

## Western Blackheaded Budworm

*Acleris gloverana* (Walsingham)

Lepidoptera: Tortricidae

Gray, T. G.; Shepherd, R. F.; Wood, C. S. 1973. A hot-water technique to remove insect eggs from foliage. Canadian Forest Service Bi-monthly Res. Notes 29: 29.

**Objective:** To develop a hot water extraction technique useful for separating *A. gloverana* eggs from hemlock foliage.

**Abstract:** Western blackheaded budworm, *Acleris gloverana* (Walsingham), is an occasional pest of western hemlock, *Tsuga heterophylla* (Raf.) Sarg., in the western US and Canada. An extraction technique using hot water was developed to remove *A. gloverana* eggs from hemlock branches in less time and with greater reliability than a sodium hydroxide solution soak. Using this technique, two people can process up to 200 branches a day if screens are not used. Two people can process 70 branches a day if samples require the use of screens to remove debris before filtration.

**Sampling Procedure:** Randomly sample 46-cm branch tips from trees in the area of concern. Soak each branch individually in a 3,000 ml beaker of boiling water (100 °C) for a maximum of 30 secs. Soaking the branches for longer will remove all the foliage in addition to the eggs, requiring additional screening of the needles from the sample. Using tongs, agitate the branch in the water to ensure that all *A. gloverana* eggs are released from the foliage. Eggs will settle to the bottom of the beaker. Remove the branch and slowly pour the water containing the eggs into a 18.5-cm Buchner funnel. Rinse the beaker with additional water to ensure no eggs remain and pour this rinsate into the funnel as well. Vacuum filtrate the material through filter paper. A plexiglass ring can be used to weight the filter paper down and ensure that eggs stay on the upper surface of the paper. This ring should also be rinsed adequately and the rinsate filtered as well.

Cumbersome branches should be clipped into smaller segments to fit in the beaker, but this will increase the amount of debris in the water. Debris can be removed by pouring the contents of the beaker onto a #20 mesh screen fitted onto a #50 mesh screen (US Series Equivalent). The top screen will filter coarse debris while the bottom screen will capture the eggs. Wash the debris on the top screen with additional rinses using plenty of water. When done, wash the bottom screen into a funnel fitted into a 1-liter container. Use plenty of water to remove all the eggs on the screen, then vacuum filtrate as described above.

**Notes:** Express egg density as the total number of eggs counted on the filter paper divided by the initial wet weight of the 46-cm branch sample. Filter papers may be refrigerated or frozen for counting at a later date; store labeled filter papers between polyethylene sheets. The authors showed that a single wash using this technique recovered 84% of the total eggs while three washes recovered 98% of the total. This method may be useful with other lepidopteran species, but should be tested and verified before use.