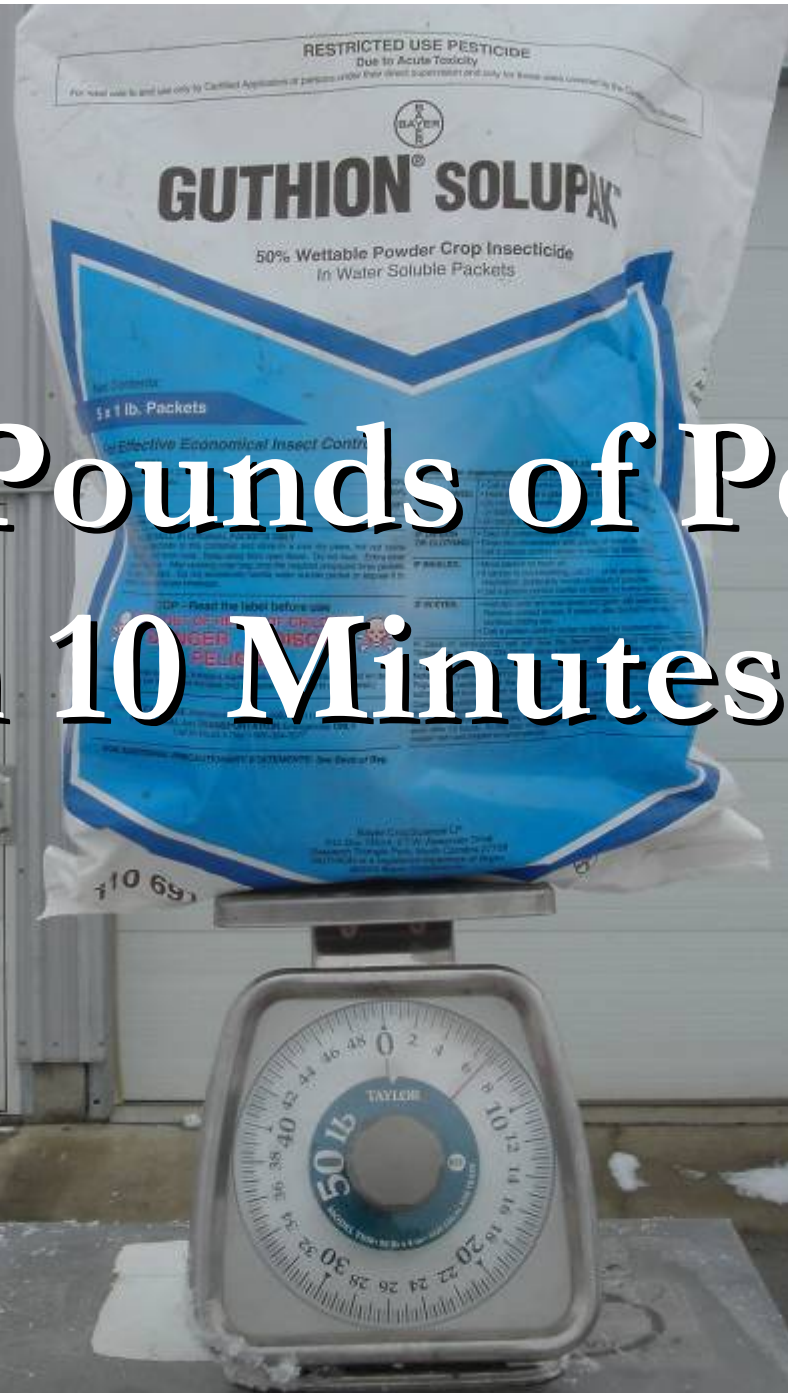
