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Amherst

## Research Update Meeting 2005 - Cranberry Weevil Review and Research 2005

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# **Cranberry Management Update 2005**

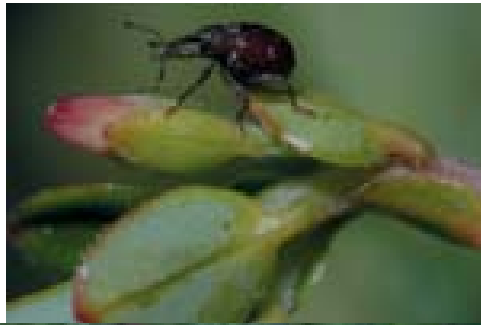
## **Cranberry Weevil: Review and Research**



**Martha Sylvia & Anne Averill**

# LIFECYCLE

## Cranberry Weevil



- Overwinter as an adult weevil in debris in uplands
- Early season host plants are blueberries starting in April
- Can lay eggs in developing blueberry flowers
- Feed on many alternate plants

# LIFECYCLE

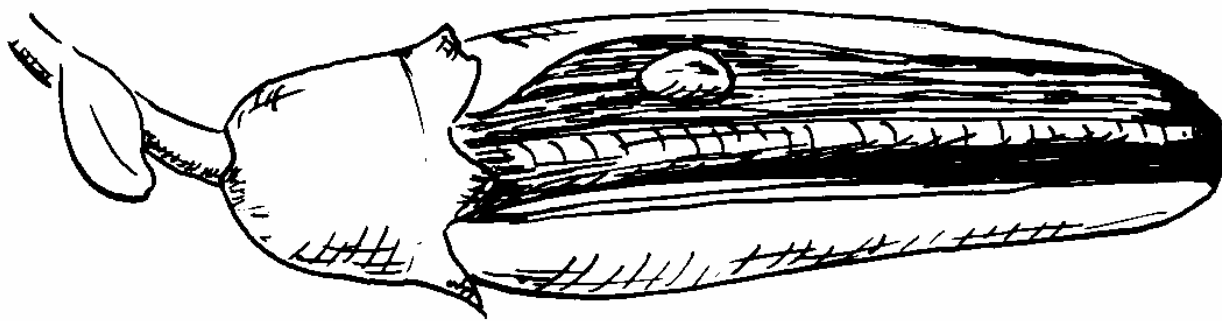


- Winter woods
- Spring blueberries
- Feeding and laying eggs in developing blueberry flowers
- Moves to cranberry as soon as new growth appears

