

COMPARATIVE MORPHOLOGY AND EVOLUTIONARY GENOMICS PROVIDE USEFUL CLUES FOR MANAGEMENT OF AN EMERGING DROSOPHILA PEST

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Drosophila suzukii is one of the few fruit flies to lay eggs and feed on fresh fruit. Its recent outbreak in western countries, and its peculiar ecological behaviour makes it an emerging model for pest management and biology. A recent genomic survey suggested that *D. suzukii* unusual behaviour is intimately linked with an ecological pre-adaptations to temperate climates and the ability of overwinter in sexual diapause state. Here we provide comparative morphological and behavioural evidences supporting that diapause occurs preferentially in females, is temperature dependent, and is likely mediated by an enlargeable highly pigmented spermatecha. Comparative genomics reveal a cytochrome associated with spermatecha as the gene under stronger positive selection in *D. suzukii* genome. Evolutionary genomics further identify two genes under positive or abnormal evolution involved in insecticide resistance and immune response to parasitoids. Based on our results, we advocate that early spring trapping is key for *D. suzukii* population control as it may target the few overwintering females exiting diapause. Our results show that evolutionary genomics and comparative morphology are useful tools to guide application in the field of pest management.