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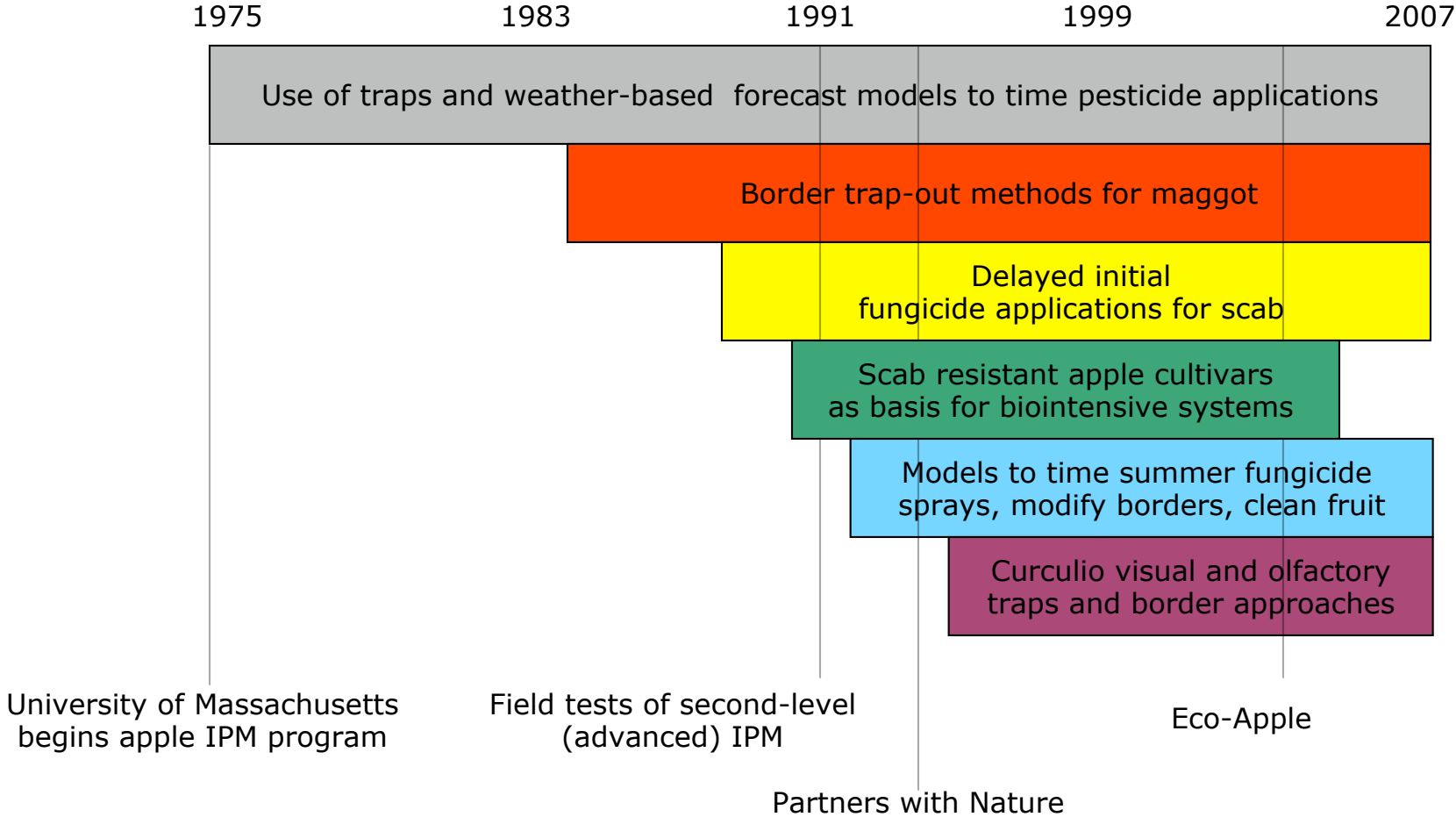
# Biointensive Apple IPM in New England

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# Massachusetts Apple IPM Development



# Apple IPM in New England

- Growers willing to work on the edge
- “Certainly...the relationship with the grower is paramount in this work. Many growers are right at the margin of existence, and amazingly enough, they are willing to take this risk.” (Ron Prokopy)
- Small scale orchards in small states



## Building biointensive IPM: bottom up

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- Scab resistant cultivars
- Tuckaway Farm '77
- LISA/SARE Apple Project '89 - '97
- Solves the scab issue, a key problem but...



## Problems with SRCs

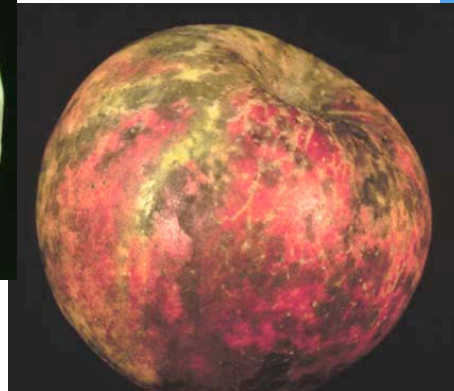
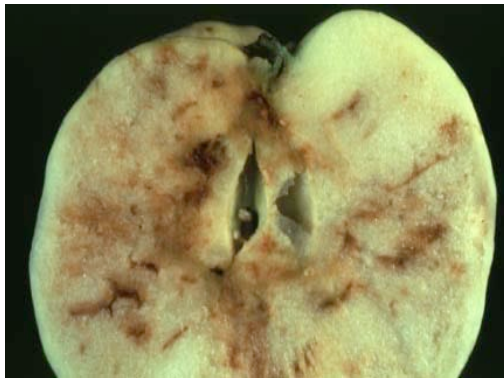
- Market issues
- Direct sales okay - wholesale problematic
- Still have insects
- Still have many diseases
- Primary resistance gene losing effectiveness in Europe
- Generally, top down





