US EPA ARCHIVE DOCUMENT

RAMP II

2008

Michigan Tart Cherries

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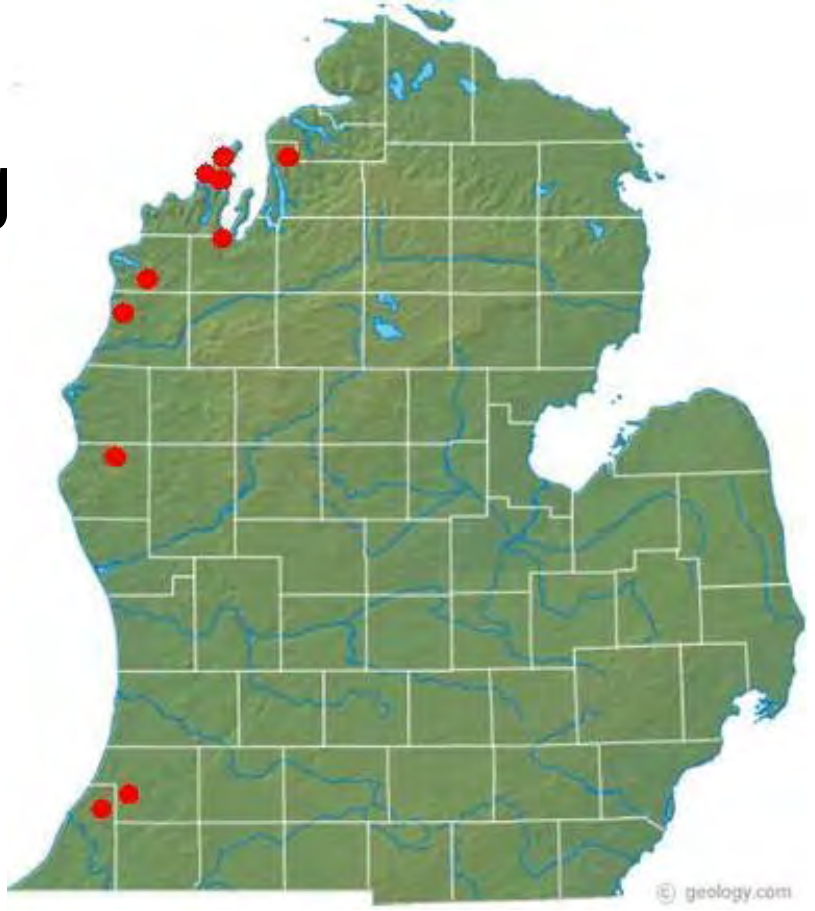
Goals

- RR, OP-alternatives:
  - Develop, implement, and evaluate alternative pest management systems
- Tart Cherry Industry:
  - Enhance productivity, profitability, and competitiveness
- Minimize risk:
  - to workers, consumers, and environment

Location

8 MI Cherry Growing Counties

Antrim, Benzie, Berrien,
Grand Traverse, Manistee
Leelanau, Oceana,
Van Buren



Experimental Design

- 10 Growers
- 2 Orchards each: Each Orchard ~10A
  - RAMP
    - AZM Alternatives
    - Reduced Risk Compounds
    - Organophosphate Alternatives
  - COMP
    - Conventional chemistries
    - No AZM (ideally)

Treatment Regimes

COMP

Combination of:

- Guthion® (azinphos-methyl)
  - Rate: 1.5 lbs./acre
- Imidan®$_{70\text{-}W}$ (phosmet)
  - Rate: 2.5 lbs./acre
- Lorsban®$_{50\text{-}W}$ (chlorpyrifos)
  - Rate: 3 lbs./acre
- Perm-UP®, Pounce® (permethrin)
  - Rate: 6.4-12.8 oz./acre

Tart cherry end use September 30, 2012
We avoided the use of AZM throughout this study…even for rescue sprays…

