

## THE RESULTS OF THE MONITORING OF SOUTH AMERICAN TOMATO MOTH *Tuta absoluta* POVOLNY, 1994 (LEPIDOPTERA: GELECHIIDAE) IN 2010 IN CROATIA

Mladen ŠIMALA<sup>1</sup>, Tatjana MASTEN MILEK<sup>2</sup>, Gabrijel SELJAK<sup>3</sup>

<sup>1,2</sup> Croatian Centre for Agriculture, Food and Rural Affairs – Institute for Plant Protection,  
Zagreb

<sup>3</sup> Agriculture and Forestry Service Nova Gorica, Nova Gorica

### ABSTRACT

The South American tomato moth, *Tuta absoluta* Povolny, 1994 is a serious devastating pest of tomato. Larvae feed on all parts of tomato plants and can cause severe crop damage. *T. absoluta* is a pest of tomato in many South American countries since 1970. Recently, this dangerous pest was detected in many countries in Europe and Mediterranean region. In Croatia the presence of *T. absoluta* was reported for the first time at the end of 2009. In 2010 we conducted the monitoring of *T. absoluta* from April to July in the tomato protected production on 19 localities in 8 counties in Croatia, along the Adriatic coast and the continental part, along with Slovenian border. Presence of *T. absoluta* in the tomato plantation was established by the visual inspection of the tomato plants, based on the symptoms of larvae feeding and by hanging of sex pheromone traps above the plants. After approximately one month from installation, the traps were removed from the greenhouses and analysed in the laboratory. The species of male moths that were caught in the traps was identified according to their morphological characteristics and by dissection of genital segment of several specimens. During the monitoring in 2010 by using the methods listed, the species *T. absoluta* was reported on 16 localities in 6 counties of Croatia. The number of males caught in the traps was ranged from 1 to even 317 moths per 1 trap. Since the first detection of *T. absoluta* in 2009, the results of monitoring in 2010 show that this serious pest of tomato is spreading rapidly across Croatia. The significant damage on leaves and fruits was reported in the tomato protected production in the coastal part of Croatia.

**Key words:** Croatia, monitoring, *Tuta absoluta* Povolny, 2010

### 1 INTRODUCTION

The South American Tomato moth, *Tuta absoluta* Povolny, 1994, is a very harmful leaf mining moth, with a strong preference for tomato. It can also attack eggplant, sweet pepper, potato and other various cultivated plants, as well as the weeds of the family Solanaceae. Over the past decades, this micro lepidopteron moth has spread over the large parts of the South American continent, while it was first observed in Europe in 2006, in Spain (OEPP/EPPO, 2008). *T. absoluta* is listed on the EPPO A2 list. Since the first detection of this pest in Europe, it has been spreading rapidly through Mediterranean region, causing very high level damages to the tomato crops in some of them. The presence of *T. absoluta* in Croatia was first reported at the end of 2009 (Gotlin Čuljak *et al.*, 2010).

---

<sup>1</sup> dr. sc., Svetošimunska 25, HR-10040 Zagreb, Croatia

<sup>2</sup> dr. sc., *ibid.*

<sup>3</sup> mr. sc., Pri hrastu 18, SI-5000 Nova Gorica

The moth of *T. absoluta* is grey-brown in colour, approximately 6 mm in size and has a wingspan of about 10 mm. It has filiform antennae, silverfish-grey scales and black spots on anterior wings. Eggs are small (0,36 x 0,22 mm), cylindrical, creamy white to yellow. Newly-hatched caterpillars are cream coloured with a dark head, becoming greenish to light pink in the second to fourth instar. The first instar is 0,9 mm long and the fourth is 7,5 mm long. The black prothoracic shield, just behind the head of the caterpillar in the last stage, is an important morphological characteristic for the detection of this pest. Pupae are about 6 mm in length and have a light brown colour.

*T. absoluta* has a high reproductive potential. Larvae do not enter diapause as long as there is food available, and there may be 10-12 generations per year. The biological cycle is completed in 29-38 days, depending on the environmental conditions. Adults are nocturnal and usually hide during the day between leaves. Females lay eggs on the aerial parts of their host plants, and a single female can lay a total of about 260 eggs during its lifetime. Four larval instars develop. Pupation may take place in the soil, on the leaf surface or within the mines, depending on the environmental conditions. The pest may overwinter in a form of an egg, pupa or as an adult (OEPP/EPPO, 2005).