# Key pests in New England apple orchards

- Scab
- Curculio
- Sooty blotch & flyspeck
- Maggot



## Early apple IPM in Massachusetts (1975 - 1981)

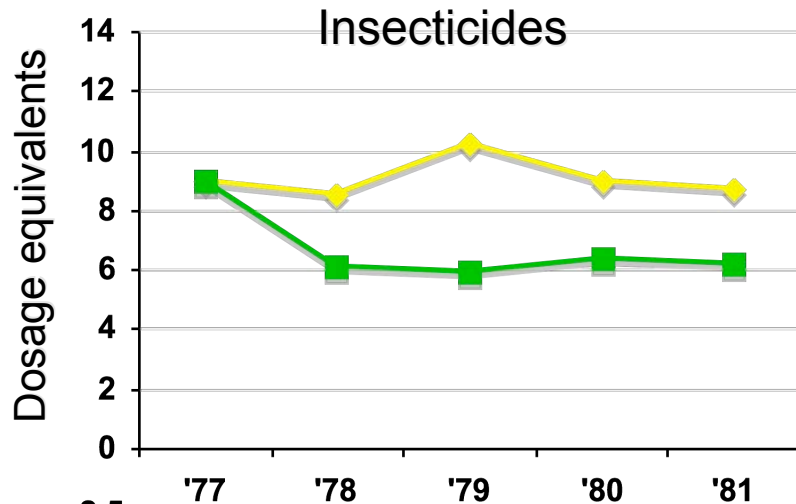
- Acceptance of early IPM by growers driven by economics and pesticide resistance concerns
- NOT environmental issues
- Public largely unaware of IPM

Insect results in IPM and comparison blocks in commercial orchards, MA, 1979

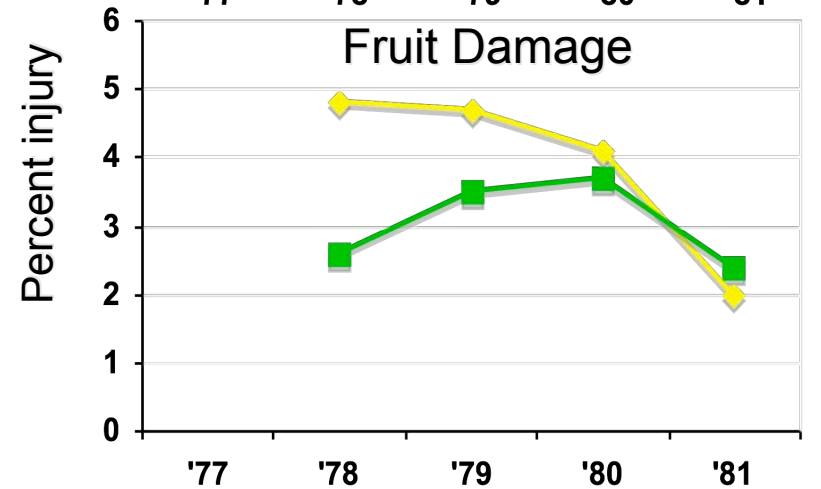
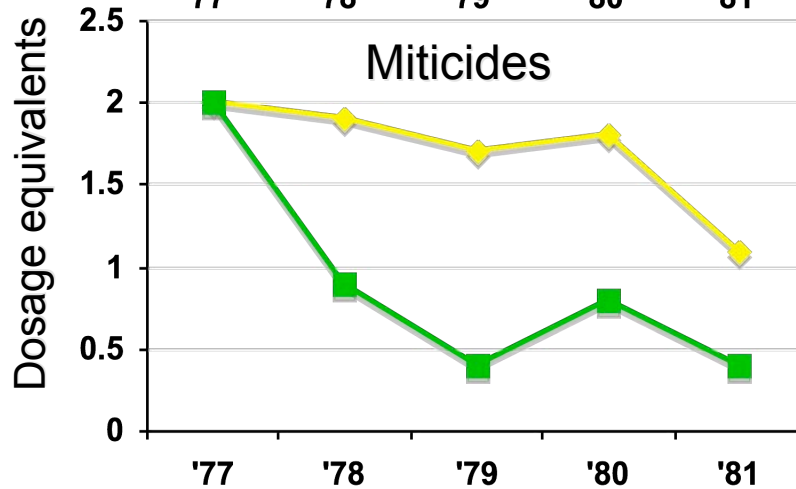
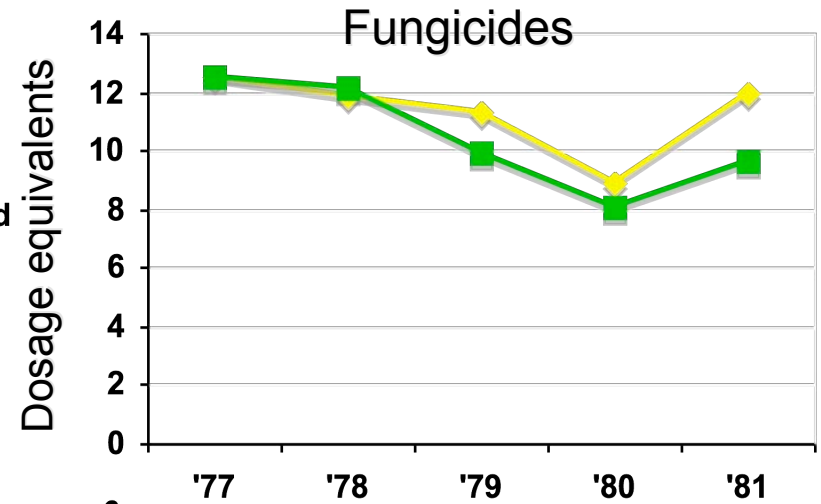
Method	Insecticide, Apps., Cost/A	Insect Damage
IPM	6, \$54	3.7%
Standard	11, \$106	5.4%

