POST HARVEST SWD MANAGEMENT

Crushing and Composting to Manage SWD in Waste Fruit

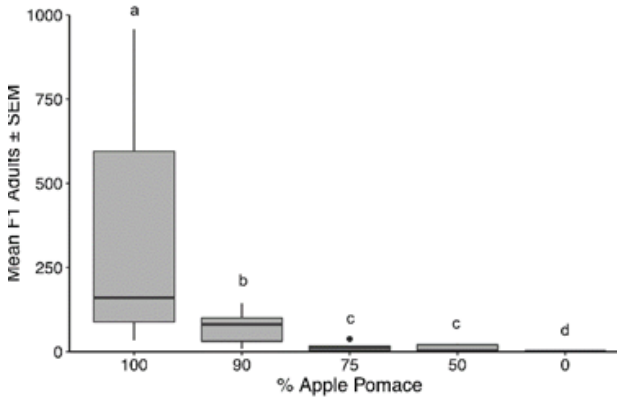
BACKGROUND:

Spotted-wing drosophila (SWD) (Drosophila suzukii*)* readily reproduces in unharvested fruit and fruit processing remnants. While some methods of management have been evaluated (Leach et al, 2018) the most common response to the invasive pest has been intense and expensive IPM programs. The following research has been conducted to evaluate composting (Fig 1), the addition of Nitrogen based fertilizers (Fig 2), and crushing waste tart cherries (Fig 3) as methods for managing SWD in waste fruit.

MSU Northwest Horticultrual Research Center Field Day
September 7, 2022

Charlotte Schuttler
Matthew Grieshop
Nikki Rothwell
MSU Entomology & MSU Extension

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:

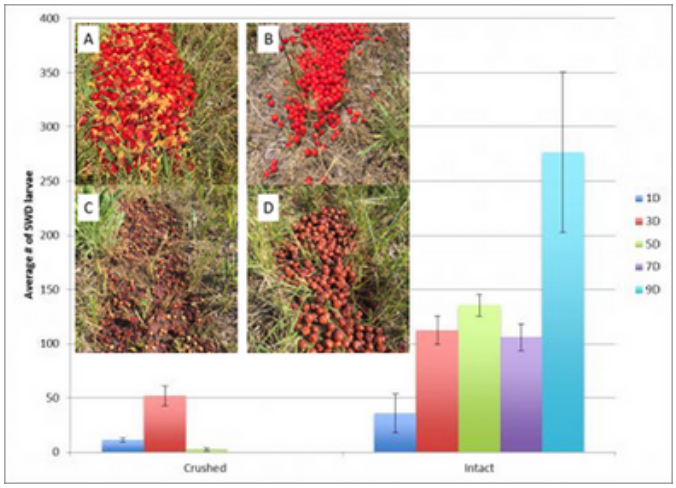
- Will manure reduce SWD use of waste cherries?
- How will sap beetles respond to manure?
- How scalable is this approach?

Figure 2: The addition of poultry manure to waste fruit impacts SWD infestation. Nitrogen based fertilizers (Urea, Potassium Nitrate, Magnesium Nitrate, Calcium Nitrate, Ammonium Sulfate) were added to apple pomace. Each mixture contained 10gN (comparable to the amount of Nitrogen in trials with organic poultry manure.) No Nitrogen treatments had SWD eggs or infestation in a lab setting (only control)

QUESTIONS:

- Does Nitrogen affect SWD reproduction in manure (or other treatments)?
- Can soluble Nitrogen-based fertilizers can be used to manage SWD?
- How scalable is this approach?

Figure 3: 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?

2022 EXPERIMENT:

- Waste cherry piles were established at 5 sites.
- Treatments : a control (just cherries), a seeded control (200 swd added for egg-laying and then removed), 15% organic chicken manure and 85% cherries, 25% organic chicken manure and 75% cherries, crushed cherries, cherries with added urea (soluble Nitrogen) (Fig. 4)
- Tents were placed on top of piles of waste fruit with a yellow sticky card changed weekly. Insects vacuum sampled weekly, subsamples were reared out in the lab and SWD traps placed around piles.

