HARMFULNESS AND POPULATION DYNAMICS OF *TUTA ABSOLUTA* (MEYRICK, 1917) IN STRUMICA REGION

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Abstract: The objective of this research is to monitor the number of tomato leaf miner *Tuta absoluta* (Meyrick, 1917) population in the Strumica region, over two harvests, spring and summer, in 2011. We also made a comparison between the damage of tomatoes, caused by tomato leaf miner in the spring and summer harvest. Tests were carried out on production plot with an area of 0,1 ha in the Strumica region, Republic of Macedonia. Pest monitoring was performed using yellow sticky traps and pheromone traps. Both methods proved to be quite effective for monitoring the pest population.

According to our surveys, the damages on tomatoes were much larger in the second, apart from damaged tomatoes in the first harvest. With tomatoes from the first harvest, the largest and most visible damages were to the leaves of the plant, although, in individual cases, were observed damages on the flower branches and the flowers of the plant.

Damages caused by the leaf miner in tomatoes from the second harvest, were visible at all organs of the plant. The greatest were damages on the leaves, but significant damages were made on the flower branches, flowers and fruits of tomatoes.

Key words: tomato, leaf miner, *Tuta absoluta* (Meyrick, 1917), spring harvest, summer harvest

Introduction

Tomato (*Lycopersicon esculentum* L.) in Strumica region is grown on an area of about 2000 ha, as spring and summer crop. In the last two years, a new pest from the family Gelechidae, Lepidoptera, is registered. It is the tomato leaf miner (TLM), *Tuta absoluta* Meyrick. TLM is a neotropical oligophagous moth, which is associated with solanaceous crops (Tosevski et al., 2011). The main host of *T. absoluta* is tomato, but potato is also reported as a host, together with *Lycopersicon hirsutum*, *Solanum lyratum* and various wild solanaceous species such as *Solanum nigrum*, *Solanum elaeagnifolium*, *Solanum puberulum*, *Datura stramonium*, *Datura ferox* and *Nicotiana glauca*. (EPPO, 2005).

TLM has high reproduction potential (EPPO, 2005). The entire life cycle develops in 29 – 38 days, depending on the climatic conditions (EPPO, 2005). There are 10 to 12 generations per year (EPPO, 2005). The adults are night insects, who hide among the leaves during the day. Over a life cycle, the female can lay more than 200 creamy-white to yellowish colored eggs (EPPO, 2005). Eggs are laid, mostly, on the back side of

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leaves, or young stems and the branches of green fruit. After 3 - 5 days eggs are hatching, and larvae penetrate the leaves, young stems and fruits. The larval stage is the most damaging period which lasts 12 - 15 days (EPPO, 2005). As long as there is available food source, the larva does not enter in diapause. After finishing the fourth larval stage, they pupate on the leaves or in the soil. Puppet stage lasts 6-10 days.

All developmental stages of the pest can be found on the plant at the same time. Damages are manifested by the presence of irregular mines on the leaves. Larvae feed on leaf mesophyl, leaving only the transparent epidermis. Larva deposit its excrement at the end of mine. After a while, mines become brown and necrotic. Larvae can leave the mines and attack other parts of the plant. So, it can penetrate the young stems and fruits. The attacked fruits have noticeable holes under and around the sepal (Bloem & Spaltenstein, 2011).

TLM reduces the value and quality of tomato grown in greenhouses and open field. Potential yield loss in tomatoes (quality and quantity) is significant, and can reach up to 100% if the pest is not managed (www.irac-online.org).

Because of the large number of generations during the vegetation, TLM has ability to rapidly develop resistance on chemical control. In countries where protection from this pest is limited to the use of chemical agents, it takes from 20 to 30 treatments during vegetation (www.irac-online.org). Therefore, for efficient and environmentally acceptable control against this pest is necessary combining a few methods.

Material and method

Tests were carried out on production plot in Strumica region, with an area of 0,1 ha, over two harvests, spring (15.04. - 15.06. 2011) and summer (15.07. - 15.10. 2011). Pest monitoring was performed using yellow sticky traps and pheromone traps.

Three yellow sticky traps were placed, at the height of the top of the plant, across the reflector measuring 50 W bulb that lit the yellow sticky trap, where the miner *T. absoluta*, going after light, sticks on the yellow plate. Control of the collected material was performed at an interval of 7 days.

For the pheromone traps, were used plastic containers filled with water and oil to prevent evaporation, where on wire was hanging pheromone. Four pheromone traps were set at a height of the plant of 25 cm. Control of the collected material was performed at an interval of 7 days.

Damages that cause tomato leaf miner were monitored at all plant parts, in an interval of 7 days.

Results and discussion

Both methods proved to be quite effective for monitoring the pest population. According to the results shown in Tab. 1, we can see that with the yellow sticky traps, in the first harvest, total of 1433 males of TLM were caught. In the second harvest a total of 2735 males of TLM were caught.