Coli et al., 1979

# Early apple IPM in Massachusetts (1975 - 1981)

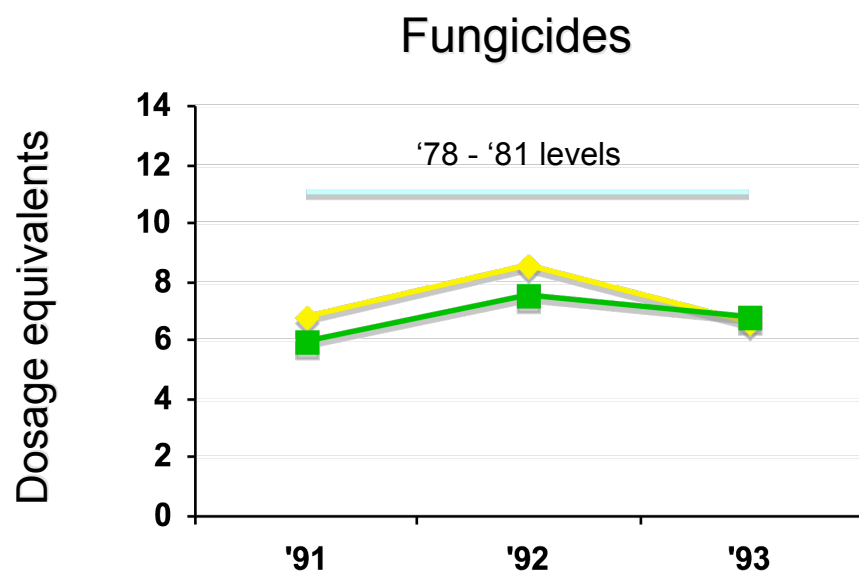


◆ Standard  
■ IPM



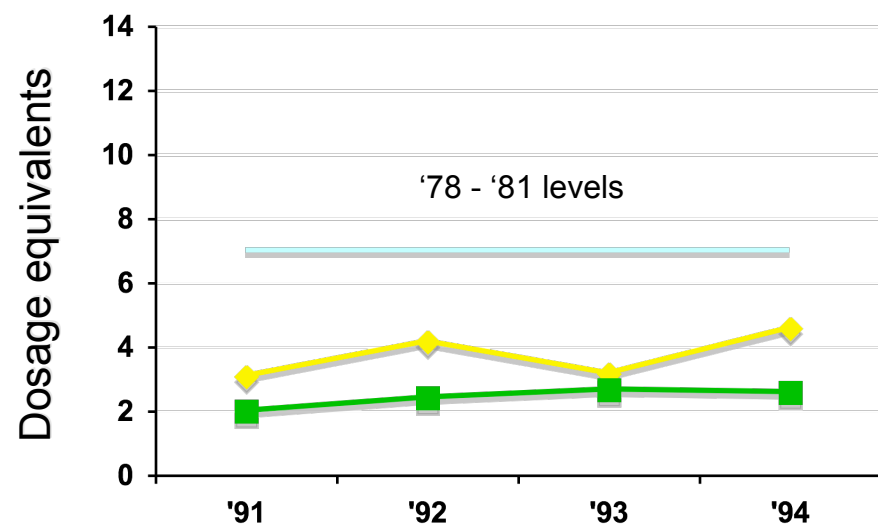


# Early second-level IPM (1991 - 1994)



# Early second-level IPM (1991 - 1994)

Insecticides



## However...

- Significantly more damage with advanced IPM: 4.8% vs. 1.9%
- More cost associated with practices
- Decreased profit = \$260/ha
- Biointensive IPM riskier and costlier