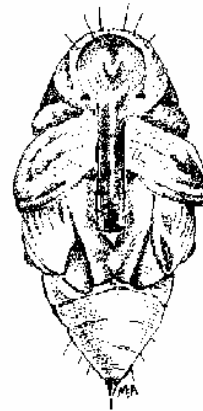
# Spring Damage



# Spring weevil population lay eggs in cranberry flower pods



# Cranberry Weevil Lifecycle



Egg →→ Grub →→ Pupa →→ Adult Beetle  
June →→→→→→→→→→ July

# LIFECYCLE

## Cranberry Weevil



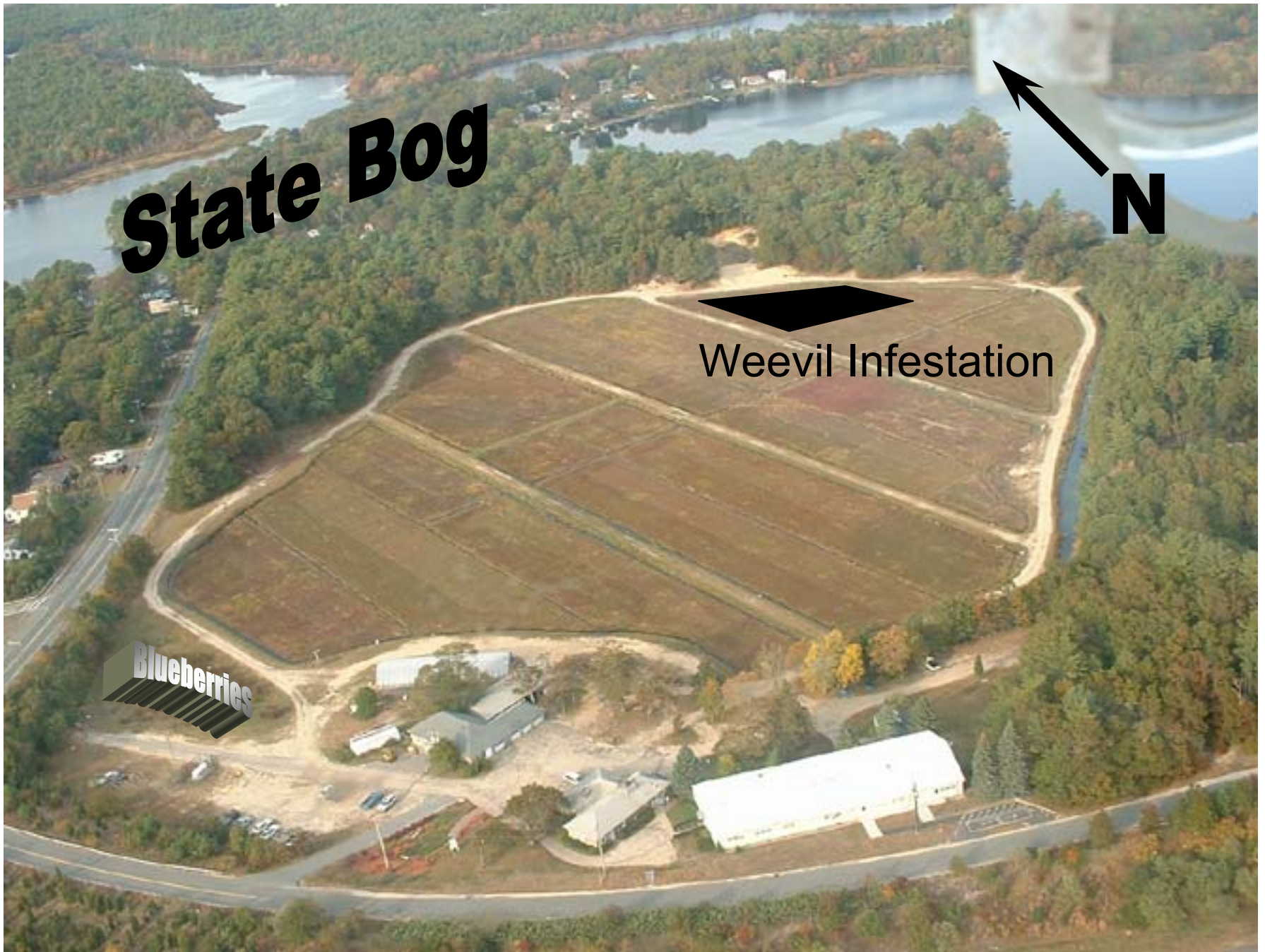
- New July Weevil feed on the bog for a few weeks on small berries and new growth
- By August move off the bog back into the woods to overwinter
- Same weevil moves back onto bog following May

