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First results with the release of *Trissolcus cultratus* Walker for the control of the red legged stinkbug *Pentatoma rufipes* L.

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Abstract

The red legged stinkbug Pentatoma rufipes L*. has developed into a serious apple and pear pest in in several regions of Southern Germany. For a successful control in organic orchards there are no sufficient measures available. In a collaboration of Katz Biotech AG and the University of Hohenheim it has been tested, if the release of* Trissolcus cultratus *Walker, an egg parasitoid of* P. rufipes*, which is most frequently found in the region, could be an efficient part of a combination strategy for the control of this pest.*

First results show an efficacy of mass release T. cultratus *of 60 to 88 % on the occurrence of the nymphs in autumn depending on the number of parasitoids released and the number of releases.*

Keywords: *Pentatoma rufipes, Trissolcus cultratus*, inundative biocontrol

Introduction

The red legged stink bug *Pentatoma rufipes* L. (Hemiptera, Pentatomidae) is known to cause serious damage in pear for more than a decade and, as observed in the region of Lake Constance since 2019, causing also considerable damage in apple. In several egg samples in this region, the egg parasitoid *Trissolcus cultratus* was found. Since the observed parasitation rate was remarkably high (Al karrat et al., 2020, 2022), a project funded by Deutsche Bundesstiftung Umwelt was started in 2022 to rear and release this parasitoid species as part of a potential control strategy in organic farming. In this abstract, the first results of this project are presented.

Material and Methods

Field tests were carried out in organic pome fruit orchards with high infestation of *P. rufipes,* where no parasitized eggs were found in the previous years. The orchards were split across the rows into two plots, each plot consisted in 4 rows in 2022 and 6 rows in 2023 with 33-35 trees in each row. Between the plots with release of *T. cultratus* and the untreated control plot, a buffer zone of ca. 60 m was left without treatments. For each release point a cardboard roll was prepared with parasitized eggs together with a piece of paper glued with honey to provide energy for newly emerged parasitoids.

In the two middle rows the efficacy on the hatched nymphs was assessed by beating trap samples. In 2022, in the same rows, egg masses were sampled to assess parasitization. In 2023, 6 rows were used for the trial. The two rows in the middle were used for the beating trap samples, the adjacent rows for egg samples and the border rows were not assessed.

Results and Discussion

The trial in 2022 showed that the parasitization rate of the eggs was above 76 % in both repetitions, where about 30 parasitoids per each third tree were released two times. In the control plots no parasitization was found. The efficacy (Henderson-Tilton, 1955) in reduction

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of the number of hatched nymphs was also 88 % in the first plot and about 65 % in the second plot. When only 10 parasitoids each third tree were released, the parasitization rate of the eggs ranged between 22% and 53 % and the efficacy on the number of nymphs was lower (about 65 % in both plots).

In the trial in 2023, the first release was conducted under a difficult climatic situation, when egglaying had already started. Thus, at the first control date of egg parasitization, the parasitization rate was low in all plots (about 22 to 40 %). Later, however, it increased considerably up to 100 % in some plots.

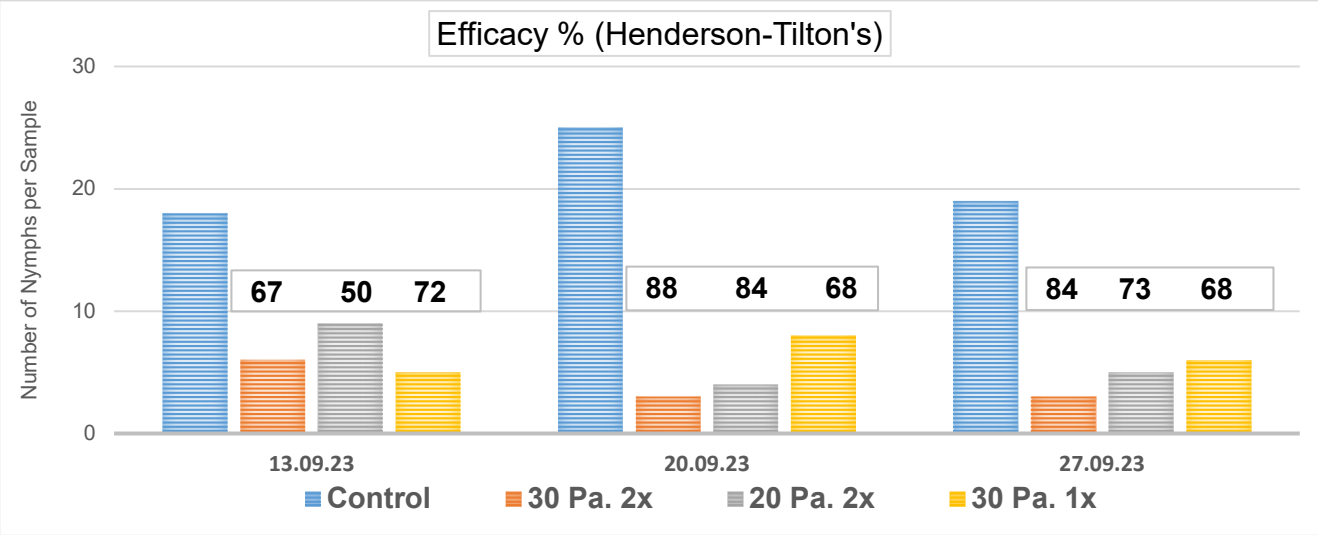

Figure 1: Number of nymphs of *P. rufipes* found in control and treatments after release of different numbers of *T. cultratus*. (Efficacy % calculated according to Henderson-Tilton's) in the trial of 2023.

The efficacy according to Henderson-Tilton on the occurrence of nymphs was higher when 30 parasitoids were released two times, it varied from 67 to 88 % during the three assessment dates (Figure 1). For the release of 20 parasitoids two times it varied between 50 and 84 %. When 30 parasitoids were released on each 3rd tree only once, the efficacy ranged between 72% and 68% (Figure 1).

Table 1: Efficacy (Henderson-Tilton) in % on the occurrence of nymphs (of the parasitoid *T. cultratus* after release of 30 parasitoids once each 5th tree in two plots: 1: with flower strip, 2: without flower strip compared to untreated control (no parasitism observed).

Time after release of the parasitoids	Efficacy in % with flower strip	Efficacy in % without flower strip
After 4 weeks	67.7	54.8
After 5 weeks	84.6	82.1
After 6 weeks	82.9	77.1

Test to assess the effect of flower strips on parasitoid efficacy: The efficacy was only slightly higher in the flower strip plots compared to the plots without flower strips (Table 1). In both plots a single release was sufficient. However, it has to be considered that in the plot without flowering strips, flowers were also available for some time since due to the climatic conditions mowing was not possible for the farmer.

Recovery and establishment of *T. cultratus*: The parasitoids released in 2021 and 2022 in the tests to control the red-legged stinkbug has been found each year since it was first time released in these orchards. The parasitoids were observed in the vegetation in the alleys between May and June and in the tree canopy in August.

Discussion

These first results indicate that the release of *T. cultratus* can be a promising component of the control strategy of the red legged stinkbug in organic orchards. This pest has developed into a serious apple pest in the last years in several regions of Southern Germany (Al karrat et al., 2020, 2022).

Acknowledgements

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Citation of the full publication

The citation of the full publication will be found on Ecofruit website as soon as available.