Characterization of Wolbachia-infected Drosophila suzukii lines for the development of a combined SIT and IIT approach

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Abstract

Drosophila suzukii, the Spotted Wing Drosophila (SWD), fly originated from South East Asia, has recently invaded western countries and it has been recognized as an important threat for a wide variety of commercial soft fruits both in open field and greenhouse production systems. The shape and length of the females' ovipositor allows *D. suzukii* to infest a wide range of ripening fruits, leading to substantial yield and revenue losses in the affected regions. The species demonstrated a rapid and widespread expansion in America and Europe, and it has escalated into a major invasive insect pest. The development of an efficient environmentally-friendly control approach to fight against *D. suzukii* is necessary.

An encouraging way out of the chemical control is to employ species-specific and environmentally-friendly control methods, like the Sterile Insect Technique (SIT), which is based on the mass-rearing and release of males sterilized by ionizing irradiation to suppress populations of a target pest species. The SIT has been successfully applied for about 60 years in controlling various insect pest and disease vector species worldwide. As a contingency plan, we suggest exploiting *Wolbachia*, a bacterium able to manipulate its host reproduction through cytoplasmic incompatibility (CI), to develop a combined Sterile and Incompatible Insect Technique (SIT / IIT).

In this study we aimed at characterizing two candidate *Wolbachia*-infected *D. suzukii* lines. We concluded that both *Wolbachia* strains induce strong, but not 100%, CI in *D. suzukii*. Both *Wolbachia*-infected lines suffered from reduced fecundity compared to the uninfected line. Our currently available data suggest that low irradiation doses can be combined with *Wolbachia* infections to produce fully sterile males. We plan to perform experiments to assess the production and quality profiles of these lines, as well as the mating compatibility and male mating competitiveness in field cages.

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