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DISCOVERY AND IMPACT OF THE SPOTTED WING DROSOPHILA (DROSOPHILA SUZUKII) (MATSUMURA 1931) (DIPTERA: DROSOPHILIDAE) IN A MIXED RASPBERRY AND BLACKBERRY PLANTATION IN PERIȘOR, DOLJ, ROMANIA

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ABSTRACT

The study examines the signaling of the pest Drosophila suzukii (Matsumura 1931) (Diptera: Drosophilidae) in a mixed raspberry and blackberry plantation in Perișor, Dolj, in the Oltenia region of Romania. The main objective is to assess the impact of the pest on the crops and to explore control measures. Monitoring the presence of the pest, analyzing its insecticide tolerance, and evaluating its effects on fruit quality are the main aspects investigated. The importance of early detection and the implementation of efficient management strategies to minimize crop losses are highlighted. Drosophila suzukii has become a global threat to fruit crops, causing significant economic losses (Roșca, M., et al., 2021).

INTRODUCTION

Fruit-bearing plants constitute an essential component of agriculture and the global economy, providing the production of delicious and healthy fruits for human consumption. However, the horticultural industry faces increasing challenges due to the invasion of the pest *Drosophila suzukii*, also known as *the spotted-wing drosophila or the Japanese fruit fly.* This insect species has become a major pest for fruit crops, including raspberries and blackberries, causing significant economic losses in regions where it is present (Roșca, M., et al., 2021).

Drosophila suzukii, known as the spotted-wing drosophila, was first identified in Japan in 1931. Subsequently, in 2008, it was reported in Italy, and in 2009, it was confirmed in the United States of America. In the following years, it was identified in Spain (2010), France (2011), Germany (2012), Canada (2013), Australia (2015), and China (2016). In Romania, the species was reported in 2013 (Chireceanu & Chiriloaie 2014).

Infestation with *Drosophila suzukii* has become a major concern for the horticultural industry in numerous countries worldwide, and the effective monitoring and management of this pest remain essential priorities to protect fruit crops.

Females have a yellow or brown body, with a size ranging between 3.2-4 mm, but not exceeding 4 mm [20]. Their antennae are short and round, featuring branched arista, while their eyes are red. Wings are transparent, without any

coloration around the veins. The final abdominal segment shows uninterrupted transverse bands, and the legs lack spurs. The ovipositor is sharp, resembling a saw with darker teeth compared to the rest of the ovipositor (Hauser 2011).

Males, on the other hand, have a body length of about 2.6-2.8 mm and a yellow or brown color [20]. Their eyes are red, and the wings feature a dark spot located towards the tip, centered on the leading edge. This spot may or may not be present in certain male populations. The final abdominal segment of males shows uninterrupted transverse bands of a darker color.

Regarding the developmental stages, the egg is oval, translucent, shiny white, with a length of 0.6 mm and a width of 0.2 mm. Two white filaments can be observed on the subapical part (Toševski et al. 2014).

The larva is white and cylindrical, with black-colored mouthparts. The front part of the body is conical, and the respiratory stigmata are prominent. The length of larval stages varies between 0.7-3 mm. Internal organs become visible, especially after the larva feeds (Calabria et al. 2012).

The pupa measures approximately 2-3 mm in length and 1 mm in width. Initially, it has a greenish color, then becomes brown, and finally yellow (Walsh et al., 2011).

The Oltenia region of Romania was not an exception to the threat posed by the *Drosophila suzukii* pest. In 2018, a study conducted by Roșca and colleagues documented the presence and spread of this pest in raspberry and blackberry plantations (Roșca et al. 2018). This raised concerns among fruit growers in the area, as infestations of the spotted-wing drosophila can lead to significant crop losses and impact the economic viability of the plantations.

With the aim of better understanding the dynamics of the *Drosophila suzukii* invasion in the Oltenia region and identifying effective pest management measures, we conducted this study in a mixed raspberry and blackberry plantation located in Perișor, Dolj. This area was chosen for monitoring due to the prevalence of fruit crops and to assess the impact of the spotted-wing drosophila on them.

Our main objective was to investigate the presence of the *Drosophila suzukii* species in the plantation and evaluate its impact on fruit quality. Within the study, we conducted extensive monitoring, including analyzing harvested fruits and using traps equipped with ripe raspberry fruits to attract the spotted-wing drosophila. We also performed morphological examinations using magnifying glasses and microscopes to confirm the presence of the spotted-wing drosophila and to identify its eggs and larvae.

