Assessing the hybridization potential between a hypothetical gene drive-modified insect strain and related non-target species

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Abstract

Genetically engineered gene drives (geGD) are a potentially powerful tool to control pest insects by population suppression or even elimination. Before living GD modified insects can be released into the environment, they must pass an environmental risk assessment (ERA). The ERA can benefit from the experience made with a number of established agricultural pest control methods that (i) require the release of living organisms, (ii) provide high levels of area-wide control, and (iii) might be irreversible (e.g., classical biological control).

When assessing geGD organisms, a key question to be addressed is the potential acquisition of functional GD elements by non-target species as this may lead to the loss of those species and to a disruption of the ecosystem services they provide. The main route for gene flow is through hybridization between the GD insect strain and closely related species that co-occur in the area of release. Using the invasive *Drosophila suzukii* as a case study, we demonstrate how the potential for hybridization with *Drosophila* species native to the area of release can be assessed by a combination of interspecific hybridization experiments, behavioral observations, and molecular genetic analyses.

Key words: environmental risk assessment, non-target effects, pathway to harm, pest control, spotted-wing drosophila