# Evolution of advanced IPM for apple maggot

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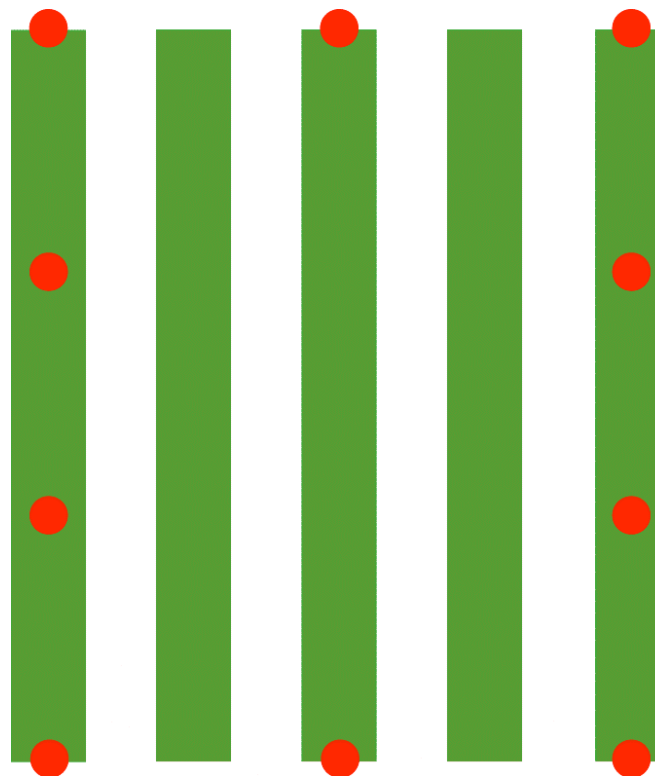
- Time sprays according to captures on red sticky sphere





## Evolution of advanced IPM for apple maggot

- Time sprays according to captures on red sticky sphere
- Add odor stimulus and use traps to intercept flies around perimeter (must eliminate in-orchard population)



## Evolution of advanced IPM for apple maggot

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- Eliminate sticky, add toxin
- Took time to develop current concept, CurveBall
- Starker Wright and Tracy Leskey





## Evolution of advanced IPM for apple maggot

- Results variable
- Not ready for high-risk orchards
- Risk in general is higher with CurveBall
- The cost of deployment will also be higher

Method	Mean control standard locations*	Mean control challenging locations**
Calendar	99.9%a	98.7% a
Threshold	99.9%a	98.7% a
CurveBall	99.7%a	59.7% b

\*14 commercial blocks MA

\*\*3 commercial blocks RI

## Advanced IPM for sooty blotch & flyspeck

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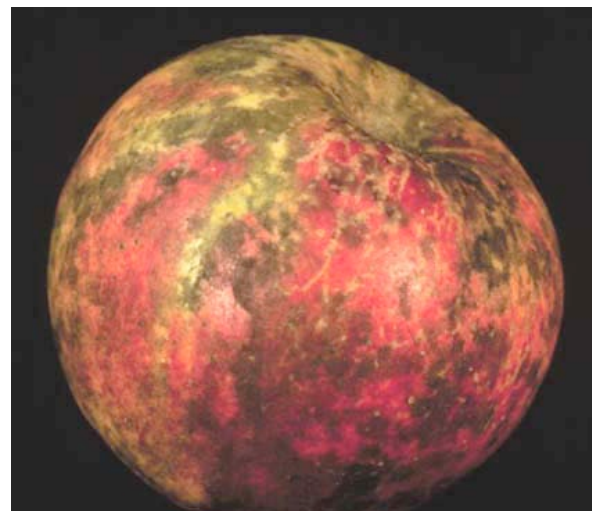
- Summer sprays of fungicide timed according to fungicide depletion, need for other applications (maggot, etc.)



## Advanced IPM for sooty blotch & flyspeck

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- Adoption of NC model to New England to predict need for first spray based on wetting hours



## Advanced IPM for sooty blotch & flyspeck

- Adoption of NC model to New England to predict need for first spray based on wetting hours
- Use of less toxic chemicals

Treatment	Sooty blotch and flyspeck incidence
Captan 50W + TopsinM (full rates)	12% <sup>a</sup>
CaCl <sub>2</sub> + Captan 50W (25% rate)	24% <sup>ab</sup>
Serenade ( <i>B. subtilis</i> ) + Biotune	23% <sup>ab</sup>
No Spray	59% <sup>c</sup>

## Advanced IPM for sooty blotch & flyspeck

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- Summer pruning
- Labor intensive, removes small twigs, limbs, suckers in summer
- Lowers humidity
- Improves spray deposition in tree





# Advanced IPM for sooty blotch & flyspeck

- Modify border
- Epidemics start on reservoir host plants at orchard borders
- SBFS decreases with distance from border (both inoculum and humidity effects)
- Removing borders expensive; leaves non-productive land





## Advanced IPM for sooty blotch & flyspeck

- Can soak in a 5 to 10% bleach solution for ~ 5 min.
- Rinse, and rub off with a cloth
- Time consuming, labor intensive - mechanize?



