WHERE DO SPOTTED WING DROSOPHILA GO IN THE WINTER?

Heather Leach, Jaclyn Stone, and Rufus Isaacs
Department of Entomology, Michigan State University
East Lansing, MI 48824

WHAT'S A WINTER MORPH?

SUMMER MORPHS

WINTER MORPHS

Winter morphs form when spotted wing Drosophila (SWD) eggs or early instar larvae are subjected to cold temperatures ($\leq 10^\circ C/50^\circ F$). They take 3 times longer to emerge as adults at $10^\circ C/50^\circ F$ than at $25^\circ C/77^\circ F$. Summer morphs can live for 1 month in colony, while winter morphs can live for >13 months in colony. Winter morphs are darker, have a smaller body, and longer wings (Shearer et al. 2016; Wallingford et al. 2016). They can withstand colder temperatures, have decreased egg production, and reduced cell division (Shearer et al. 2016).

SWD likely experience severe climatic pressure during the winter, thereby reducing the surviving population in the spring. Our objectives were to better understand SWD winter biology, including their phenology, survival, and reproductive capacity, which can help us control this pest while it's population is low.

CAN THEY SURVIVE?

After placing winter morphs under the leaf litter in late November, we found that there was no survival past 6 weeks (Figure 4).

However, temperature under the soil stayed above freezing (green line), indicating it's potential for an overwintering site.

CAN THEY REPRODUCE?

Summer morphs can lay more eggs than winter morphs at all temperatures tested.

But, when winter morphs are acclimated to 48 hours of warm temperatures, they can lay more eggs than unacclimated flies.

SUMMARY

Winter morphs appear in October and until no more flies are caught after December.

Flies overwintering underneath the leaf litter and in the soil can remain in above freezing temperatures throughout the duration of the winter.

After being exposed to warmer temperatures for 2 days, winter morphs have a greater reproductive capacity, allowing them to begin laying eggs during the spring.

SWD likely go through a bottleneck period, with few flies surviving winter and starting the spring population, making this time a potential opportunity to manage SWD.

Research is ongoing, and we are focused on understanding where flies overwinter on farms, how annual shifts in winter temperatures affect their survival, and how we can trap them in the spring.