

# Analysis of Insect Collection Data from Minnesota Orchards



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## Objectives

1. Graphically summarize insect collection data from MN apple orchards
2. Create degree day based models for insect flight activity
3. Compare degree day based models from MN to published models from MI

## Methods

- Weekly insect flight activity was monitored using pheromone baited traps at twenty-five locations in MN from 1998 to 2005.
- Degree day (DD) data was obtained using WI-MN degree day calculator (soils.wisc.edu/wimnext/asos/SelectDailyGridDD.html)
- Insect data was graphically summarized using statistical software (SPSS). Each data point on the graphs represents the average across all locations and years. The bars represent the standard error of the mean ( $\pm 5\%$ )
- Models for each insect were developed based on DD data and compared to published DD models from Michigan (MI) when available.

## Insects monitored

Apple Maggot  
(*Rhagoletis pomonella*)



Codling Moth  
(*Cydia pomonella*)



Lesser Apple Worm  
(*Grapholitha prunivora*)



Obliquebanded Leafroller  
(*Choristoneura rosaceana*)



Redbanded Leafroller  
(*Argyrotaenia velutinana*)



Spotted Tentiform Leafminer  
(*Phyllonorycter blancardella*)



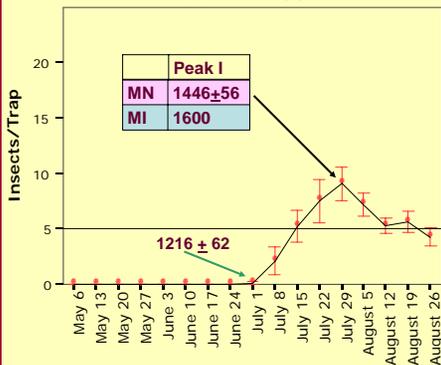
### Pictures of insects:

Apple Maggot:  
agl.gov.bc.ca/roproff/images/applemaggot1.jpg  
Codling Moth:  
calnetb.wsu.edu/foosd/treefruit/codmoth.jpg  
Lesser Apple Worm:  
entomology.tlrec.wsu.edu/pearent/images/law03.jpg  
Obliquebanded leafroller:  
nyipgm.com/edu/factsheets/treefruit/pests/obl/obl1.jpg  
Redbanded leafroller:  
nyipgm.com/edu/factsheets/treefruit/pests/rbl/rbl1.jpg  
Spotted tentiform leafminer:  
orchard.umn.edu/vmapplepest/9697heapngstlm1.jpg

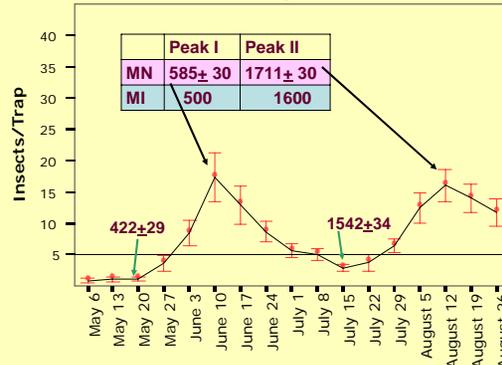
### Pictures of fruit and leaf damage:

Field Guide for Identification of Pest Insects, Diseases, and Beneficial Organisms in Minnesota Apple Orchards, MN Dept. Agriculture, [www.mda.state.mn.us/ibm/appleifg/default.htm](http://www.mda.state.mn.us/ibm/appleifg/default.htm)

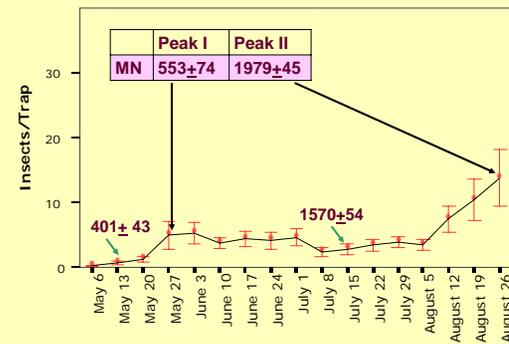
Apple maggot



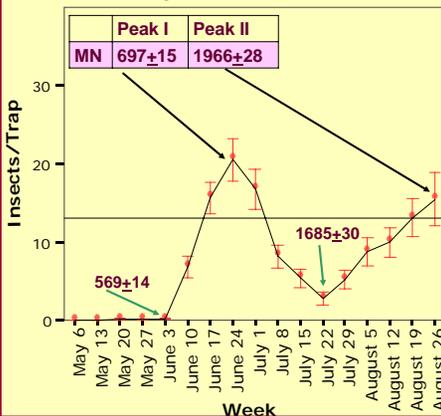
Codling moth



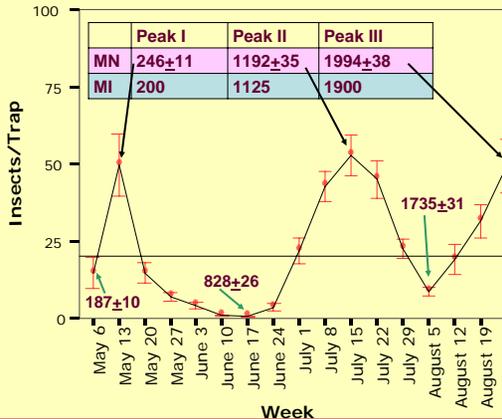
Lesser Apple Worm



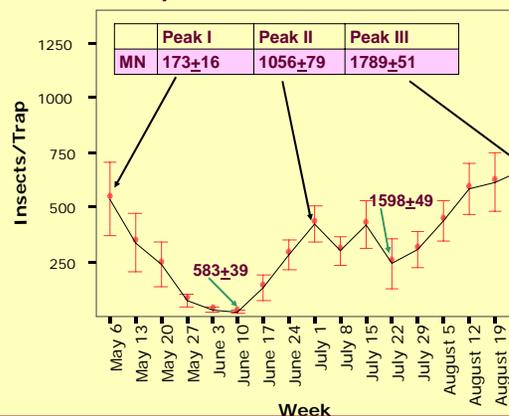
Obliquebanded Leafroller



Redbanded Leafroller



Spotted Tentiform Leafminer



## About the graphs:

- X-axis is week of data collection
- Y-axis is # insects caught in each trap each week.
- The solid horizontal line represents the economic threshold (where insect damage will reduce yield)
- Green arrows with corresponding numbers refer to DD at beginning of flight
- Black arrows with corresponding numbers in tables refer to DD at peak flight

## Conclusions

- Graphing insect activity allows growers to visualize when insects are in orchards
- DD models developed from data collected in MN closely align with models developed in MI.
- The two data points that become important are when the insect flight begins and when the peak flight occurs.
- Plum curculio (*Conotrachelus nenuphar*) and tarnished plant bug (*Lygus lineolaris*) are 2 additional insects that feed directly on fruit and are potential pests in orchards