

ROLE OF FECES AND EFFECTS OF SIMULATED RAIN ON HORIZONTAL TRANSMISSION OF THE MICROSPORIDIUM, *NOSEMA LYMANTRIAE*

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ABSTRACT

Two main routes of horizontal transmission have been identified for the microsporidium, *Nosema lymantriae* Weiser, a frequently occurring pathogen of *Lymantria dispar* in Europe. Spores are released from 1) feces of living, infectious larvae after a latent period of approximately 2 weeks; and 2) the cadaver after host death. Quantification of spore release from feces has been done in laboratory studies using a meridic diet. Under such circumstances, horizontal transmission of *N. lymantriae* is known to be extremely high. However, the quality of feces originating from meridic diet is substantially different to those from oak leaves.

We designed this experiment to prove the role of feces originating from oak leaves as food in horizontal transmission of *N. lymantriae*. Moreover, we tested the hypothesis that rainfall can aid transmission by increasing the attachment of the otherwise dry feces to leaf surfaces and better dissemination of spores. Therefore, we set up two 9.1-liter acrylic glass cylinders containing oak twigs and separated by steel mesh. Infectious *L. dispar* larvae that had been fed with foliage were put in the top cylinder; the mesh allowed feces to fall to the bottom

cylinder but prevented migration of larvae. After 24 h, the infectious larvae were removed and uninfected test larvae were put into each cylinder to measure transmission. A light intensity rain was simulated by sprinkling foliage with tap water from a watering can twice during the exposure period.

The inoculated larvae heavily contaminated their environment. Transmission to test larvae in the upper cylinders was often close to 100 percent. Furthermore, the experiment proved that fecal pellets are a source of spores for transmission, although at a rather low level under the tested, dry conditions. The mean percentage of *N. lymantriae* infection acquired by test larvae was 4.4 ± 2.4 percent in the dry, bottom cylinders. Longer exposure times or an experiment later in the infectious period would probably lead to higher transmission. Simulated rainfall significantly increased transmission in the bottom cylinders to 30.0 ± 8.2 percent. We conclude that light rain is likely to enhance transmission in the field by increasing the number of fecal pellets that stay on the foliage and by dissolving them, consequently spreading spores on leaf surfaces.