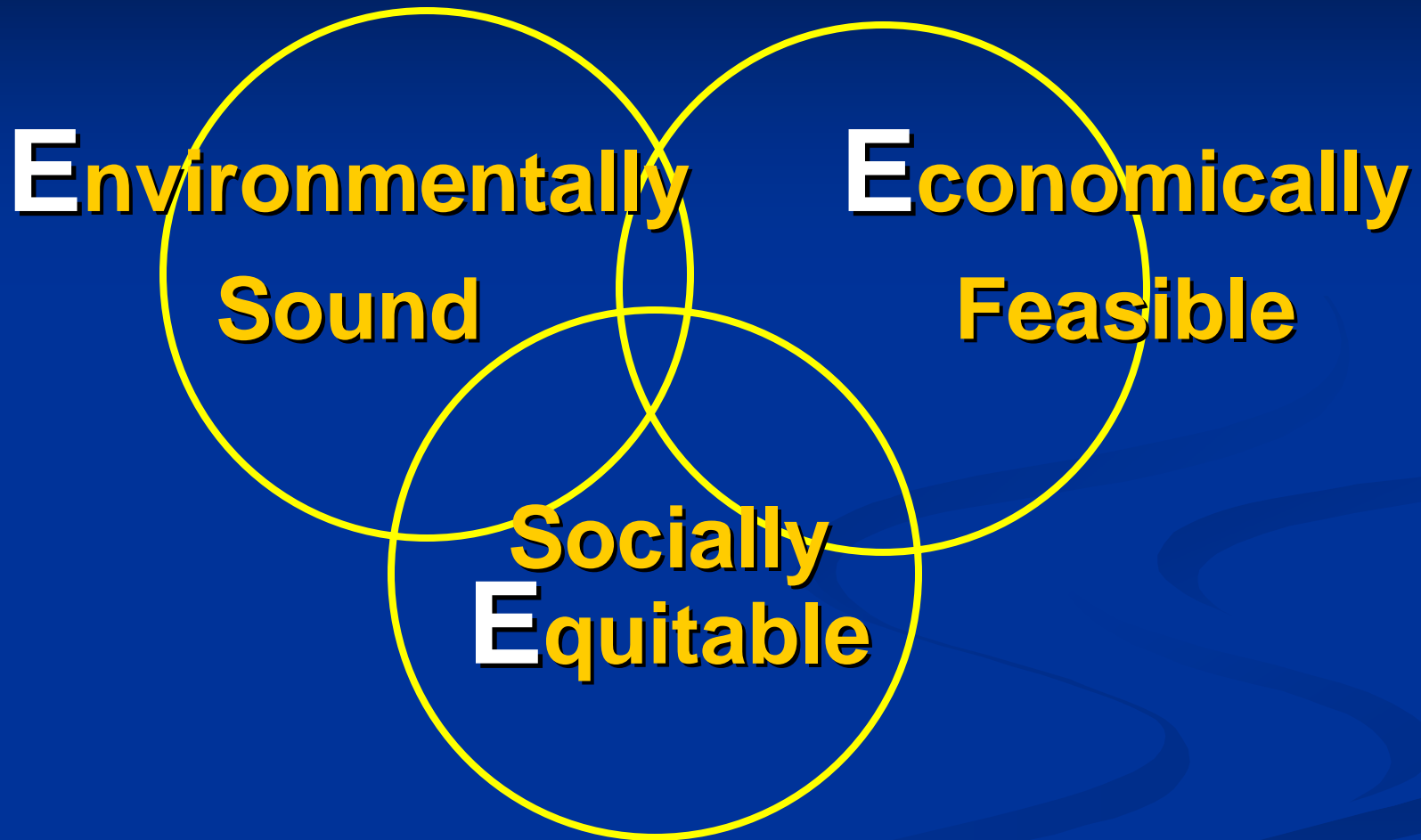


