# Lacanobia Fruitworm Management in 2001

Mike Doerr and Jay Brunner

Tree Fruit Research and Extension Center

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# Developing an IPM program

- Know your enemy
- What constitutes a treatable population
  - Most difficult IPM decision
- When to treat
  - Sampling and DD models
- What to spray
  - Bioassays and field trials screen potential candidates

# Know your enemy

- Survey of noctuid pests Washington
  - Spotted Cutworm
  - Bertha Armyworm
  - Lacanobia subjuncta (Lacanobia fruitworm)
- Main pests differ in biology
  - Overwintering stage
  - Host plants

# Lacanobia, bertha armyworm and spotted cutworm (5th instar larvae)

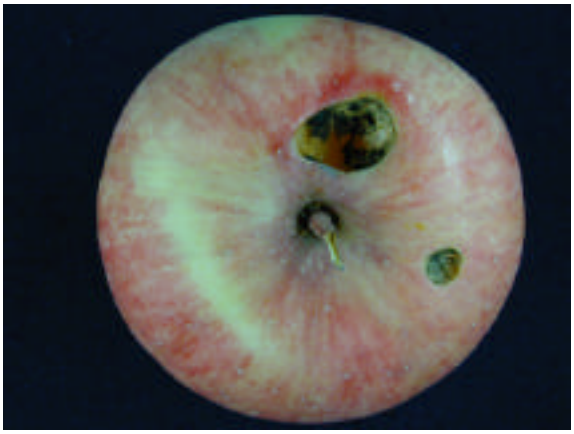

Herringbone pattern

Bertha armyworm

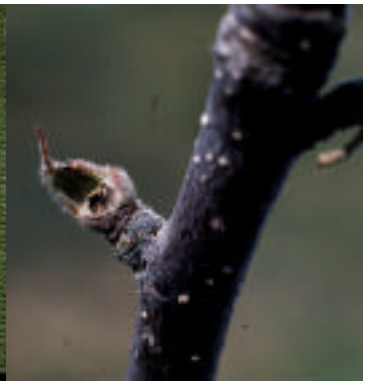
Spotted cutworm

Note difference in pattern on last segments

# Spotted Cutworm



**Overwintering larvae feed early on developing buds/fruitlets and late on mature pears and apples**



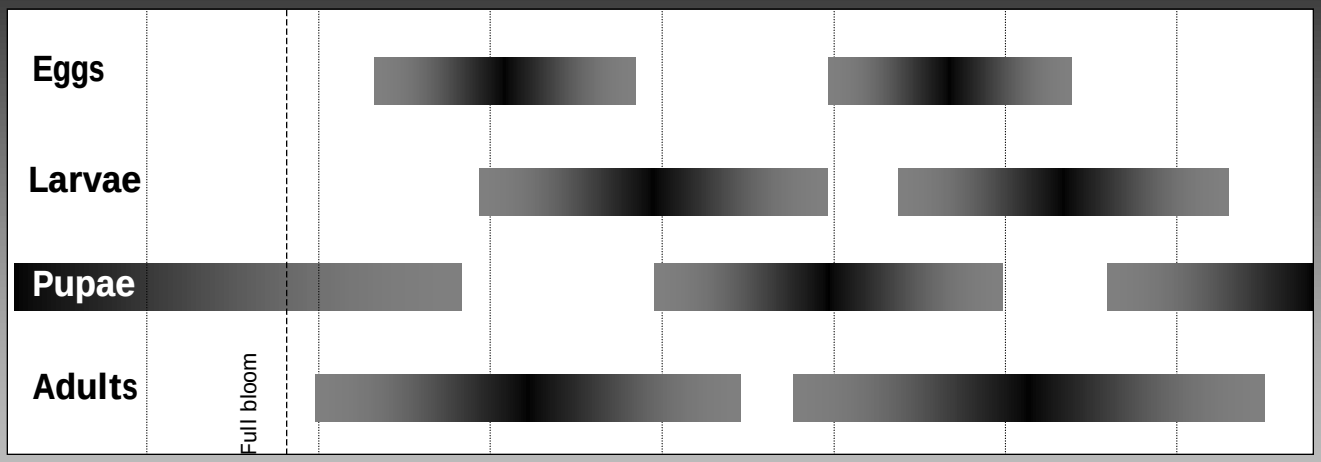
# Bertha armyworm

**Damage, appearance and phenology very similar to lacanobia. Will also attack pear. Associated with poor weed control.**

