MICHIGAN STATE UNIVERSITY EXTENSION

OBLR Resistance Management for Cherry IPM

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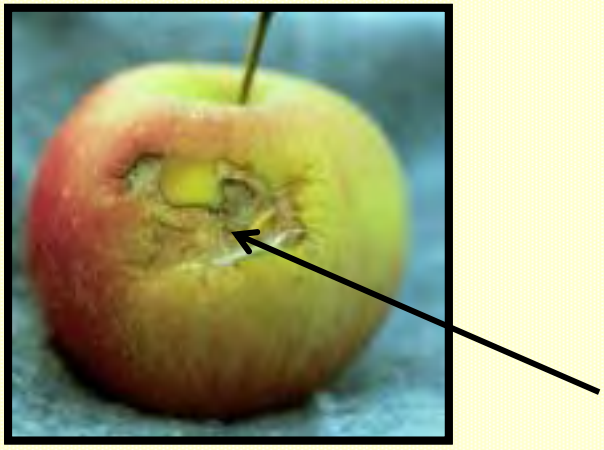


Damage in Apple

- Overwintering larvae feed on buds, leaves, and flowers
- Also feed on developing fruit causing deformed and scarred fruit
  - Many will fall in June drop
- Summer larvae feed on skin and flesh of apple just below surface

Damage in Cherry

- Not as well documented in cherry
- Overwintering larvae feed on buds, leaves, and flowers
- Summer larvae shelter in rolled leaves.
- No evidence of economically important fruit feeding

- Summer larval generation often coincides with harvest
  - Larvae in tanks!

Conventional Insecticides for OBLR Control

Organophosphates

~~Guthion~~

Imidan

Lorsban

Carbamates

Lannate

Synthetic Pyrethroids

Asana

Danitol

Warrior

Baythroid

Battalion

Warrior

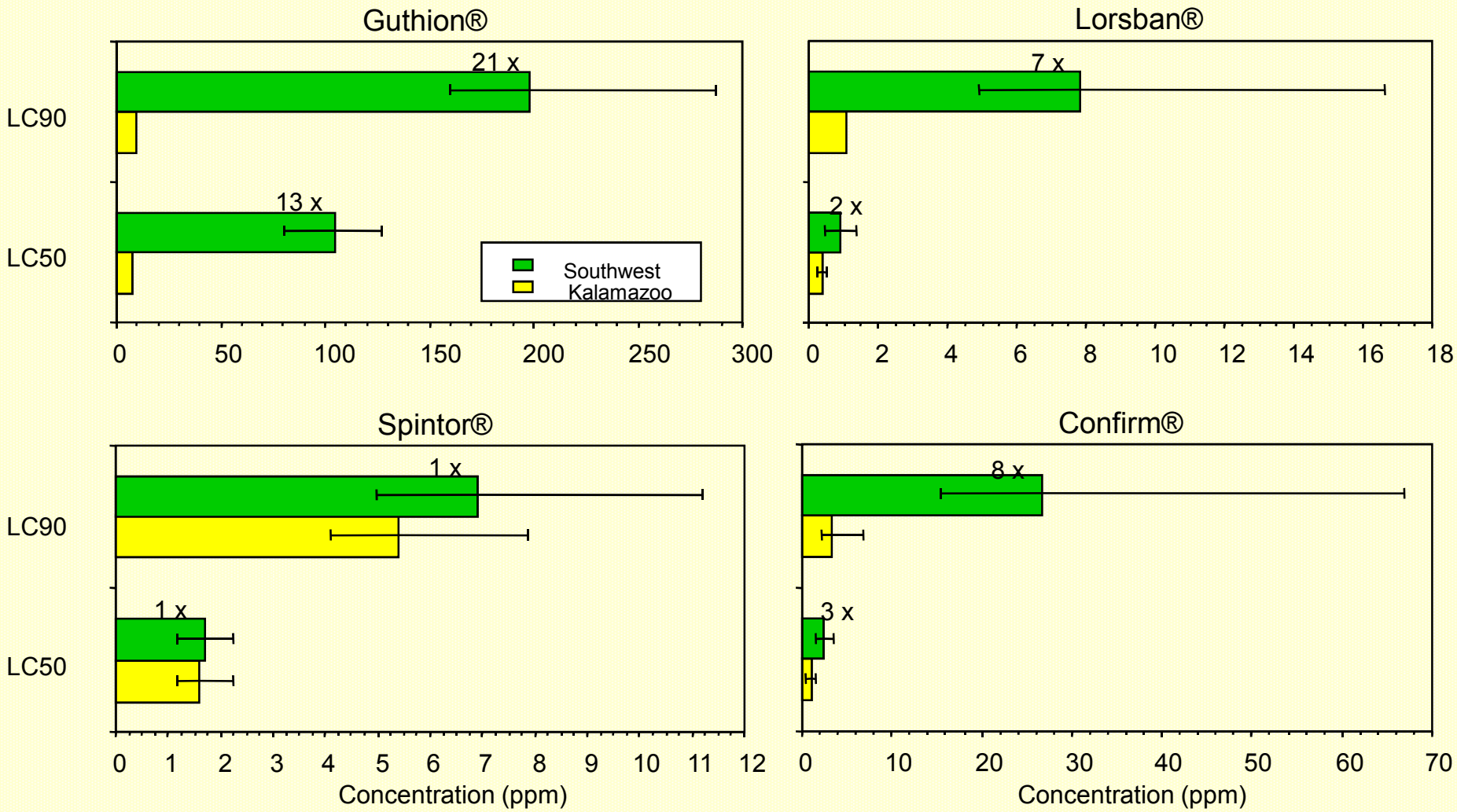


Figure 1. Susceptibility of resistant (Southwest) and susceptible (Kalamazoo) obliquebanded leafroller strains to four insecticides. Resistance ratio indicated above each data bar for the Southwest strain.

