

Saratoga Spittlebug

Aphrophora saratogensis (Fitch)

Homoptera: Cercopidae

Wilson, L. F. 1987. Saratoga spittlebug--its ecology and management. Agric. Handb. No. 657. Washington, DC: U.S. Department of Agriculture, Forest Service; 56 p.

Objective: To provide survey procedures useful for assessing spittlebug populations and predicting population trends.

Abstract: The Saratoga spittlebug, *Aphrophora saratogensis* (Fitch), is the most destructive sap-sucking forest pest of pines, *Pinus* spp., in eastern North America. Nymphs feed on alternative hosts, typically sweetfern, until mid-summer and adults feed on pines until autumn. The most obvious signs of infestation are spittle-like masses on alternate hosts, reddish-colored branches on host trees, and tan or brown flecks on the outer bark. Heavy infestations cause top kill, stem deformity, growth loss, and tree mortality. The greatest impact occurs in young plantations of red, *Pinus resinosa* Ait., and jack, *Pinus banksiana* Lamb., pine in the Lake States and Canada.

Two types of surveys are available to assess changes in *A. saratogensis* density and to predict stand risk or hazard. If a feeding scar survey indicated that the average number of scars was less than 25, then no further surveys were warranted. If the survey value was 20-25, then a feeding scar survey should be conducted the following fall. If the survey value was greater than 25, then a nymph survey should be conducted the following spring. A density of one nymph per tree-unit indicated a 25% reduction in tree growth. In areas with greater than one nymph per tree and with visible flagging or defoliation, control was recommended for the same year. A risk rating system was developed for *A. saratogensis*.

Sampling Procedure: You may stop the survey after any step if feeding injury is seen or the insect is collected and verified. When infestations are too low to show injury, you may need to sample several trees or alternate hosts before locating *A. saratogensis*.

Feeding scar survey: This survey estimates the severity of adult feeding which predicts whether a more detailed nymphal survey is warranted the following spring. Sample areas of moderate to high risk in autumn based on presence of alternate hosts. Determine the number of samples you will take according to the area at risk: <4.5 ha (20 samples), 4.5-8.1 ha (25 samples), 8.1-20.2 ha (30 samples), and >20.2 ha (>35 samples). Conduct a survey systematically at specified intervals in order to get adequate stand coverage. At each sample point, select a tree of average height and remove a 10-cm section of two-year-old growth from an upper whorl. Remove the bark with a knife and record the

number of scars (red flecks) on the sapwood and then average the number of scars from the samples. If the value is less than 25, no further surveys are required. If the average is between 20-25, the stand should be scar surveyed again the following fall. If the average is greater than 25, the stand should be surveyed for nymphs in the spring.

Nymph survey: The survey of *A. saratogensis* nymphs determines the current threat of injury. Begin looking for nymphs in spittlemasses the second week of June and tally when most appear to be late instars (third to fifth) which more accurately reflect the adult population and subsequent damage. The first to fourth instars are black and red whereas fifth instars are chestnut brown. If a current lack of spittle-masses does not warrant concern, no further sampling needs to be done that year. However, surveys should be scheduled periodically until crown closure occurs.

Select the number of 400-m² (0.1 acre) plots to cover the area in question: 0.4-2 ha (1 plot), 2.4-4 ha (2 plots), 4.5-8.1 ha (3 plots), 8.5-16.2 ha (4 plots) and >16.2 ha (5 plots). Determine the number of trees in each plot, average number of whorls per tree, and height of 10 trees scattered throughout the plot. Calculate and record the tree-units for the plot (A) by multiplying the number of trees by the average number of whorls by the average tree height. Count the number of nymphs in a plot 63.5 by 63.5 cm using a sampling frame to delineate plot boundaries. When you find one nymph, stop sampling and record that sample as a (+). If no nymphs are found after examining all host plants record the sample as a (-). After taking all 50 samples, count the (+) and multiply by 2 to determine the percentage of samples infested with nymphs, which provides an estimate of the number of nymphs per 400-m² plot (B). Calculate the number of nymphs per tree-unit (C) by taking the number of nymphs per plot (B) and dividing by the number of tree-units per plot (A). This value (C) is used to predict probable damage (Table 12) and the need for future surveys and control (Table 13).

Tables:

Table 12—*Damage level categories for adult spittlebug feeding*

Damage level	Nymphs/tree unit	Potential growth reduction (%)
<i>Very low</i> —lateral terminal growth differences	0.25	2
<i>Low</i> —up to 4 yr of growth reduction	0.50	6
<i>Moderate</i> —up to 10 yr of growth reduction, scattered flagging, some degradation	1.00	25
<i>High</i> —whole-branch flagging, dead tops, extensive degradation, some dead trees	2.00	41
<i>Very high</i> —dead tops, extensive degradation, many dead trees	6.00	66

Table 13—*Key to action recommended after nymphal appraisal survey*¹

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- 0a. Nymphs/tree-unit less than 1.0—see no. 1
 - 0b. Nymphs/tree-unit 1.0 or more—see no. 8

 - 1a. Trees shorter than 10 ft—see no. 2
 - 1b. Trees 10 ft or taller—see no. 4

 - 2a. Nymphs/tree-unit less than 0.15—evaluate again in 3 years
 - 2b. Nymphs/tree-unit 0.15 or more—see no. 3

 - 3a. Nymphs/tree-unit more than 0.25—evaluate next year
 - 3b. Nymphs/tree-unit 0.15 to 0.25—evaluate in 2 years

 - 4a. Trees from 10 to 12 ft—see no. 5
 - 4b. Trees taller than 12 ft—see no. 7

 - 5a. Nymphs/tree-unit more than 0.15—see no. 6
 - 5b. Nymphs/tree-unit 0.15 or less—no need to reevaluate

 - 6a. Nymphs/tree-unit more than 0.25—evaluate next year
 - 6b. Nymphs/tree-unit 0.15 to 0.25—evaluate in 2 years

 - 7a. Nymphs/tree-unit more than 0.40—reevaluate next year
 - 7b. Nymphs/tree-unit 0.40 or less—no need to reevaluate

 - 8a. Nymphs/tree-unit 1.0 to 2.0—if there is flagging or noticeable degradation, control this year; if not, reevaluate next year
 - 8b. Nymphs/tree-unit more than 2.0—control this year
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¹Given near threshold values, use indicators of the previous year's feeding injury to help make a control decision. The previous year's feeding scars persist to add to the present year's injury; thus, use presence of feeding scars, flagging, and the previous insect evaluation, if available, to decide if control is warranted.