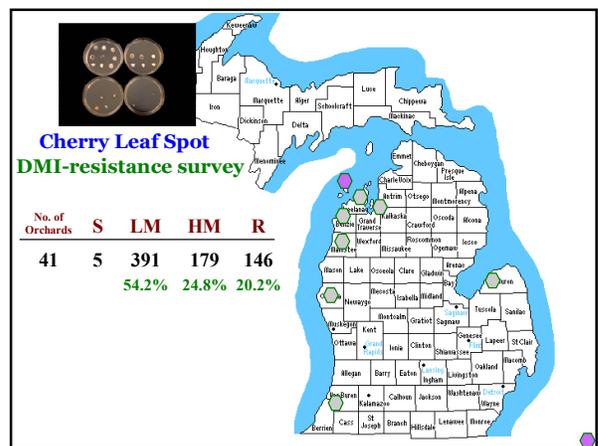
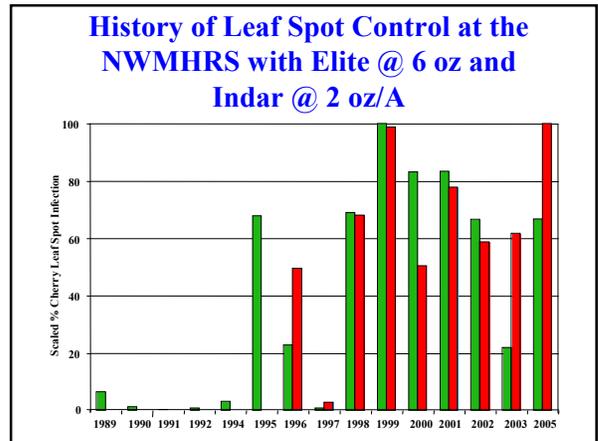




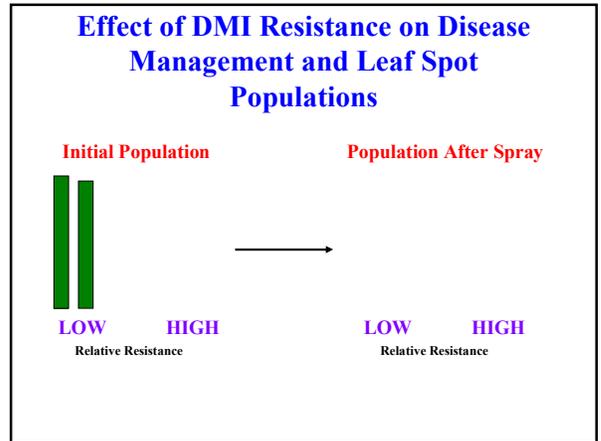
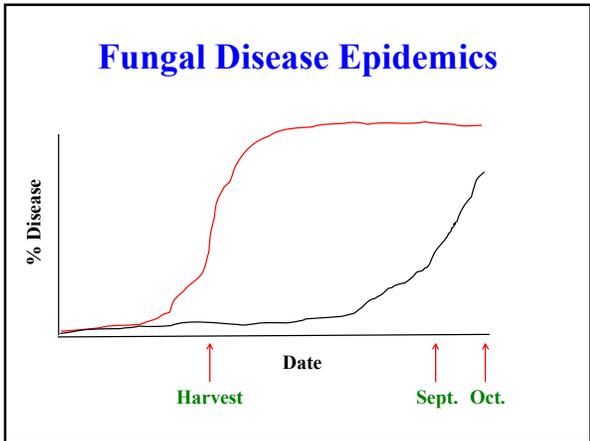
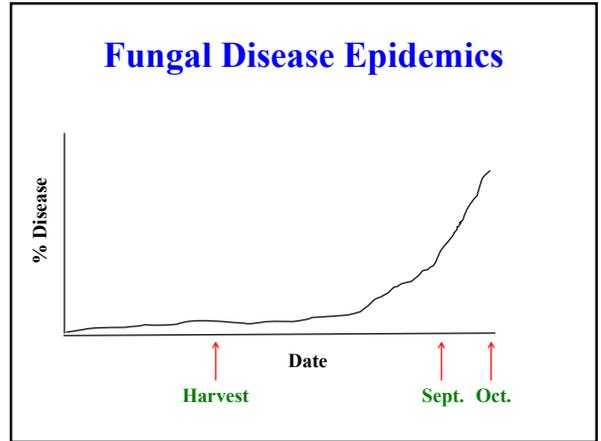
### RAMP Pathology Objectives