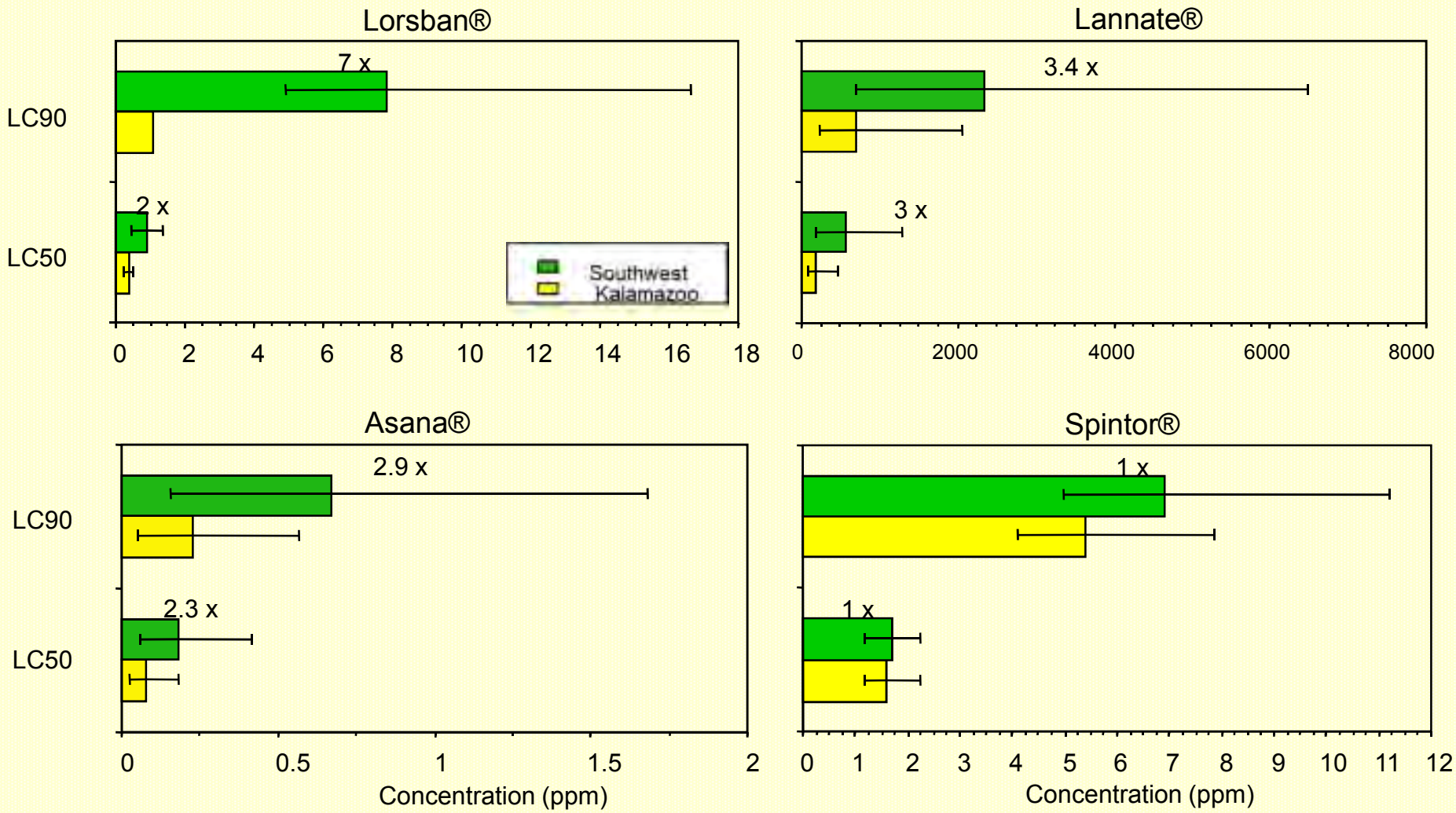


Figure 2. Susceptibility of resistant (Southwest) and susceptible (Kalamazoo) obliquebanded leafroller strains to four insecticides. Resistance ratio indicated above each data bar for the Southwest strain.

Study Objectives

- Field collect and rear OBLR populations from several apple Ridge and Southwest MI locations.
- Establish baseline susceptibility values (LD50, LD90) to selected insecticides for commercial populations, compared to a susceptible laboratory population.

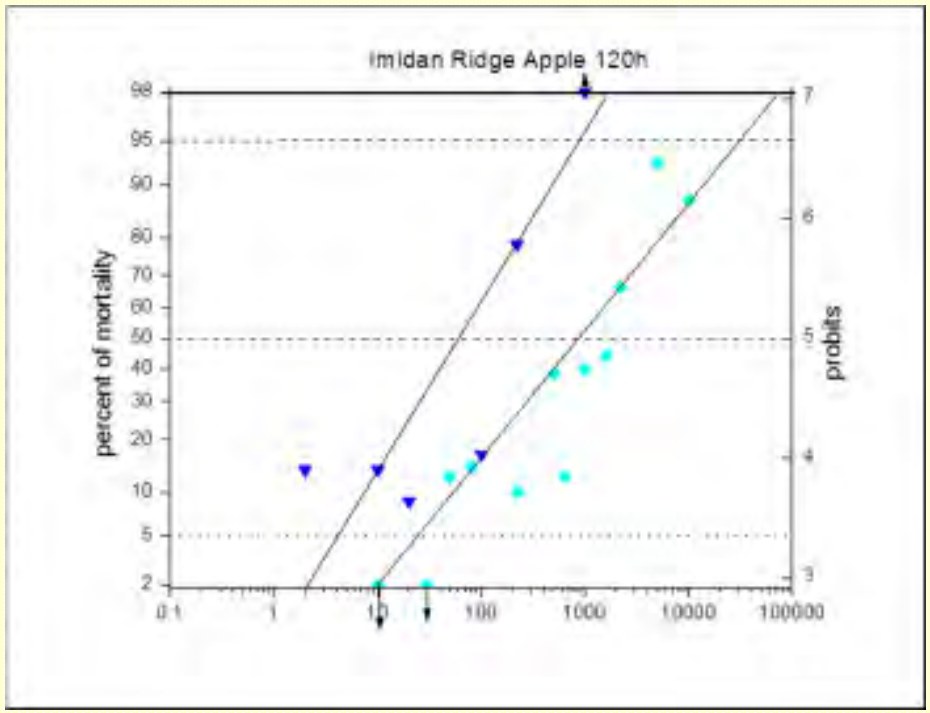
Insecticides targeted in 2013:

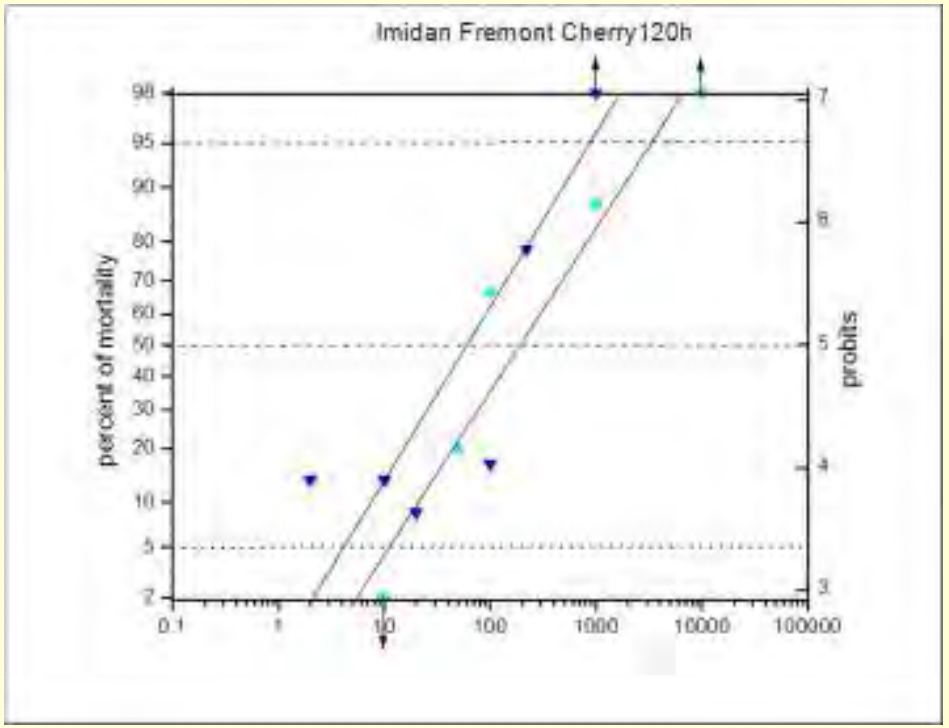
Insecticides tested in 2013 research:

Mode of action	Active ingredient and brand name
Acetilcholinesterase (AChE) inhibitors	phosmet (Imidan ®)
Sodium channel modulators	bifenthrin (Bifenture ®)
Nicotinic acetylcholine receptors allosteric activators	spinetoram (Delegate®)
Chloride channel activators	emamectin benzoate (Proclaim®)
Inhibitor of chitin synthesis biosynthesis, type 0	novaluron (Rimon®)
Ryanodine receptor modulator	chlorantraniliprole (Altacor®)