**State Bog**



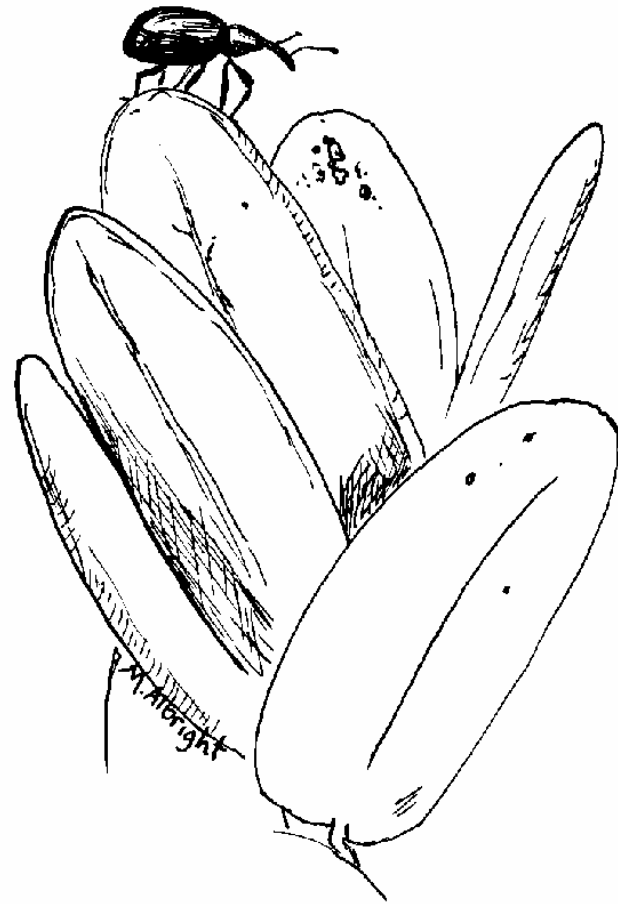
**Weevil Infestation**

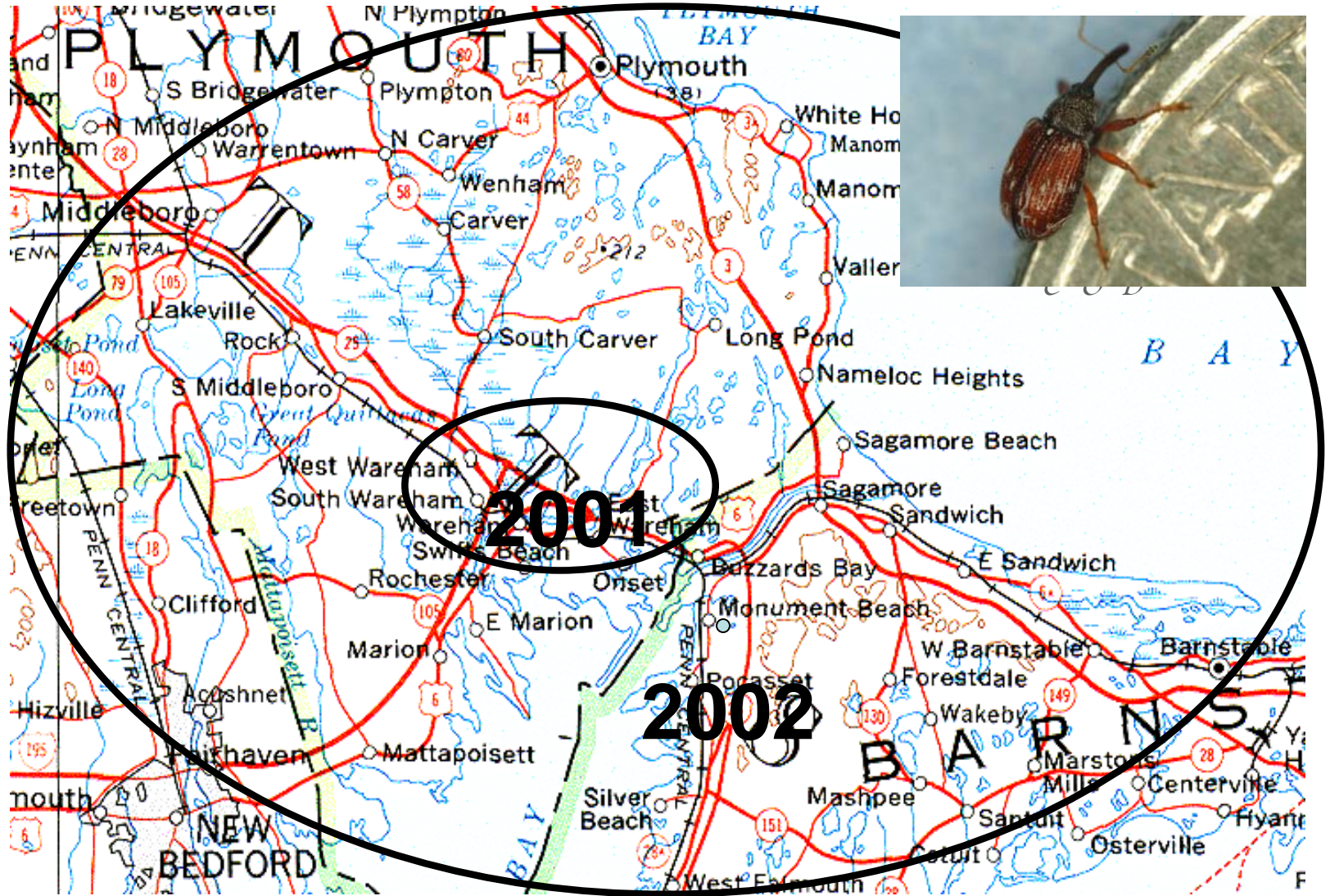
**Blueberries**



# HISTORY

## Resistant Weevil





OP-resistant cranberry weevil

# Resistant Management

- hitting both spring and summer population with same compound will increase likelihood of developing resistance



- **Crisis Exemption for Avaunt in 2002**
  - granted by MA Dept of Food and Ag and US-EPA  
but missed early spring populations
- **Section 18 for Avaunt in 2003**
  - but Avaunt didn't work well on summer population
    - 1<sup>st</sup> generation weevil 80-100% mortality
    - 2<sup>nd</sup> generation < 50% mortality
- **Section 18 in 2004 for Avaunt spring and Actara summer – best of both worlds.**

- Section 18 in **2004**
- Avaunt spring applications
  - 10,000 Acres treated in May and June
- Actara summer
  - 2,500 Acres treated in July

