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

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Cranberry Management Update 2005

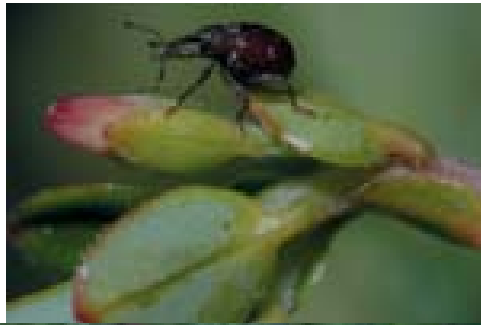
Cranberry Weevil: Review and Research



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

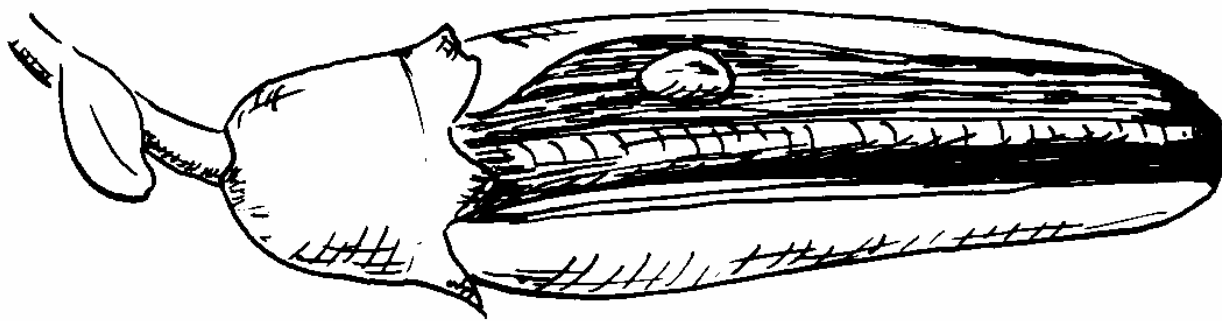


- Winter woods
- Spring blueberries
- Feeding and laying eggs in developing blueberry flowers
- Moves to cranberry as soon as new growth appears

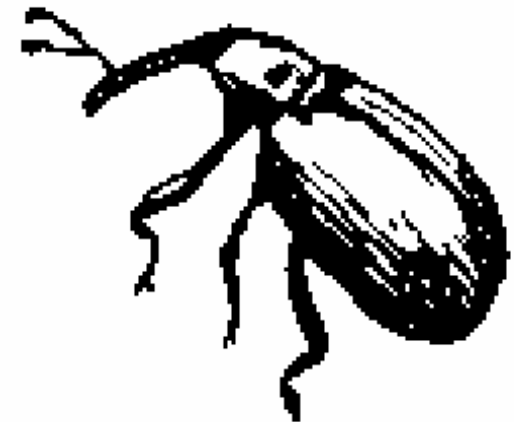
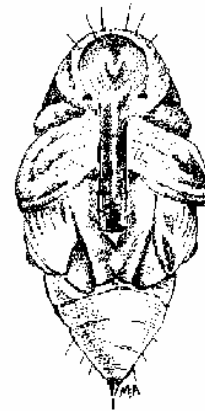
Spring Damage



