Does the Red Color Enhance Spotted Wing Drosophila Response to Traps Baited with Diluted Concord Grape Juice?

Lyndsey A. Ware, Elizabeth W. Garofalo, Elsa Petit, and Jaime C. Piñero
University of Massachusetts Amherst

Spotted wing drosophila (SWD), *Drosophila suzukii*, is an invasive vinegar fly. The female of this species possesses a serrated ovipositor, enabling her to lay eggs in sound, ripening fruit unlike other vinegar flies which only inhabit damaged or rotting fruits and vegetables. This knife-like ovipositor enables the female of this species to penetrate firm fruit surfaces and lay her eggs inside where larvae subsequently hatch and feed, causing damage to fruit and dismay to consumers. To time insecticide sprays effectively and mitigate damage caused by SWD, growers need to monitor SWD populations.

For the past two years we have been evaluating the attractiveness of diluted Concord grape juice, a low-cost and readily available material, to male and female SWD. When diluted at a ratio of 1:3 (= 1 part of grape juice and three parts of water), diluted grape juice showed to be three times more attractive to males and females than one commercial lure under field conditions. In addition, grape juice diluted at the 1:3 ratio attracted significantly fewer (about three times less) non-targets than one commercial lure, highlighting a potential greater selectivity of diluted Concord grape juice (see Piñero et al. [2019]; *Fruit Notes* summer issue).

Appropriate combinations of visual and olfactory cues could be helpful for earlier detection or in attract-and-kill strategies for SWD control. In general, darker, less reflective colors have been proven to attract SWD. In our previous studies, we have used semitransparent traps. The present study was designed to quantify the extent to which color plays a role in SWD captures in traps baited with diluted Concord grape juice.

Materials & Methods

This study was conducted from August 8 to September 15, 2020, in one section of Frontenac wine grapes at the UMass Cold Orchard (Belchertown, MA). Once Covid-19-related restrictions were loosened and appropriate safety protocols implemented, team members were able to access the fields and execute this experiment. Traps used were 1 quart in capacity and had 12 pin holes punched around the rim. The holes were big enough to allow SWD adults to enter the trap but small enough to reduce captures of larger insects. Twistable wire extruding from a single hole in the lid allowed for trap deployment on the lower training wires between posts (Figure 1).

Figure 1. White- and red-painted traps used for the study.

We evaluated four treatments, dictated by the combination of two colors: red and white, and two baits: diluted Concord grape juice and wa-

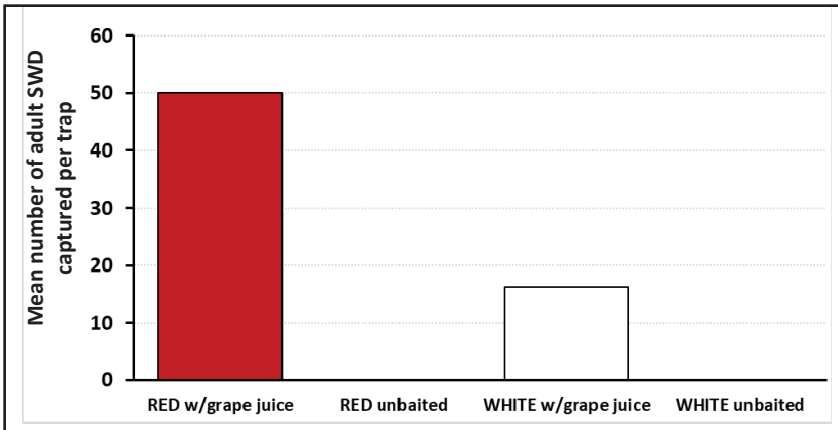

Figure 2. Average captures of male and female (data combined) spotted wing drosophila in red- and white-painted traps baited with either, diluted Concord grape juice or unbaited traps. Unbaited traps had 8 ounces of unscented soapy water to kill responding insects.

ter as a control. The traps and the corresponding lids were spray-painted red or white. Diluted grape juice was prepared by mixing two ounces of grape juice and six ounces of tap water. Water-baited traps had one drop of unscented soap to break the surface tension of water thereby making the insects sink.

On August 5, four sets consisting of four traps each (one for each color/bait combination) were deployed along the lower horizontal wire of the trellis. Each set was positioned in a different row, and considered a replicate. The distance between traps was 3 yards. Traps were positioned so that sunlight did not hit traps directly. To minimize fermentation effects, all traps were serviced twice a week. At each inspection session, all traps were retrieved and all insects were collected. Traps were then cleaned thoroughly with soapy water, rinsed with deionized water and refilled before being re-hung in the lower canopies. SWD captured were identified according to sex and non-SWD insects were recorded as non-targets.

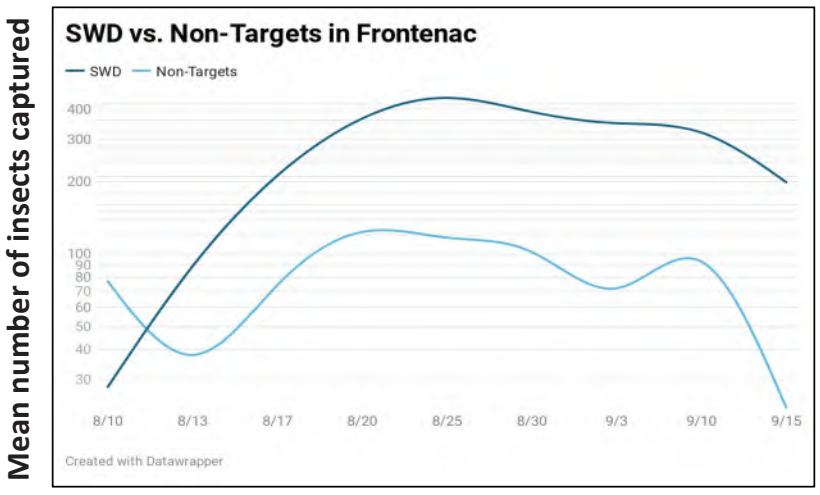

Figure 3. Captures of adult SWD and non-target insects in diluted Concord grape juice-baited traps according to date.

Results

Figure 2 shows that captures of SWD were strongly affected by trap color. Across the entire period of investigation, red-painted traps baited with diluted grape juice captured at least three times more adult SWD (males and females combined) than similarly-baited white-painted traps. Regardless of color, unbaited traps captured very few insects, and zero SWD.

As for captures of non-target insects, diluted Concord grape juice consistently attracted more SWD than non-target insects (3.6 times more, on average, across all trapping dates) except for the first (August 10) trapping date (Figure 3).

Conclusions

This study showed that by painting traps red captures of SWD in traps containing diluted grape juice are greatly enhanced, thereby demonstrating the importance of vision in this invasive species. This inexpensive trapping system can improve the 'bottom line' by saving on lure costs while maximizing SWD captures.

References

Piñero, J.C., Wen, X.J., and Begonis, E. 2019. Using diluted grape juice for early-season monitoring and its potential for Attract-and-kill of Spotted Wing Drosophila, *Drosophila suzukii*. Fruit Notes 84: 12-15.

ACN INC.®
SINCE 1905

Adams County Nursery, Inc.

Growers of Fruit Tree Nursery Stock

26 Nursery Road, Aspers, PA 17304

acn@acnursery.com • 717.677.8105 • www.acnursery.com