- Develop and deliver alternative disease management strategies
  - Evaluate reduced risk pest management strategies
  - Survey orchards for fungicide resistance in the cherry leaf spot pathogen
  - Develop leaf spot resistant cultivars

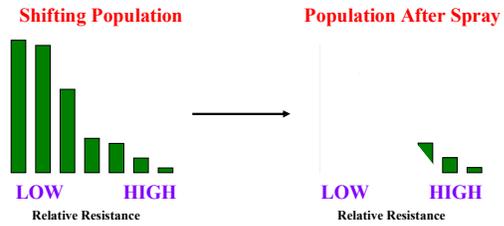




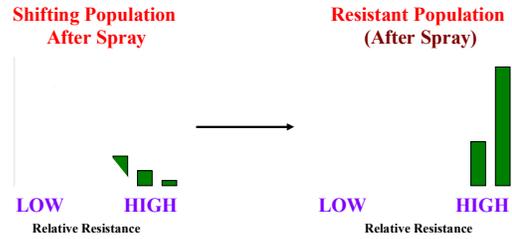
**Early infection:**  
 Uneven fruit ripening  
 Epidemic risk -- extreme  
 premature defoliation



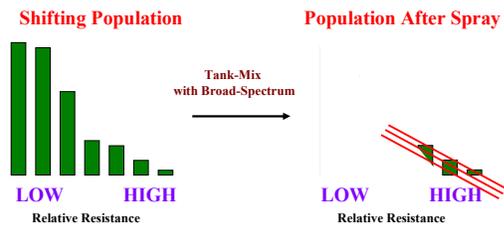
### Effect of DMI Resistance on Disease Management and Leaf Spot Populations



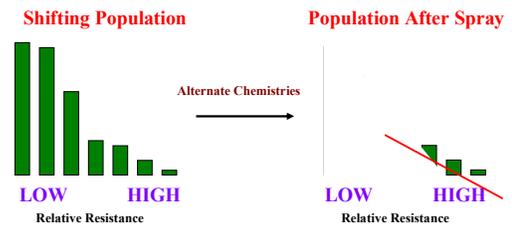
### Effect of DMI Resistance on Disease Management and Leaf Spot Populations



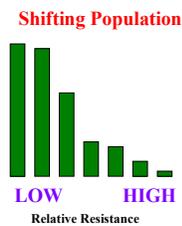
### Resistance Management Strategy for At-Risk Fungicides



### Resistance Management Strategy for At-Risk Fungicides

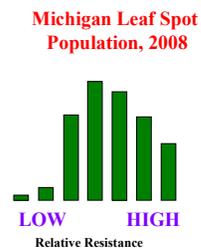


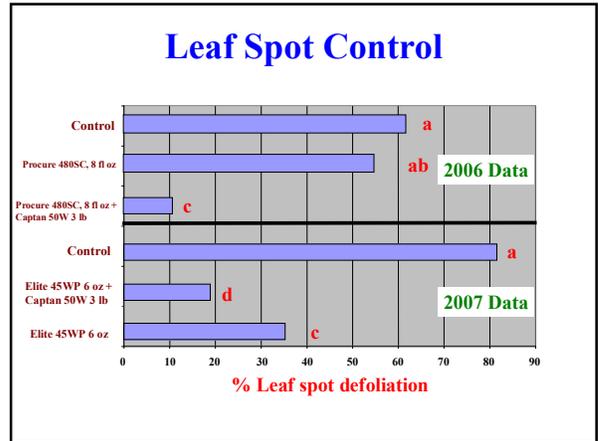
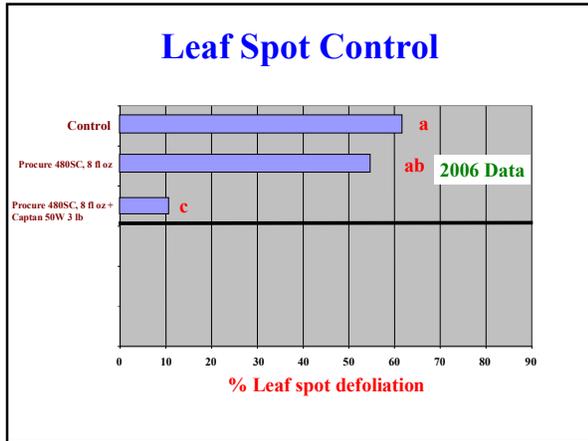
### Current Status of Michigan Leaf Spot Populations