Spring weevil population lay eggs in cranberry flower pods



Cranberry Weevil Lifecycle



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

LIFECYCLE

Cranberry Weevil



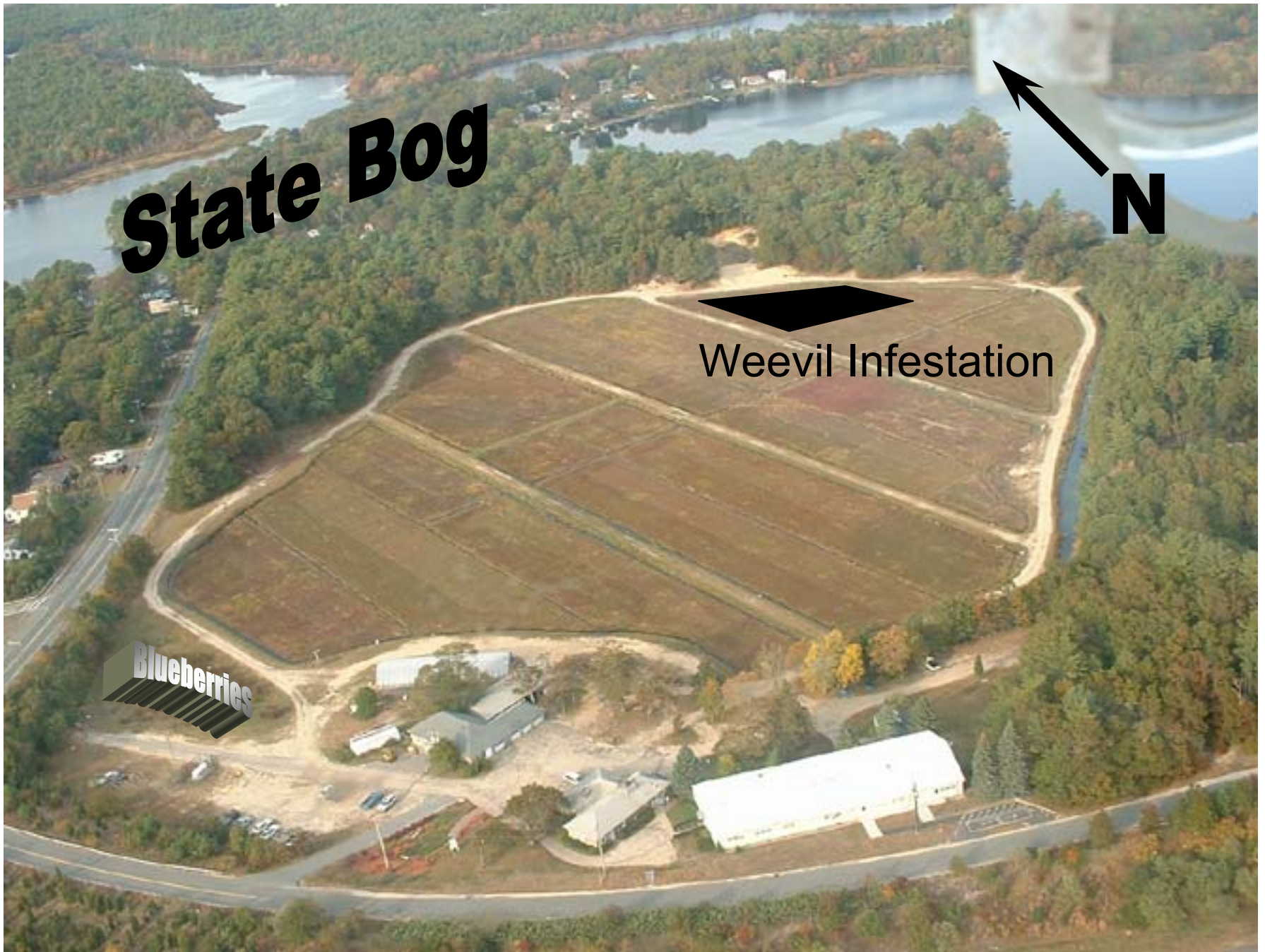
- New July Weevil feed on the bog for a few weeks on small berries and new growth
- By August move off the bog back into the woods to overwinter
- Same weevil moves back onto bog following May