All aboveground parts of the tomato plant, in each developmental stage, can be infested by *T. absoluta*. Under greenhouse conditions, its continuous development results in the presence of all stages of pest throughout the entire growing season. The caterpillars have a strong preference for leaves and stems but they may also be found in, or under the crown of the fruit and in the fruit itself; small heaps of excrements are often found near the entrance hole. The most distinctive symptoms of the presence of the pest are the blotch-shaped mines that are visible on both sides of the leaf in which the caterpillars and dark, granular excrements can be found. In case of a serious infestation leaves die off completely, while mining damage to the stems causes malformation of the plant. The caterpillars can tunnel into the fruit and leave only a surface hole visible, and/or may mine just below the surface, creating a yellow-coloured fruit mine. Damage to the fruit may give easy access to diseases, causing decay of the fruit. Losses up to 100 % have been reported in the tomato crops, and even where the control programmes are implemented, losses can still exceed 5 % ([www.fera.defra.gov.uk](http://www.fera.defra.gov.uk)).

In 2010, the Institute for Plant Protection conducted the monitoring of *T. absoluta* in the tomato protected production in 8 counties in Croatia, along the Adriatic coast and the continental part, along with the Slovenian border.

## 2 MATERIALS AND METHODS

The monitoring of *T. absoluta*, in tomato plantations in greenhouses, was carried out from April to July 2010, on 19 localities total in 8 counties in Croatia. Eventual presence of the species was established by the visual inspection of the tomato plants, based on the symptoms of larvae feeding and by hanging sex pheromone traps above the plants.

Two visual inspections of the tomato plants were done on each locality. Tomato plants were controlled on the presence of the blotch-shaped mines on the leaves and caterpillars and their dark frass inside them, than on entrance holes and small heaps of excrement nearby on the stems and finally on the presence of entrance holes and caterpillar's excrements on the fruits or yellow-coloured mines just below the fruit surface. *T. absoluta* adults in tomato plantations in greenhouses were detected by using the delta type traps with pheromone dispenser, containing a species specific sex pheromone "Pherodis". The capsules release a scent which lures adult males into the trap. There they get trapped on the adhesive plate. The traps were hanging about 10 centimetres above the plants, in the amount of 1 trap/greenhouse on each locality, except on the localities Jankolovica and Turanj where 2 traps were placed.

After approximately one month from installation, the traps were removed from the greenhouses and analysed in the laboratory. The species of male moths that were caught in

the traps was identified using the classical identification method, according to their morphological characteristics. Identification was performed through comparison of a genital dissection of several adult males (Figure 1) with the reference material obtained from the Agriculture and Forestry Service Nova Gorica, Slovenia, with the literature descriptions (Espinosa and Sannino, 2009; Viggiani *et al.*, 2009) of the species and a photo material of a dissection by J.F. Germain on the EPPO-website. Male genitalia of *T. absoluta* were slide-mounted in Canada balsam as a permanent microscopic slide. For an accurate identification, a stereomicroscope (Nikon SMZ 800) and a compound microscope (Nikon Eclipse E200) were used.



Fig. 1: Microscopic slide of *Tuta absoluta* male genitalia

### 3 RESULTS AND DISCUSSION

During the monitoring of the South American tomato moth in 2010 in Croatia, a total of 38 visual inspections of tomato plants in greenhouses were carried out and 21 sample traps has been collected and analyzed.