# Avaunt Resistance Management

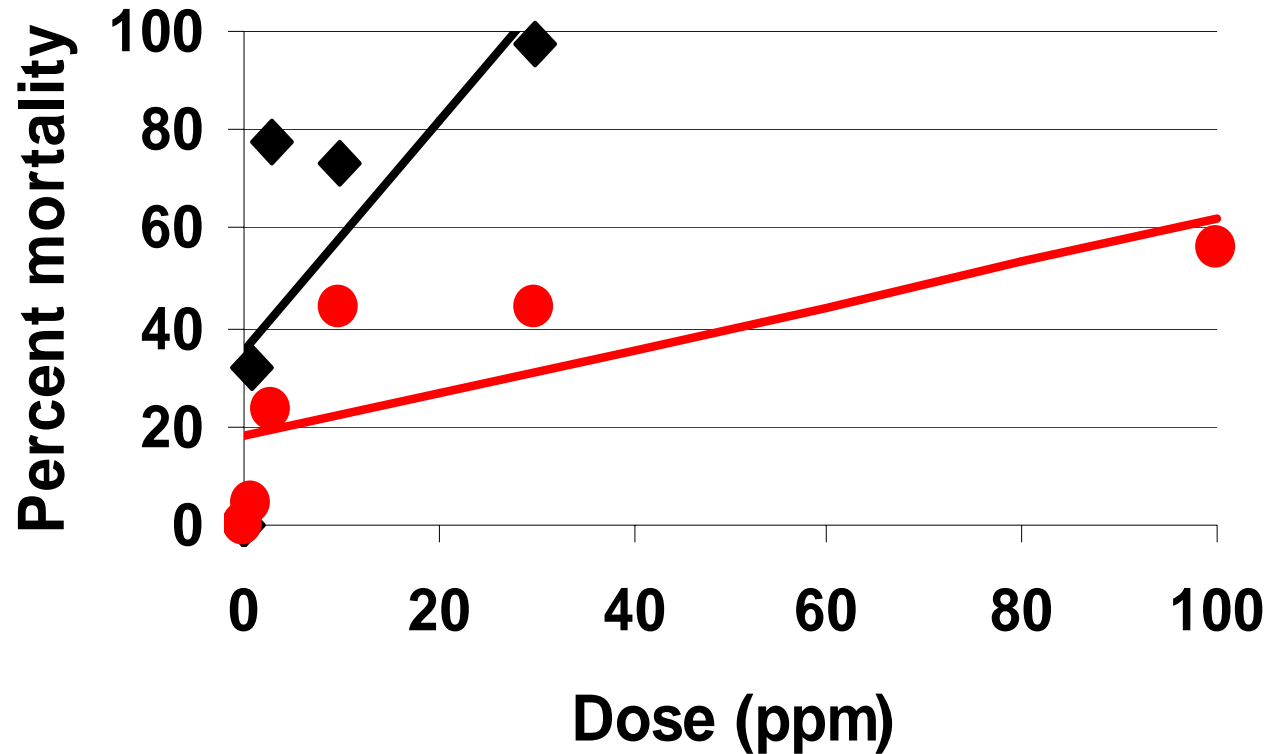
- Monitoring of LD<sub>50</sub> of generations
- LD<sub>50</sub> dose-response test
- 1 upright per cell
- Treatments were control and 1, 10, 30, 100, 300 ppm indoxacarb
- 16 reps per treatment (16 weevils)