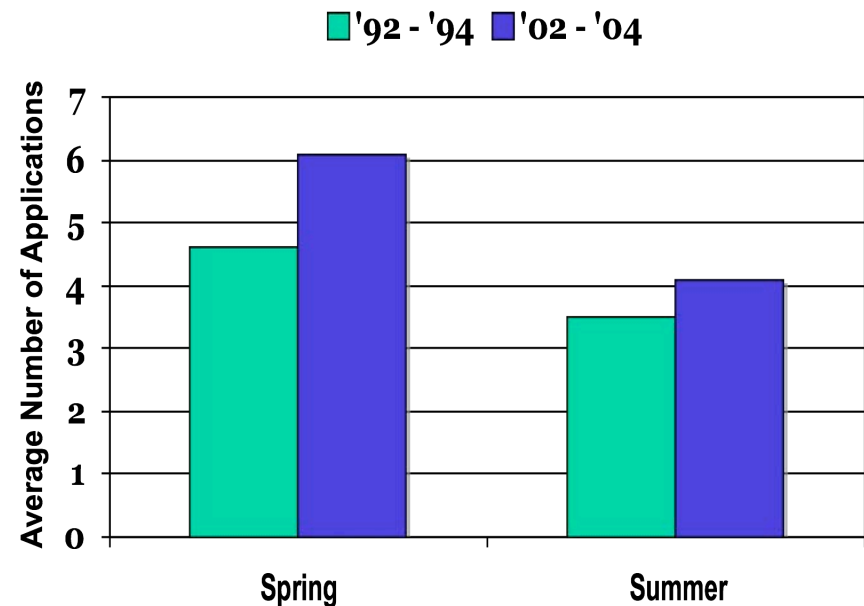
## Advanced IPM for scab and curculio

- Potential ascospore dose and inoculum eradication for apple scab
- Bomb tree to destroy plum curculio
- Practices for advanced IPM for key pests not widely adopted



## Implementation of IPM stagnant or decreasing

- Fungicide use in apples in MA decreased by 40% from 1978 - 1994.
- Fungicide use in apples in MA increased by 26% from 1994 - 2007.
- Resistance issues
- Decreased willingness to take risk
- Increased costs for practices



## Increasingly difficult to advance IPM

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- IPM inputs must complement the broad mission of a farm
- Must work to establish and maintain profitability
- New England apple growers face increasing global and national competition

# Changing to more biointensive IPM inputs

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Within the context of increased farm profitability, what effect will biointensive IPM have?

- No** Reduce input costs
- Maybe** Increase crop value (per box)
- Maybe** Increase sales (boxes sold)
- Yes** Reduce use of toxic pesticides
- Maybe** Have a positive effect on human and environmental health

# Changing to more biointensive IPM inputs

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So what will drive adoption of more biointensive IPM practices for apples?

- |       |  |
|-------|--|
| No    | Relative profitability                     |
| Maybe | Risk                                       |
| Yes   | Public policy                              |
| Yes   | Information for and education of consumers |



# Educating consumers: Partners with Nature

- A program based on a checklist with points for IPM practices
- Participants got brochures, posters, stickers
- Began '91
- Ironically apple growers disliked the approach
- Ended program in '99



## The EcoApple approach

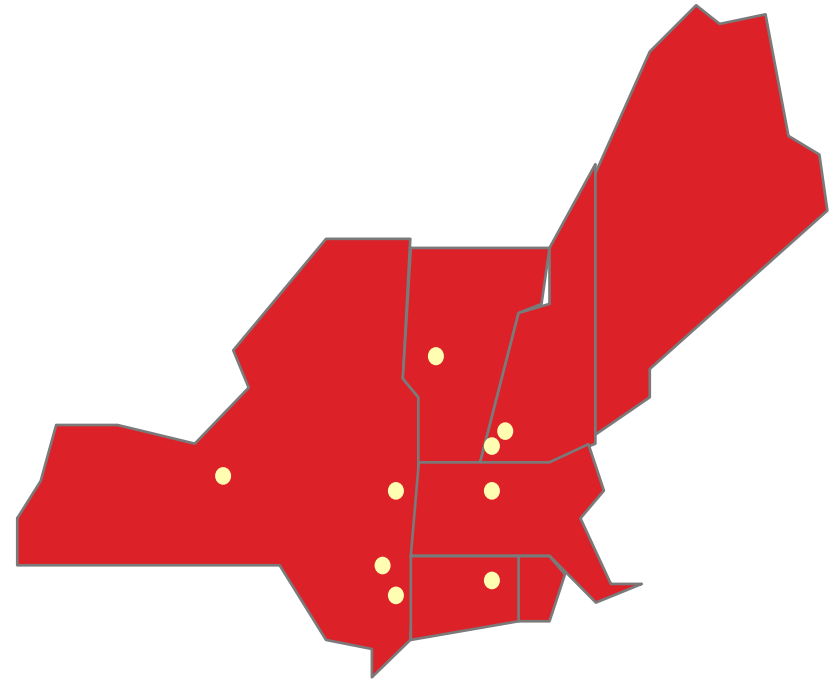
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- Revisited idea in 2002 with Michael Rozyne of Red Tomato and small set of growers
- Non-profit, connects farmers with markets and consumers with fresh fruits & vegetables
- Asked question: “Is there a premium market for high-quality, local apples produced using advanced IPM?”



