Bruce Spanworm, *Operophtera bruceata*, Egg Surveys

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I. Historical records of Bruce spanworm in Vermont[1]

Bruce spanworm outbreaks have been observed to last approximately 2 years, after which the population crashes. The first recorded Bruce spanworm outbreak in Vermont began in 1933, primarily in sugar maple orchards in the north and northeast regions of the state. This original outbreak lasted until 1935.

Populations again increased in 1950 in Vermont, and also in Alberta and Wisconsin. They remained at high levels through the 1954 growing season, although damage was considered to be low because a forest tent caterpillar outbreak, causing considerable damage, was occurring also. This forest defoliator was not a problem again until 1981, when populations began to increase and damage was observed in Vermont sugarbushes. Damage at that time was limited to the understory vegetation.

Of interest is that spanworm damage was frequently observed to occur in areas previously damaged by other insects. The outbreak of 1981 continued until 1983. Concurrent damage occurred in Maine. In 1983, 12,240 ha (30,000 acres) received light to moderate defoliation, the heaviest being in the Northeast Kingdom. In 1986 and 1987, no appreciable defoliation was mapped. However, in 1988 in Moretown and Cabot, larvae were found and very light defoliation was observed.

(To see the complete excerpt from the original document, go to Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Files Common to Egg, Larvae and Moth Surveys\BSW Outbreaks.pdf)

II. Vermont Pest Alert[2]

A pest alert entitled BRUCE SPANWORM – ANOTHER SUGAR MAPLE PEST FOR VERMONT was prepared by Ron Kelley in 1983 with the following information:

This inchworm was abundant in Vermont sugarbushes in 1983 but did not cause the heavy defoliation that occurred in Maine and New Hampshire where 338,000 and 18,000 acres, respectively, were defoliated. This insect defoliated northern Vermont sugarbushes in the 1930's and appears to be on the increase for 1984 in northern Vermont.

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[1] Direct excerpt from Parker, B.L., K.E. McGrath, S. Moulton and H.B. Teillon. 1989. *History of the major forest insect pests in Vermont*. A joint VT Agr. Exp. Station and State of VT publication. RR 57. Univ. VT, Burlington. 32 pp.

[2] Kelley, R.S., 1983. Bruce Spanworm – Another sugar maple pest for Vermont. Pest Alert, VT. Dept. of Forests, Parks and Recreation, Agency of Environmental Conservation. 1 p.

What to Look For – the grayish-brown moths were abundant during November, 1983. Female moths lay eggs which are orange and extremely small, about the diameter of the needle portion of a common pin. There are laid singly under lichens and in bark crevices on tree trunk and branches.

Larvae hatch shortly after bud burst in the spring. Their favorite hosts are sugar maple and beech. Newly hatched larvae are pale yellow and 1/8" long. Older larvae become more greenish with narrow, yellowish-white stripes. Full-grown larvae vary in color from light green to olive and are about ¾" long (Figure 1). They attain full growth by the first week in June.

What to Do – Start looking for larvae as soon as small sugar maple leaves begin to form. There is no established sampling procedure for predicting future numbers of this insect but if careful searching of maple leaves in the understory or lower tree crown reveals an average of close to one or more larvae per leaf, heavy defoliation (Figure 2) can probably be expected. If you find large numbers of insects and desire an evaluation of the situation, contact your county forestry or Forest Protection Specialist Ron Kelley (888-5733).

Figure 1. Bruce spanworm larva.

Figure 2. Typical pattern of defoliation.

For more information about Bruce spanworm, see the USFS Pest Leaflet:
http://www.na.fs.fed.us/spfo/pubs/pest_al/bruce_spanworm/pa.htm

(For the original copy of this pest leaflet, see Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Files Common to Egg, Larvae and Moth Surveys\BSW Leaflet VT.pdf)
For more images of the Bruce spanworm by Ron Kelley, see Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Files Common to Egg, Larvae and Moth Surveys\Bruce Spanworm Photos.

III. Vermont Surveys for Bruce Spanworm

Surveys for Bruce spanworm have included eggs, larvae and adults. Protocols and data provided here include only egg surveys. For other surveys for Bruce Spanworm, see **Bruce Spanworm Larvae Survey** and **Bruce Spanworm and Winter Moth Pheromone Trap Survey**.

Two survey methods have been used to monitor populations through egg counts. These include (1) examining the bark on pole-sized sugar maple trees in sugarbushes of concern (see http://sal.snr.uvm.edu/vmc/reports/related/180__pdf_BruceSpanwormEggSurvey.pdf) and (2) providing an artificial substrate for egg-laying Bruce spanworm moths (see Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Bruce Spanworm Egg Survey\BSW survey.pdf)

Bruce spanworm egg surveys conducted in Vermont utilizing **method 1** (examining bark of trees) were made in the years 1984, 1994, 1996 and 2005. Results of these surveys can be found at Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Bruce Spanworm Egg Survey\method 1 egg survey results.xls.

Bruce spanworm egg surveys conducted in Vermont utilizing **method 2** (with artificial substrates) were made in the years 2002-2005. Results of these surveys can be found at Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\ Bruce Spanworm Egg Survey\Egg Count Data 2002-2005.xls

An informal study was undertaken in 2003 to ascertain the **viability of eggs** that were laid on the artificial substrate used for egg surveys. Results of this study can be found at Y:\FPR_Forestry\ForestResourceProtection\Forest Biology Lab Databases\Bruce_Spanworm_for_VMC_Library\Bruce Spanworm Egg Survey\Bruce Spanworm Egg Hatch.doc

For several years, surveys for Bruce spanworm larvae were conducted in late May when sugar maple leaves are not quite fully expanded larvae are predominantly in the second instar. This information is provided in the VMC Data Library under the project title **Bruce Spanworm Larvae Survey**.

Surveys for **Bruce spanworm moths** were conducted in cooperation with Joe Elkinton at the University of Massachusetts[3], who was attempting a world-wide survey of species of *Operophtera*, specifically *O. brumata*, the so-called winter moth. The protocol for and

[3] Division of Entomology, Dept. of Plant Soil and Insect Science, Fernald Hall, University of Massachusetts Amherst, MA 01003

results of these surveys can be found in the VMC Data Library at **Bruce Spanworm and Winter Moth Pheromone Trap Survey.**

Notes:

Here are links to the protocols and data mentioned above.

Outbreak history:

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Bruce spanworm leaflet:

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Ron's photos of Bruce spanworm:

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Egg survey method 1:

http://sal.snr.uvm.edu/vmc/reports/related/180__pdf_BruceSpanwormEggSurvey.pdf)

Results of method 1 egg survey results:

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Egg survey method 2:

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Results of egg survey 2002-2005 using method 2:

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Protocol for and results of egg viability study:

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