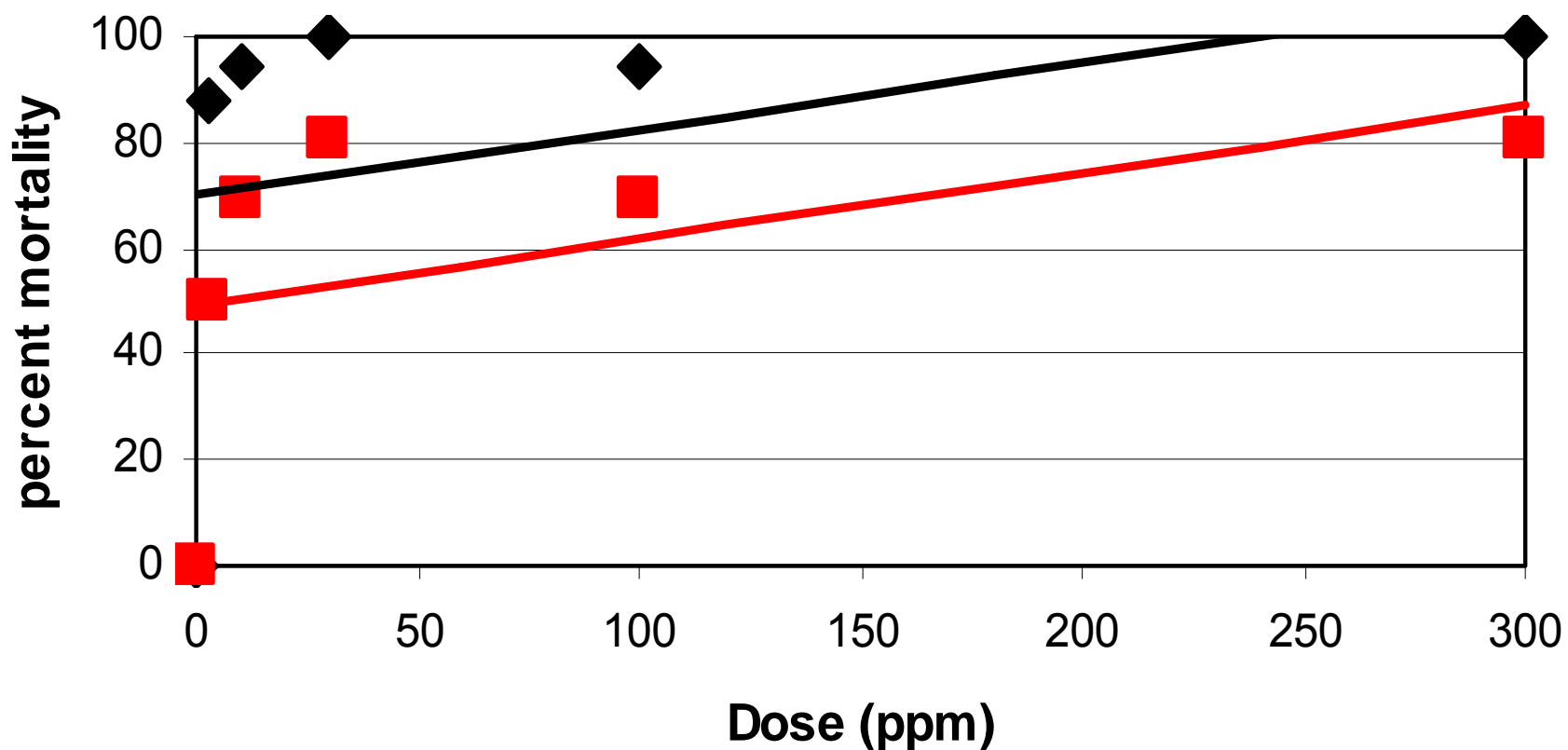
# Dose-response bioassay for Avaunt: Mean results for six commercial bogs

◆ 1st gen ● 2nd gen

**2003**



# Dose-response bioassay for Avaunt: Carver bog 2004



◆ 1st gen    ■ 2nd gen    — Linear (2nd gen)    — Linear (1st gen)

**Slide 16**

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**ALA1**

Can see that 50% mortality or LD50 is ca 15 times higher for second generation: about 5 ppm vs 75

