

# Are there natural enemies of spotted wing drosophila in Virginia?

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# Introduction

- **Spotted wing drosophila** (*Drosophila suzukii*): invasive economic pest of small fruit production in North America [1, 2]
- **African fig fly** (*Zaprionus indianus*): another concerning invasive fly [3, 4], which has been observed concurrently with SWD infestations in Virginia – especially during late season
- **Potential for biological control using local natural enemies (parasitoids)?**



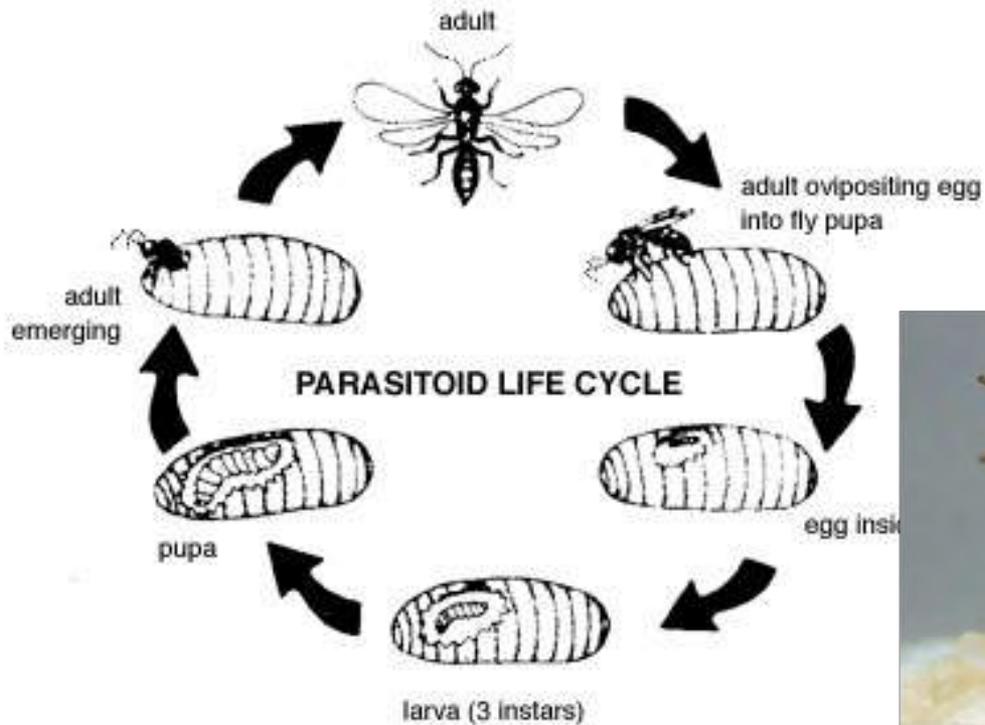
1. Hauser 2011. Pest Manage. Sci. 67: 1352-1357. 2. Walsh et al. 2011. J. Integ. Pest Manage. 2: 1-7.

3. da Mata et al. 2010. Biol. Invasions 12: 1231-1241. 4. van der Linde et al. 2006. Fla. Entomol. 89: 402-404.

# What is a parasitoid?

- Adult lays egg in, on, or near host
- Parasitoid egg develops into larva, then eats host while host is still alive
  - Host provides nourishment for parasitoid larva to develop into adult
- A successful parasitoid **always kills the host**

# What is a parasitoid?



# Research Questions:

- 1) Which parasitoids of drosophilids are present in southwest VA small fruit production?
- 2) Can native parasitoids successfully attack SWD and/or AFF in the field and in the laboratory?

# Sentinel Trapping

- 2015 field season: Sentinel traps placed in cherry orchard, caneberry field, blueberry farm, and two vineyards in SW Virginia
- Each sentinel trap contained fruit infested with larvae of common vinegar fly (*D. melanogaster*), SWD, AFF, or was left uninfested for control traps
- After 3-4 d in the field, baits were brought back to lab where larvae completed development