**Lose 10 Pounds of Pesticide
in 10 Minutes!**



Principles of Sustainability



The 3 E's are the Triple Bottom Line

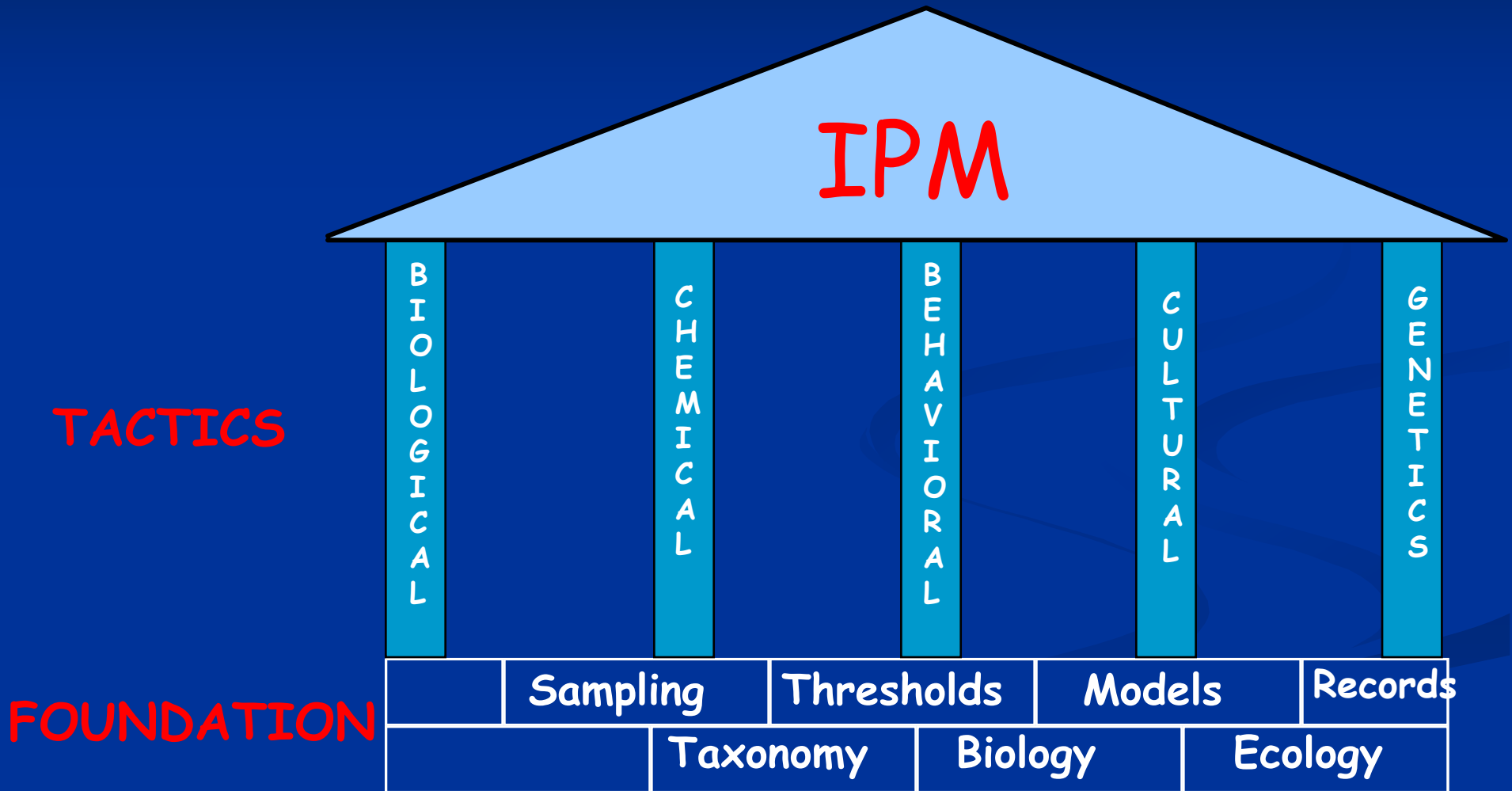
Integrated Pest Management (IPM)

Ecosystem-based, site specific decision making process that prevents pest damage through a combination of appropriate pest control strategies used in an environmentally and economically sound manner.

