Analyzing the Life History Traits of *Drosophila suzukii*:
An Invasive, Agricultural Pest

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*Drosophila suzukii*, a native fruit fly species of Southeast Asia, has over the last 80 years spread and become an invasive species to much of Europe and America. As of 2011, *Drosophila suzukii*, or Spotted Wing Drosophila (SWD) for the black spots on the males’ wings, became prevalent through much of Northeast America and have been threatening agricultural production, particularly blueberries in NJ. What differentiates SWD from other fruit flies and makes it a formidable pest is that the females lay their eggs in soft skin fruit that are still on the vine, as opposed to fallen, decaying fruit. With their ovipositor, a saw-like organ in the abdomen, the females are able to cut into the skin of fruit to deposit their eggs, sometimes a hundred at a time. When the eggs hatch, the larva consume the fruit from the inside, rendering the fruit unsuitable for consumption as it softens and is vulnerable to bacterial infection. Since SWD have a short life cycle and are able to mate just a few hours after eclosion (emergence from the pupal casings), they are able to multiply rapidly and cause widespread damage. In order to address this environmental problem, our lab analyzed SWD’s behavior to understand what makes SWD successful as an invasive species and to find a mechanism by which SWD can be controlled.

We found that adding blueberries to our culture medium is necessary to maintain SWD in the laboratory. Therefore, we conducted an experiment to determine the effect of blueberries on reproductive behavior and offspring production. Virgin *D. suzukii* males and female flies were collected and housed individually in vials containing Instant Drosophila Medium (4-24) plus yeast. For approximately one-half of the females, the vial also contained a single, whole blueberry. When 3-5 days old, single females were placed into a vial containing a single male, and the flies were observed for 60 min during which copulation frequency (CF), copulation latency (CL) and copulation duration (CD) times were recorded. Females that mated were maintained in a vial (either with or without a blueberry) for 7 days, and offspring from that vial were counted.

The results show that there was no significant difference between females maintained with a blueberry (BB) and females maintained without a blueberry (no BB) with respect to reproductive behaviors. CF for BB females was 0.716 and CF for No BB females was 0.642 (p = 0.313; $X^2 = 1.0196$). CL for BB females was 1331.55 ± 166.42s and CL for No BB females was 1479.33 ± 233.31s. CD for BB females was 1323.93 ± 80.16s and CD for No BB females was 1257.39 ± 51.78s. There was no significant difference between CL for BB and No BB females (p = 0.6017). There was also no significant difference between CD for BB and No BB females (p = 0.4979).

With respect to housing conditions prior to mating, BB females produced significantly more offspring (41 ± 4 offspring) than females housed without a blueberry (23 ± 3 offspring) (p = 0.0004). With respect to housing conditions before and after mating, “BB/BB” females produced significantly more offspring (47 ± 5 offspring) than the “No BB/BB” females (21 ± 4 offspring; p = 0.001) and “No BB/No BB” females (26 ± 4 offspring; p = 0.011). These results suggest that exposure to blueberries prior to mating leads to higher offspring production in *D. suzukii* females. Future studies will determine whether other food sources have similar effects.