

ENHANCEMENT OF *Spodoptera littoralis* (Boisd.) SUSCEPTIBILITY TO NUCLEOPOLYHEDROVIRUS (*Spli* MNPV) COMBINED WITH INSECT GROWTH REGULATORS (IGR's)

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ABSTRACT

Five insect growth regulators (IGR's) were tested to increase the susceptibility of the cotton leaf worm, *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae) to its homologous nucleopolyhedrovirus (*Spli*MNPV). *Spodoptera littoralis* MNPV was tested alone or in combination with IGR's at LC₁₀ level against second instar larvae of the pest. An increased infection rate was detected in the mixture containing *Spli*MNPV+IGRs in the case of using Chlorfluazuron, Flufenoxuron, Triflumuron, Hexaflumuron or Teflubenzuron at 10%. The LC₅₀ value for the virus alone treatment was 1x10⁷ PIB's reduced to 4.3x10⁶, 9.9x10⁴, 4.9x10⁴, 3.1x10⁵ and 1.69x10⁶ PIB's, with the five IGR's, respectively.

Key words: insect growth regulators, IGR's, nucleopolyhedrovirus, NPV, *Spodoptera littoralis*.

1. INTRODUCTION

Baculoviruses are promising biocontrol agents in plant protection due to their host specificity, thus safety to the environment. Several studies showed an increase of host susceptibility to virus by using certain additives such as fluorescent brighteners (Shapiro and Dougherty, 1994; and El Salamouny, 2004). The mechanism of increase in the susceptibility by brighteners was confirmed as causing disruption in the midgut defense system in insects (the peritrophic membrane) which lines the midgut (Wang and Granados, 2000). Lepidopteran insects are most susceptible to IGR's that cause molting disturbances (Smaghe *et al.*, 2001; Smaghe and Degheele, 1992 and 1994) and the difference in susceptibility depends on the larval age.

Based on the work published by Arakawa (2002), Flufenoxuron (IGR) promoted infection of the silkworm *Bombyx mori* 5th-instar larvae by *B. mori* nucleopolyhedrovirus (*Bm*NPV) which could be due to interference with chitin synthesis of the peritrophic membrane.

In this study, five insect growth regulators (IGRs) were tested to increase the susceptibility of *Spodoptera littoralis* to its homologous nucleopolyhedrovirus (*Spli*MNPV) in order to select the best enhancement effect.

2. MATERIALS AND METHODS

2.1. Test insect

The cotton leaf worm, *Spodoptera littoralis* larvae were raised on the semi-synthetic diet of Shorey and Hale (1965). The test insect in all experiments was the 2nd instar larvae.

2.2. Virus

The Egyptian isolate of *Spodoptera littoralis* multiple embedded nucleopolyhedrovirus (*Spli* MNPV) was used. Virus suspension was prepared in distilled water. Serial viral concentrations ranged from 4.3x10⁴ to 10⁷ PIBs/ml were used to determine the lethal concentrations (LC) values.

2.3. Insect growth regulators

Five insect growth regulators (IGR's), were used as synergistic additives to *Spli*MNPV inocula. The tested additives were Chlorfluazuron (IKI-7899, 10% EC, Atabron™), Flufenoxuron (10% EC, Cascade™), Triflumuron (Systeine, SIR 8514™), Hexaflumuron (Consult™) and Teflubenzuron (15 % EC, Nomoult™). All tested IGR's were freshly prepared in distilled water before each test. The concentrations were adjusted as part per million (ppm). To determine the LC values, serial concentrations ranged from 0.0078 to 8 ppm were used.

2.4. Virus purification

To get enough virus inocula for the experiments,