

Bean leaf beetle biology in soybean

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Outline

- Description
- Life cycle
- Biology
- Damage



Bean leaf beetle (BLB)

- *Cerotoma trifurcata*
 - leaf beetle (Coleoptera: Chrysomelidae)
- 5 mm long, oval shape
- Typically dark yellow with black
 - orange and red phases possible



- 4 black rectangles on forewings (usually)
- Black triangle at the base of “neck”
- Long antennae, walking legs, obvious eyes



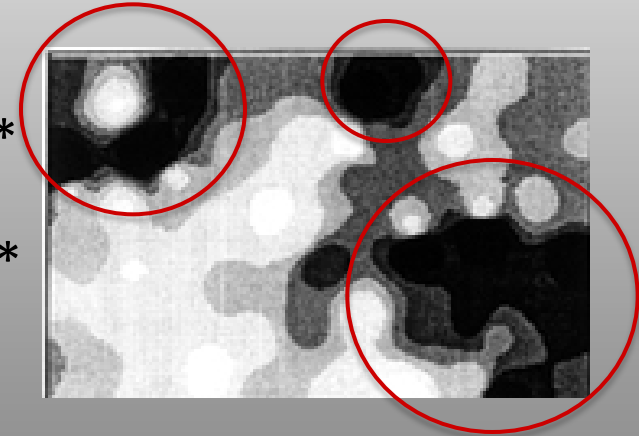
BLB Larvae

- White with brown head, 5mm long
- Found in the soil
- Feed on roots, root hairs and nodules



BLB Distribution

- Native to eastern North America
 - Common soybean insect in southern U.S.
 - More common in north-central U.S. (1980s)
- Fly short distances (<175 feet)*
- Highly aggregated in soybean**



BLB Plant Hosts

- Large host range, strongly prefers legumes
 - Soybean, alfalfa, clover*
 - Less common on corn, cucurbits**



BLB Life Cycle

- Generations variable
 - Multivoltine (3 gen); SE U.S.
 - Bivoltine (2 gen); IA, IL
 - Univoltine (1 gen); MN, Canada
- Overwinter as adults in leaf debris^{*}