# The CAR grant to develop concept

- New York
  - 4 farms
  - 62 acres
  - 3 wholesale marketers
  - 1 direct marketer
- New England
  - 5 farms
  - 500 acres
  - Both direct and wholesale producers



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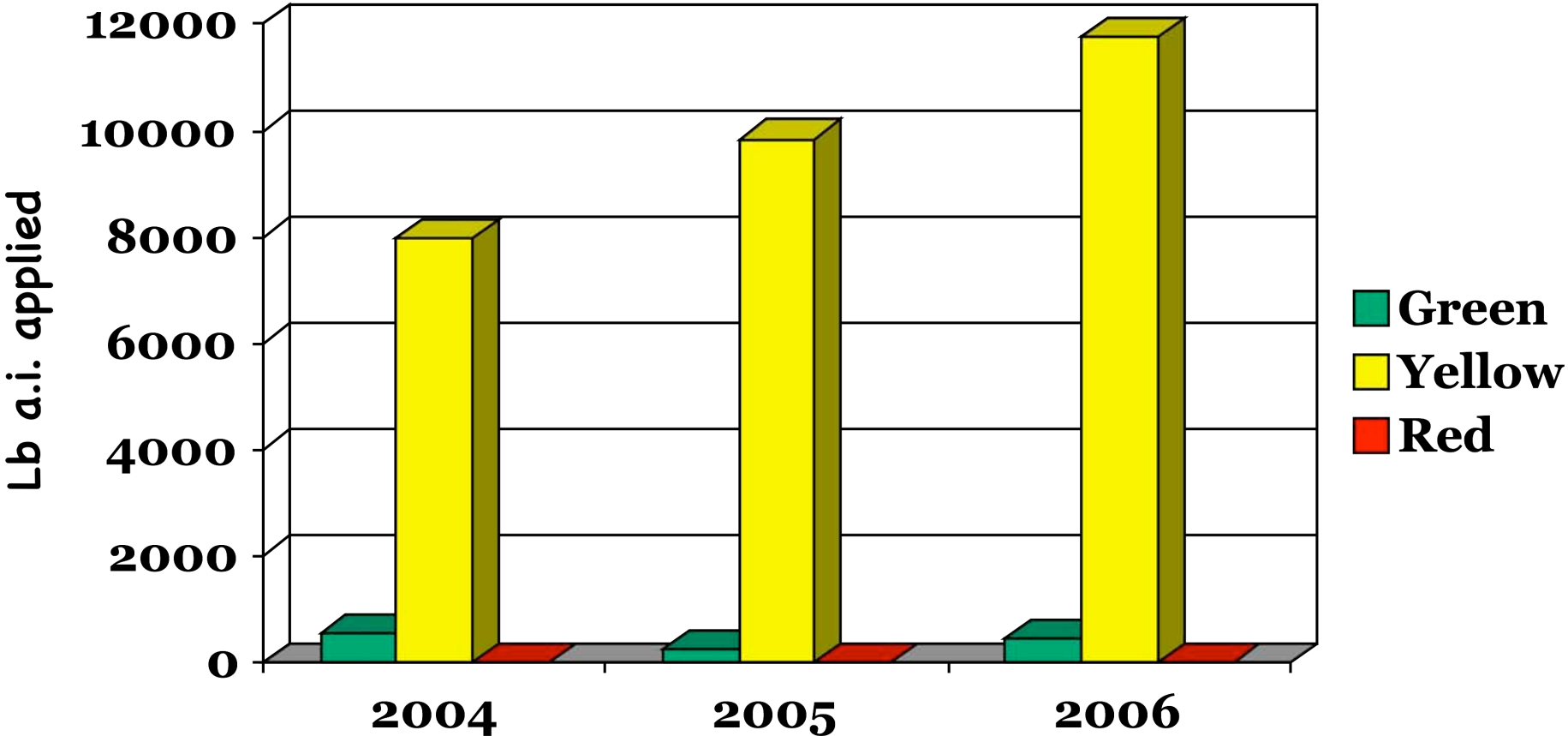
D. Cooley, A. Tuttle, Dept. of Plant, Soil & Insect  
Sci., UMass, Amherst, MA