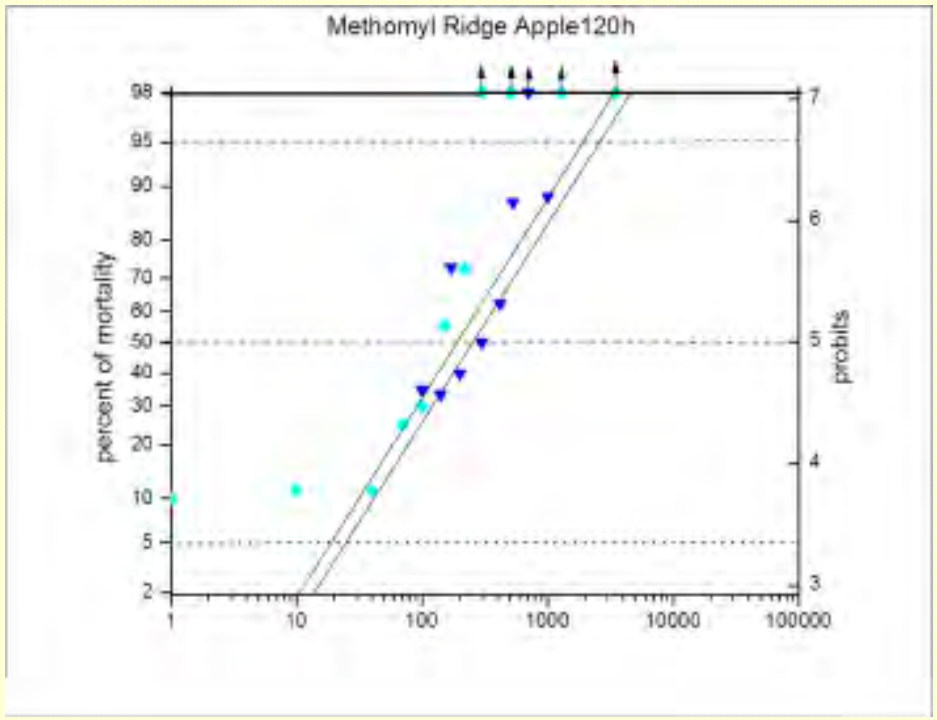
Resistance Bioassay Methods

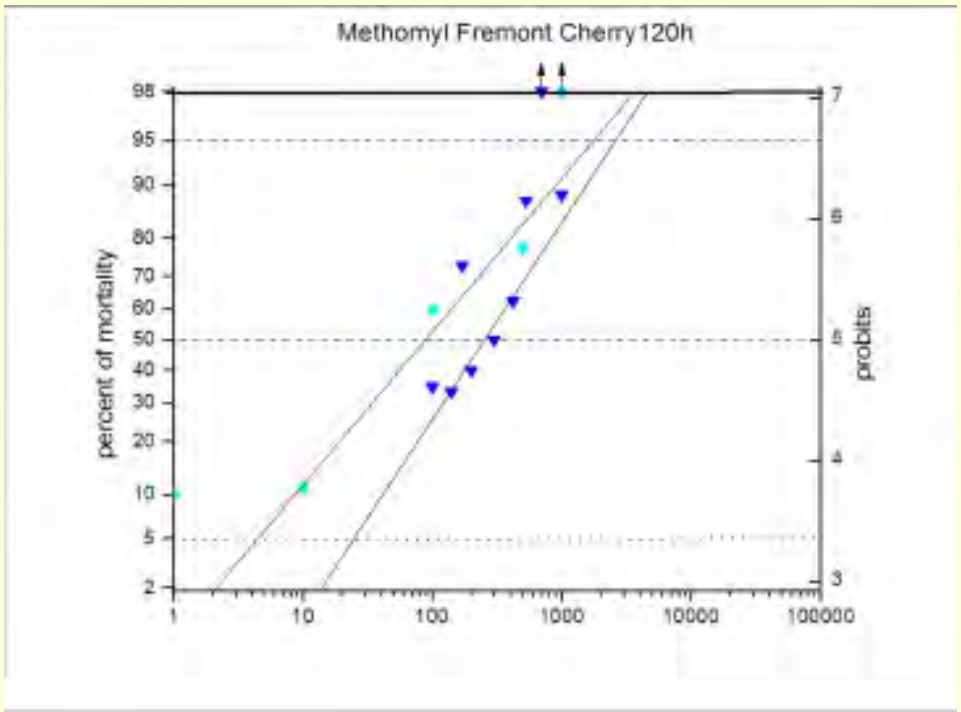
Preliminary Bioassay Results for Imidan



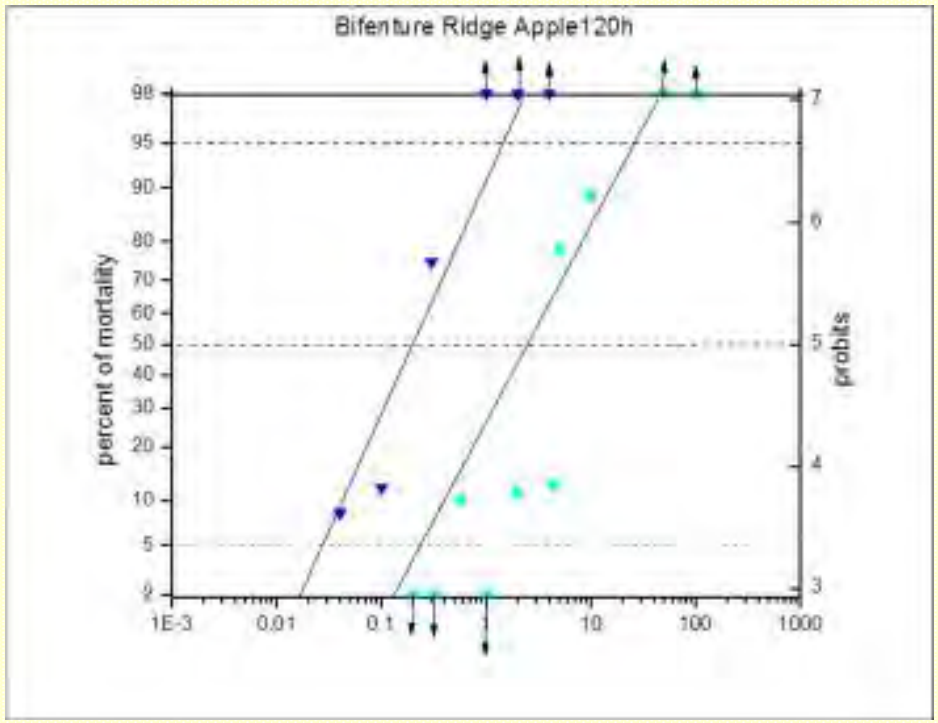