In this context, this article aims to provide new data and valuable information regarding the *Drosophila suzukii species* and its impact on fruit crops in the Oltenia region. The obtained results will contribute to the development of efficient pest management strategies, allowing for the minimization of losses at the crop level and safeguarding the economic viability of fruit production in this region.

MATERIALS AND METHODS

The study was conducted in a mixed raspberry and blackberry plantation, predominantly of the *Polka* variety, located in Perișor, Dolj. The presence of the *Drosophila suzukii* species was monitored during the time interval spanning from the second decade of August to the end of the harvesting period, which took place on November 10th.

The monitoring included the analysis of harvested fruits and the use of homemade traps (Figure 1) equipped with ripe raspberry fruits and adhesive strips. Morphological examinations were performed using magnifying glasses and microscopes to confirm the presence of the *Drosophila suzukii* species and to identify its eggs and larvae.

Figure 1. Homemade Traps for *Drosophila suzukii* (original)

RESULTS AND DISCUSSION

The monitoring confirmed the presence of the Drosophila suzukii species in the raspberry and blackberry plantation in Perișor. Eggs (Figure 2) and larvae (Figure 3) were identified in the analyzed fruits, indicating infestation by *the spotted-wing drosophila*. Morphological examinations allowed for the precise identification of the pest. Infestation by *Drosophila suzukii* had a significant impact on fruit quality, rendering them susceptible to rapid softening and deterioration, making them unsuitable for commercialization (Roșca et al. 2020). Early detection of the pest is crucial for implementing effective management strategies to minimize crop losses and to maintain the economic viability of the plantation. The pest's tolerance to insecticides was evaluated, highlighting potential challenges in the use of conventional control methods (Bălănescu et al. 2022). Therefore, the adoption of an integrated pest management approach is recommended, involving cultural practices, biological control agents, and selective insecticides to efficiently control the infestation.

Early detection and continuous monitoring are crucial for prompt actions and successful prevention of significant crop losses. This study provides valuable insights for horticultural practices aimed at combating infestations of *Drosophila suzukii* and protecting fruit crops in the Oltenia region.

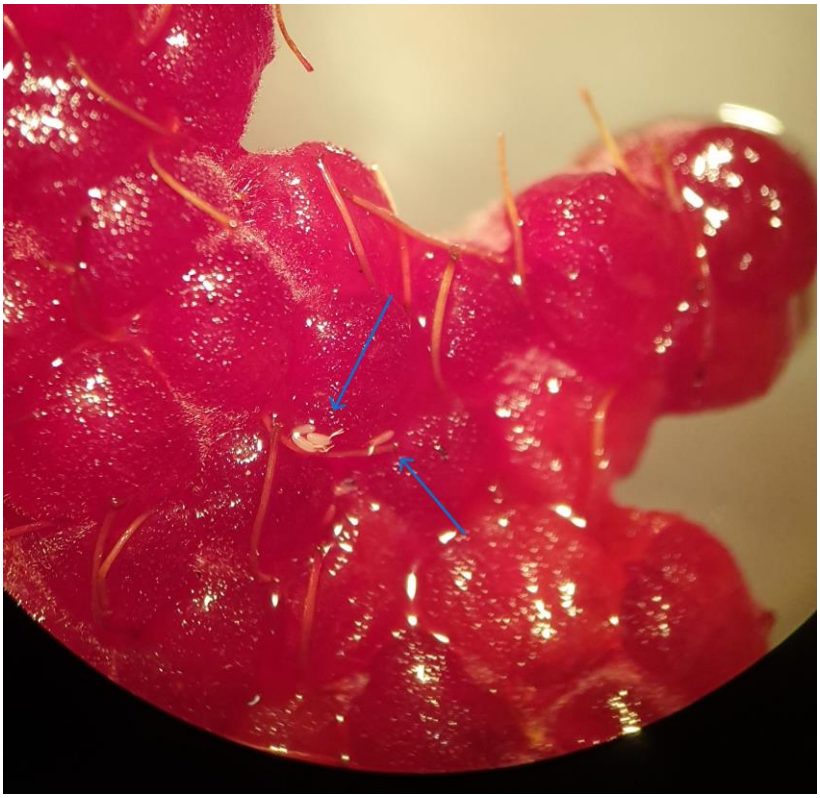

Figure 2. *Drosophila suzukii* Eggs on the Exterior Surface of Raspberry (original)

