Introduction

*Drosophila suzukii* Matsumara is an invasive vinegar fly (Fig 1) that was first detected in the U.S. in 2008. *D. suzukii* was reported in Wisconsin in 2010. Since then, *D. suzukii* has been reported every year with infestations primarily affecting fall-bearing raspberry production, however it can utilize both cultivated & wild hosts. It is confirmed & affecting soft skinned fruit crops in North America, South America & Europe. As of 2015, *D. suzukii* has been confirmed in 42 counties in Wisconsin & is suspected in an additional 7 counties (Fig 2).

**Objectives**

1: Describe *D. suzukii* phenology
2: Identify the presence & abundance of seasonal morphs
3: Evaluate reproductive output of each seasonal morph

**Methods**

**Objective 1: Phenology**
- 13 yeast-sugar traps (Fig 3) maintained weekly at 7 farms
- Adult *D. suzukii* were counted & sexed

**Objective 2: Seasonal morphs**
- 2014 samples, 10 female *D. suzukii* were randomly selected biweekly per farm from 2 locations, raspberry and woodlot
- Each female was assessed as a lighter summer-morph or a darker winter-morph (Fig 4)

**Objective 3: Reproductive output**
- Sorted females (summer & winter-morph) were dissected
- The presence or absence of immature eggs (inside the ovaries) were recorded
- The number of mature eggs were counted & recorded (Fig 5)

**Results**

**Objective 1: Phenology**
- In 2013 & 2014, the peak trap catch was the third week of September
- First trap catch in 2015 monitoring was July 8th in raspberry crops (Fig 6)
- Peak trap catch in 2015 was August 5th (515 flies/trap)
- Last detection was December 30th, 2015 (Fig 7)

**Objective 2: Seasonal morphs**
- Two seasonal morphs, the well documented summer-morph & darker winter-morph have been identified in Wisconsin. A seasonal phenology of both morphs is described below (Fig 8).

**Objective 3: Reproductive output**
- Only summer-morphs were trapped from July through mid-August, however summer-morphs were caught throughout the 2014 season
- By mid-October, winter-morphs represented > 50% of samples
- Trap catches were predominantly winter-morphs in November
- Proportion of winter-morphs was not significantly different between raspberry & woodlot locations ($t = -1.28, df = 8, p > 0.05$)

**Results**

**Objective 3: Reproductive output**
- Female dissections suggest reproductive output declines over the season
  - More summer-morphs had immature eggs present (66%) than winter-morphs (0.33%) ($X^2 (1, N = 531) = 47.72, p < 0.001$)
  - Summer-morphs had significantly more mature eggs (3.03 ± 0.29) than winter-morphs (0.08 ± 0.05) ($H = 84.92, df = 1, p < 0.05$)

**Discussion**

- *D. suzukii* were trapped from July through December in 2015 & the late season catches indicate that *D. suzukii* is active with warmer temperatures, as 2015 is the warmest year on record
- Seasonal morphs are present in Wisconsin suggesting local populations of *D. suzukii* are able to overwinter
- The typical summer-morph had a higher presence of immature eggs and more mature eggs present than the darker late season winter-morph, suggesting females enter a reproductive diapause with changing environmental conditions (shorter photoperiod & colder temperatures)
- Previous research found that *D. suzukii* appear 1-2 weeks earlier in highly wooded areas suggesting woodland landscapes may provide overwintering habitat early in the spring or late fall but do not drive population growth or abundance (Pelton et al. 2016)
- Knowing when & where *D. suzukii* are present (Fig 10), in addition to behavioral changes, throughout the season could help develop more effective management

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