

Bruce Spanworm

Operophtera bruceata (Hulst)

Lepidoptera: Geometridae

Hébert, C.; St. Antoine, L. 1999. Oviposition trap to sample eggs of *Operophtera bruceata* (Lepidoptera: Geometridae) and other wingless geometrid species. Canadian Entomologist 131: 557-565.

Objective: To develop an oviposition trap for *O. bruceata* that could be used in large scale population monitoring.

Abstract: Bruce spanworm, *Operophtera bruceata* (Hulst), is a major defoliator of maple (*Acer* spp.) and aspen (*Populus* spp.) stands throughout Canada. Previous sampling methods for *O. bruceata* include the use of sticky bands placed on the bole of trees to sample the wingless female, but these are costly and laborious to maintain.

Adults of *O. bruceata* and the related winter moth, *Operophtera brumata* (Linnaeus), are similar morphologically. Standard trapping techniques using sticky bands that catch adults require tedious work because the genitalia must be examined in the laboratory to differentiate between the two species. However, winter moth eggs are significantly smaller than Bruce spanworm eggs and this characteristic could easily be used to differentiate between the species. A new egg sampling method using an oviposition trap has been refined from earlier work (Hébert & St. Antoine 1998), where *O. bruceata* lay eggs on a polyurethane foam band covered by a Multi-Pher® plate. An accurate method of sub-sampling eggs on the polyurethane foam band was tested statistically and is recommended when egg densities on the traps are high. Density of eggs from 3 randomly selected sub-samples (x) (1 x 10 cm each) was related positively to density of the entire foam strip (y) ($y = 6.7 + 10.5x$, mean $r^2 = 0.957$). This trap is also useful at monitoring populations of fall cankerworm, *Alsophila pometaria* (Harris).

Sampling Procedure: The standard trap is a 1.2 m post of black ABS (acrylonitrile butadiene styrene) pipe, with a 10 x 31 cm band of polyurethane foam attached lengthwise around the top of the post. Each trap has a model I Multi-Pher trap with a closed funnel placed on top of the post. Posts are sandblasted to ensure that the wingless females can climb to the oviposition strip. Trap placement and density will depend on the objective(s) of the sampling effort. Traps should be installed before the oviposition period of *O. bruceata* and collected after oviposition has ceased. Examine collected foam strips and count the number of eggs laid on them with the aid of a light table. Sub-sampling the foam strips is often necessary to reduce effort when moth populations are high. Divide the foam strip into 30 pieces, measuring 1 x 10 cm each. Randomly select and count the eggs on three pieces, which is the recommended sub-sample size.

Notes: Several wingless geometrids could lay eggs on the foam strips, causing a bias in estimation of the population of the targeted insect pest. An insecticidal strip in the Multi-Pher trap to trap adult females might help determine the relative contribution of eggs by species. The authors also suggest using egg size to differentiate between *O. brumata* and *O. bruceata*, which has smaller eggs, but caution that this technique needs to be tested empirically with the oviposition trap (see Cuming 1961 and Brown 1962 regarding egg sizes of these two species).

References:

Brown, C. E. 1962. The life history and dispersal of the Bruce spanworm, *Operophtera bruceata* (Hulst) (Lepidoptera: Geometridae). Canadian Entomologist 94: 1103-1107.

Cuming, F. G. 1961. The distribution, life history, and economic importance of the winter moth, *Operophtera brumata* (L.) (Lepidoptera:Geometridae) in Nova Scotia. Canadian Entomologist 93: 135-142.

* Hébert, C.; St-Antoine, L. 1998. The oviposition trap: a new technique for sampling eggs of the Bruce spanworm and similar species. Res. Notes 5. Canadian Forest Service, Laurentian Forestry Centre; 4 p.