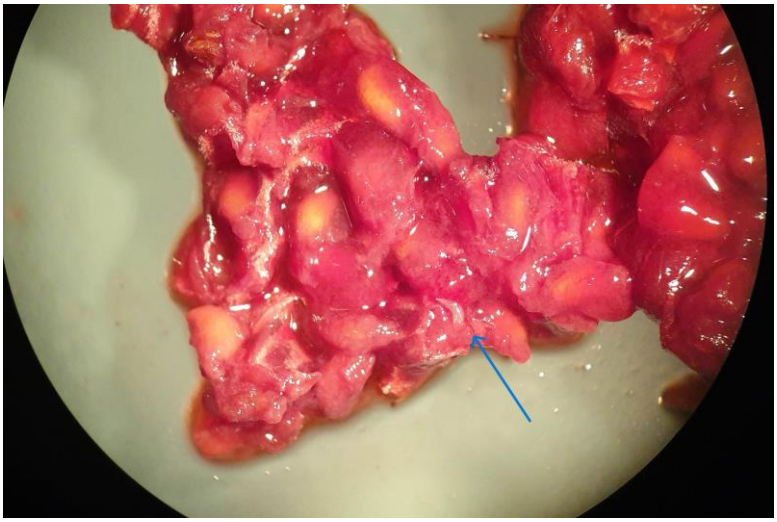

Figure 3. *Drosophila suzukii* Larva on the Inner Surface of Raspberry (original)

Figure 4. *Drosophila suzukii* Pupa (original)

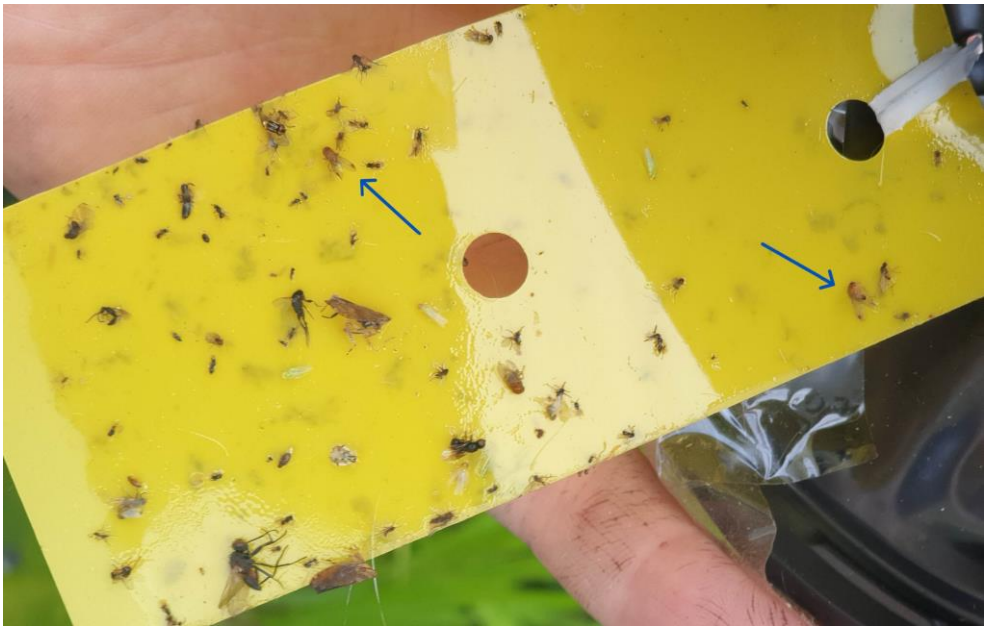

Figure 5. Adult *Drosophila suzukii* Identified in Traps (original)

CONCLUSIONS

The discovery of the *Drosophila suzukii* species (Figure 5) in the mixed raspberry and blackberry plantation in Perișor, Dolj, underscores the importance of implementing effective pest management strategies. Early detection and continuous monitoring are vital for minimizing the impact of the pest on crop yields and preserving fruit quality. This study provides valuable contributions to horticultural practices aimed at reducing the economic losses caused by infestations of *Drosophila suzukii*.

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