Treatment Regimes

RAMP = 3 Alternatives

1. Assail/Delegate/Avaunt
2. Actara/Delegate
3. Avaunt/Provado

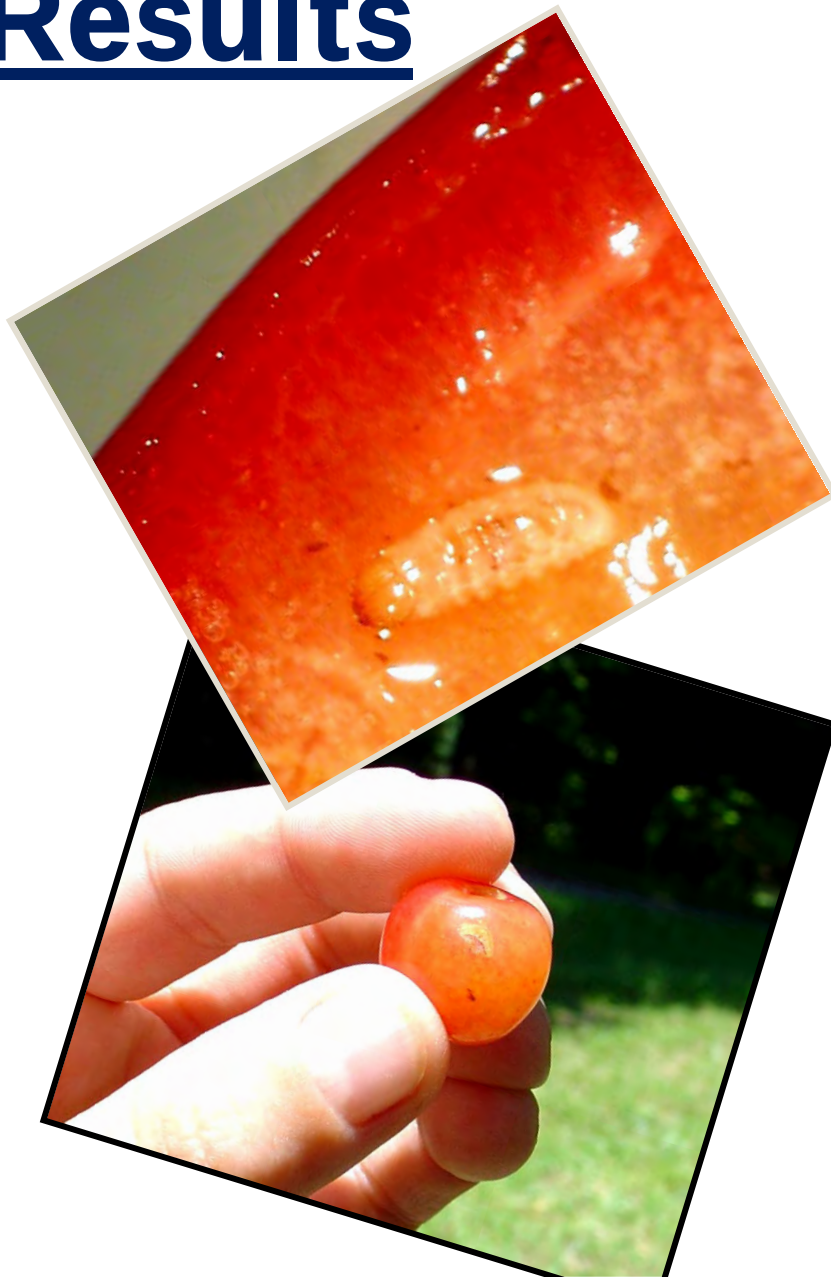
Actara® (thiamethoxam), Assail® (acetamiprid)

Avaunt® (indoxacarb), Delegate® (spinetoram)

Provado® (imidacloprid)