BLB Life Cycle - *complete metamorphosis*

egg



larva

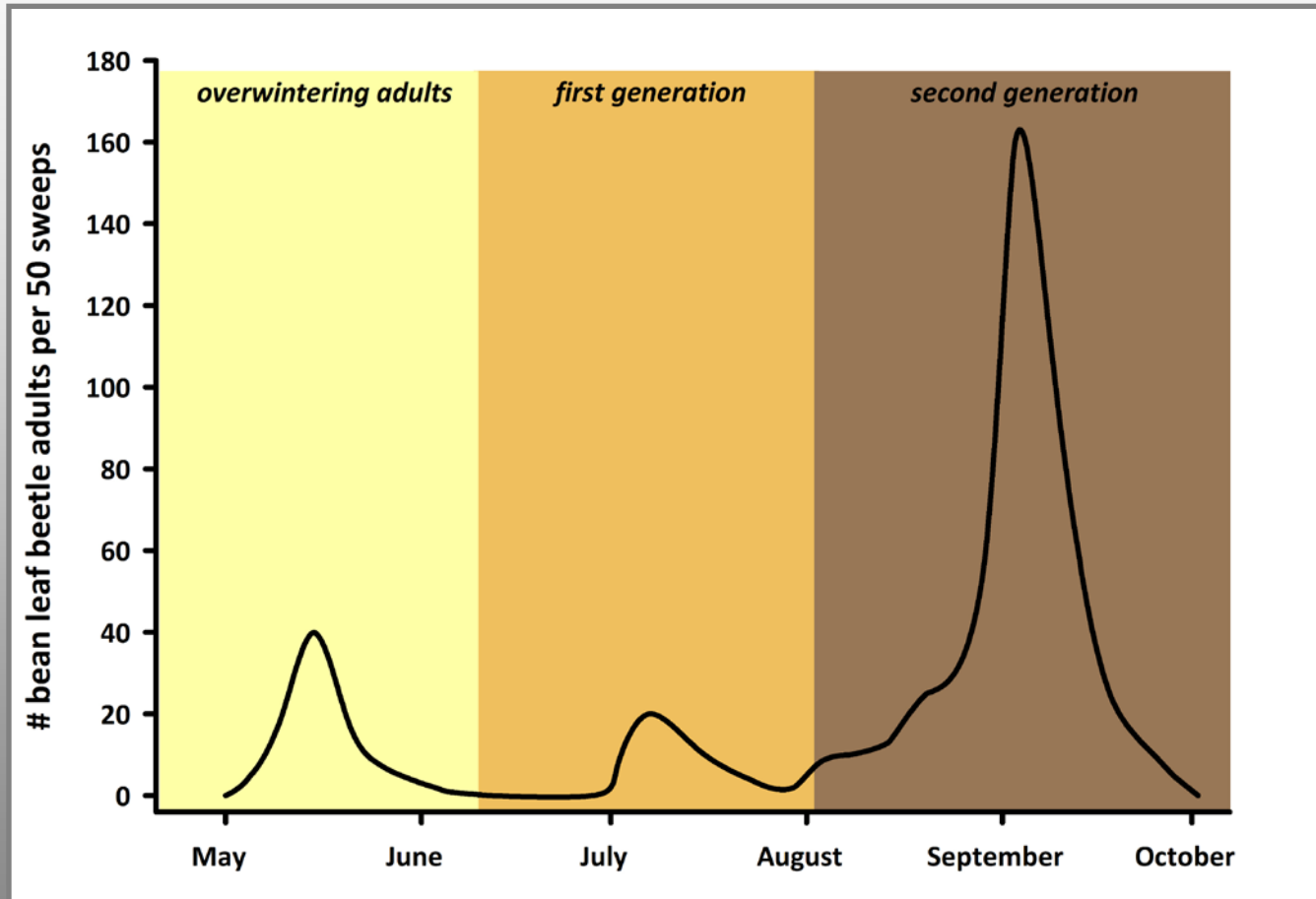
adult



pupa

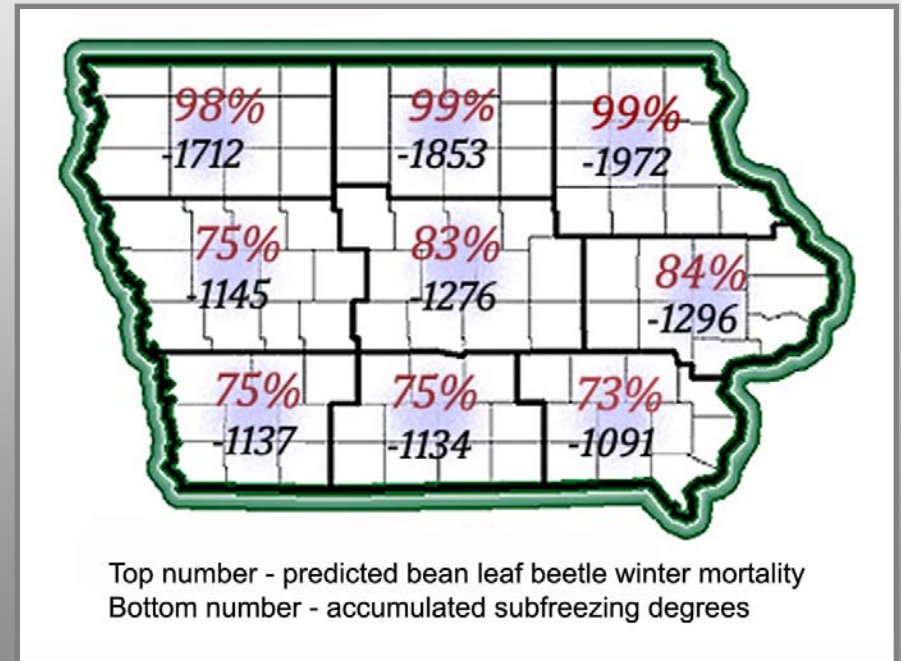
- *Eggs laid in soil near plant base*
- *Larvae hatch and move down to roots*
- *Go through 6 instars before pupating*
- *Adults emerge and begin feeding/mating (3-4 weeks to adult)*