# Lacanobia Fruitworm

# Lacanobia damage

# Lacanobia fruitworm life cycle

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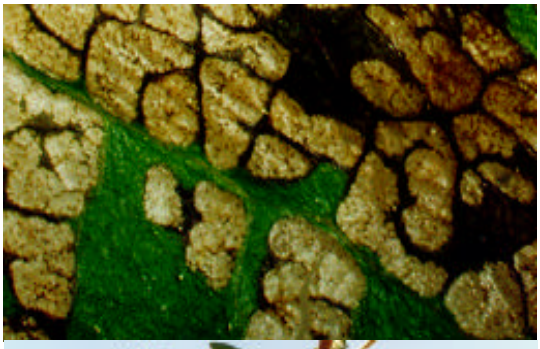
# What is a treatable population

- Adults highly attracted to a pheromone lure
  - Must be monitored with a bucket-style trap
  - Not well correlated with fruit injury
  - Catch of more than 150 moths/week is sign of trouble

# What is a treatable population

- Larval densities are better measure of population
  - Tend to find larvae in areas of dense foliage
  - Beating tray and shoot inspections
    - Mid June/Early August
    - Approx. 30% infested shoots
    - Approx. 1 larva/10 trays



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# When to spray

- Before 1997 little was known about lacanobia phenology
  - Difficult to visually monitor oviposition and hatch
- Pheromone lure was developed
- Degree day model parameters established
- Preliminary model developed in 2000
- Field validation program in 2001
  - Optimal timing, majority of eggs hatched and larvae still small enough to control