Anne L. Averill, 10/6/2003

# Population Differences

Spring weevil    80-100% mortality  
LD50    1-3 ppm

Summer weevil    < 50% mortality  
LD50    3-10 ppm

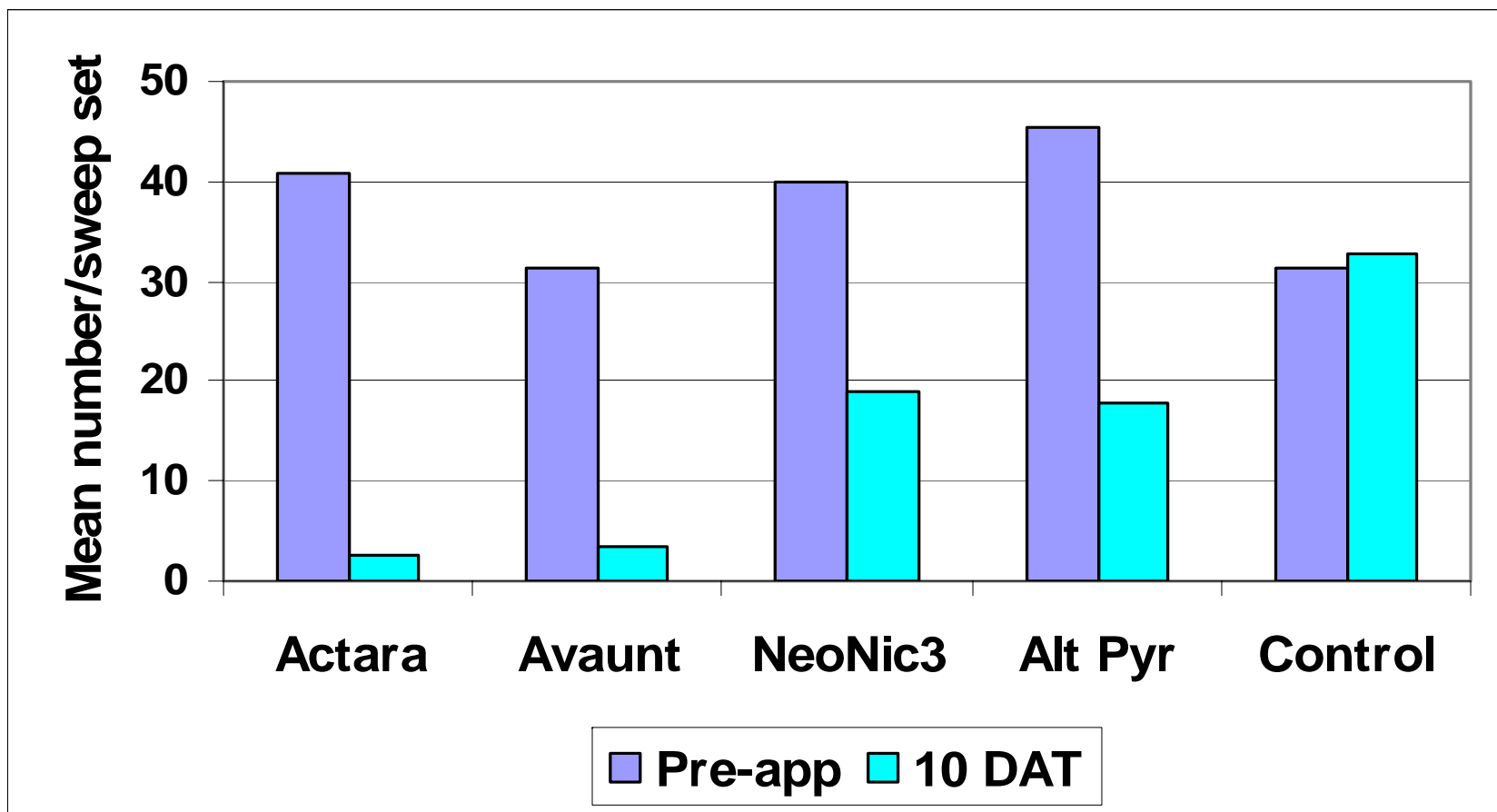
# Population Differences

- Summer weevil are newly-emerged adults that are more robust and have more fat body than spring weevil that has spent all winter using up stores (many months overwintering)
- Fat body is the insect tissue involved in detoxifying insecticides

