

Inducible Bt tolerance in *Helicoverpa armigera* (Lepidoptera: Noctuidae) and its effects on egg production and subsequent parasitism by *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae)

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Toxin extracted from the soil bacterium *Bacillus thuringiensis* (Bt) has been widely used to control pest insects, particularly lepidopteran larvae. The widespread use of Bt toxin has led to development of Bt resistance in many pest species. Recently, we have shown that Bt tolerance of *Helicoverpa armigera* (cotton bollworm) can be induced by exposure to sub-lethal Bt toxin concentrations, and that this induced tolerance is not apparently related to changes in gene sequences. Although the mechanism of this mode of tolerance is still unclear, it is associated with developmental penalties and elevated immune processes (such as melanisation) in Bt tolerant larvae. In addition, inducible Bt tolerance is mainly maternally transmitted. This has led us to speculate that there may be changes in the immune status of eggs laid by tolerant female moths. In this study, we have investigated the effect of induced Bt tolerance on the eggs of *H. armigera* and on egg-parasitism by *Trichogramma pretiosum*, a biocontrol agent of *H. armigera*. In addition to the effecting the size of eggs, the sex ratio of emergent offspring were also affected. We hope to investigate further differences at the molecular level by utilising deep sequencing to detect expression of many immune genes in *H. armigera* eggs and qPCR of targetted immune genes in fertilized eggs.

