	***
4	28.87	130.8	+ 6.80	***
5	22.07	100.0	-	-
LSD 5% LSD 1% LSD 0.1%	= 1.78 = 2.59 = 3.88			

Differences between the experimental variants can be observed in the photos 1, 2, 3, 4 and 5.

Photo 1. Effect of mixed bio-insecticides in the control of red spider mites on cucumber plant (V1)

Photo 2. Effect of *spinosad* and *abamectin* alternate applied in the control of red spider mites on cucumber plants (V2)

Photo 3. Effect of saponified *neem* oil in the control of red spider mites on cucumber (V3).

Photo 4. Effect of *spinosad* in the control of red spider mites on cucumber plants (V4).

Photo 5. Effect of red spider mites attack on untreated cucumber plants (V5).

CONCLUSIONS

The most relevant parameters in this study proved to be general attack, harvest/plant and production increasing compared to untreated check. Based on them, it can appreciates that *spinosad* and *abamectine* applied alternately gave the best results (6.1 %; 3.914 kg; 224.8 %, respectively), being followed of *neem* oil alone (6.4 %; 3.076 kg; 176.7 %, resp.), mixed bio-insecticides alternate (17.7 %; 2.504 kg; 143.8 %, resp.) and *spinosad* alone (75 %; 2.278 kg; 130.8 %, resp.). At untreated check were registered the most poor results (92.5 %; 1.741 kg).

On the other hand, the relatively great decreasing of yield registered at *neem* oil by comparison with *spinosad* and *abamectine* alternately applied, it could suggest a slowly phytotoxic reaction to the oil compound that reduce the ability of plant respiration, but this should be studied in depth.

REFERENCES

Grdiša M., Gršić K., 2013. Botanical insecticides in plant protection. Agriculturae Conspectus Scientificus, vol.78, no. 2 (85-93).

Hanem F. K., 2012. Ecosmart Biorational Insecticides: Alternative Insect Control Strategies, Insecticides - Advances in Integrated Pest Management, Dr. Farzana Perveen (Ed.), ISBN: 978-953-307-780-2, InTech, DOI: 10.5772/27852.

Martinez S.S., 2001. Main pest which can potentially be controlled with techniques based on Neem products in Brazil. Practice Oriented Results on Used and Production of Plant Extracts and Pheromones in Integrated and Biological Pest Control; Abstracts of the 1. Workshop "Neem and Pheromones"; University of Uberaba, Brazil, March 29-30, 23-24.

Hummel E., Kleeberg H., 2001. Properties of NeemAzal^{TM}-TS – experienced and possibilities in biological plant protection. Practice Oriented Results on Used and Production of Plant Extracts and Pheromones in Integrated and Biological Pest Control; Abstracts of the 1. Workshop "Neem and Pheromones"; University of Uberaba, Brazil, March 29-30, 10-22.


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