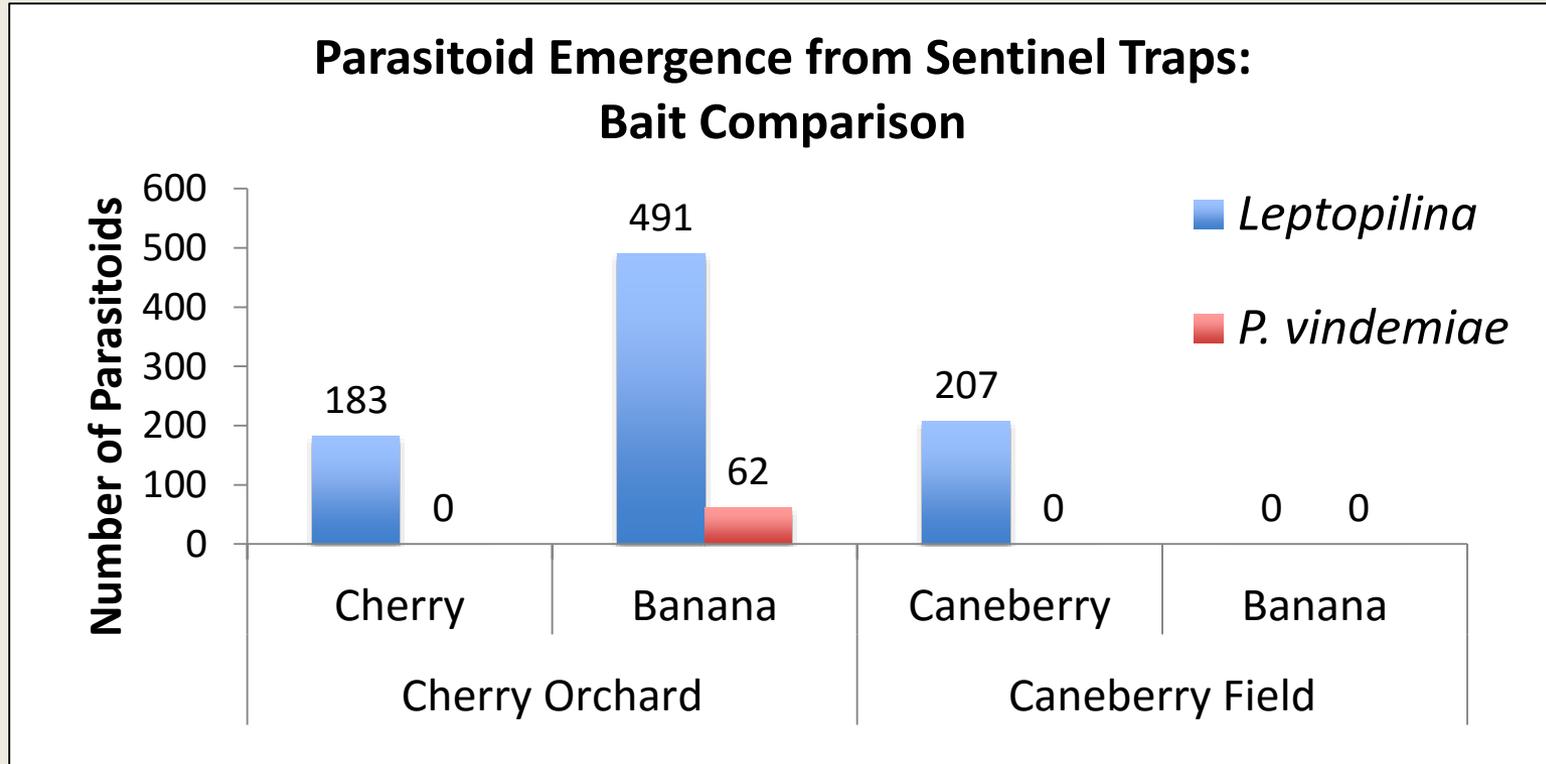
# Sentinel Trapping Results

- Larval parasitoid *Leptopilina* spp. (Figitidae) most abundant parasitoid reared from traps
- Pupal parasitoid *Pachycrepoideus vindemiae* (Pteromalidae) reared in lower numbers



Photos by Paul Marek

# Sentinel Trapping Results



- From cherry orchard, one *P. vindemiae* reared from one SWD. Rest of parasitoids reared from *D. melanogaster* or other ambient drosophilids that infested traps
- From caneberry field, all parasitoids reared from *D. melanogaster* or other wild drosophilids
- No parasitoids reared from other sites, and none reared from AFF

Why didn't SWD and AFF get  
parasitized?