# The EcoApple approach

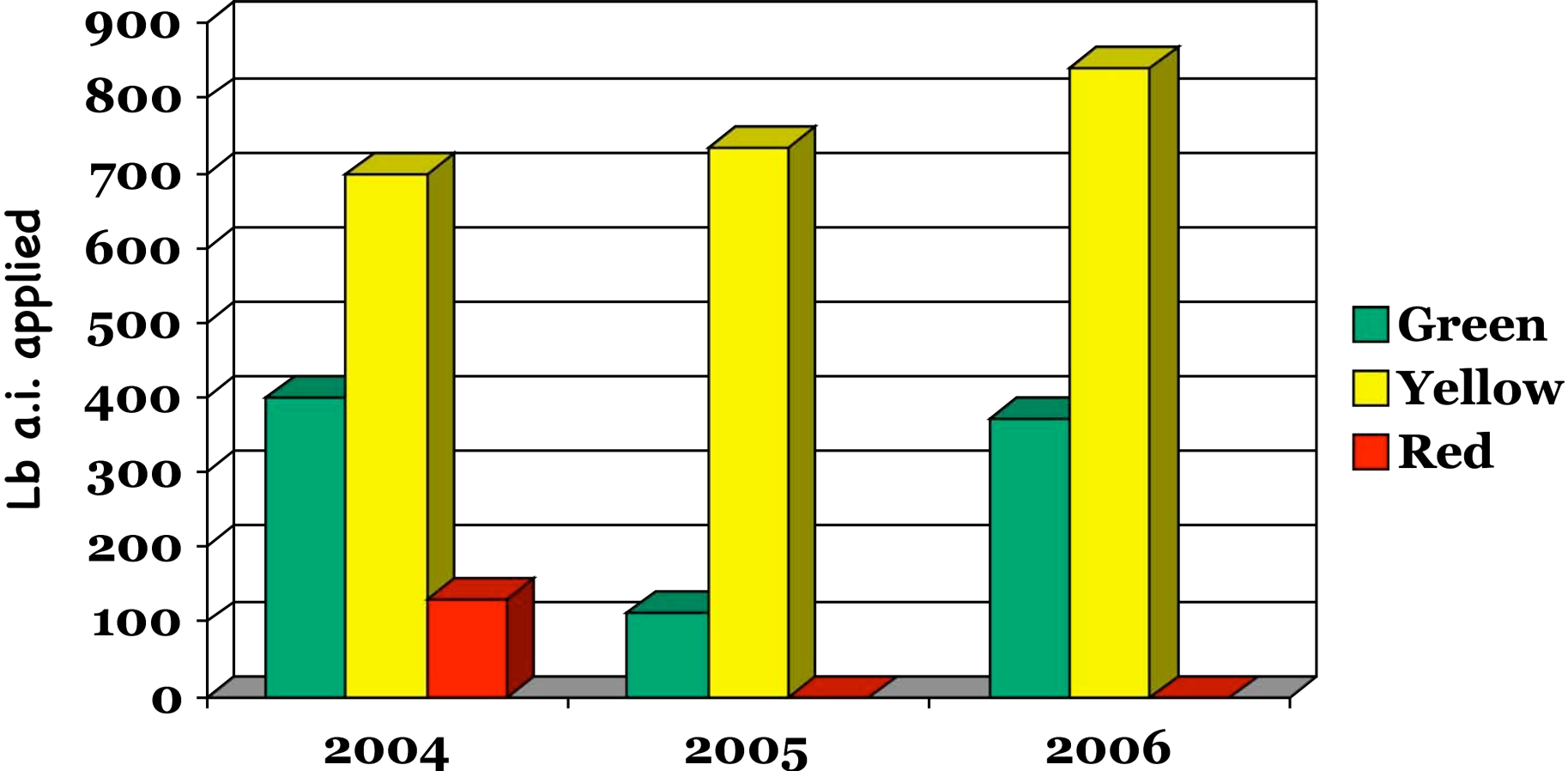
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- Pesticide classification: Tom Green, IPM Institute of North America
- Evaluation based on multiple toxicity components, potential for resistance development, and potential to contaminate groundwater
- Green: use with justification
- Yellow: use with justification when green list or other alternatives are not adequate.
- Red: do not use