Essential Components of an IPM Program

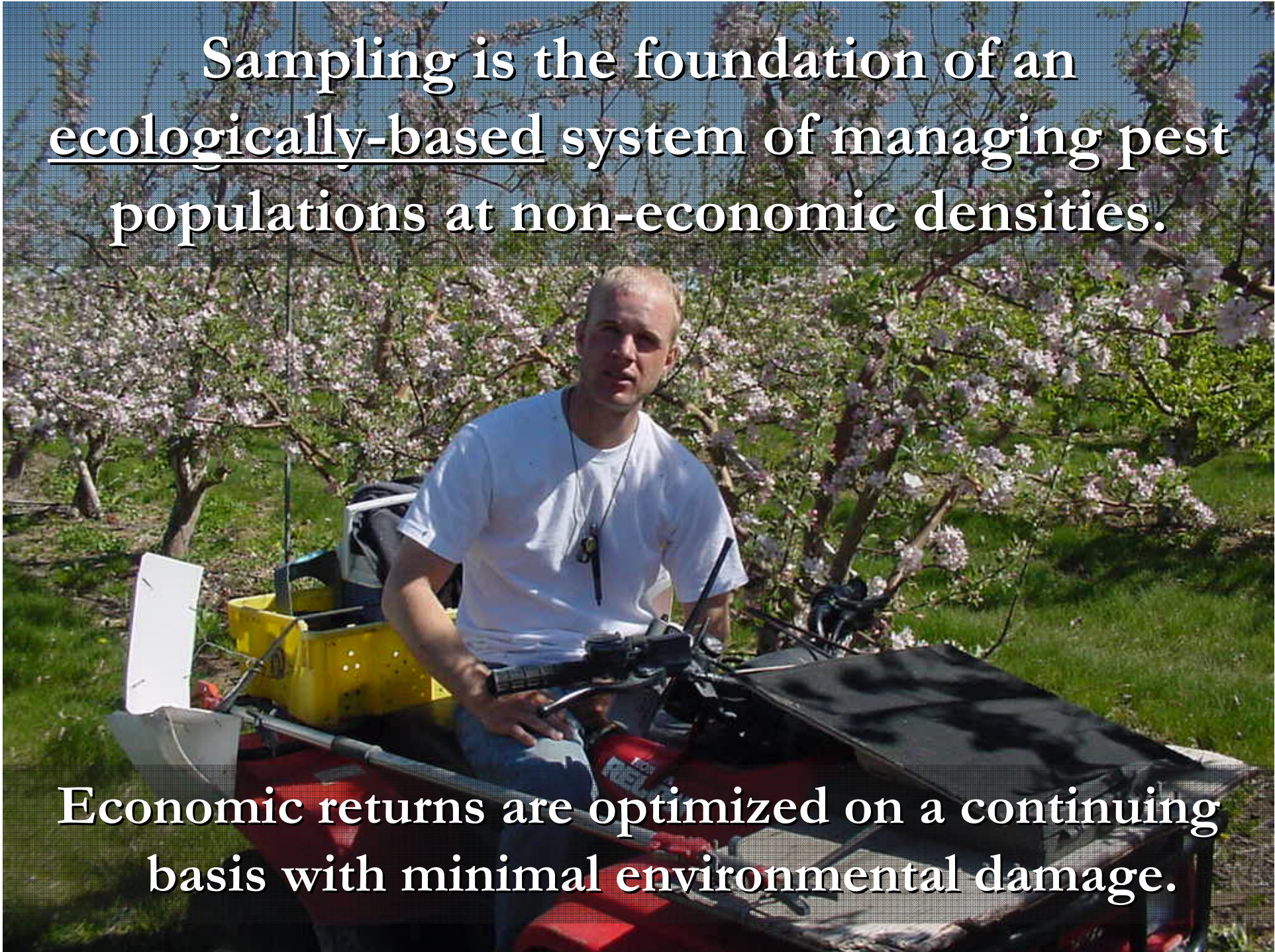
- 1. Biology, ecology of the crop
- 2. Biology, ecology and dynamics of the pest(s)
and their natural enemies in the orchard habitat
- 3. Intensive monitoring program to assess levels of pests
and beneficial insects
- 4. Action threshold for each pest
- 5. Consider all control strategies and determine the most
appropriate one(s)
- 6. Keep accurate records: evaluate results, measure change

Elements of a stable IPM structure



Sampling is the foundation of an ecologically-based system of managing pest populations at non-economic densities.

