

**Impact of host plants on the efficacy of nucleopolyhedrovirus as a
biopesticide against insect pest *Helicoverpa armigera* (Hübner)
(Lepidoptera: Noctuidae)**

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**A thesis submitted in partial fulfilment of the requirements of the
University of Greenwich for the Degree of Doctor of Philosophy**

March 2007

ABSTRACT

Nucleopolyhedrovirus, an insect pathogenic virus is used as an environmentally benign insecticide for the control of insect pests on a variety of crops. The present study evaluated the effect of three host plants; chickpea, *Cicer arietinum*, tomato, *Lycopersicon esculentum* and cotton, *Gossypium hirsutum*, on the efficacy of *Helicoverpa armigera* nucleopolyhedrovirus (*HearNPV*). The results showed that *HearNPV* was inactivated within one hour when sprayed on to the leaf surface of chickpea indicating that leaf surface factors on this plant were responsible for the effect. In contrast, virus that had been sprayed onto the leaf surface of cotton and tomato was not significantly affected compared to untreated *HearNPV*. This study also showed that *HearNPV* was inactivated on the chickpea leaf surface in field experiments. One compound was shown to be induced on the chickpea leaf surface in response to spraying with 0.02% Triton X-100 which was used as a surfactant. The induced compound was isolated and identified as sissotrin, an isoflavonoid. Sissotrin was shown to reduce the efficacy of *HearNPV*, although not by as much as when the virus was exposed to the chickpea leaf surface. The results indicated that sissotrin was partially responsible for the inactivation of *HearNPV* and that other compounds which accumulated on the leaf surface after spraying with *HearNPV* must also have an additional effect in combination with sissotrin. This is the first study to show that isoflavonoids reduce the efficacy of baculovirus against *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae). Field trials were also conducted with different low cost additives mixed with *HearNPV* on chickpea crop and these increased the efficacy and persistence of *HearNPV* under field conditions. This study may therefore help to improve biopesticide based pest management on chickpea because the chemical mechanism of *HearNPV* inactivation for which improved formulations need to be developed has been identified, and several low cost additives have been proved effective. More fundamentally, this study has shown that host plants are a limiting factor that affect NPV efficacy in different ways, and should be considered when applying NPV in different pest management programmes.