

**Bruce Spanworm, *Operophtera bruceata* (Hulst)**

**Winter Moth, *Operophtera brumata* (Linnaeus)**

Lepidoptera: Geometridae

Underhill, E. W.; Millar, J. G.; Ring, R. A.; Wong, J. W.; Barton, D.; Giblin, M. 1987. Use of a sex attractant and an inhibitor for monitoring winter moth and Bruce spanworm populations. *Journal of Chemical Ecology* 13: 1319-1330.

**Objective:** To test the addition of an inhibitor in pheromone traps for differentiating populations of *O. bruceata* and *O. brumata*.

**Abstract:** The winter moth, *Operophtera brumata* (Linnaeus), is a significant defoliator of northern red oak, *Quercus rubra* L., in Nova Scotia where it was introduced accidentally in 1930. The range of *O. brumata* has expanded to include most of eastern Canada, portions of the northeastern US and even western Canada. Adults of *O. brumata* and the related Bruce spanworm, *Operophtera bruceata* (Hulst), are similar morphologically. *Operophtera bruceata* (Hulst), is a major defoliator of maple (*Acer* spp.) and aspen (*Populus* spp.) stands throughout Canada.

The sex pheromone of *O. brumata*, (Z,Z,Z)-1,3,6,9-nonadecatetraene (1,3Z,6Z,9Z-19:H), also attracts male *O. bruceata*. The two species are nearly identical in appearance and require examination of the genitalia for proper identification. Both species are pests and monitoring each population is of importance. The pheromone (1,3Z,6Z,9Z-19:H) and several of its analogues were evaluated in the laboratory and in field trials for male response. Traps baited with (1,3Z,6Z,9Z-19:H) captured males of both species, but the addition of (E,Z,Z)-1,3,6,6-nonadecatetraene (1,3E,6Z,9Z-19:H), inhibited the attraction of *O. bruceata*. The analogue 1,3E,6Z,9Z-19:H alone was not attractive to either *O. brumata* or *O. bruceata*. The discovery of the inhibitor 1,3E,6Z,9Z-19:H facilitates the identification and separation of *O. bruceata* and *O. brumata* populations, but traps baited with 1,3Z,6Z,9Z-19:H and 1,3E,6Z,9Z-19:H still capture a low percentage of *O. bruceata*. Dissection of male genitalia is necessary to detect low densities of *O. bruceata* captured in traps with the inhibitor.

Hara traps (Hara Products Ltd., Swift Current, Saskatchewan) were preferred over Pherocon 1CP traps (Zoecon Corp., Palo Alto, CA) as trap saturation was a concern with the latter.

**Sampling Procedure:** Install Hara traps baited with 100 µg each of 1,3Z,6Z,9Z-19:H and 1,3E,6Z,9Z-19:H and traps baited with 100 µg of 1,3Z,6Z,9Z-19:H alone at each site. Load compounds on rubber septa and include an insecticidal strip in each trap to kill captured males. Hang traps 1.0-1.5 m above ground on trees or poles. Traps should be set 10-15 m from each other.

In areas predominated by *O. bruceata*, fewer males should be captured in traps with the inhibitor than in traps without the inhibitor. Trap captures should not differ in areas predominated by *O. brumata*, thus significant differences in trap captures

should signal the presence of *O. bruceata* at the site. Further research may refine this technique to where *O. bruceata* does not occur in traps with the inhibitor, but until then dissection of the genitalia is still necessary to detect low densities of *O. bruceata* in these traps. Dissection of males in traps baited with only 1,3Z,6Z,9Z-19:H is not necessary.

**Reference:**

Eidt, D. C.; Embree, D. G.; Smith, C. C. 1966. Distinguishing adults of the winter moth, *Operophtera brumata* (L.), and Bruce spanworm, *Operophtera bruceata* (Hulst) (Lepidoptera: Geometridae). Canadian Entomologist 98: 258-261.