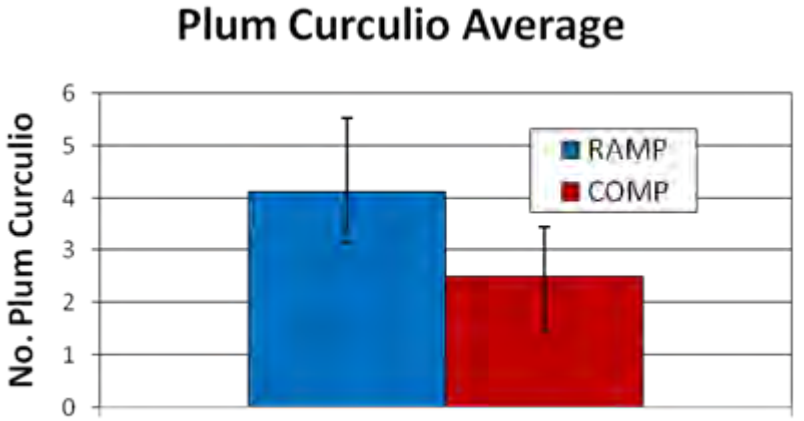
2008 Field Results

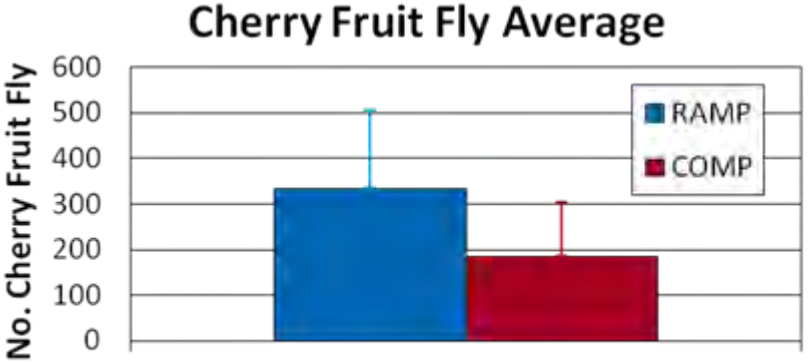
- One farm with Cherry Fruit Fly infested cherries at harvest
- Two farms with frost damage
- Three farms with additional treatments to control Plum Curculio