Economic returns are optimized on a continuing basis with minimal environmental damage.



Decision Making: Treat or Don't Treat

A man wearing a grey cap and a light-colored shirt is standing in an orchard, talking on a mobile phone. The orchard is filled with trees bearing red fruit, likely peaches or nectarines. The background shows more trees and a clear sky.

- compare pest densities to predetermined thresholds
- if pest density exceeds the threshold, consider appropriate control measures

Degree-Day Models Optimize Spray Timings

<http://das.wsu.edu/>

Timing is Everything

A photograph of a person operating a green tractor in an orchard. The tractor is positioned in the center of the frame, moving through rows of trees. The person is visible through the tractor's windshield. The background is filled with lush green foliage under a clear sky.

Results of good timing

- Obtain the greatest effect by targeting the most susceptible life-stage of pest
- Use the fewest number of sprays necessary
- The least effect on non-target organisms

Application Equipment

Tower sprayers

- reduce drift, reduces waste
- improves efficacy in top of canopy
- better coverage with less GPA
- reduces trips to spray fill
- reduces energy costs
- Maintain & Calibrate Equipment - reduces waste

Evolution of an Idea

Warren Morgan Orchards

LLC

22532 Road 9 NW



GLOBAL G.A.P.



- 1998 -CAMP USDA: Areawide CMMD
- 2001-2003 AWII WSU: OP's vs. Alternatives
- 2004-2006 WMO: No Lorsban, Reduce AZ-50
- 2007 WMO Sustainable: Eliminate OP's
- 2008 PMTP Implementation Unit (IU)

