

Reinforcement of RNA interference by gut bacteria in a leaf beetle

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Video Byte

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Abstract

RNA interference (RNAi), a popular technique for gene silencing using double-stranded RNAs (dsRNAs), can be used to manage insect pests. Once eaten by insects, the dsRNAs target specific genes to reduce growth or cause death. Multiple factors affect RNAi efficiency, but it's unknown if the gut microbiota, which encounters the ingested dsRNAs in the gastrointestinal tract, is a factor. A recent study investigated the effects of RNAi on a major tree pest, the willow leaf beetle, and explored the influence of the microbiome with molecular biology techniques. The ingested targeted dsRNAs were highly lethal to non-axenic beetles (with gut microbes) but were less lethal to axenic (microbe-free) beetles despite equivalent gene-silencing effects. All dsRNAs altered the microbiota composition and induced overgrowth of gut bacteria, especially *Enterobacter* and *Pseudomonas*, perhaps in part because their degradation provided food for the bacteria. The targeted dsRNAs also changed the gut structure, allowing bacteria to enter the hemocoel. One isolated bacterium, *Pseudomonas putida*, was particularly effective in accelerating dsRNA-mediated mortality when reintroduced. Although further studies are needed to determine the exact gut dysbiosis-inducing mechanisms, the findings reveal a synergistic role of the microbiome in RNAi-based pest control that may be useful for refining this insect management strategy.