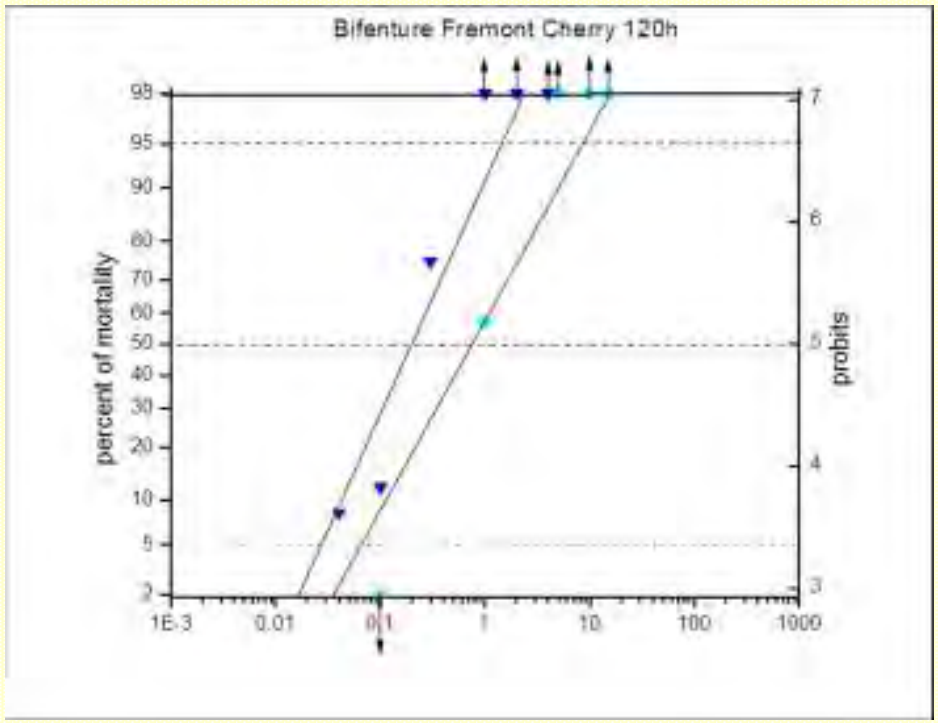
Preliminary Bioassay Results for Lannate



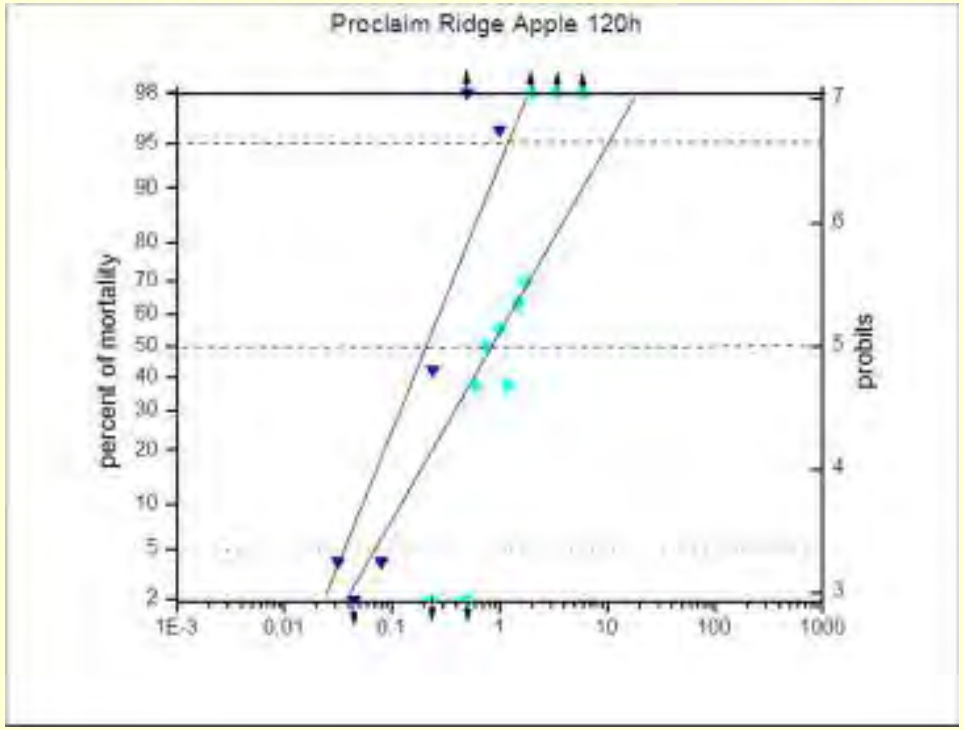


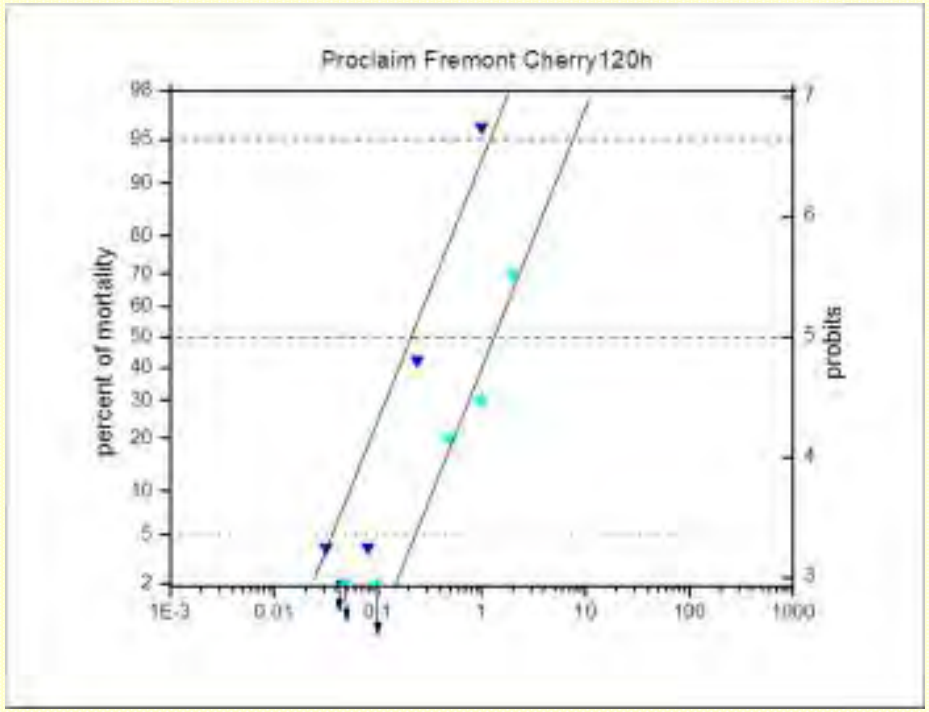
Preliminary Bioassay Results for Bifenture