Use Full Rate of Mating Disruption

- Reduce Egg-Load
- Increase Efficacy of Pesticides
- Drive Population Down

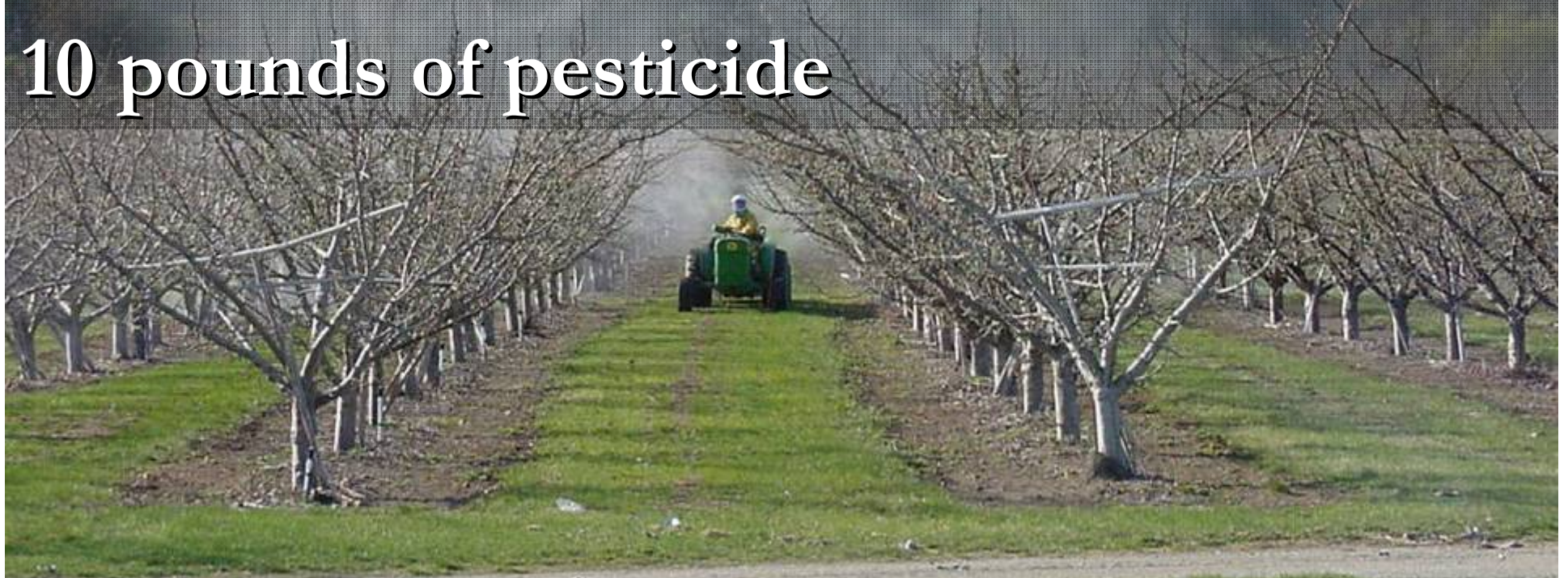


Eliminate All Organophosphates

2 lbs.(ai) Lorsban per year REI - 4 days

8 lbs. Guthion per year REI - 14 days

10 pounds of pesticide



Sustainable Pest Control Strategies

- Use Selective Pesticides for CM & LR
- Effective rates measured in ounces not pounds
- Use lowest effective rates
- Use least disruptive materials, conserve NE's

Box 4. New “kinder” pesticides still affect natural enemies

Acute effects above diagonal; Sub-lethal effects below diagonal; green indicates little or no effect, orange modest effects, red reflects strong effects (little or no survival). If acute effects were high, sub-lethal effects were tested at at 10% field rate (hatched colored areas) if sub-diagonal is white it was not tested; solid color = field rate.

	lacewings ¹	<i>C. florus</i> ²	<i>Mastrus</i> ¹	<i>Anthocoris</i> ³	Earwigs ⁴	<i>Deraeocoris</i> ⁵
Provado	Red (acute) / Green hatched (sub-lethal)	Red (acute) / White (sub-lethal)	Red hatched (acute) / White (sub-lethal)	Red (acute) / White (sub-lethal)	Orange hatched (acute) / White (sub-lethal)	Red (acute) / Red (sub-lethal)
Actara	Red (acute) / White (sub-lethal)	Red (acute) / White (sub-lethal)	Red (acute) / Orange hatched (sub-lethal)	Red hatched (acute) / White (sub-lethal)	White (acute) / White (sub-lethal)	Red (acute) / Red (sub-lethal)
Assail	Red (acute) / Orange hatched (sub-lethal)	Red (acute) / White (sub-lethal)	Red (acute) / Orange (sub-lethal)	Orange hatched (acute) / White (sub-lethal)	Orange (acute) / Green (sub-lethal)	Red (acute) / Green (sub-lethal)
Success	Green (acute) / Red (sub-lethal)	Red (acute) / Red (sub-lethal)	Red (acute) / Orange hatched (sub-lethal)	Green (acute) / Orange (sub-lethal)	Red (acute) / White (sub-lethal)	Orange (acute) / Orange (sub-lethal)
Intrepid	Green (acute) / Orange (sub-lethal)	Green (acute) / Green (sub-lethal)	Green (acute) / Orange (sub-lethal)	Green (acute) / Orange (sub-lethal)	Green (acute) / Green (sub-lethal)	Green (acute) / Green (sub-lethal)
Esteem	Green (acute) / Green (sub-lethal)	Green (acute) / Orange (sub-lethal)	Green (acute) / Orange (sub-lethal)	Green (acute) / Green (sub-lethal)	Green (acute) / Green (sub-lethal)	Green (acute) / Green (sub-lethal)
Novaluron	Green (acute) / Red (sub-lethal)	Green (acute) / Red (sub-lethal)	Green (acute) / Orange (sub-lethal)	Green (acute) / Red (sub-lethal)	Red (acute) / Green (sub-lethal)	Orange (acute) / Orange (sub-lethal)