Typical BLB Dynamics



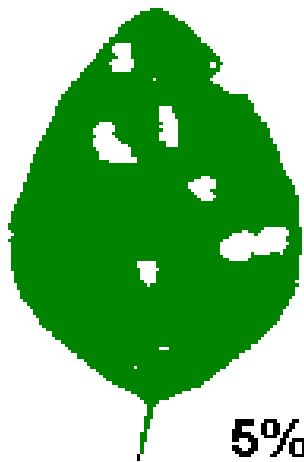
Overwintering Success

- Predictive model based on temperatures*
- $<10^{\circ}\text{C}$ is fatal
- Example of BLB predicted winter mortality in Iowa for 2009**

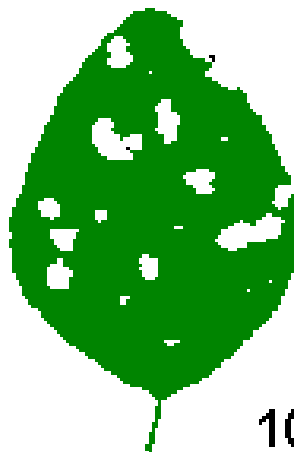


Injury and Damage

- Injury – effect of **insect** activity
 - E.g., Ten percent defoliation
- Damage – measureable loss of quality, quantity or aesthetics to **plant**
 - E.g., Five percent yield reduction



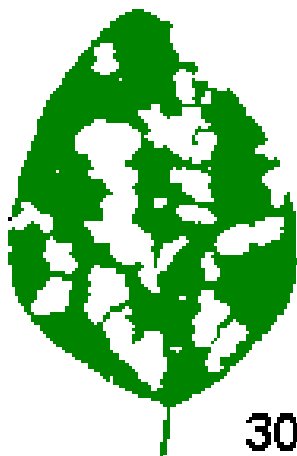
5%



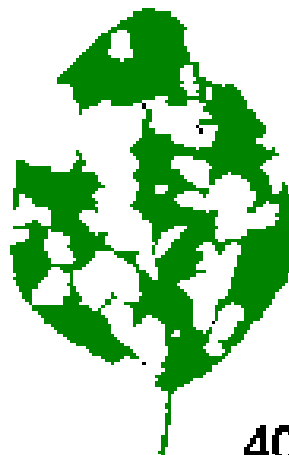
10%



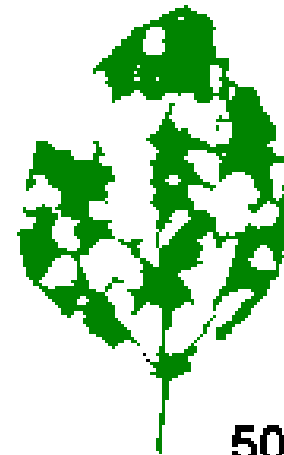
20%



30%



40%



50%

BLB Injury

- Adults feed for 3 weeks
 - 0.384 cm² per day*
- Indirect injury to leaves
 - 0.384 cm² per day*
- Direct injury to pods
 - 0.2 pods per day



BLB is a Disease Vector

- Capable of transmitted several pathogens
- Bean pod mottle virus (BPMV)*
 - Poor seed appearance (mottled, moldy)
 - Reduced performance: germination and seedling vigor
 - Delayed plant maturation (green stem)

Bean pod mottle virus (BPMV)*

- Common viral soybean pathogen
 - Reduces quality, yield up to 52%
- Seedborne disease or via insect vectors
 - BLB is most common and efficient vector
- Synergistic with other soybean diseases

Symptoms of BPMV

Leaf mottling and discoloration, and green stem or delayed maturation



Symptoms of BPMV



Seed coat mottling and discoloration, bleeding hilum, and Phomopsis infections



How can you test for BPMV?

- Even without BLB
- Take mottled seed sample to testing lab
 - Plant disease/insect diagnostic labs
 - Ask Extension Service



BLB Biology Summary

- Leaf beetle native to U.S.
- Adults can indirect/direct injury to soybean
- 1-3 generations per year
- Vector of BPMV