

## Thresholds and Monitoring

### ARE MULLEIN BUG TRAPS WORTH USING?

Stephen D. Cockfield  
Okanogan Valley IPM, LLC, Brewster, WA

*Keywords:* mullein plant bug, *Campylomma verbasci*, pheromone traps, monitoring

*Abstract:* Mullein plant bug (*Campylomma verbasci*) traps baited with pheromone were set out during egg lay at harvest and the results were compared with beating tray samples during egg hatch the following year. An action threshold was estimated based on one season and results of three years were used to evaluate the thresholds. Although thresholds were very low, especially in Golden Delicious, the procedure was used to sort potential problem orchards. A Chi-square analysis showed a significant correlation between pheromone trap samples in the fall and beating tray samples the following spring. The procedure could be used to select 30-50% of the orchards for more intensive beating tray samples during egg hatch.

#### **Materials and Methods**

This report is based on data gathered in an IPM program in commercial orchards. In 1996, approximately 100 orchards of 'Golden Delicious', 'Gala', and 'Delicious' were monitored with pheromone-baited traps to catch adult male campylomma. Methods were based on those of Brunner and Gut (1996), except that a Pherocon II trap (Trécé, Inc.) was used instead of a wing trap. One trap was set out every 10 acres and campylomma were counted after two weeks. The same orchards were sampled during spring egg hatch with a beating tray to count young nymphs. Techniques and economic threshold were followed according to Thistlewood (1986), except samples were limited to 20 tray counts in a 20-acre block. Blocks were sorted according to variety, because 'Golden Delicious' had an economic threshold of 1 nymph/tap and 'Delicious' had a threshold of 4 nymphs/tap. 'Gala' was assumed to have the same economic threshold as 'Golden Delicious', so they were analyzed together. Blocks were then sorted by beating tray results into "below threshold" and "above threshold." A range of preliminary thresholds was chosen for the pheromone trap results and blocks sorted into groups above and below the thresholds. The percentage of type I errors (above pheromone trap threshold, below beating tray threshold) and type II errors (below pheromone trap threshold, above beating tray threshold) was calculated. Thresholds yielding type II errors below 3% were selected.

Sampling continued from 1998-2001 in the same orchards and data were used to evaluate the thresholds. In some years, only three blocks had beating tray samples above threshold, so data from three egg hatch periods were combined. Threshold results for all the blocks of each variety formed two 2X2 contingency tables. Data were analyzed with a Chi-square test. The accuracy and utility of the pheromone traps results were analyzed.

#### **Results and Discussion**

A threshold of 5 males/trap for 'Delicious' and 1 male/trap for 'Golden Delicious' yielded a type II error less than 3%, but a relatively high type I error (14-17%) (Table 1). These were selected for evaluation.

**Table 1.** Agreement of campyloomma nymph samples and pheromone trap catch using preliminary action thresholds

Variety	Threshold	% correct	% Type I error	% Type II error
'Delicious'	0	45.2	52.4	2.4
	5	83.3	14.3	2.4
	10	83.3	10.7	5.9
	20	86.9	5.9	7.1
	30	86.9	2.4	10.7
'Gold. Del.'	0	81.7	16.7	1.7
	2	78.3	13.3	8.3
	5	75.0	8.3	16.7
	10	65.0	6.7	28.3

Validation sampling yielded 226 observations of 'Delicious' orchards and 158 observations of 'Golden Delicious' and 'Gala' orchards. For 'Delicious' orchards, the traps predicted 73% of the time nymphs would not exceed the threshold in the spring. Only one orchard (0.4% of total) did exceed the nymph threshold in one season while the traps indicated it would not. However, the traps gave false warning of a problem 21.2% of the time. The trap threshold decisions and beating tray decisions were correlated ( $\chi^2=33.05$ , d.f.=1,  $p<0.005$ ). For 'Golden Delicious' and 'Gala' orchards, traps predicted 55% of the time the nymph threshold would not be exceeded. There were three incidents (1.9% of total) where traps indicated falsely that nymphs would not exceed the threshold. Traps indicated falsely that nymphs would exceed the threshold 31.6% of the time. Trap threshold decisions and beating tray decisions were also correlated ( $\chi^2=20.70$ , d.f.=1,  $p<0.005$ ).

Although the analysis did show a significant correlation between pheromone trap results and beating tray results, the thresholds chosen were very conservative, and false positive trap results (type I errors) were common. However, the technique could screen out at least half of the low-risk orchards. This may not change the total time spent sampling in the spring but could concentrate time and effort where needed. To be sampled properly, the beating tray protocol calls for checking almost every acre up to twice/week (Thistlewood, 1986).

#### References Cited

- Gut, L.J., and J.F. Brunner. 1997. Potential for monitoring campyloomma with pheromone traps. Wash. State Univ. Coop. Ext. IPM update 2.
- Thistlewood, H.M.A. 1986. The bionomics and monitoring of *Campyloomma verbasci* (Meyer) on apple in the Okanagan Valley, British Columbia. Ph. D. dissertation. Simon Fraser, Burnaby, BC.