

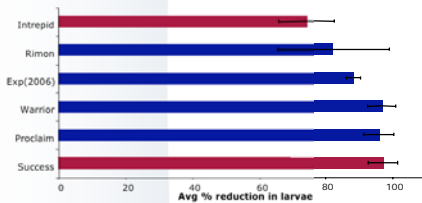
Managing Leafrollers in Apple Orchards

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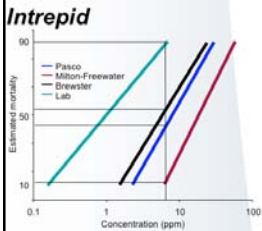
research

objective 1

Field trials with new insecticides



- New insecticides compared to industry standards of **Intrepid** and **Success**.
- Rimon and Warrior controlled OBLR at least as well as Intrepid and Success.
- Proclaim (registration in 2006) and an experimental insecticide (name to be released in 2006) are promising alternatives.



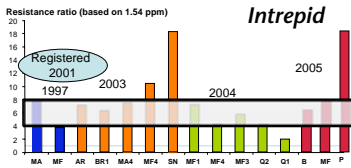
- Dose response curves generated for several field collected populations.
- Mortality between populations compared at a concentration that killed 90% of a susceptible laboratory population.

- Exposure to a discriminating dose is a method of predicting resistance. Testing only one concentration requires fewer specimens, and less time and labor.

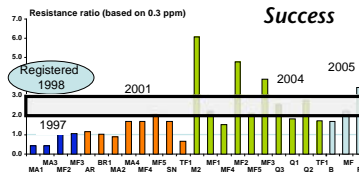
Insecticide	Dose (ppm)	Estimated mortality at LC ₉₀ of Laboratory colony			
		LAB	Pasco	Milton-FW	Brewster
Guthion	20.0	90	0	0	0
Intrepid	6.7	90	43	10	53
Success	1.3	90	50	66	65
Proclaim	0.07	90	100	100	100
Exp (2006)	14.0	90	78	88	81

objective 2

develop discriminating doses



- Moderate Intrepid resistance (above) was noted prior to registration. This level of OP-mediated cross resistance seems to be stable.
- Success resistance (below) was first documented in 2004. The increase in tolerance gives reason for concern.

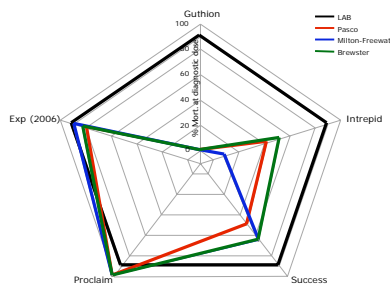


objective 3

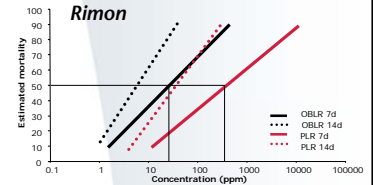
evaluate resistance levels in field

objective 4

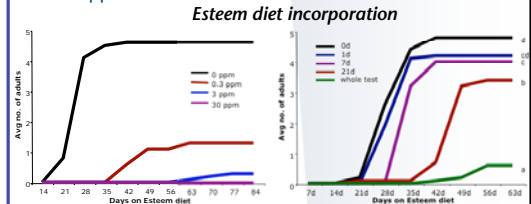
characterize cross resistance



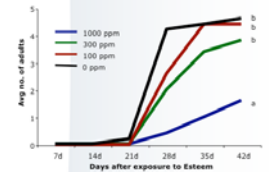
- Data from the discriminating dose experiment.
- Mortality lines at 0% for Guthion from all field populations indicate a high level of resistance.
- An increase in tolerance was noted for Intrepid and Success from all field populations.
- Mortality lines from field populations similar to the LAB suggest no cross resistance to Proclaim or the experimental insecticide.



- Rimon is a growth regulator that inhibits normal chitin synthesis and affects molting.
- Mortality is delayed, with a significantly lower LC₅₀ noted between 7 days and 14 days after exposure (above).
- PLR appears to be more tolerant of Rimon than OBLR



- Estem is a juvenile hormone that affects the larva as it develops to maturity (photo below). Normal development to adult is considerably delayed (above).
- Incorporating small amounts of Estem into diet (above) results in significant mortality (left). Once removed from Estem diet (right), development resumes.
- Consuming a single high dose (1000 ppm) of Estem on a leaf disk resulted in significant mortality (below).



objective 5

dose mortality bioassay for IGRs

review