

POST HARVEST SWD MANAGEMENT

Crushing and Composting to Manage SWD in Waste Fruit



BACKGROUND:

Spotted-wing drosophila (SWD) (*Drosophila suzukii*) readily reproduces in unharvested fruit and fruit processing remnants. Removal of fruit resources and sanitation can reduce SWD local populations. For example, Leach et al (2018) demonstrated that increased harvest frequency and removal of dropped or waste fruit reduces populations by up to 60%. Burial of wastes has also been evaluated but research suggests that shallow burial is not effective at farm scales with depths of at least 10" (24 cm) needed to achieve 95% emergence reductions. Composting and crushing are two additional methods of fruit disposal. Composting waste apple pomace with >10% chicken manure by volume greatly reduces SWD reproduction (Fig. 1). Crushing waste tart cherries also greatly reduces SWD emergence (Fig. 2)

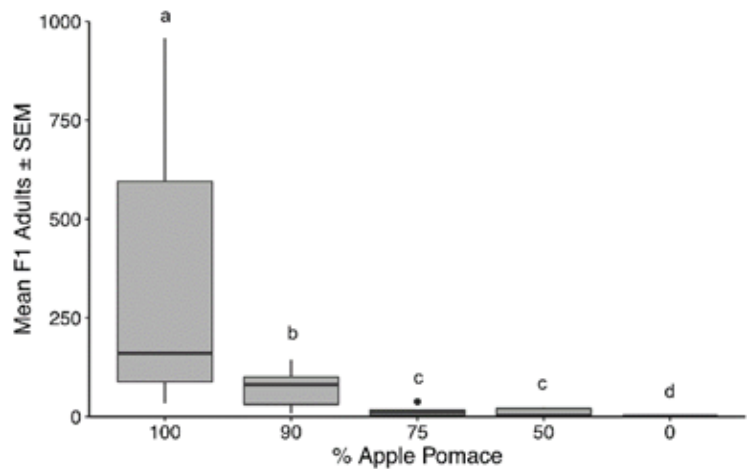


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Figure 1: Mean SWD offspring produced from apple pomace mixed with 0-90% poultry manure. The addition of even 10% manure nearly eliminated SWD reproduction. Data developed by Holly Hooper and Matt Grieshop.



QUESTIONS:

- Will manure reduce SWD use of waste cherries?
- How will sap beetles respond to manure?
- How scalable is this approach?

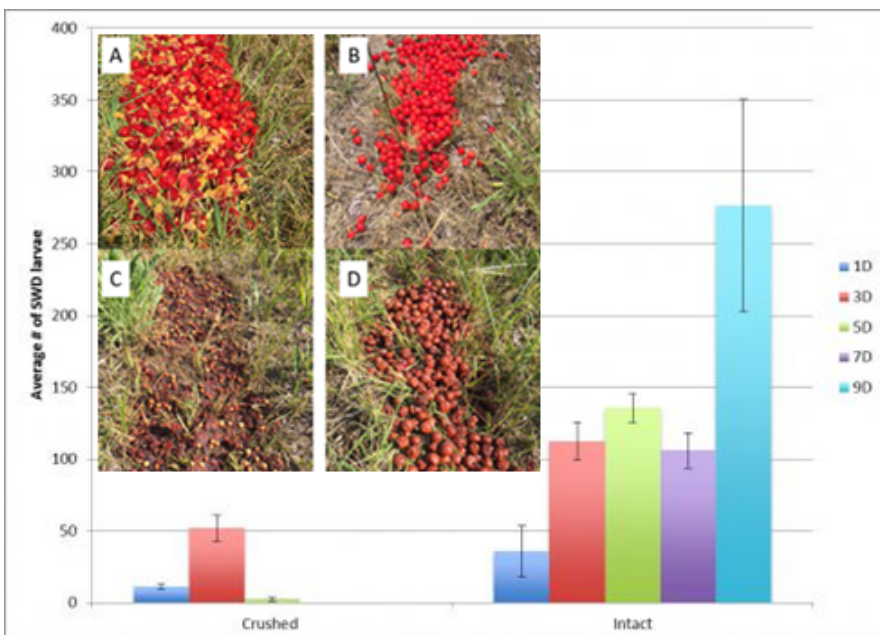


Figure 1: Mean SWD larvae collected from crushed or intact cherry wastes 1-9 days after crushing. Crushing completely eliminated SWD larvae after 5 days. Data developed by Nikki Rothwell and Emily Pochubay.

QUESTIONS:

- Will crushing scale to larger cherry piles?
- How will crushing affect sap beetles?

