1.   Biology/Phenology
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   1.   *Campylomma verbasci* on apple

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Field Corroboration of a Degree-Day Based Phenology Model for *Campylomma verbasci.*
Campylomma verbasci Meyer (Hemiptera: Miridae) is a direct pest on sensitive apple varieties in Washington. *C. verbasci* overwinter as eggs laid in the young twigs of apple and pear. In the spring, first generation *C. verbasci* nymphs emerge from overwintering eggs. The emergence dates vary widely from year to year and are dependent on temperature. *C. verbasci* is very small and first and second instar nymphs are difficult to detect. Thus, monitoring is very difficult and at present, sampling is labor intensive and inefficient.

In Canada, a degree-day based phenology model was developed, under laboratory conditions, for predicting emergence of first generation, first instar *C. verbasci*. The objective of this study was to corroborate this model in the field under Washington conditions.

Materials & Methods

C. verbasci were collected and daily max-min temperatures were recorded from the same three orchards in 1993 & 1994 and two of these orchards in 1992. *C. verbasci* nymphs were collected three times per week, from tree limbs by jarring the nymphs onto a black cloth tray (limb tap method) whereby they were aspirated and then stored in 70% ethanol. Sampling began early enough in the spring to detect first emergence, and collecting began when the first nymphs were detected.

The stored nymphs were separated and counted by instar. Percent in stadium was calculated for first generation, first instar *C. verbasci* nymphs. Degree-days were calculated from daily max-min temperatures by a sine-wave function with a vertical cutoff. Tb was set at 50° F and Tmax was set at 95° F. The NLIN procedure of SAS was used to fit a logistic function to the percent in stadium/degree-day data.

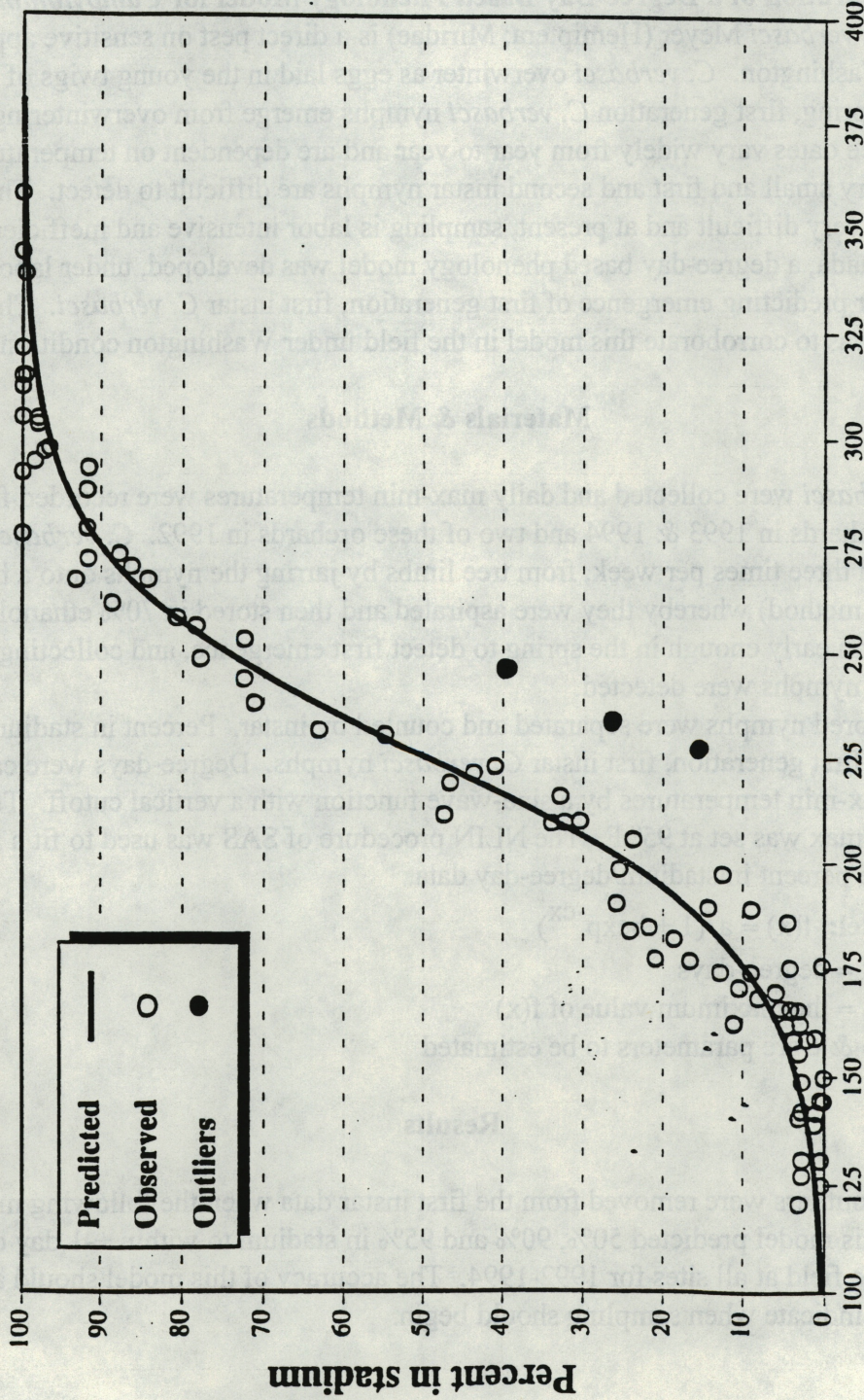**Model:** $f(x) = a/(1 + b\exp^{-cx})$

x = degree-days
a = the maximum value of f(x)
b & c are parameters to be estimated

Results

Three outliers were removed from the first instar data when the following model was generated. This model predicted 50%, 90% and 95% in stadium to within +-1 day of that observed in the field at all sites for 1992-1994. The accuracy of this model should allow us to set a biofix to indicate when sampling should begin.

First generation first instar nymphs	
Percent In Stadium	Degree-Days Calculated by Model
1	125
10	175
20	195
30	205
40	215
50	225
60	235
70	245
80	255
90	275
95	290
99	330

First Instar C. *verbasci* Temperature-Dependent Development: Predicted and Observed

Legend: Predicted, Observed, Outliers

X-axis: Degree-day accumulation: 50° F/95° F (Tlb/Tmax, vertical cutoff)

Y-axis: Percent in stadium