

Insights into the complex biology of an invasive *Drosophila* pest, *Drosophila suzukii*

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Drosophila suzukii is a major pest in many Palaearctic areas, where females oviposit on ripening fruits to which larvae can cause severe damage. Initiating through morphological, behavioural, and electrophysiological studies, we sequenced the genome and transcriptome of *D. suzukii* with the two fold aims of assisting the different research lines and elucidating its evolutionary history. Comparative genomics were coupled with field observation to unveil the reasons behind its peculiar ecological behaviour. Our data support a late Miocene origin of *D. suzukii*, concomitant with events and conditions that suggest an adaptation to mountainous temperate forests, a hypothesis confirmed by our field trapping. Morphological studies included imaging different parts of male and female *D. suzukii* using Scanning Electron Microscopy (SEM) in comparison with *D. melanogaster* and *D. biarmipes*, sister species of *D. suzukii*. Olfactory structures distinguishing *D. suzukii* from its related species have been described. We tested the olfactory response of *D. suzukii* adults to its host plant volatiles using Y-tube olfactometer and the results show strong attractiveness by mated females. Electrophysiological experiments were performed using Gas-Chromatography Electro-Antennal-Detector (GC-EAD) for fruit volatiles collected from the Headspace and the profile of EAG-active volatiles has been identified using GC-MS. The future assays will be performed with the identified compound/s in single or in blend of synthetics using Single Sensillum Recording (SSR) with an aim of developing a semio-chemical which has a potential to be employed in environmentally-safe strategies for controlling the pest.