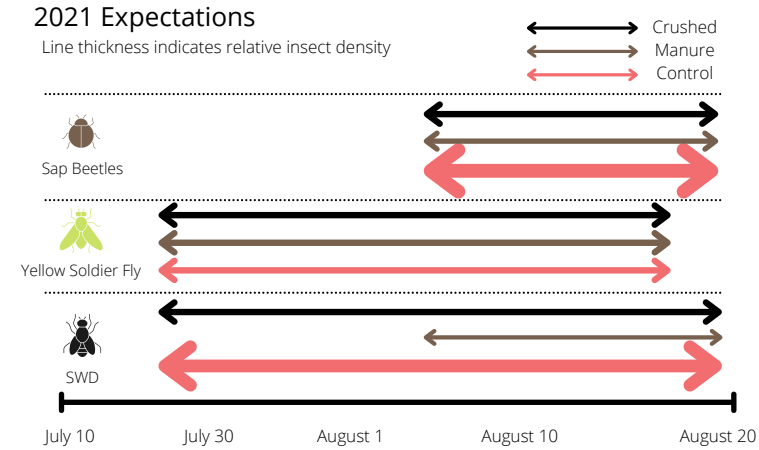


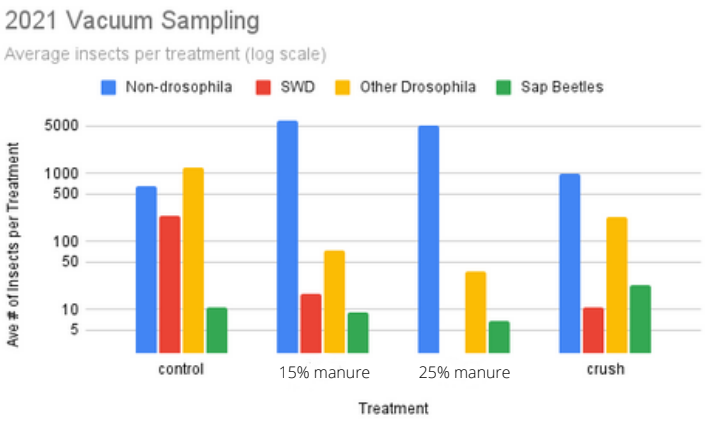
Figure 4: Waste cherry pile with tent and traps and closeups of control cherries, cherries mixed with manure and crushed cherries (left to right)

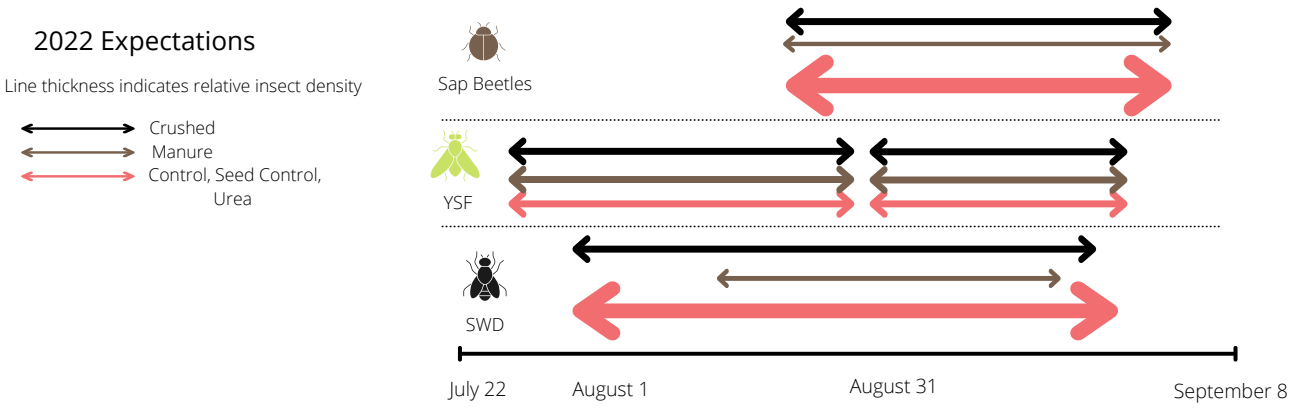
OBSERVATIONS:

- Crushing waste cherries had a variable impact depending on consistency of crush and pile placement
- Piles containing 25% chicken manure had the least number of drosophila, SWD, and sap beetles (Fig 5)
- Once drosophila started to decline, sap beetles began to increase
- 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
- Urea (soluble Nitrogen) treatments had more drosophila than the controls

Figure 5: Timelines and relative density of SWD, sap beetles and yellow soldier fly on control, manure and crushed treatments for 2021 and 2022 (with added treatments)







Acknowledgements: Heather Leach and Cherry Bay Orchards, Myron Anderson, Gene Garthe/ Garthe Farms, MSU Northwest Horticulture Research Center Staff, Herbrucks Poultry Ranch, Denny Farms
This project is funded by NCRSARE