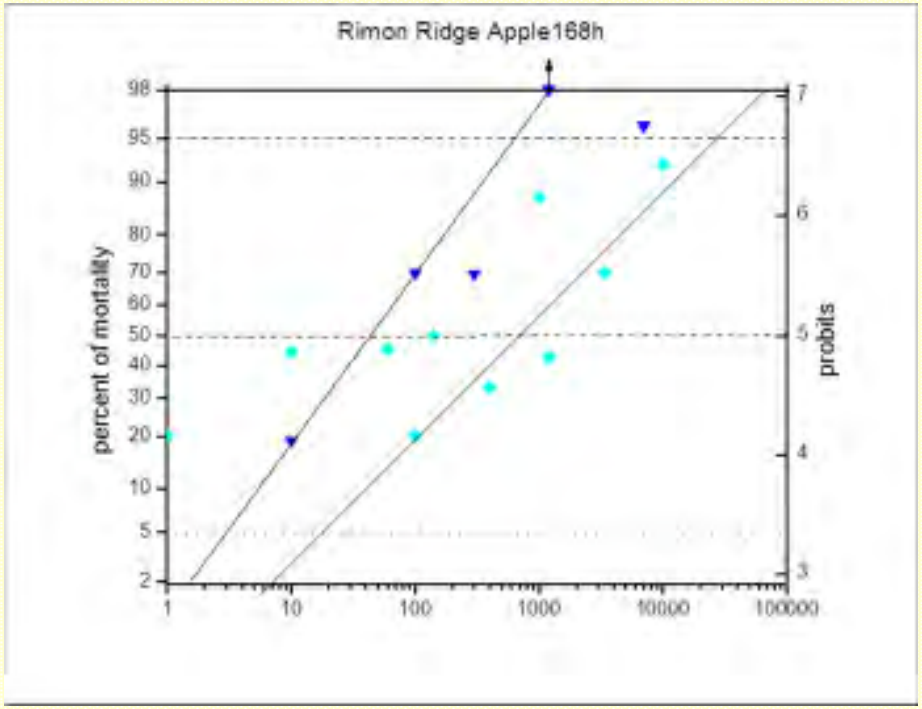


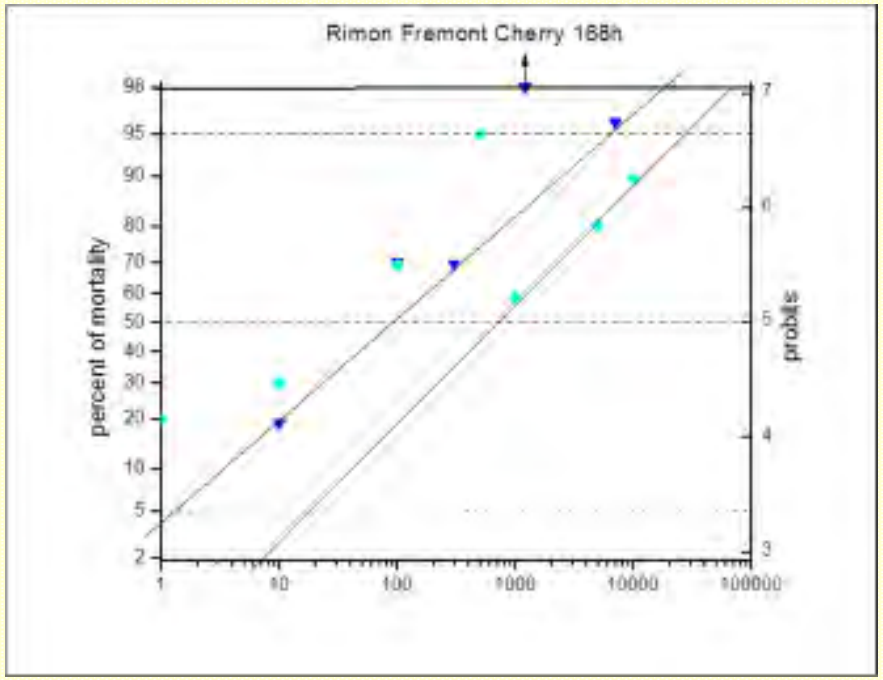
Preliminary Bioassay Results for Proclaim