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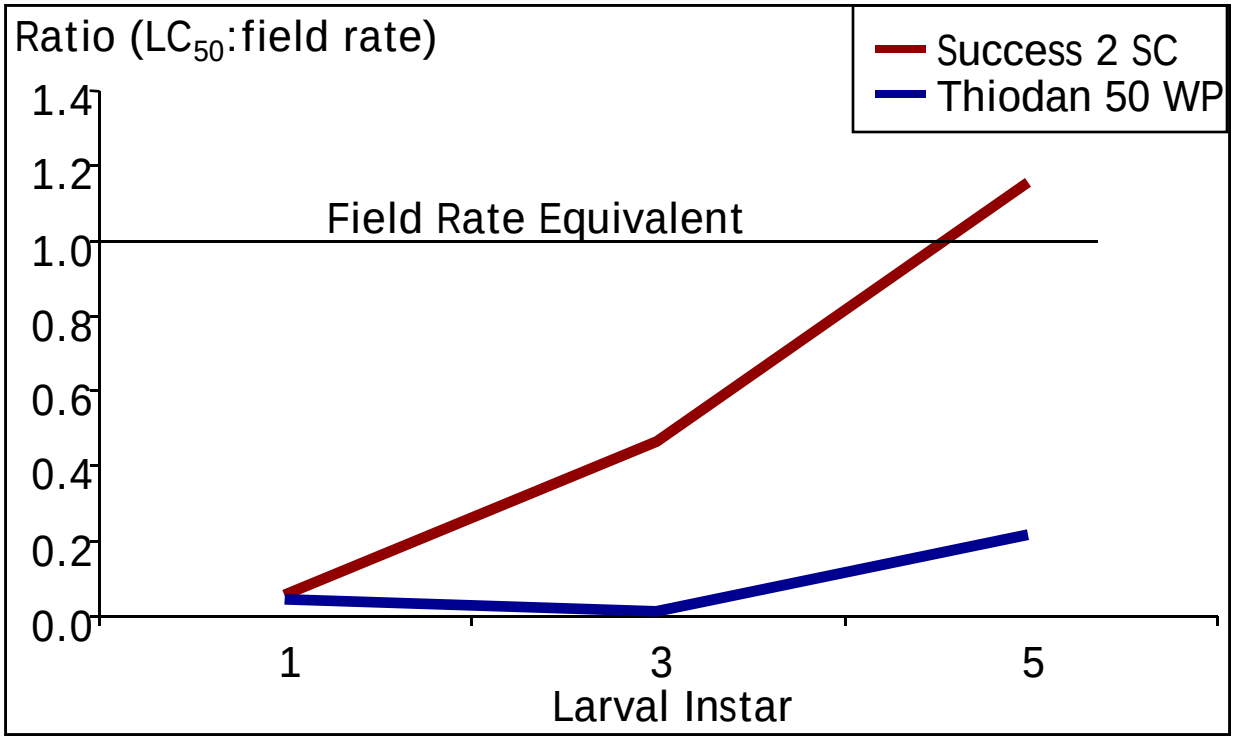
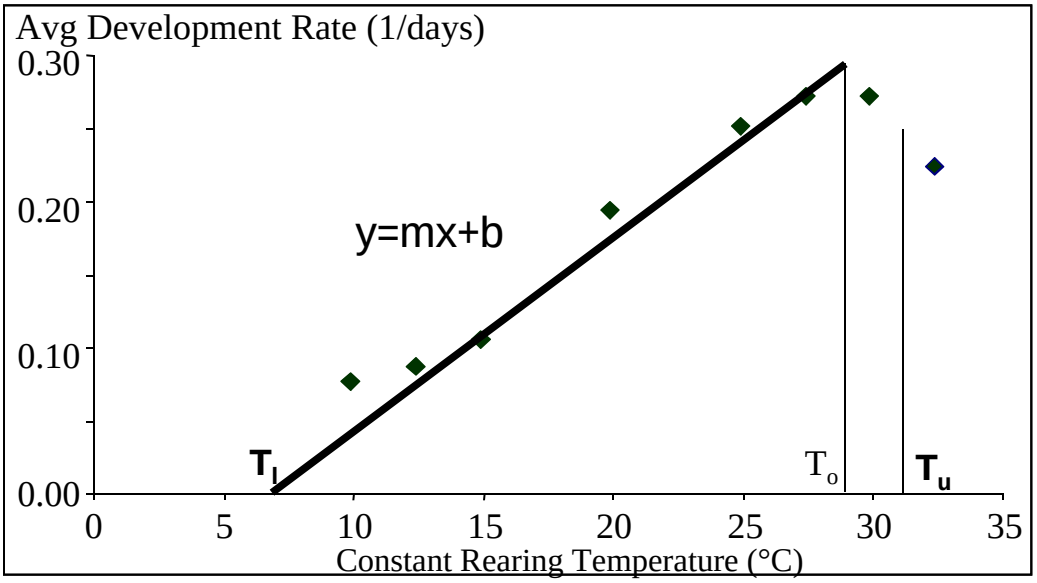
# Stage specific activity of Success

