

Pathogen pressures at the insectaries

Introduction. Pathogen pressure occurs in the production settings of the mariposario (MPZ) and the insectary. Low levels of the disease occur regularly in the production areas, and concerns rise when the infection rates skyrocket. Disease pressure can be high enough to interfere with experiments.

The causal agent is believed to be a baculovirus. Primary infection of baculoviruses occur when a caterpillar ingests leaf or other material that contains hemolymph infected with viral occlusion bodies. Secondary infections are caused by sick individuals leaking infectious hemolymph onto shoots, paper towels, and cage walls.

Vertical transmission from mother to offspring might occur. This is based on a small number of observations of characteristic infection symptoms in pupa that were raised in an incubator with very high standards for sanitization. Spotting a diseased adult is not easy, though some reports mention that they are smaller, generally weaker, and have shorter lifespans.



Symptoms. Mostly occurs in caterpillars and pupa.

In caterpillars: early stages of the disease leaves individuals sluggish and sometimes discolored. As the disease progresses, caterpillars begin to leak hemolymph through their cuticles and segments of the body turn soggy and dark. Caterpillars have been observed to climb to the top of a plant or cage prior to death, though this does not always happen.

In pupa: discoloration and death, displaying as a dark, limp, and wet chrysalis. Oftentimes the bottom of pupal cups will collect dark fluid. Failed eclosions (butterfly only partially emerges) have been recorded as a baculovirus symptom in Monarch butterflies when pupal death does not occur, and this might happen in Heliconius as well.

Proven management strategies. More individuals should be reared than are expected to be needed for experiments. This is the most effective way to complete experiments despite pathogen pressures.

Management strategies that are likely to be effective.

- Do not overcrowd pop-ups and quarantine pop-ups with sick individuals to mitigate secondary infections.
- Clean shoots prior to feeding by spraying or dunking in 1:1 hydrogen peroxide and water solution and then rinsing with water.
- Sanitize hands with 95% alcohol in between pop-ups or after touching anything with hemolymph on it (dark fluid excreted by sick individuals).
- Sanitize pop-ups and other equipment (cups, lids, bottles, etc.) in bleach water solution and then rinse with water in between each use.
- Collecting wild butterflies for stock cages is generally advisable to mitigate inbreeding issues, and would also mitigate vertical transmission if this occurs.

Key points

- The disease spreads when healthy individuals ingest infectious hemolymph leaked from sick individuals onto shoots and cage surfaces. Vertical transmission from mother to offspring might occur (limited observations).
- Diseased individuals look wet and limp and should be quarantined or disposed of.
- Maintain pop-ups: dispose of infected materials, clean between use, clean plant material prior to introduction, and sanitize hands in between each pop-up.
- It is advisable to collect wild butterflies in stock cages for egg collections, to mitigate general inbreeding issues and the possibility of vertical transmission.
- **Plan rearing needs with pathogen pressure accounted for.**