bi-monthly research notes

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ENTOMOLOGY

A Hot-water Technique to Remove Insect Eggs From Foliage.—An improved technique was devised to remove eggs of western blackheaded budworm [*Aclevis gloverana* Walsingham] from western hemlock [*Tsuga heterophylla* (Raf.) Sarg.] foliage to facilitate counting. It was developed from a poaching method used on the spruce budworm [*Choristaneura fumiferana* (Clemens)] (Eidt and Cameron, Bi-Mon. Res. Notes 26: 46-47, 1970). Previously, blackheaded budworm eggs were removed from foliage by soaking in a 1.5% sodium hydroxide solution, followed by a spry wash and filtration (Condrashoff, Can. Ent. 99:300-303, 1967). A similar method was developed to separate budworm hibernacula (Miller et al., Can. For. Serv. Info. Rep. M-X-25, 1971). Although egg recovery was satisfactory, this method was slow, and foliage dry weights that formed the basis of our sample method were reduced.

Samples are trimmed to 18 inches in length, and the fresh weight is recorded. Each branch is immersed in a 3000 ml beaker of boiling water which removes all eggs within 30 seconds; longer immersion removes needles, necessitating screening. The branch is swirled in the water with tongs to ensure that all eggs are free to settle out. A large supply of boiling water can be obtained by piping steam into a 45 gal (205 l) drum containing 25-30 gal (114-136 l) of water. The water and eggs are slowly poured into an 18.5 cm Buchner funnel with attached vacuum; grade 202 coarse filter paper (Reeve Angel, 9 Bridewell Place, Clifton, New Jersey) is used to speed filtering. A circular plexiglass ring, placed around the edge of the labelled filter paper, prevents eggs from floating underneath. The container and ring are rinsed and examined after each filtering to ensure that no eggs stick to the apparatus. Eggs or the filter paper can be counted immediately, or the papers may be stored between polyethylene sheets in a refrigerator or deep freeze for counting later.

Bulky branches should be cut into small segments to ensure proper immersion; this increases the amount of debris in the water and slows counting. To alleviate this problem, pour the water and eggs onto two screens (mesh #20 and #50 U.S. Series Equivalent). The top screen removes needles, branchlets and coarse debris, which must be repeatedly mixed under a spray rinse. The bottom screen, which contains the eggs, is inverted over a large plastic funnel and the contents washed into a l-qt (1.1 ml) sealer and then into the Buchner funnel, as previously described. Adequate rinses must be used.

Two people can process 70 branch samples per day with the screens; whereas without them, up to 200 samples can be handled. This difference is compensated, to some extent, by the ease of counting eggs from the screened process.

Reliability of this procedure was tested by processing branches by the sodium hydroxide method after all eggs had presumably been removed by the hot-water technique. Only 11 eggs were recovered from 100 branches that had over 2000 eggs. Thus, this procedure was simpler, faster, and appeared to be almost as reliable as the sodium hydroxide method.

This method was also tested with eggs of the false hemlock looper [*Nepytia freemani* Munroe] deposited on Douglas-fir branches. Screens could not be used effectively, as the eggs often remained in clusters and were removed with the debris by the first screen. When the maximum likelihood method (Shepherd and Gray, Can. Ent. 104: 751-754, 1972) with three washes is used to estimate total population, 84% of 2970 eggs were recovered in the first wash and a total of 98% in three washes. Visual counts of eggs on foliage only yielded 82% of the total and required considerably more time. Removal of eggs remained relatively constant with each wash (74-84%): therefore, the method was considered satisfactory for this species, provided three washes and the maximum likelihood method were used to estimate density. This may be a fast and accurate technique for extracting eggs of other species, but it should be checked for each species of insects before the technique is accepted.—T. G. Gray, R. F. Shepherd and C. S. Wood, Pacific Forest Research Centre, Victoria, B.C.

Smaller European Elm Bark Beetle Found in Ottawa.—Reports by the Forest Insect and Disease Survey, Great Lakes Forest Research Centre, show that the smaller European elm bark beetle [*Scolytus multistriatus* (Marsh)], is distributed generally throughout southwestern Ontario below 44°30'N, in the Bruce Peninsula, roughly south of a line across Barrie at Lake Simcoe, Fenelon Falls, slightly north of Peterborough, Belleville and Kingston, and along a narrow belt following the St. Lawrence River approximately to Morrisburg in eastern Ontario.

Thomas (Bi-mon. Res. Notes 27(1):3, 1971) observed that the rate of dispersal of *S. multistriatus* northward has declined in recent years and in some areas appears virtually static. He suggests that low winter temperatures may be regulating the northward spread of the insect. Preliminary tests by Thomas indicate that the mean freezing point of *S. multistriatus* larvae appears to be approximately −30°C (−22°F) (Thomas, *ibid.*).

Scolytus multistriatus was found at one location on a single, standing, diseased elm in Ottawa along the Ottawa River at Remic Rapids on 22 June 1973. This is approximately 55 miles (88.50 km) north of its nearest known distribution in Ontario. Numerous brood and larval galleries typical of the smaller European elm bark beetle were found on the dead portion of the elm at a height of 10-20 ft (32.8-65.6 m). The lower trunk of the elm was still alive at the time of collection and no galleries were found in this region. Dead adults of *S. multistriatus* were found in a few of the galleries. Detailed examination of the collected elm material revealed that none of the larvae above snow level survived the low 1972-73 winter temperatures in this region as no spring development was evident. Table 1 shows temperature data from three locations in Ottawa obtained from the Department of the Environment, Atmospheric Environment Service.

TABLE 1
Temperature Data, Ottawa (October 1972-March 1973)

Weather Station	No. of days equal to or below −10°F (−23.0°C)	−15°F (−26.1°C)	−20°F (−28.9°C)	Lowest temperature (°F)	(°C)
National Research Council (Montreal Road)	11	8	2	−24	−31.1
Agriculture Canada (Central Experimental Farm)	12	5	2	−22	−30.0
International Airport	10	2	1	−20	−28.9

These data provide supporting evidence that low winter temperatures may be regulating the northward dispersal of *S. multistriatus*. A survey for further *S. multistriatus* will be maintained in this area in Ottawa.—E. S. Kondo and G. D. Huntley, Great Lakes Forest Research Centre, Sault Ste. Marie, Ont.