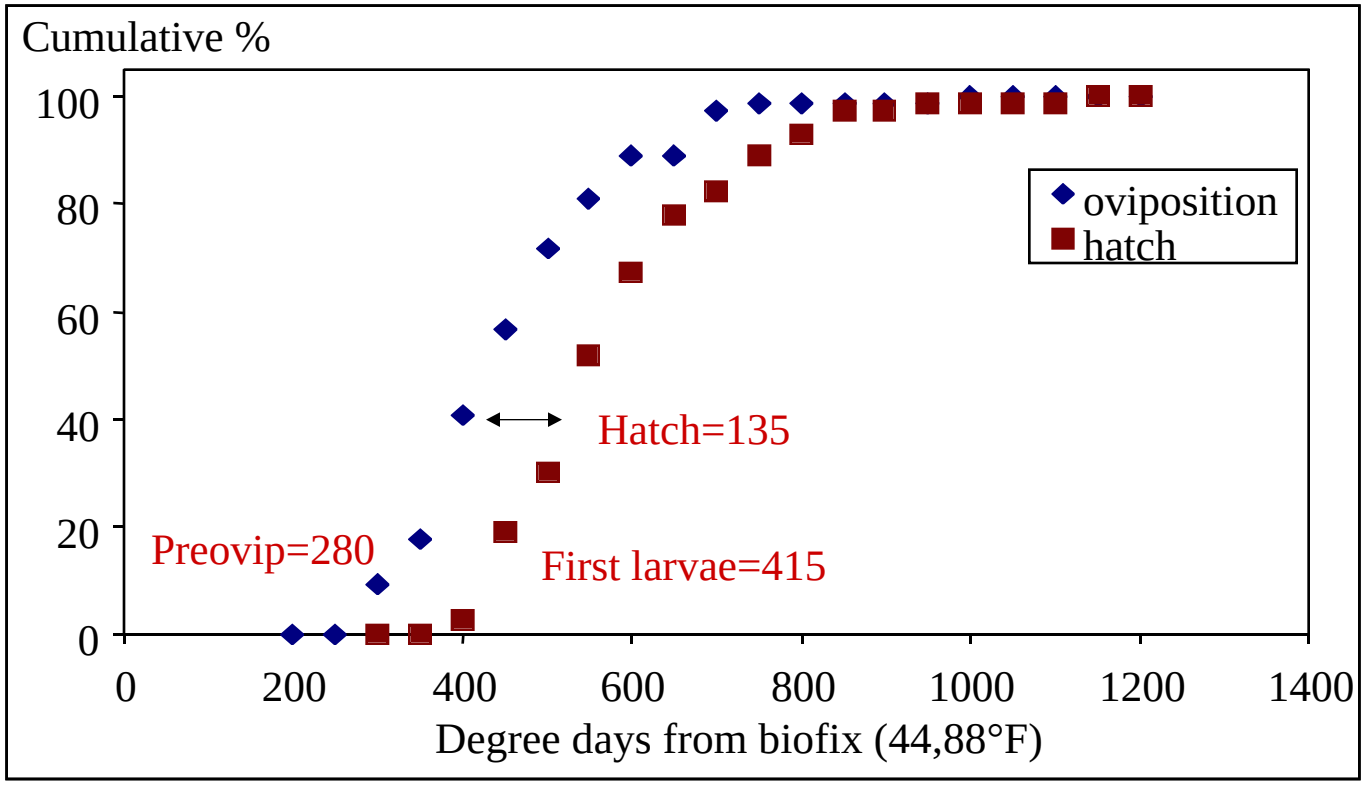


# When to spray

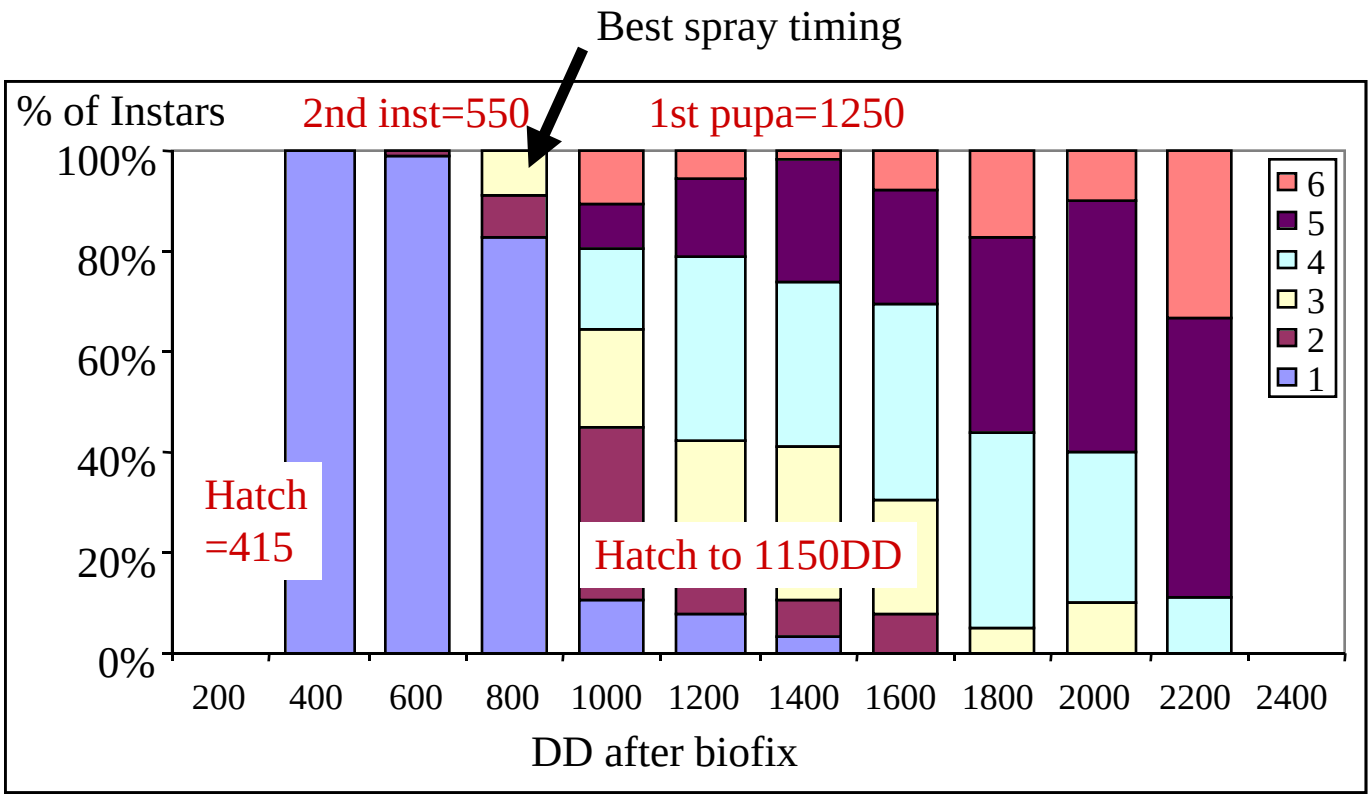
- Rear all life stages at constant temperatures and fluctuating field conditions



# Field Validation



# 1st generation larval sample



# Field observations

| | | | Degree days | | | Calendar days | |
|---|---|---|---|---|---|---|---|
| Event | Location | Predicted | Observed | \|variation\| | Predicted | Observed | \|variation\| |
| Biofix | Quincy | 378 | 340 | 38 | 27 Apr | 24 Apr | 3 |
| | Brewster | | 343 | 35 | 29 Apr | 27 Apr | 2 |
| | Chelan | | 379 | 1 | 24 Apr | 24 Apr | 0 |
| | Stayman | | 401 | 23 | 23 Apr | 25 Apr | 2 |
| **Avg \|variation\|** | | | | **24.2** | | | **1.8** |