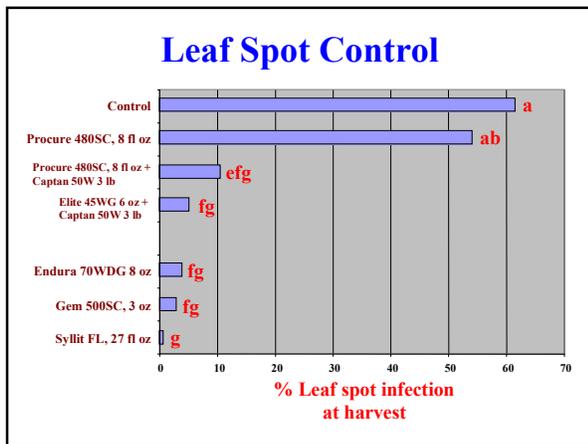
Michigan ~ late 1990's

### Current Status of Michigan Leaf Spot Populations





- ### Cherry Leaf Spot Fungicides (2008)
- Bravo
  - SI + Captan
  - Gem (Flint -- strobilurin) \*
  - Pristine (boscalid + strobilurin) \*
  - Syllit (dodine) \*
    - Syllit + Captan
  - Copper

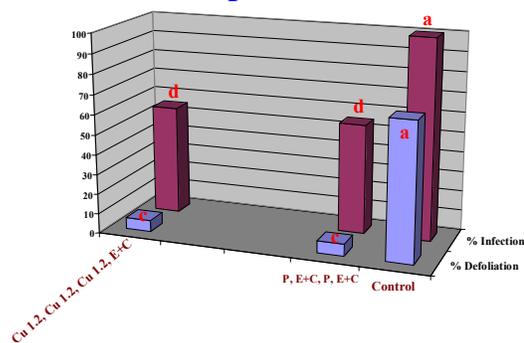


## Coppers for Leaf Spot Control

- Excellent activity -- leaf spot fungus is highly susceptible to copper
- 2nd, 3rd cover spray timing
- Rate is 1.2 lbs metallic per acre
- Add lime (6-9 lbs/A) as a safener
- Phytotoxicity concerns
  - Do not use if hot, dry conditions in forecast (80's)



## Leaf Spot Control



## Cherry Leaf Spot -- Disease Control Recommendations for Michigan

- Late bloom, shuck split -- Chlorothalonil (Bravo)
- Postharvest -- Bravo

We currently lack an IPM (reduced risk) alternative at these timings

## Optimal Timings for Cover Spray Options

- 1st Cover
  - Pristine (10.5 or 14.7 oz) or Gem (500 SC @ 3-3.8 fl oz)
    - additional powdery mildew control
- 2nd, 3rd Cover
  - Coppers, Syllit (27 fl oz) + Captan (3-4 lbs)
  - Pristine or Gem
- 4th Cover
  - SI + Captan
    - additional brown rot control
  - Coppers, Syllit + Captan
  - Pristine or Gem

## Fungicide Chemistries at Risk for Resistance Development

- Sterol Inhibitors
  - Elite, Indar, Nova, Rubigan
    - (RESISTANCE IS PRESENT IN CHERRY LEAF SPOT)
- Strobilurins
  - Gem (Flint)
- Boscalid
  - Pristine (also contains a strobilurin)
- Dodine
  - Syllit

## Breeding Objective: Develop Leaf Spot Resistant Cultivars



Two sources of resistance identified;

Used in breeding experiments

## Breeding Results for Leaf Spot Resistance

- Crosses between Montmorency and Balaton and resistant sources
  - 257 seedlings obtained
- A replicated field trial of five tart cherry selections was planted at NWHR
- Selections were evaluated for various horticultural characteristics

## Continuing RAMP Objectives for Disease Management

- Conserve the number of available chemistries:
  - Chlorothalonil; strobilurins; boscalid; coppers; dodine + captan
- Fungicide resistance screening (current baselines)
  - Leaf spot -- strobilurins
  - Brown rot -- DMI's
- Copper usage weather guidelines
- Breeding work



**RAMP**  
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USDA