Results

- Average Plum Curculio and Cherry Fruit Fly Counts



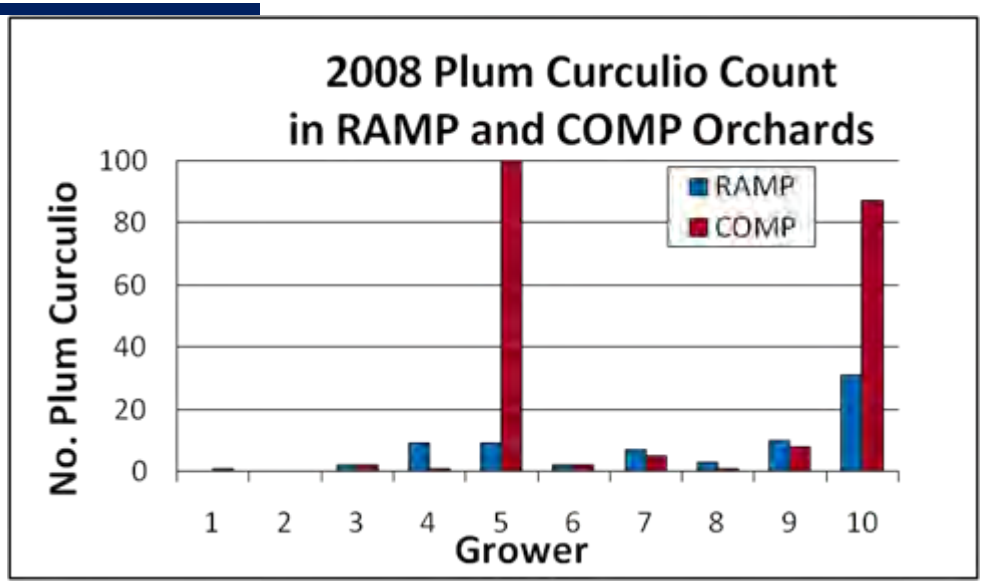


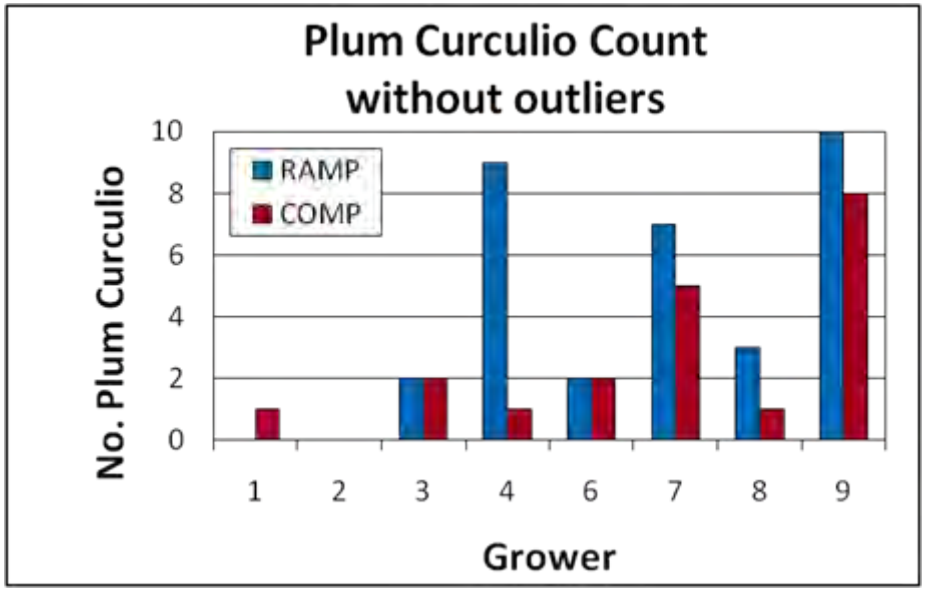
(PC average –outliers)

Results

Plum Curculio

- Grower 5 had loss from frost damage
- Grower 10 is a first-time participant in the Risk Avoidance program
- RAMP Blocks exceeded COMP blocks in PC numbers trapped