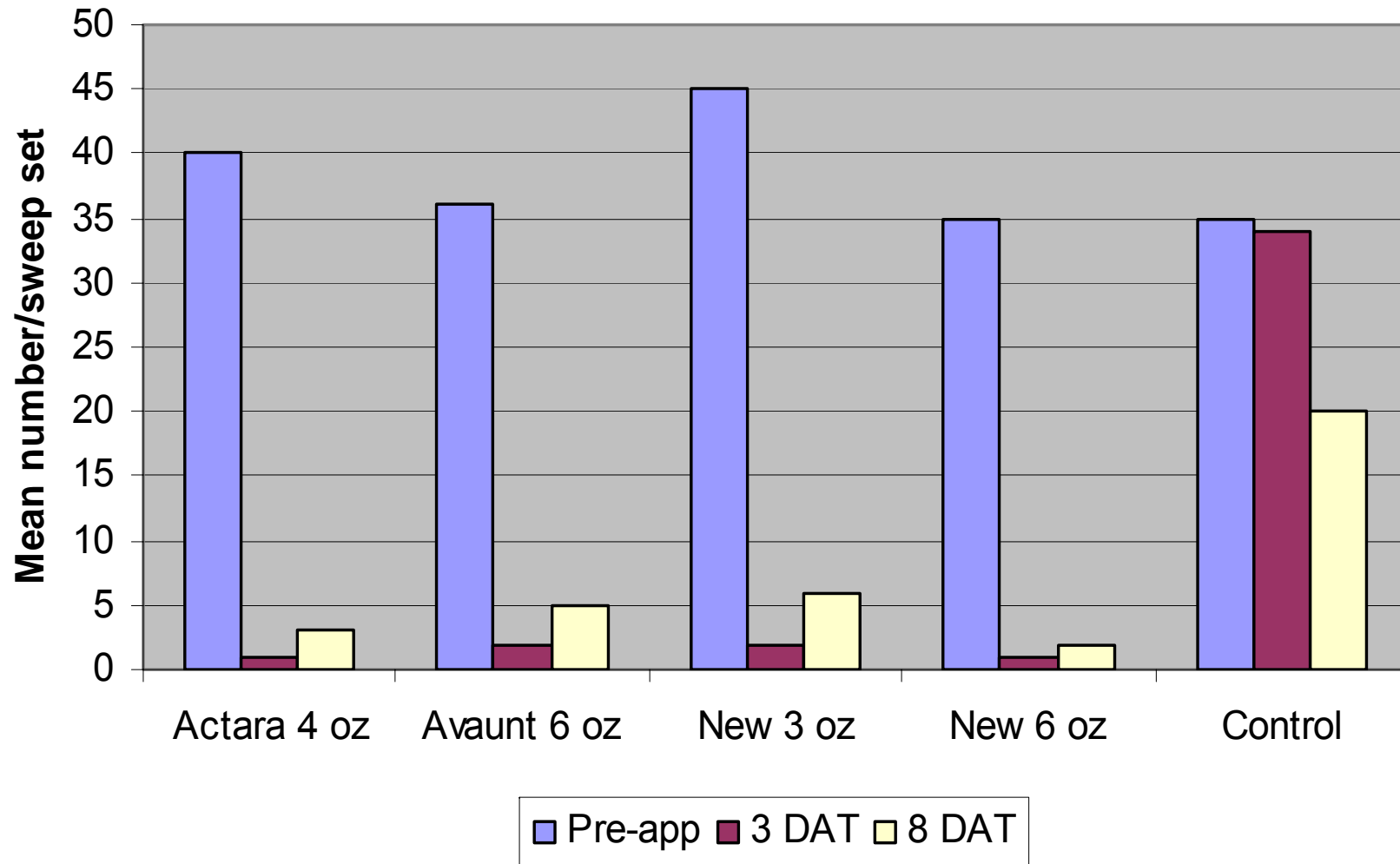
# SPRAYS



# Simulated chemigation; field trials; Spring population 2003



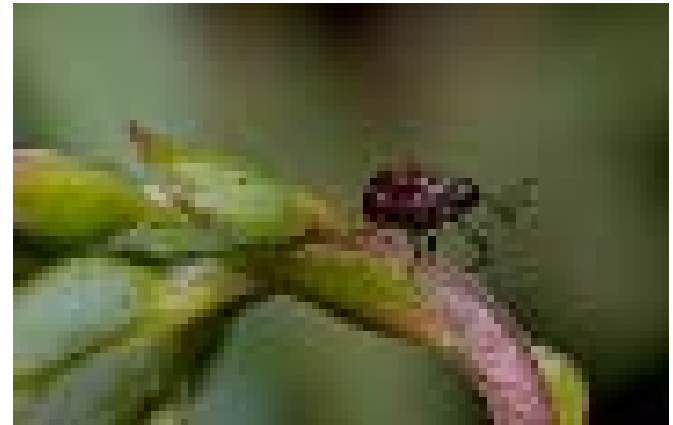
# Simulated chemigation, field trials; Spring population 2004



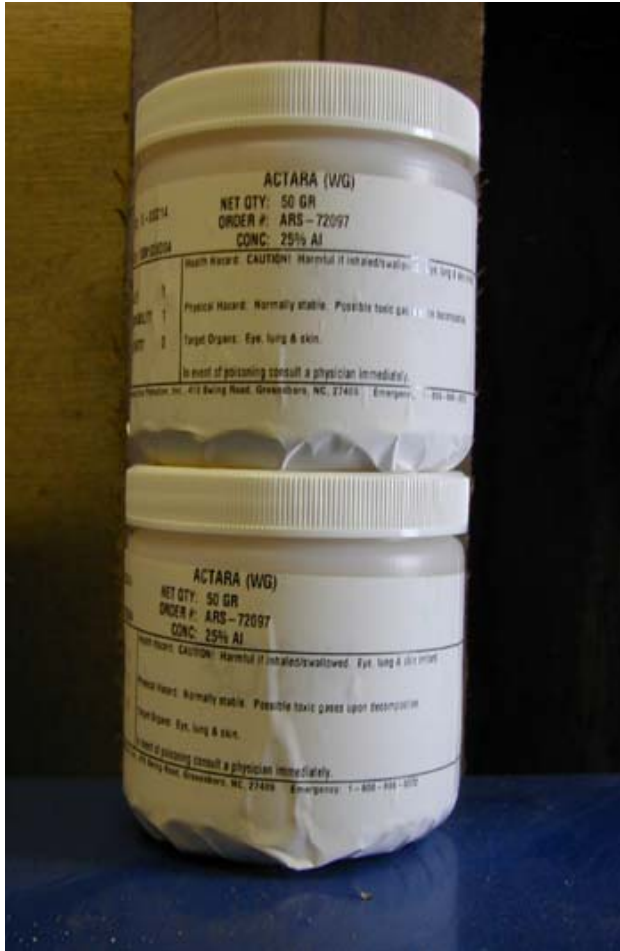


# 2005 Weevil

- Populations reduced?
  - 10,000 acres spring 2004
  - 2,500 acres summer 2004
- Bust of population?
- Actara management only?