2021 EXPERIMENT:

- Waste cherry piles were established at 7 sites.
- Treatments were: a control (just cherries), 15% organic chicken manure and 85% cherries, 25% organic chicken manure and 75% cherries, and crushed cherries (Fig. 3)
- Tents were placed on top of piles of waste fruit and insects vacuum sampled weekly, subsamples were reared out in the lab and SWD traps placed around piles.

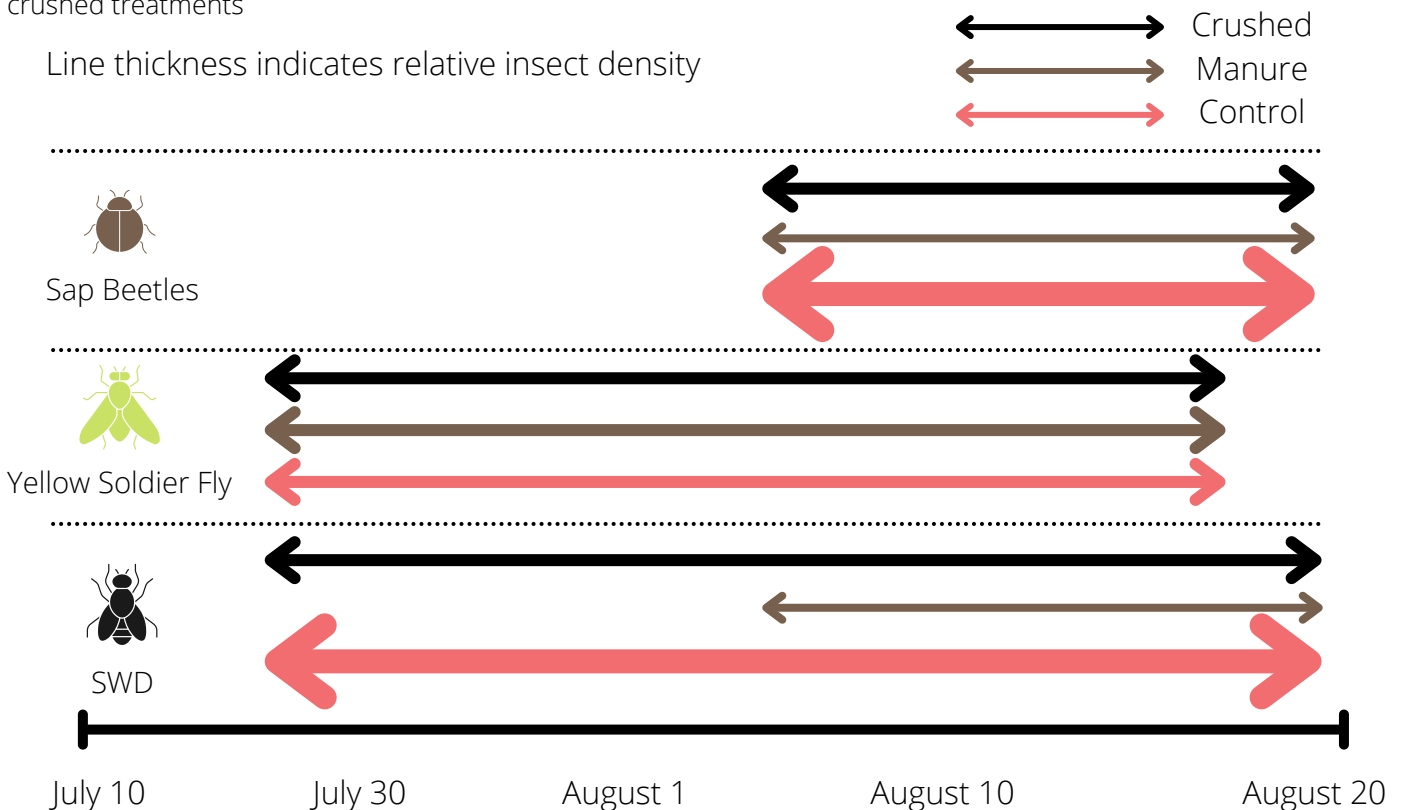
Figure 3: Waste cherry pile with tent and traps and closeups of control cherries, cherries mixed with manure and crushed cherries (left to right)



INITIAL OBSERVATIONS:

- Crushing waste cherries had a variable impact depending on depth and consistency of crush
- Piles containing 25% chicken manure had the least number of drosophila throughout the experiment
- Once drosophila started to decline, sap beetles began to increase. Sap beetles were less abundant in treatments with manure (Fig. 4).
- Yellow soldier flies were observed in many of the piles regardless of treatment. Black soldier fly have been shown to out compete SWD in fruit wastes but it is unknown whether yellow soldier flies will do this
- Controls had drosophila through the end of the study (8/24/2021)

Figure 4: Timeline and relative density of SWD, sap beetles and yellow soldier fly on control, manure and crushed treatments



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