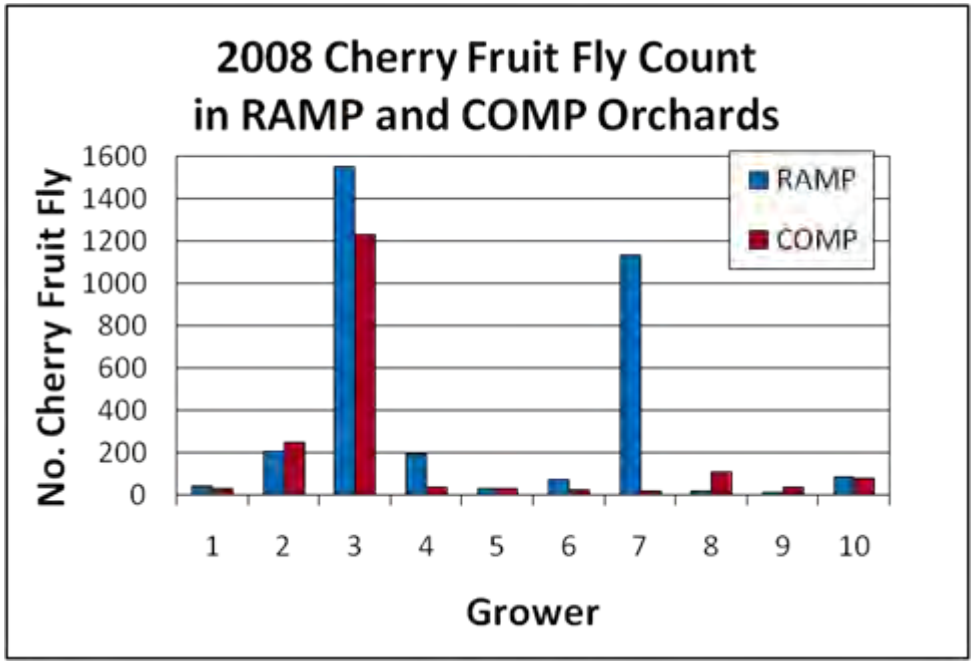




Results

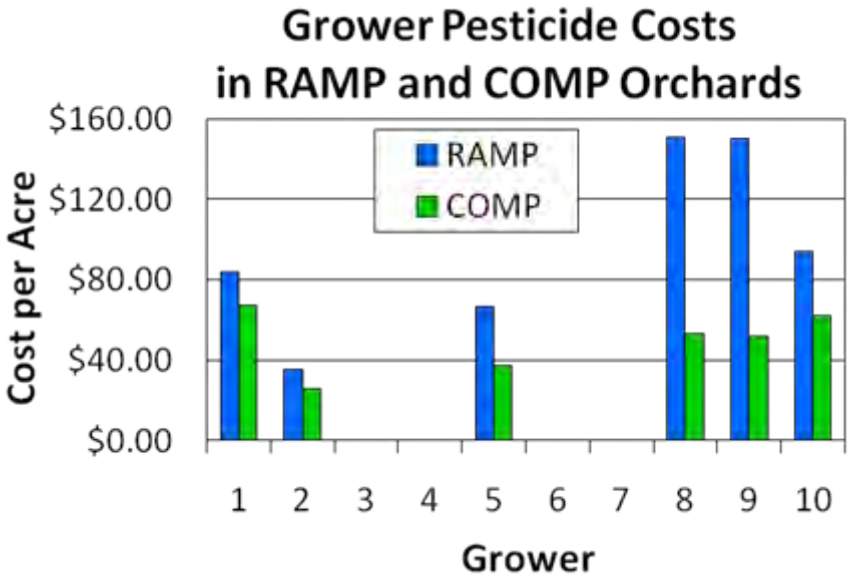
Cherry Fruit Fly

- There was 1 grower with infested fruit at harvest
- RAMP blocks exceeded COMP blocks in CFF trapped…

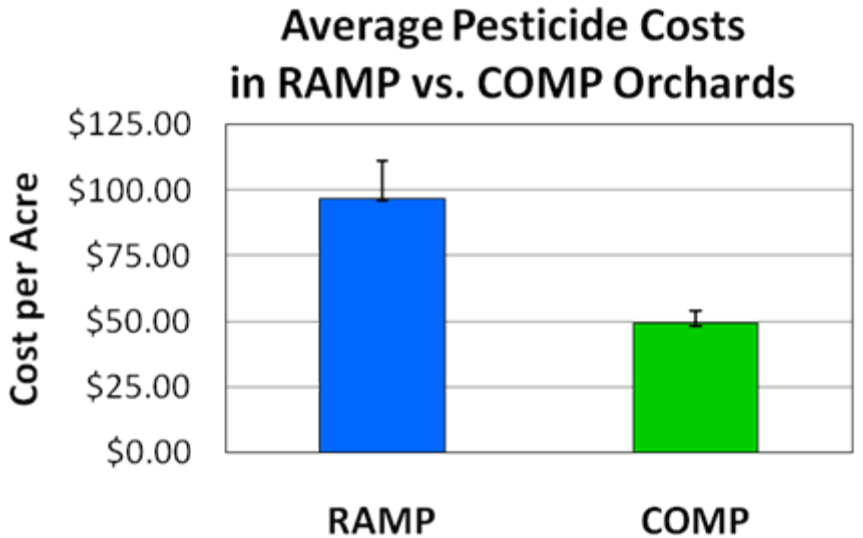


Results

- Cost per Acre was higher in RAMP orchards for all growers*



- Average* cost was >40% higher per acre in RAMP



*data includes 6 of 10 growers

Results

Measuring Ecosystem Services: Ecological impact of RAMP vs. COMP

- Shannon Diversity Index (H')
- Richness (S)
- Evenness (E)

$$H' = -\sum p_i \ln(p_i)$$

$$p_i = \frac{\#\text{ individuals in species } i}{\text{total number individuals}}$$

$$S = \#\text{ different species observed}$$

$$E = \frac{H'}{H_{\max}}; \quad H_{\max} = \ln(S)$$

Results

Measuring Ecosystem Services

- Natural Enemy diversity was highest outside the orchards
- COMP diversity > RAMP in general
- COMP yielded 18% higher Ecosystem Services on average as measured in $