



# New Insecticide Alternatives for Codling Moth Control on Apple



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## Insect Growth Regulators (IGR's)

- ◆ Rimon (difluorobenzamide), Intrepid (methoxyfenozide)
- ◆ Safe for the environment, safe for farm workers, and low toxicity to natural enemies
- ◆ Narrow pest spectrum (primarily Lepidoptera)

## Neonicotinyls

- ◆ Assail (acetamidrid), Calypso (thiacloprid), Clutch (clothianidin)
- ◆ Safe for the environment and farm workers
- ◆ Wider spectrum of activity (including Lepidoptera)

## Field Trial Methods

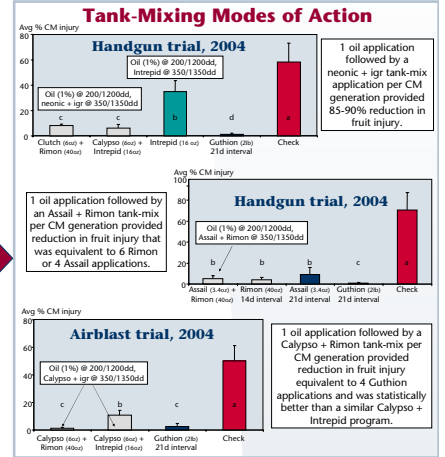
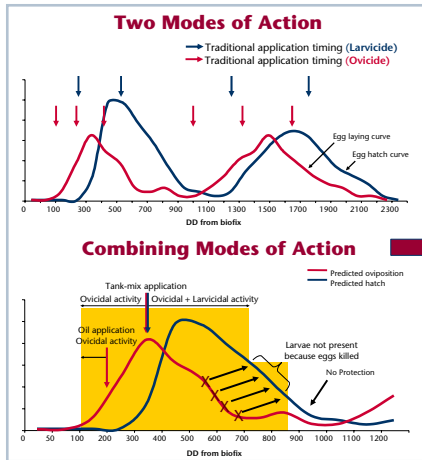
### Handgun

- ◆ Single-tree plots sprayed to the point of drip to simulate a dilute spray
- ◆ Buffer trees used to avoid overspray and drift
- ◆ Applications made with a multiple-tank handgun sprayer

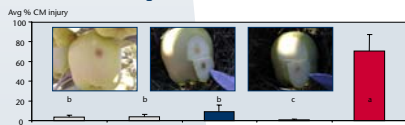
### Airblast

- ◆ Fifteen-tree plots sprayed at 100 gpa
- ◆ Buffer rows used to avoid overspray and drift
- ◆ Applications made with a dual-tank airblast sprayer

Fruit injury evaluations at the end of each CM generation

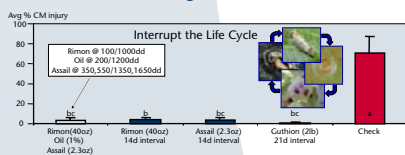


## Small-plot handgun trials, 2004 Rimon Compared to Assail & Guthion



Rimon provided 94-95% reduction in % injured fruit when applied 3 times per CM generation timed to target the CM egg laying period.

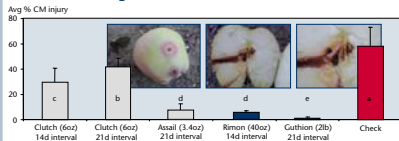
## Combination Program - Rimon & Assail



Rimon kills CM eggs that are laid on top of residues – oil applied over the top of CM eggs smothers the developing embryo – Assail kills eggs already in the orchard as well as newly hatched CM larvae. This program reduced CM fruit injury by 95% in this trial.

## Small-Plot handgun trial, 2004

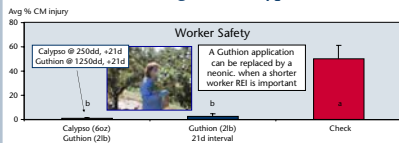
### Clutch Compared to Assail, Rimon & Guthion



Clutch did not provide the same level of CM control as other available options. Assail and Rimon both consistently provide 85-90% reduction in fruit injury.

## Large-Plot airblast trial, 2004

### Combination Program - Calypso & Guthion



Two Calypso applications followed by two Guthion applications provided CM control that was equivalent to four applications of Guthion.

- ◆ **Rimon** is a very promising new ovicide. Very effective when applied against CM at the beginning of the egg laying period (100 or 1000dd) and repeated at 14d intervals.
- ◆ **Rimon** can add an early advantage when applied in combination with a larvicide based program by killing eggs and consequently larvae that would have hatched.
- ◆ **Assail** has both ovicidal (topical only) and larvicidal activity and is effective when applied at 21d intervals (3.4oz) or can be used at a lower rate (2.3oz) applied more frequently (14d).
- ◆ **Calypso** and **Assail** have similar activity against both CM eggs and larvae.
- ◆ **Clutch** is not as effective as **Assail** or **Calypso** against CM in the field at the rates that have been tested.
- ◆ Tank-mixes of neonicotinyl insecticides (**Assail**, **Calypso**, **Clutch**) combined with IGRs (**Intrepid**, **Rimon**) effectively reduce CM damage with one tank-mix application preceded by one oil application in each CM generation.
- ◆ Tank-mix programs work by combining two different modes of action – the ovicidal activity kills eggs that have been or will be laid in the orchard while the larvicidal activity works against larvae that successfully hatch.