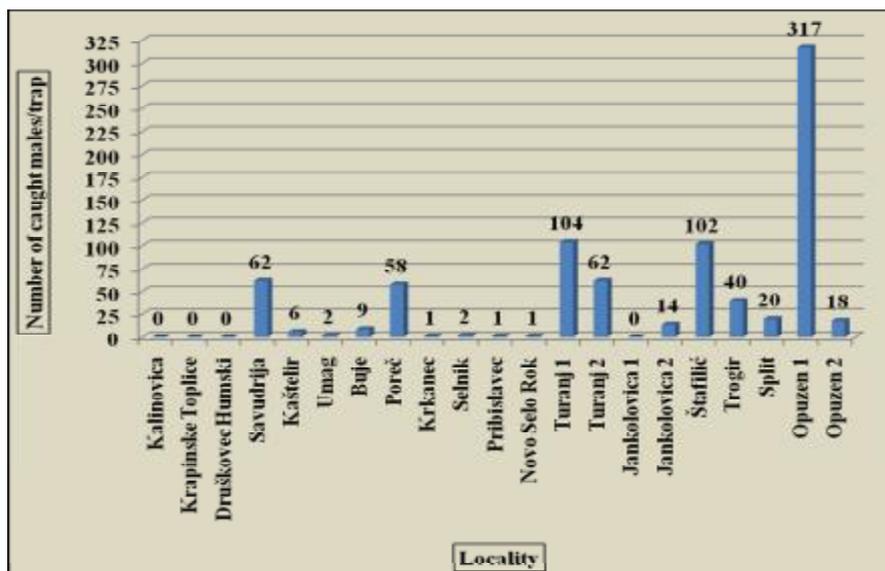


Fig. 2: Number of *Tuta absoluta* male moths caught in the sex pheromone traps

Species *T. absoluta* was identified in 17 samples. The number of males caught in the traps was ranged from 1 to even 317 moths per 1 trap (Figure 2). A pest was not detected in traps

hanged in the tomato plantations in greenhouses in the county of Krapinsko-zagorska and in the city of Zagreb. In the north-western counties of Croatia, the number of *T. absoluta* male adults caught in the traps was very low. The number of moths of *T. absoluta* caught in the Croatian coastal counties was medium, high or very high.

By using the methods listed, the species *T. absoluta* was reported on totally 16 localities in 6 counties of Croatia (Figure 3). The research has shown that the intensity of the symptoms and damage inflicted by the *T. absoluta* caterpillars, on tomato plants in greenhouses, was positively correlated with the number of adults found in the traps. Economically significant damage from South American tomato moth was observed in protected tomato crops in the county of Zadarska (estimated direct damage to fruit 1-10 %), Splitsko-dalmatinska (estimated direct damage to fruit 1-15 %) and Dubrovačko-Neretvanska (estimated direct damage to fruit 1-10 %).



Fig. 3 Finding places of the species *Tuta absoluta* in Croatia in 2010

#### 4 CONCLUSIONS

The results of monitoring in 2010 show that the species *T. absoluta*, after its first discovery in December 2009, expended rapidly both in Croatia, as in the other Mediterranean countries. The species *T. absoluta* has acquired the status of economically important pest of tomato in the greenhouses, both in central and southern Dalmatia. Monitoring of the species *T. absoluta* in the tomato protected production in Croatia will continue in 2011 in the counties in which the pest was not detected in 2010, as well as in the counties that were not included in the survey during 2010.

## 5 REFERENCES

- Espinosa, B., Sannino, L. 2009. *Tuta*, *Keiferia* e *Phthorimaea*, tignole da tenere sotto controllo. L'Informatore Agrario, 29: 56-58.
- Fera 2009. Plant Pest Factsheet - *Tuta absoluta*. Available at: <http://www.fera.defra.gov.uk>.
- Gotlin Čuljak, T., Ražov, J., Gomboc, S., Grubišić, D., Juran, I., Žanić, K. 2010. Prvi nalaz lisnog minera rajčice *Tuta absoluta* Povolny, 1994 (Lepidoptera: Gelechiidae) u Hrvatskoj. Glasilo biljne zaštite, 4/2010: 273-281.
- OEPP/EPPO 2005. Data sheets on *Tuta absoluta*. OEPP/EPPO Bulletin 35: 434-435.
- OEPP/EPPO 2008. First report of *Tuta absoluta* in Spain. EPPO Reporting Service No. 1.
- Viggiani, G., Filella, F., Delrio, G., Ramassini, W., Foxi, C. 2009. *Tuta absoluta*, nuovo lepidottero segnalato anche in Italia. L'Informatore Agrario, 2: 66-68.