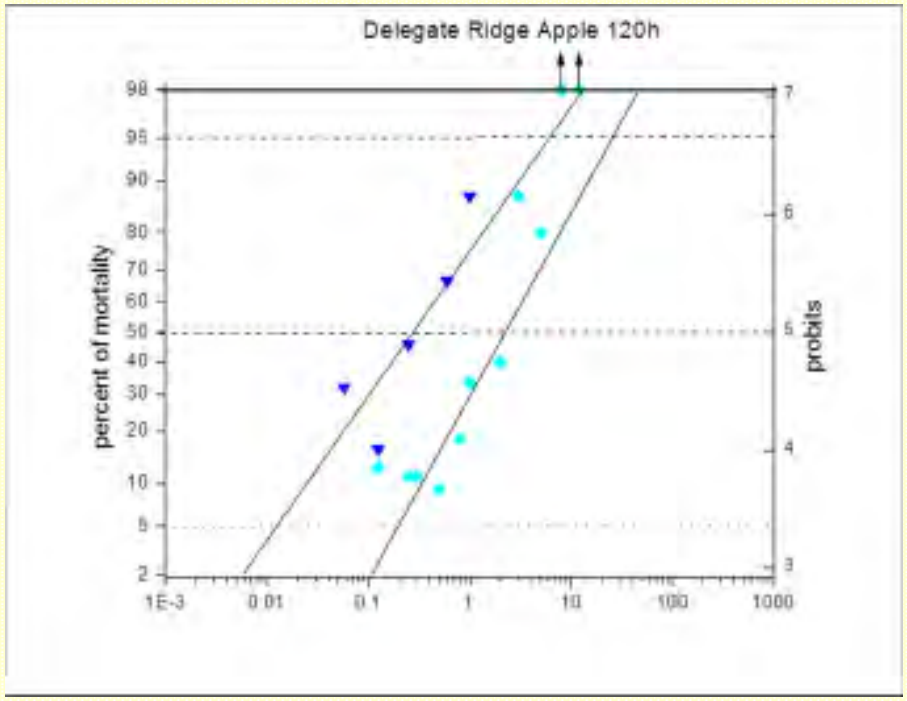


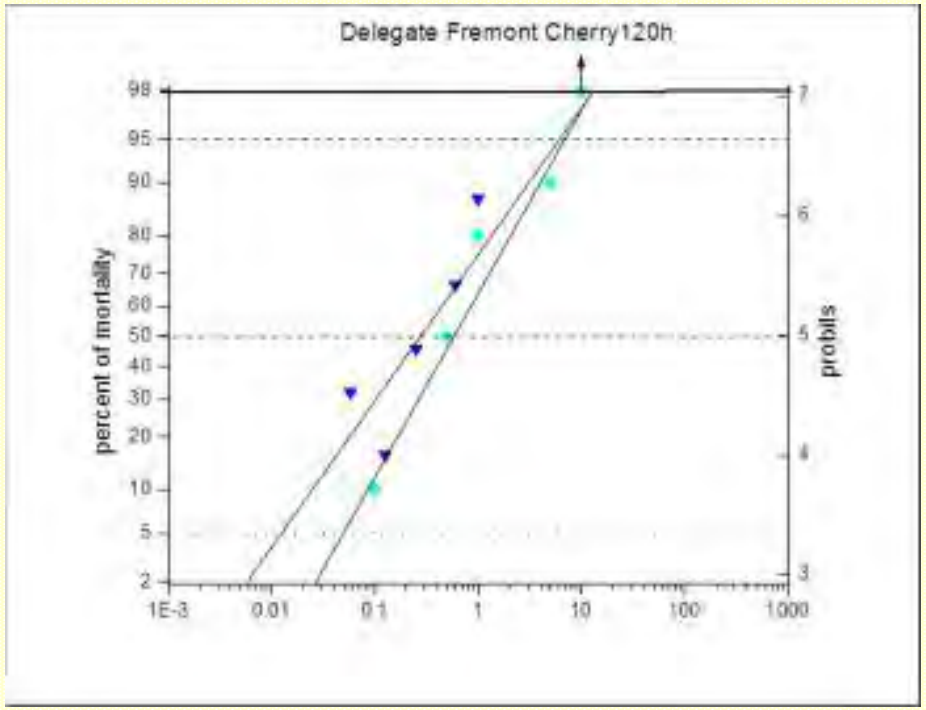
Preliminary Bioassay Results for Rimon



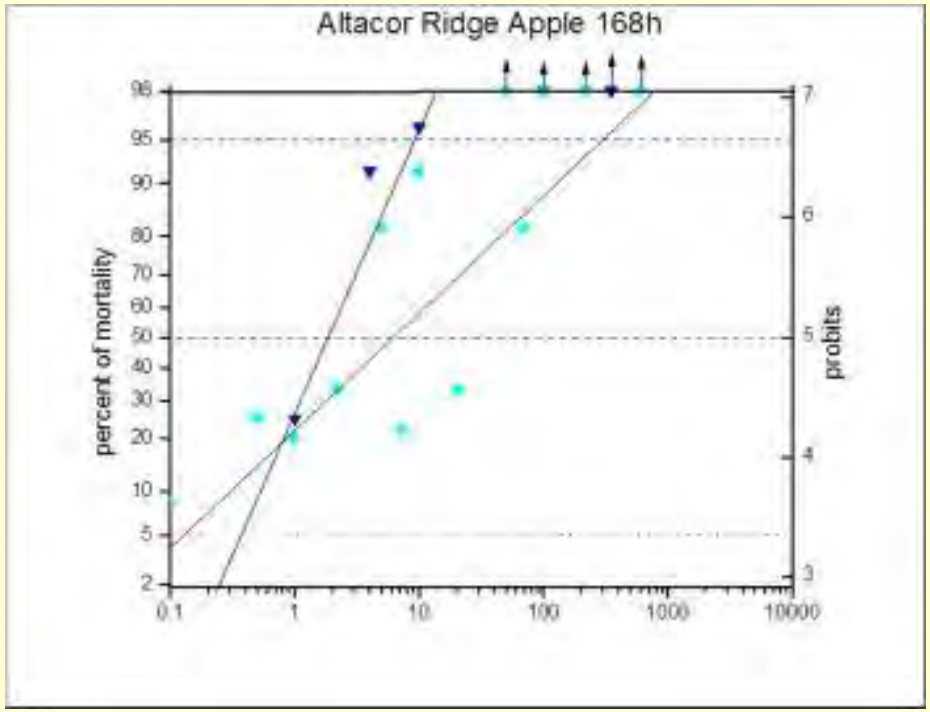


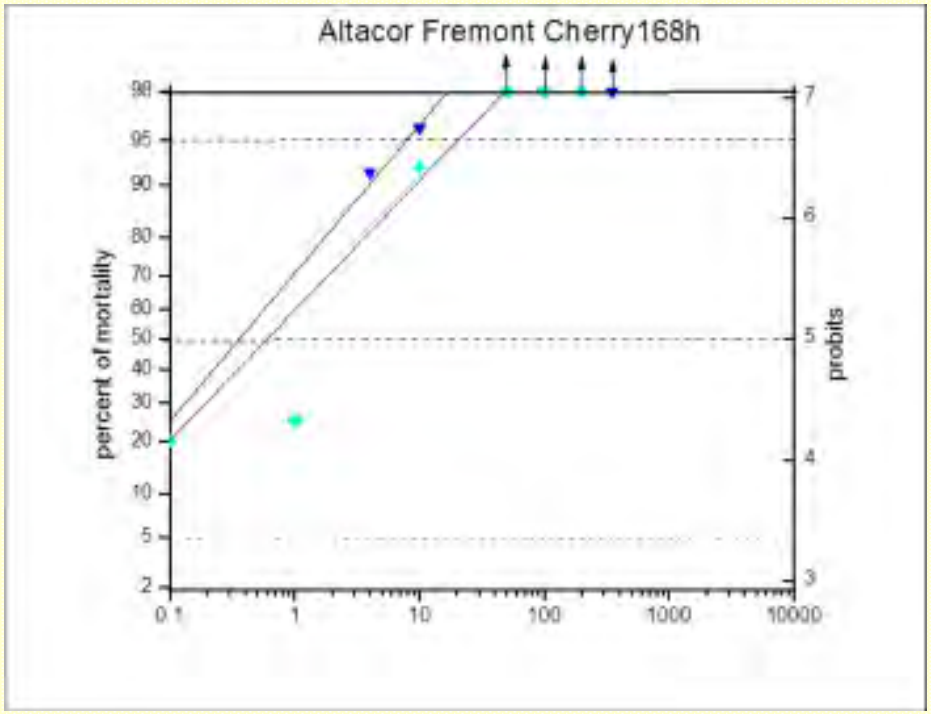
Preliminary Bioassay Results for Delegate





Preliminary Bioassay Results for Altacor





New Insecticides for OBLR Control

Spinosyns

Delegate

Entrust*

Diamides

Altacor

Belt

Pre-mixes

Voliam Flexi (chlorantraniliprole + thiamethoxam)

Voliam Express (chlorantraniliprole + lamda-cyhalothrin)