# Actara vs. Avaunt





# Actara (thiamethoxam)

## Full label 2005

- Great efficacy
- Residue trials ran in 2000
- EPA rejected section 18 2001, 2002, 2003
- allowed section 18 for summer use 2004



# Actara 25 WG

- Full label 2005
- 25% thiamethoxam active ingredient
- water dispersible granule, easy to use
- Systemic insecticide, longer control
- Neonicotinoid nerve toxin
  - Interferes with postsynaptic nicotinic acetylcholine receptors
- Rainfast
  - (48 hr irrigation caveat → groundwater issue)

# Actara (thiamethoxam)

- Full label 2005
- Caution
- Not reduced risk
- Restricted Use Compound
- Zone II Restricted
- Possible Carcinogen

# Actara and Other Insects

- Excellent control of weevil
- Probably excellent control on flea beetle and leafhopper
- No control of caterpillars
- Labelled on other crops for aphids, leafhoppers, whitefly, and thrips

# Actara and Aquatic toxicity

- Highly toxic to aquatic invertebrates (midge larvae)
- Practically non-toxic to water fleas and fish species
- Practically non-toxic to estuarine/marine fish and molluscs
- Moderately toxic to estuarine/marine invertebrates (shrimp) on an acute basis.

# **Actara and Aquatic toxicity**

- Recommend Holding Water for 5 Days
- Not on the label

# Actara rate and application

- 2-4 oz. rate
  - 8 oz. limit per season
  - number of applications not limited
  - Should work at 2 oz. allowing 4 applications

Mean number of live cranberry weevil per sweep set

	Treatment/ formulation	a.i./A form./A	Pre- treatment	1 DAT	3 DAT	6 DAT	10 DAT
<b>4 oz</b>	thiamethoxam (Actara 25WDG)	30.0 g 120 g	<b>35.2</b>	<b>2.4 a</b>	<b>2.8 a</b>	<b>4.6</b>	<b>5.0</b>
<b>2 oz</b>	thiamethoxam (Actara 25WG)	15.0 g 60 g	<b>36.0</b>	<b>2.0 a</b>	<b>3.4 a</b>	<b>6.4</b>	<b>7.0</b>
<b>1 oz</b>	thiamethoxam (Actara 25WG)	7.5 g 30 g	<b>29.8</b>	<b>6.4 a</b>	<b>11.2 a</b>	<b>8.0</b>	<b>9.6</b>
<b>0.5 oz</b>	thiamethoxam (Actara 25WG)	3.75 g 15 g	<b>32.6</b>	<b>7.6 a</b>	<b>11.0 a</b>	<b>10.8</b>	<b>7.4</b>
<b>2 pts</b>	Chlorpyrifos Lorsban 75WG	680.0 g 906.7 g	<b>29.4</b>	<b>11.8 a</b>	<b>14.4 ab</b>	<b>7.4</b>	<b>8.4</b>
	<b>Control</b>	--	<b>26.2</b>	<b>27.6 b</b>	<b>38.8 b</b>	<b>21.2</b>	<b>9.6</b>

Spring assessment, 2001. Large field plot results  
(Don Weber - Ocean Spray Cranberries; Middleboro-Carver, MA)

Mean number of live cranberry weevil per sweep set

	Treatment/ formulation	a.i./A form./A	Pre- treatment	1 DAT	6 DAT	12 DAT
4 oz	thiamethoxam (Actara 25WG)	30.0 g 120 g	93.0	1.2 a	4.8 a	1.8 a
2 oz	thiamethoxam (Actara 25WG)	15.0 g 60 g	121.8	4.4 a	3.4 a	5.2 abc
1 oz	thiamethoxam (Actara 25WG)	7.5 g 30 g	153.6	6.6 a	6.4 a	11.4 abcd
0.5 oz	thiamethoxam (Actara 25WG)	3.75 g 15 g	151.8	5.6 a	22.6 bc	13.0 bcd
2 pts	chlorpyrifos Lorsban 75WG	680.0g 906.7g	108.4	1.2 a	2.2 ab	4.2ab
	Control	--	170.6	79.0 b	30.2 c	14.6cd

Summer assessment, 2001. Large field plot results  
(Don Weber - Ocean Spray Cranberries; Middleboro-Carver, MA)

# Issues with Actara?

Excellent efficacy but...

- \* 5 day holding time

- \* Zone II issue

- \* limited # of sprays



# Actara only

- Only 2 applications
  - 8 oz. limit, not number of applications limited
  - Should work at 2 oz. allowing 4 applications
- Zone II
  - 20% growers in Zone II
  - If only option, UMass Extension can write support letter, and can still use
- Hold Water 5 days
  - Not a label requirement
  - Some aquatic toxicity

# 2005 Cranberry Weevil



- Lowered populations
- Actara ready to go
- No Avaunt
- Monitor in May
- 5-10 threshold
- Spray before pods get infested