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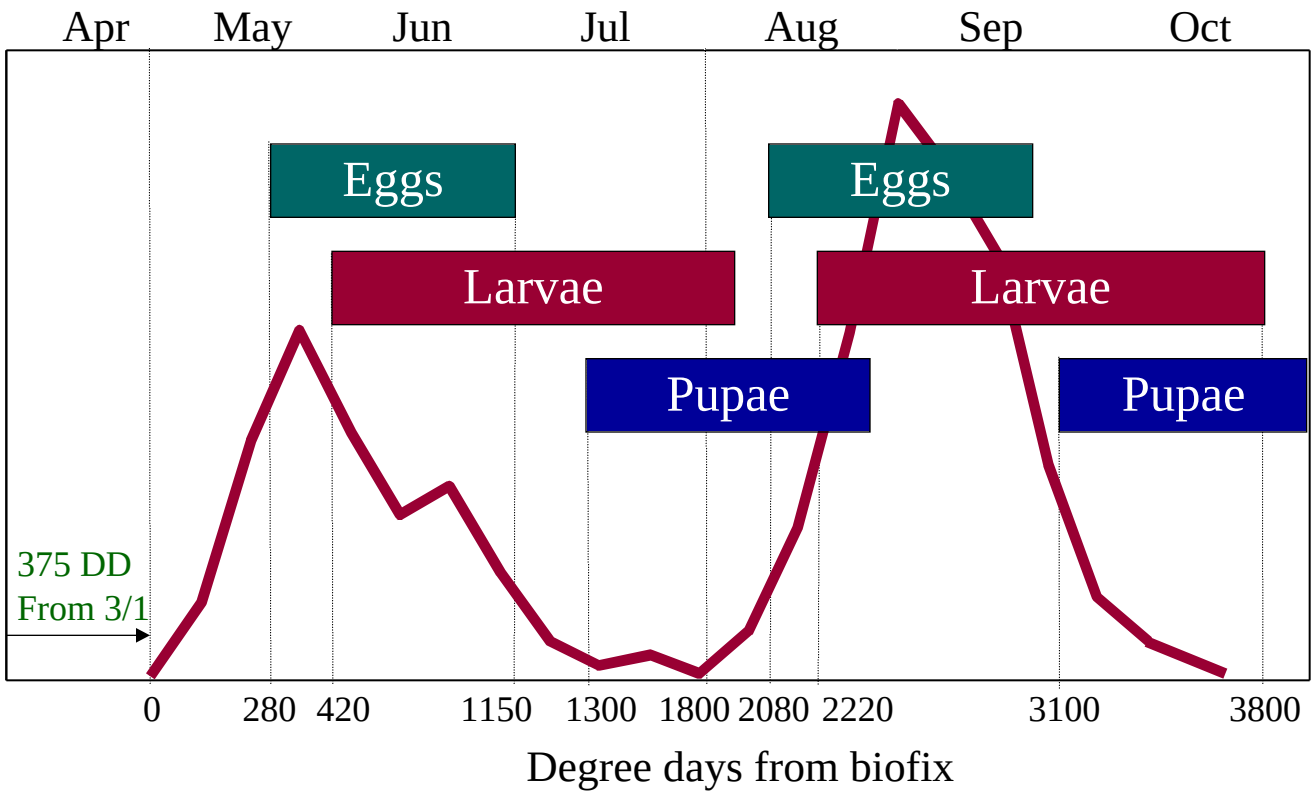


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# What to spray

- Determine cause of pest status increase
- Find potential chemical controls
  - Relative toxicity to lacanobia in lab
  - Optimize use and timing in field trials
  - Activity of field-aged residues
- Evaluate potential new chemicals
- Determine baseline resistance levels

# Possible cause of outbreak

- Evidence of Guthion (OP) resistance

| Rate | percent mortality |
|---|---|
| 0.2 lb/acre | 0 |
| 0.7 lb/acre | 4 |
| 2 lb/acre | 4 |
| 7 lb/acre | 40 |

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# Chemicals tested

- IGR
  - Confirm, Intrepid, Ecozin, Neemix
- Neonicitinoids
  - Provado, Actara, Assail, Calypso
- Organophosphates
  - Lorsban, Guthion, Penncap, Imidan, mal/methoxychlor
- Organochlorines
  - Thiodan
- Pyrethrums/Pyrethroids
  - Pyrellin, Diotech, Asana
- Carbamates
  - Avaunt, Lannate, Sevin, Larvin
- Miscellaneous
  - Success, Bt, Surround. Cryolite, Proclaim

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# Toxicity rankings

- High
  - Success
  - Avaunt+
  - Proclaim+
  - Lorsban+
  - Malathion
  - Thiodan
  - Asana
  - Larvin+
  - Lannate
- Moderate
  - Confirm
  - Intrepid
  - Surround
  - Cryolite
  - Ecozin
  - Pyrellin
  - Diotech
- Low
  - Guthion*
  - Imidan*
  - Sevin*
  - Bt
  - Actara+
  - Assail+
  - Calypso+
  - Provado
  - Penncap+

+ not registered

* resistance reversion

# Biological control

- 3 species of tachinid flies
- Several wasp species
- Generalist predators???
- Varies in effect from yr to yr (0-25%)

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