Avermectins

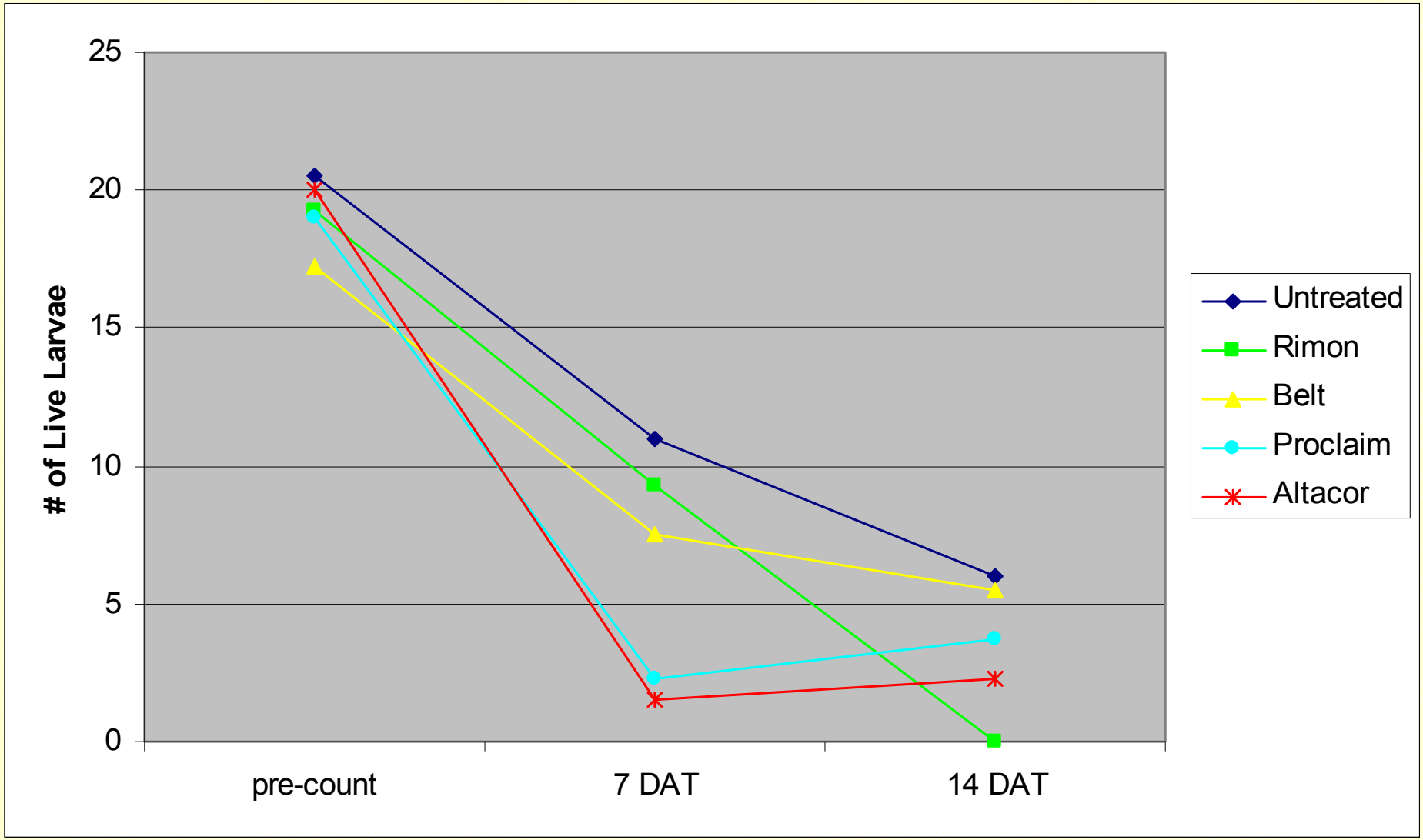
Proclaim

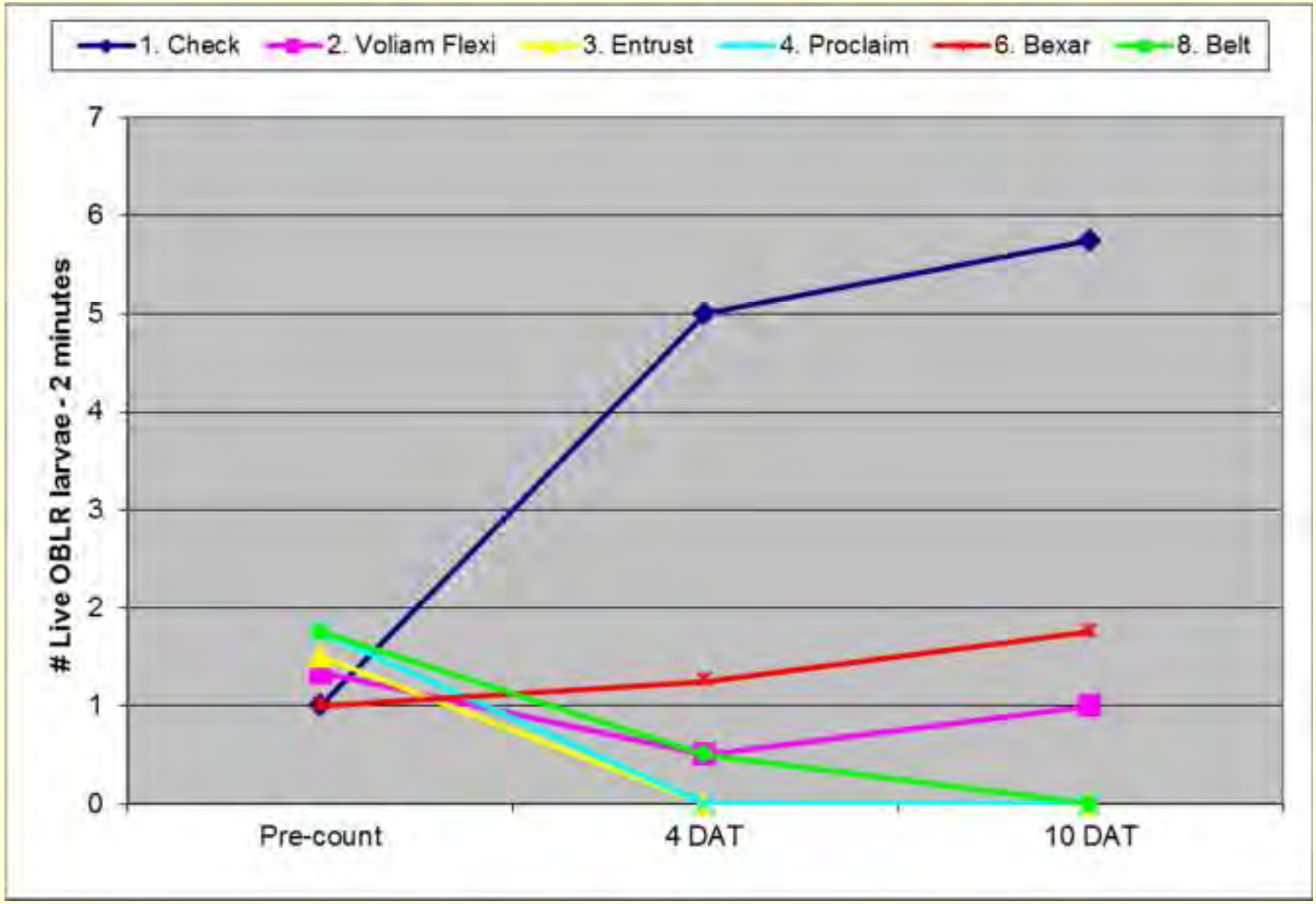
Insect Growth Regulators

Rimon

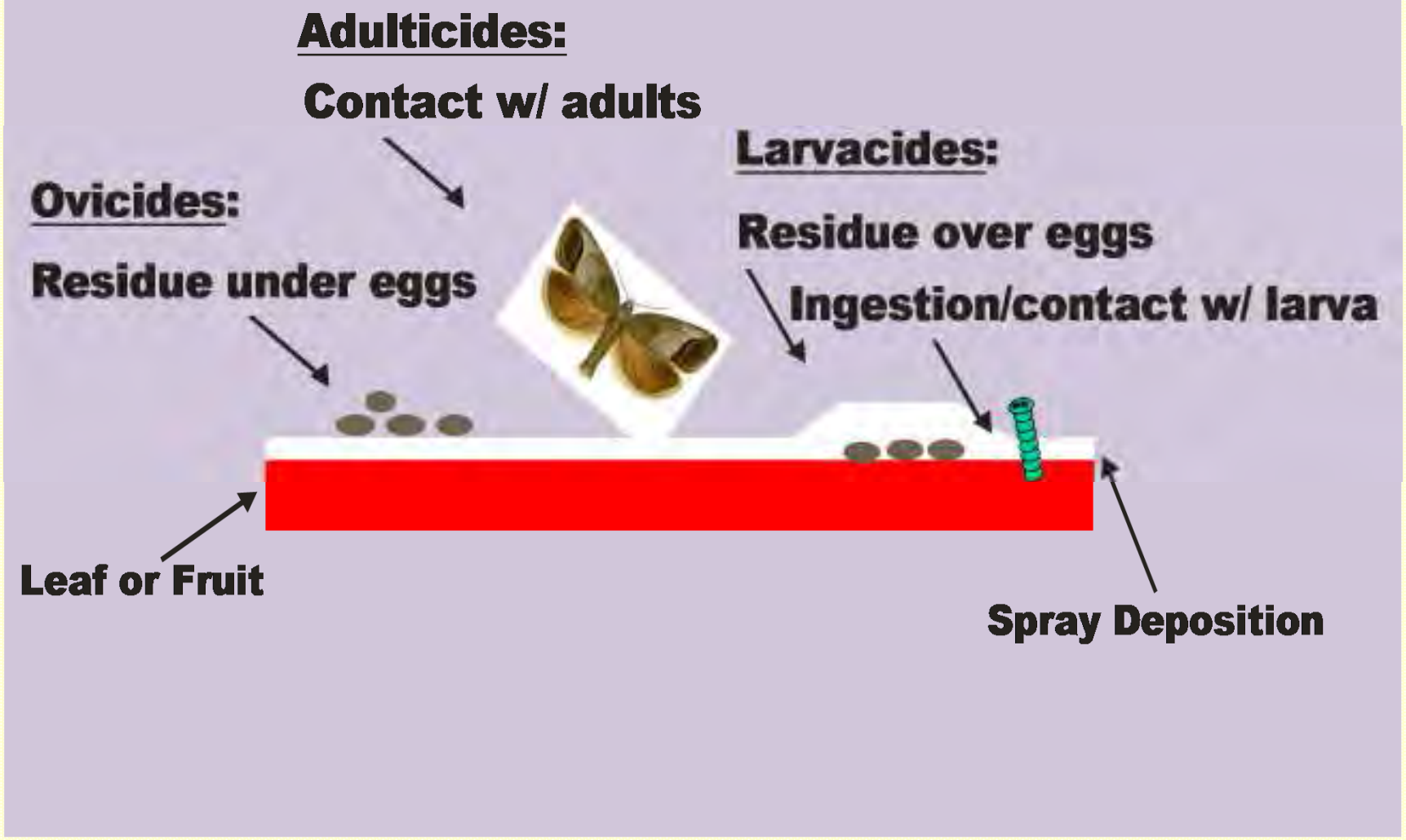
Microbials

Dipel*

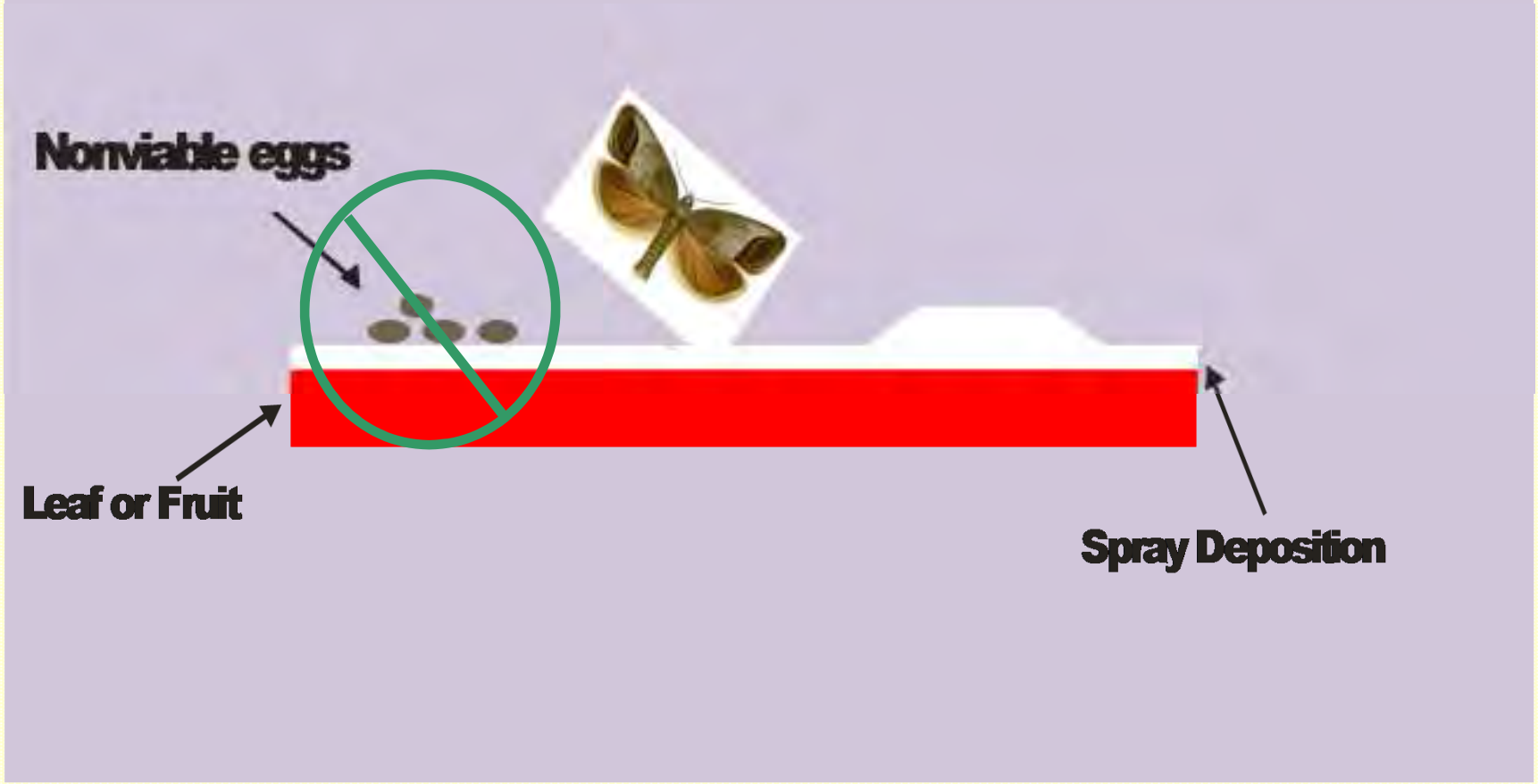

25
20
15
10
5
0
# of Live Larvae
pre-count
7 DAT
14 DAT
Untreated
Rimon
Belt
Proclaim
Altacor


1. Check
2. Voliam Flexi
3. Entrust
4. Proclaim
6. Bexar
8. Belt
Live OBLR larvae - 2 minutes
0
1
2
3
4
5
6
7
Pre-count
4 DAT
10 DAT

Life Stage Activity



Sub-lethal activity affects the subsequent generation of the pest



Insecticidal Activity on OBLR in Cherry

Compound	**Life-stage activity**	**Speed of Activity**	**PHI**
Pyrethroids	larva, adult	fast	7-14
Rimon	egg, larva adult (sub)	slow	8
Delegate	larva	fast	7
Entrust	larva	fast	7
Bts	larva	slow	0
Proclaim	larva	fast	-
Altacor/Belt	larva	good	10/7
Voliam Flexi	larva	fast	14
Voliam Express	larva, adult	fast	14

Early Season Options for OBLR Control

Compound	**OBLR**	**Plum Curculio**
OPs	poor	excellent
Carbamates	fair	good
Pyrethroids	fair	fair
Rimon	excellent	good (sublethal)
Delegate	excellent	fair (ingestion-active)
Entrust	excellent	poor
Bts	good	poor
Proclaim	excellent	poor
Altacor/Belt	excellent	Poor
Voliam Flexi	excellent	good-excellent

Pre-harvest Options for OBLR Control

Compound	**OBLR**	**SWD**	**CFF**
OPs	poor	excellent	excellent
Carbamates	fair	good	fair
Pyrethroids	fair	excellent	fair
Rimon	excellent	good (sublethal)	good (sublethal)
Delegate	excellent	excellent	good
Entrust	excellent	excellent	fair
Bts	good	poor	poor
Proclaim	excellent	poor	poor
Altacor/Belt	excellent	good	good
Voliam Express	excellent	excellent	excellent

Conclusions

- OBLR is emerging new contaminant pest of tart and sweet cherries
  - OP resistance is the likely cause of increases in OBLR populations.
  - Good scouting will inform decision-making.
- New materials are effective
  - Costly
  - Need to be well-timed and well-placed.
  - Need to rotate chemistries to minimize risks of resistance.

The TNRC staff say thank you to the
Michigan Apple Committee &
Michigan Cherry Committee
for making this research possible

Preliminary Bioassay Results for Avaunt