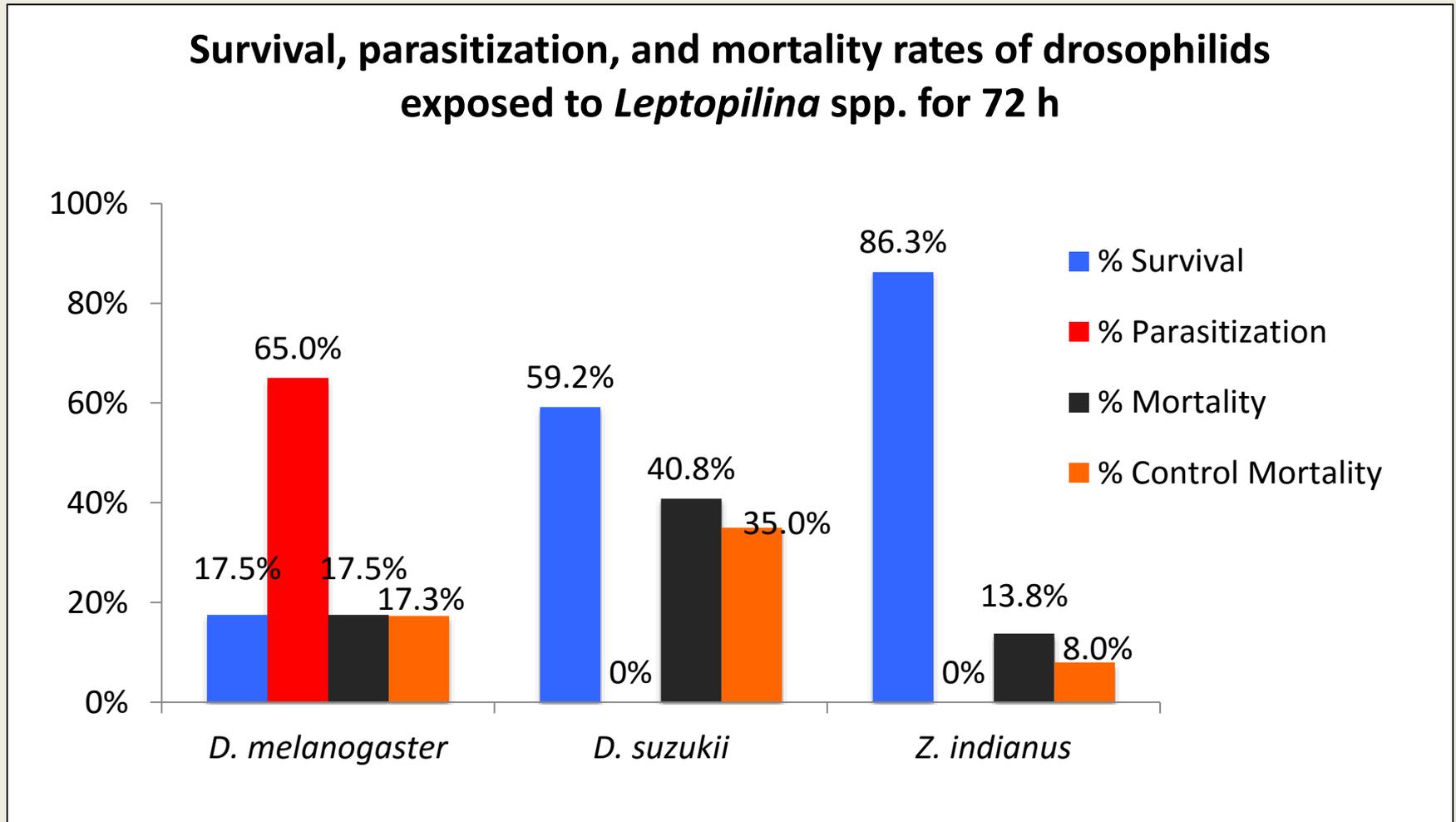
# Parasitization Bioassay

- Larvae of *D. melanogaster*, SWD, and AFF exposed to mated females of *Leptopilina* for 72 h
- Larvae allowed to complete development and observed for parasitoid emergence



# Parasitization Bioassay Results

- SWD and AFF avoided parasitization by *Leptopilina*... why?



# Immune response encapsulates, kills parasitoid eggs

- Dissections of larvae from bioassay showed encapsulation of parasitoid eggs
- Capsules even visible in adult flies
- High hemocyte load allows for effective encapsulation [1]



# What about the pupal parasitoid?

- Parasitization bioassays in progress
- Initial results indicate *P. vindemiae* does have success attacking SWD
- However, *P. vindemiae* is a generalist, so does not specifically seek out SWD or other vinegar flies



# Main Conclusions

- Native parasitoids in VA are not likely to be successful biological control against SWD or AFF
  - SWD and AFF have **enhanced resistance to parasitization by *Leptopilina***
  - Because *P. vindemiae* is a generalist, **parasitization by this species likely to be insignificant** on SWD and AFF
- These results support the case for **classical biological control**
  - There is still hope!



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