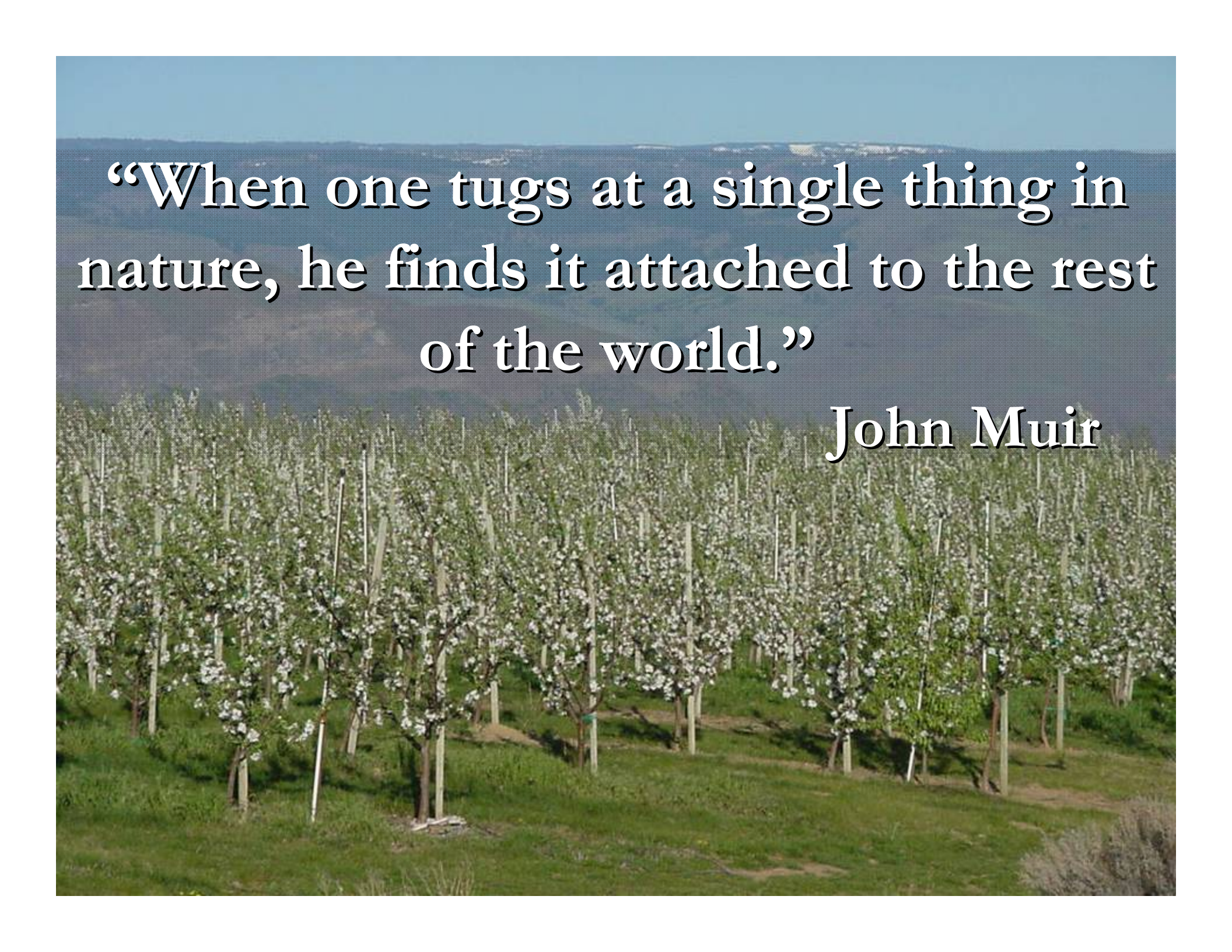
¹Nick Mills UC Berkeley, ²Tom Unruh, ³Dave Horton, ⁴Rick Hilton, Oregon State University, ⁵Helmut Riedl, Oregon State University

Conservation Biological Control



Habitat Manipulation





“When one tugs at a single thing in nature, he finds it attached to the rest of the world.”

John Muir

Benefits of WMO Sustainable Program

"The 3 E's"

- Create a safer environment for all employees
- All employees become stakeholders
- Eliminate need for cholinesterase monitoring
- Reduced potential for drift, improve efficacy
- Reduced spraying for induced pests
- Reduced pesticide use – by at least 10 lbs./acre
- Apples with no detectable pesticide residues
- Making changes that are REAL



Thank You!