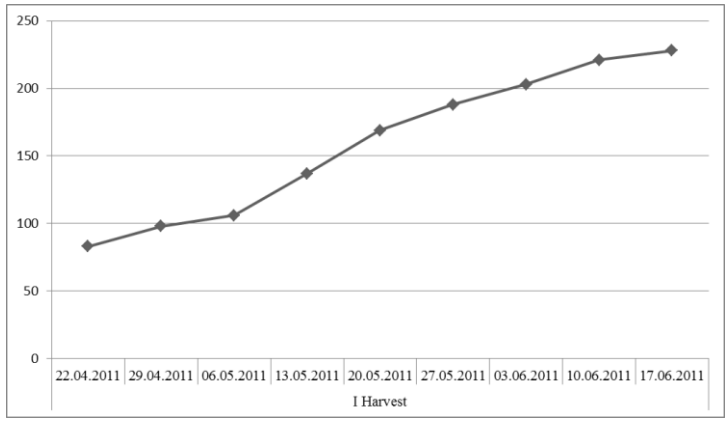
With the pheromone traps in the first harvest, total of 1570 male individuals of the miner were caught, and in the second harvest a total of 3197 male individuals of the miner were caught (Table 1).

The number of miners population mostly depends on weather conditions, which in the summer, allow maximum reproduction of the pest, while in spring, when temperatures are lower the number of the miner population is less.

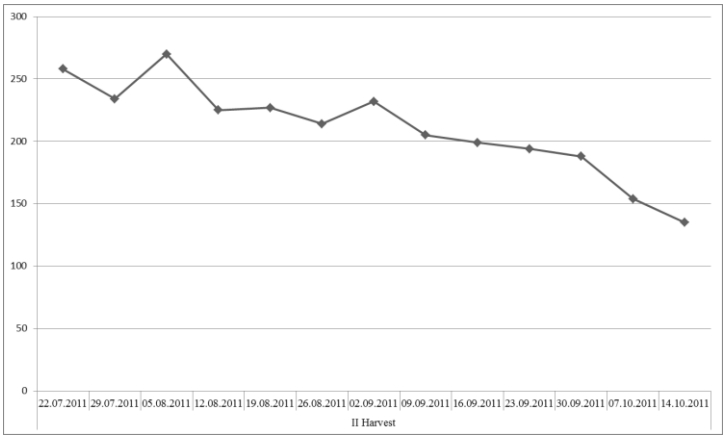
Table 1. Number of caught males of TLM with yellow sticky and pheromone traps

Type of traps	Number of caught TLM males	
	I harvest	II harvest
Yellow sticky trap	1433	2735
Pheromone trap	1570	3197

The analysis of the curve for population dynamics (Graph. 1), for the first harvest, shows that in mid-April pest has already occurred. Its numbers increased and by mid-June they have reached the maximum number. The curve for population dynamics (Graph. 2), for the second harvest, shows that the pest reach its maximum number in the beginning of August and it gradually decreases until the middle of October, when occurring in the lowest number.



Graph. 1. Dynamics of population of the tomato leaf miner for the first harvest



Graph. 2. Dynamics of population of the tomato leaf miner for the second harvest

Infestation of tomato plants occurs throughout entire crop cycle. Feeding damage is caused by all larval instars and throughout whole plant.

According to our surveys, damage on tomatoes was much larger in the second, apart from damage on tomatoes in the first harvest. With tomatoes from the first harvest, the largest and most evident were damages on the leaves. It is important to emphasize that with tomatoes from the first harvest there were damages on the flower buds and fruits of tomatoes, but only in individual cases.

With tomatoes from the second harvest, damages on all organs of the plant were visible. The greatest damages were on the leaves of the plants, but significant damages were made at flower buds and fruits of tomato.

Conclusion

Based on the test results the following conclusions can be made:

- On the yellow sticky bases during the first and second harvest of tomato, total of 1433 and 2735, respectively, males of TLM were caught.
- On the pheromone traps, during the first and second harvest of tomato, total of 1570 and 3197, respectively, males of TLM were caught.
- Pheromone traps are also a good method for controlling the number of the pest population.
- In the first harvest, in mid-April pest has already occurred. Its numbers increased and in mid-June we registered pick.
- In the second harvest, the pest reach its maximum number in the beginning of August and it gradually decreases until the middle of October, when occurring in the lowest number.
- Damage on tomatoes was much larger in the second, apart from damage on tomatoes in the first season. With tomatoes from the first harvest, the largest and most evident were damages on the leaves. It is important to

emphasize that with tomatoes from the first harvest there were damages on the flower buds and fruits of tomatoes, but only in individual cases.

- With tomatoes from the second harvest, damages on all organs of the plant were visible. The greatest damages were on the leaves of the plants, but significant damages were made flower buds and fruits of tomato.

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