# Fungicide use by all growers

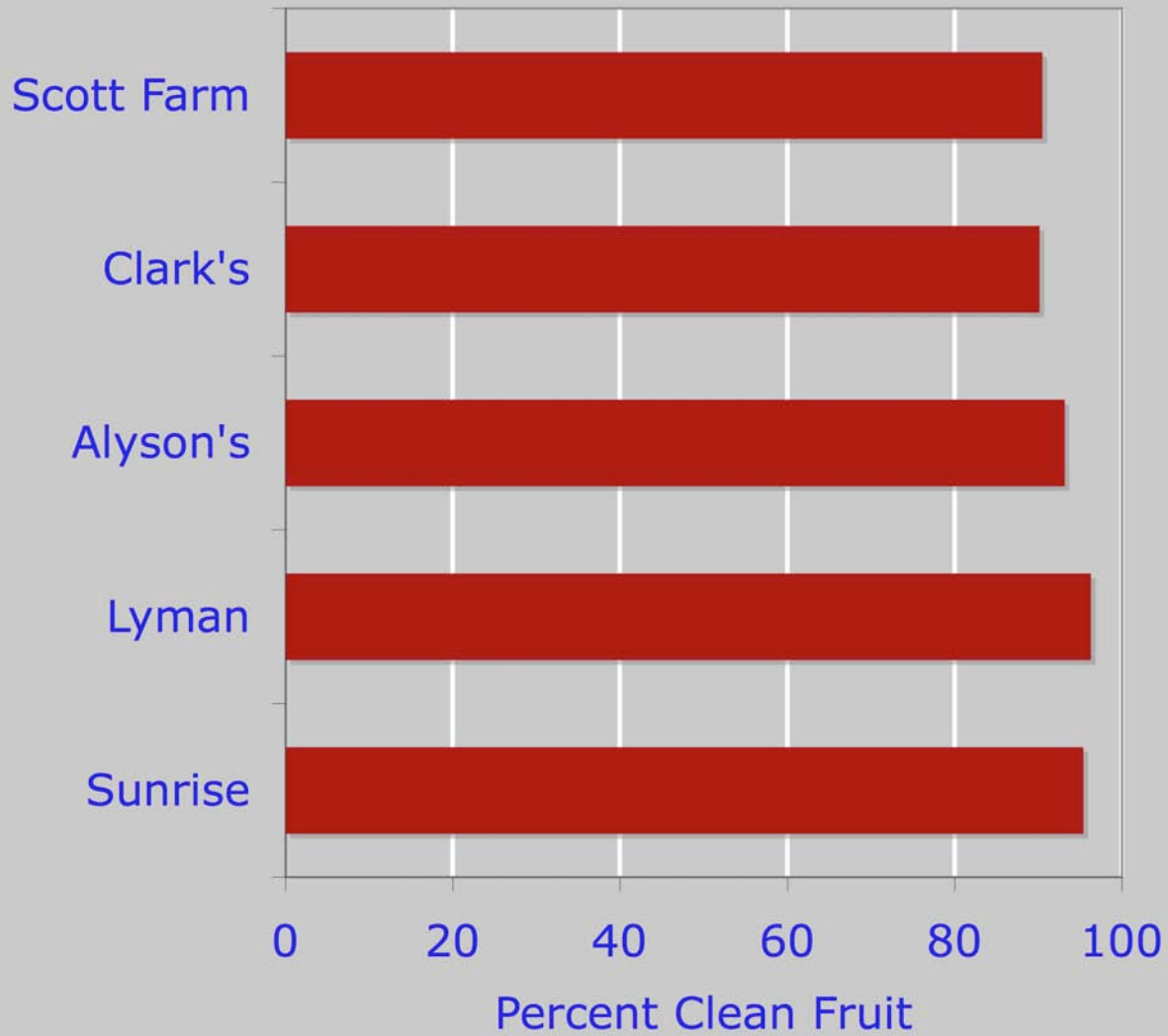


# Insecticide use by all growers





## Clean Fruit - New England Orchards



## EcoApple primary markets

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- Whole Foods
- Trader Joe's
- Several independent chains



# Assessing EcoApple benefits

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- Responses to 2006 RT Grower Interviews
- Price
  - Better than through other brokers
  - Price is set; get what's been promised
- Relationship with growers
  - Good working relationship (transparent); communication
  - Understanding when not able to meet target; don't feel that they'll go elsewhere
  - Red Tomato works with smaller guys (don't have to have tractor-trailer loads)
  - Other buyers erratic, even with high-quality produce

# Assessing EcoApple benefits

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- Access to markets

- Red Tomato does “footwork”, relieves pressure for selling
- Benefit from Red Tomato’s contacts, ability to deal with logistics
- Added value of Eco Apple brand
- Dependable market, orders, in niche arena

# Advantages of marketing with Red Tomato

- Was the price you received from RT? (15 respondents):
  - much higher (7)
  - about the same (6)
  - somewhat lower (2)

**ON THE COVER**

## Selling A Vision

**A Northeast grower, with a little help, takes IPM production and marketing to a new level.**

**By Brian Sparks**  
Editor

**T**HE Clark brothers consider themselves strong followers of integrated pest management (IPM). But then again, who wouldn't take this approach? With rising input costs and pressure from consumers, moving their pest control programs in the direction of IPM is something most growers are looking to do already. The way to differentiate yourself

from other growers, according to Aaron Clark of Clark Brothers Orchard in Aubfield, MA, is twofold: you need to be able to effectively use IPM as a production/marketing strategy and you need to essentially convey to the public that you are following an advanced IPM approach, even if you can't commit to being organic.

"We come as close as you can come to organic in New England and still have a crop," says Clark, one of three brothers who, with the help of a local

family farm marketing organization, have positioned themselves as key retail suppliers in the Northeast.

**Setting The Foundation**

Clark Brothers Orchard was founded back in 1886, but until the early 1980s, it served as both an apple orchard and a dairy farm. When Clark's uncle died in 1982, his family inherited the apple business, and his father sold the dairy herd to devote himself to apple growing. While Clark's father and his brother Dana ran the orchard, he and his brother Brian were in slightly different directions: Brian worked for IBM as a software engineer and Aaron ran a gunsmith business for many years. However, both Brian and Aaron kept their toes to the farm, helping out when necessary, and now each of them plays an active role in the business.

Aaron Clark's journey to heading up Clark Brothers' marketing program has been particularly interesting. While in college, he became a paraplegic as a result of an accident he suffered while painting high-tension towers during a summer job. But even in his time away from the orchard, he maintained an interest in apple growing. Following the death of his uncle, and while Dana was on a missionary trip to Michigan, Aaron Clark returned to the farm full-time. He even remitted a John Deere orchard tractor to provide easier access and more hand controls. "I really enjoy the work and forget how much I liked it when I was younger," notes Clark. "I felt like I was doing what I was meant to be doing." He also worked with Brian to set up a wireless computer system on the farm.

When Clark took over the finances at the orchard, their biggest buyers were C&S Wholesale Grocers and Bread & Circus, which was to become Whole Foods Northeast. The relationship with each of these companies was strong, and working with C&S allowed them to continue market-



Photo by Tom Harkness of the University of Massachusetts

The on-armed efforts of the Clark brothers (left to right, Brian, Aaron, and Dana) and Red Tomato have helped Clark Brothers Orchard establish a identity among local retailers for their IPM practices.

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## What is the future?

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- In New England, no research entomologist in apple IPM - slows research on IPM methods
- Cooperation with broader region, e.g. USDA Kearneysville, NYAES Cornell, etc. keeps research going
- Growers will need marketing advantages to compensate for increased risk and expense of biointensive IPM
- If EcoApple and similar marketing programs grow, challenges may come from established markets



# Thanks

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- Northeast Sustainable Agriculture Research & Education Program
- Northeast Regional IPM Centers
- USDA/CSREES Crops at Risk Program

