INTERACTIONS BETWEEN NUCLEAR POLYHEDROSIS VIRUS AND *NOSEMA* SP. INFECTING GYPSY MOTH

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ABSTRACT

Nuclear polyhedrosis virus (NPV) is the only entomopathogen that plays an important role in the natural regulation of North American gypsy moth populations. Recent European studies suggest that populations of gypsy moth in Eurasia are regulated primarily by the interactions between NPV and several species of microsporidia. Researchers have proposed that the introduction and permanent establishment of microsporidia into North American gypsy moth populations may reduce the frequency, duration, and severity of population fluctuations.

Microsporida are obligate, intracellular protozoan pathogens that typically cause chronic disease of many insect species. Their low virulence allows high persistence within populations. However, the coinfection of microsporidia and NPV in host tissues suggests the potential for interaction is high. The purpose of this study is to determine the nature of the interactions between NPV and a microsporidian species in the genus *Nosema.*

A reproducible bioassay procedure was developed to provide second-, third-, and fourth-instar larvae known doses of NPV and *Nosema* within a 24-h time period or less. Simultaneous, sequential, and separate pathogen treatments were performed at these larval stages.

The results of these studies show that NPV LD_{50}s were not affected by simultaneous, pre-existing, or subsequent infection by *Nosema.* NPV LT_{50}s were reduced significantly be the presence of *Nosema* infection. The pathogen interaction at the population level can be described as independent in terms of mortality and synergistic in terms of lethal time. However, quantification of infective units by each pathogen produced on a dry weight basis suggest that production of polyhedral inclusion bodies may be antagonized by pre-existing *Nosema* infections. This competition was positively correlated with *Nosema* dosage. This is being studied further using transmission electron microscopy. The short lethal time of NPV also antagonized *Nosema* pathogenesis by preventing the production of large numbers of mature spores in individuals with dual infections.