Orangestriped Oakworm
Anisota senatoria (J.E. Smith)
Lepidoptera: Saturniidae

Objective: To relate *A. senatoria* frass length and quantity to defoliation levels on pin oak.

Abstract: The orangestriped oakworm, *Anisota senatoria* (J.E. Smith), is a native defoliator of various oaks, *Quercus* spp., and other hardwood species in the eastern US and Canada. Severe outbreaks of *A. senatoria* occurred in some urban areas of Virginia in the early 1990s, leading to the development of integrated pest management strategies. Coffelt and Schultz (1990) developed an aesthetic injury level of 25% defoliation for *A. senatoria* on urban pin oak, *Quercus palustris* Muenchhausen. In the urban landscape, citizens objected to frass accumulation and noticeable larvae more than actual defoliation by *A. senatoria* (Coffelt and Schultz 1990).

Field and laboratory experiments were designed to develop decision-making guidelines for *A. senatoria* management based on frass measurements. Frass length and production per larva were affected by *Quercus* spp. host, but mean frass length could be used to estimate which instars were present on pin oak. The presence of early instar *A. senatoria* may signal the need to consider control measures in the urban landscape. Frass production on pin oak was positively related to percentage defoliation ($y = 24.12 + 0.43x$; $r^2 = 0.62$), allowing for the prediction of defoliation levels based on frass accumulation. Using the aesthetic injury level developed by Coffelt and Schultz (1990), 2.2 g of frass collected on a 2.62 m^2 circle of fabric under a tree equated to 25% defoliation on pin oak and would thus warrant control measures.

Sampling Procedure: Place a circular piece (2.62 m^2) of polypropylene landscape fabric under the canopy of selected pin oaks in late July. Leave fabric circles in place until late August, then weigh all the frass pellets collected on the fabric to the nearest gram. Use the equation $y = 24.12 + 0.43x$, where y = percent defoliation and x = frass weight in g per 2.62 m^2, to predict defoliation. Frass production of 2.2 g per 2.62 m^2 circle of fabric would warrant control measures if using the aesthetic injury level of 25% defoliation.

To determine if early instars are present, take a subsample of 25 frass pellets from each tree. Measure pellet length to the nearest 0.01 mm using a stereomicroscope fitted with an ocular micrometer. Compare the average length of collected pellets to those presented in Table 1 to determine the stage of instars present on the tree. The presence of early instars could indicate the need for control strategies.

Notes: This technique assumes that the operator has a certain familiarity with the characteristics of lepidopteran frass. The presence of *A. senatoria* larvae should be verified on sampled trees before assuming any collected frass was produced by *A. senatoria*. The relationship between frass production and percent defoliation on pin oak was developed from data taken on small trees approximately 2 m tall and with a 6.3 cm diameter breast height. Further research is needed to determine if the relationship is valid for larger pin oaks, or for oaks of different species.

Reference:

* Coffelt, M. A.; Schultz, P. B. 1990. Development of an aesthetic injury level to decrease pesticide use against orangestriped oakworm (Lepidoptera: Saturniidae) in an urban pest management project. Journal of Economic Entomology 83: 2044-2049.

Table

Table 1. Mean frass length and total frass produced by *A. senatoria* instars, 1989 field experiments.*

Instar	Frass Length (mm)	n	Total Frass Produced[†]	n
First	0.58 ± 0.003 e	15	4.96 ± 0.33 c	15
Second	1.06 ± 0.01 d	9	12.63 ± 1.76 c	15
Third	1.64 ± 0.02 c	11	35.54 ± 3.89 c	15
Fourth	2.57 ± 0.05 b	11	233.65 ± 17.5 b	11
Fifth	3.33 ± 0.09 a	6	340.33 ± 70.8 a	6

* Means (± SEM) within columns followed by the same letter are not significantly different ($P > 0.05$) (Student-Newman-Keuls test) (SAS Institute 1985).
[†]Total frass produced by instar of an *A. senatoria* group with an estimated initial mean population size of 485 larvae.