

## Thresholds and Monitoring

### ESTIMATING SUMMER LEAFMINER OUTBREAKS FROM SPRING SAMPLES

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*Keywords:* western tentiform leafminer, *Phyllonorycter elmaella*, fecundity, sampling

*Abstract:* Western tentiform leafminers were sampled for five years in an orchard of 20-year-old 'Delicious'. Samples of the first and second new generations were gathered. Between the two generations, leafminers increased by a mean of 9.5-fold. Measurements of leaf growth helped determine estimates of fecundity. Leafminers can be occasional but serious pests and need control action at oviposition. Therefore, advanced warning of outbreaks is necessary for IPM decisions.

### Materials and Methods

This experiment was conducted in a 20-year-old 'Delicious' orchard from 1997 to 2001. After most of the first new generation of leafminers had emerged in June, 50-200 primary leaves were sampled and the leafminer density and mortality were assessed. The same sampling was repeated the next generation, mid to late July, with secondary leaves. The increase in population density (I) from the first new to the second generation was represented by the following model:

$$I = L2/L1$$

where L1=the number of first new generation larvae per primary leaf, L2=the number of second generation larvae per secondary leaf. The estimated eggs hatched/female (EH) of leafminers in trees of different leaf growth was expressed by the following model:

$$EH = 2(L2/(L1(A)))(S+P)/P$$

where A = the proportion of first generation larvae reaching adult stage, S = the relative number of secondary leaves, and P = the relative number of primary leaves. To estimate S and S+P, five meter-long branches from the orchard were selected each year and the number of leaves counted at egg lay of the first new generation (early May) and egg lay of the second generation (mid-July).

### Results and Discussion

The mean measurement of population density increase, L2/L1, was 9.5. The proportion reaching adult stage, A, was relatively high, a mean of 0.80. The proportional increase in leaves between leafminer generations, (S+P)/P, was a mean of 1.58. There was almost no change in the number of leaves from the second to the third generation of leafminers. Using these measurements, the estimated eggs hatched per female was a mean of 33.8, nearly twice as high as the fecundity, measured in the lab, of 18.3 eggs laid/female (Barrett and Brunner 1988). The

difference could be caused by greater nutritional quality of leaves in the field, leading to increased fecundity, or overestimating the increase in leaves.

Using the estimated increase in population density, 9.5, and the economic threshold of the second generation, 2 tissue feeders/leaf (Beers et al. 1993), the estimated economic threshold based on the first new generation is 0.2. That is, if more than one mine per five primary leaves is observed, then the eggs and neonates of the second generation probably need to be treated with insecticide. If the mortality of the first new generation is higher than 20%, then this estimate would have to be adjusted higher. And, if the proportional increase in new leaves is higher than 1.6, then the estimate has to be adjusted lower.

### **References Cited**

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