Insecticidal toxin useless without 'friendly' bacteria accomplices

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The toxin produced by the bacterium *Bacillus thuringiensis* (Bt) is a popular insecticide used to control pest moths and butterflies, and in some GM pest-proof crops. In a study published in the open access journal *BMC Biology*, researchers show that its effectiveness against a number of susceptible *Lepidopteran* species depends on the presence of the normally "friendly" bacteria that colonise their guts. Without these bacteria, the Bt toxin can become impotent in some species.

A team of researchers from the University of Wisconsin studied the effects of wiping out the commensal gut bacteria using antibiotics in six moth and butterfly species. In five of these species, the antibiotic treatment protected the insects against the lethal effects of the toxin, and in four of the five species, replacing the gut bacteria caused the toxin to become effective again. Graduate student Nichole Broderick said, "Our results suggest that Bt may kill some insects by causing otherwise benign gut bacteria to exert pathogenic effects. If the insects don't have these bacteria present, the toxin may be ineffective".

According to the authors, "We've shown that larval enteric bacteria affect susceptibility to Bt, and the extent of this impact varies across butterfly and moth species. This does not exclude other factors, including the insect host, B. thuringiensis strain, and environmental conditions. In some cases these factors may interact, for example, host diet can alter the composition of enteric bacteria".

They conclude, "From a pest management perspective, the ability of a

non-specific enteric bacterium to restore B. thuringiensis-induced mortality of some *Lepidopteran* species may provide opportunities for increasing susceptibility or preventing resistance".

More information: Contributions of gut bacteria to Bacillus thuringiensis-induced mortality vary across a range of Lepidoptera, Nichole A. Broderick, Courtney J. Robinson, Matthew D. McMahon, Jonathan Holt, Jo Handelsman and Kenneth F. Raffa, *BMC Biology* (in press)
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