QUANTIFYING TRANSMISSION OF MICROSPORIDIA IN THE FIELD

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Abstract

Microsporidia transmission in terrestrial insect populations is still not well understood. In our study, we attempted to quantify transmission of one microsporidium in forest lepidopteran larvae; as far as we are aware this is the first time such an experiment has been performed under semi-field conditions. We used a naturally occurring *Nosema* sp. that was isolated from a *L. dispar* population near Levishte, Bulgaria. The parasite propagates in the silk glands, fat body and Malpighian tubules of the host. Infective spores are released into the environment from living larvae, most likely via silk and faeces as well as from cadavers.

Field cages (1x1x2 m) were installed around each of 15 *Quercus petraea* trees of 2 m height and with similar foliage density on a young oak plantation. *Nosema*-infected and uninfected *L. dispar* larvae (hereafter referred to as initially-infected and test larvae) were placed into the cages. Numbers of initially-infected and test larvae per cage were 10:90, 20:80, 30:70, 40:60, 50:50; each treatment ratio was replicated in three cages. Larvae were removed after 21 d of exposure. Larvae were reared individually in the laboratory for an additional 11 d, then diagnosed for microsporidian infections using phase contrast microscopy. We succeeded in recovering approximately 70% of the exposed larvae in each cage after 21 d. Ratios of recovered initially-infected and test larvae remained consistent with the ratios released. Upon dissection many test larvae were determined to be infected, proving that transmission had occurred under the experimental semi-field conditions. At the lower infection ratios, the numbers of *Nosema*-positive test larvae followed the expected pattern, considering the number of initially-infected larvae in each cage. However, at higher densities, percent infection in the cages appeared to level off. Mean infection percentages (± SE) in test insects were 19.1±5.2 at 10:90 initially-infected larvae to test larvae, 26.5±0.3 at 20:80, 38.9±7.7 at 30:70, 28.3±11.4 at 40:60, and 32.0±4.3 at 50:50. Unfortunately, the scale and time requirements of this experiments limited us to three replicates per treatment and, to a certain degree, inconsistent transmission did not allow us to draw definite conclusions. A repetition of this experiment in Spring 2005 should help to clarify our results.