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# Insect pest management via *Wolbachia*-induced cytoplasmic incompatibility: puzzle more than buzz on *Drosophila suzukii*

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## Résumé

*Wolbachia pipientis* is a widespread symbiotic bacterium that produces infertile crosses through cytoplasmic incompatibility (CI). It has for this reason been envisaged as a component of novel, environment-friendly pest control strategies. In this context, we have explored the potential of *Wolbachia*-induced CI on a severe agricultural pest worldwide, the fruit fly *Drosophila suzukii*. The principle is simple: introducing an incompatible strain of *Wolbachia* into the pest population should lead to an increase in reproduction failures, ultimately reducing population size. The synergy with other processes such as the Allee effect could doom the unwanted population to extinction. Preliminary observations involving *D. suzukii* and three *Wolbachia* strains (the wild strain *wSuz* and two transinfected strains, *wTei* and *wHa*), differed from the expectation: introducing incompatible strains into populations at carrying capacity yielded no decline. Furthermore, the absence of Allee effect resulted in the exponential growth of small populations, up to densities where negative density dependence became overwhelming. From these observations, we hypothesized that a compensation mechanism triggered by competition could jeopardize the expected effects of CI, and experimental results confirmed this hypothesis. First, when CI was manipulated in interaction with competition, CI caused a reduction of host reproductive rates, albeit only when competition was low. Second, in newly founded populations, CI led to a decrease in fly abundance that persisted as long as competition remained moderate. These results demonstrate the influence of demographic compensation on *D. suzukii* populations, which add a major twist on CI-based control strategies. Altogether, our research highlights the need to understand sometimes complex eco-evolutionary population dynamics before implementing biocontrol methods. Ignoring this complexity may yield misinterpretation and ineffective strategies.

**Mots-Clés:** *Drosophila suzukii*, *Wolbachia*, population dynamics, competition, cytoplasmic incompatibility, compensation

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