State Bog



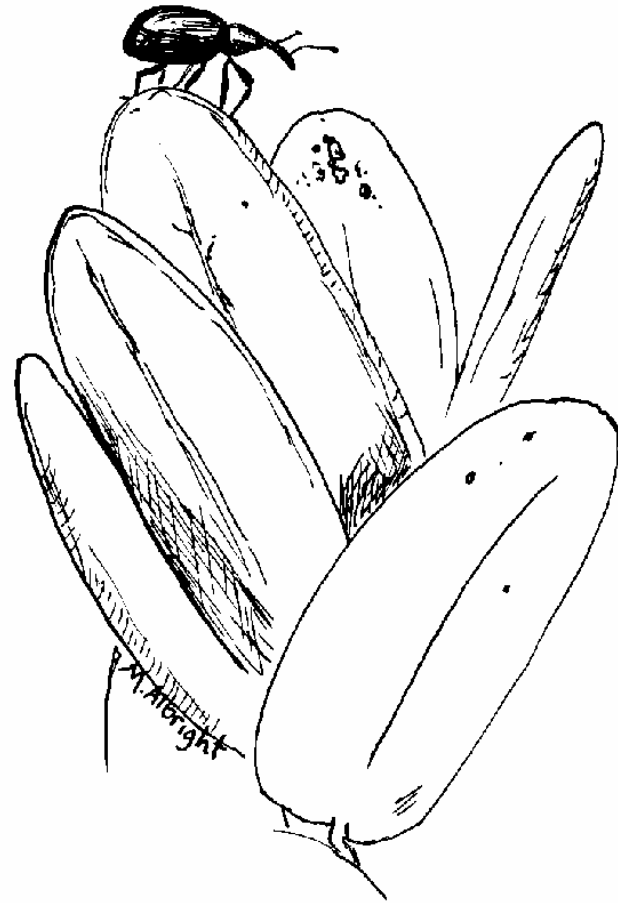
Weevil Infestation

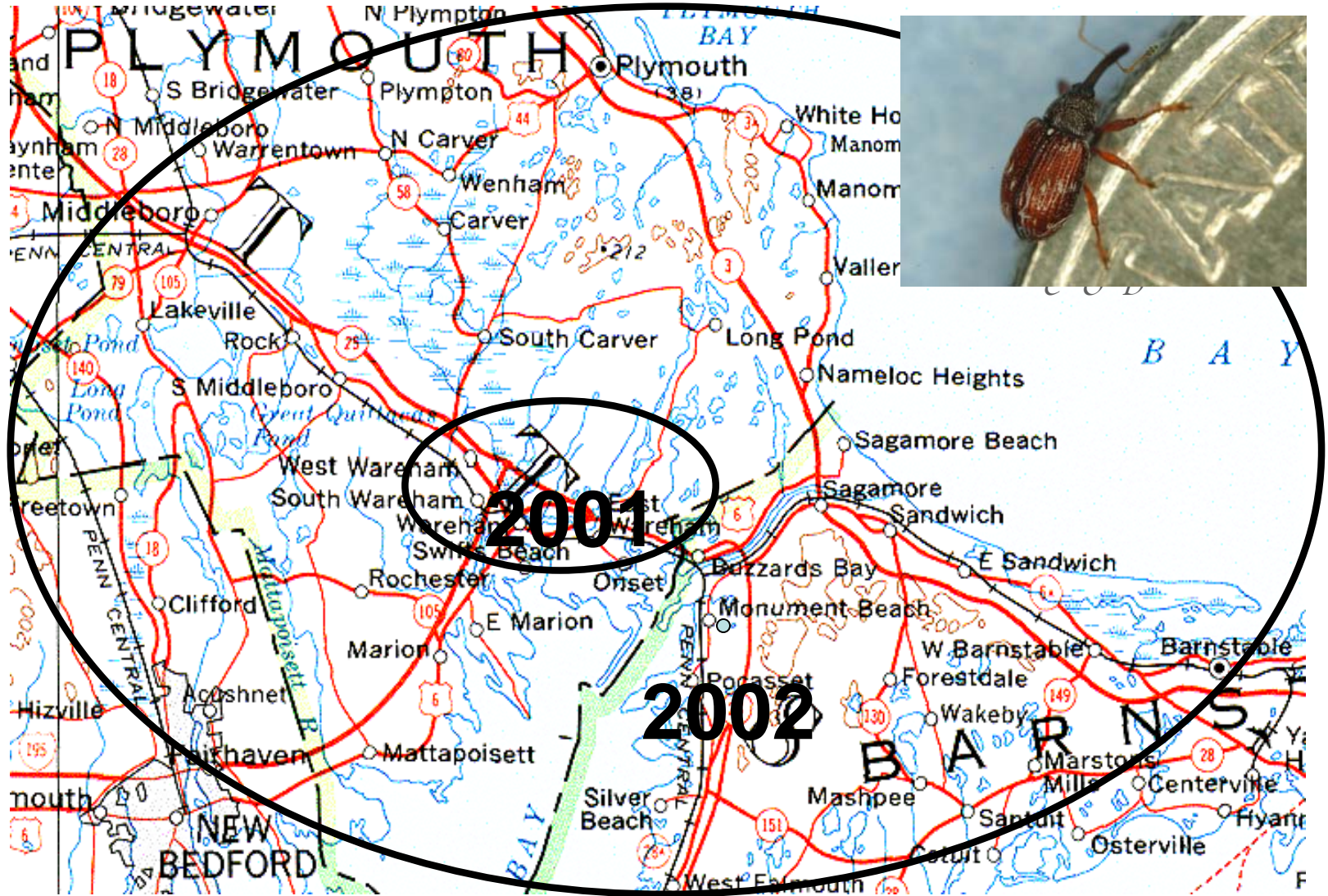
Blueberries



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
 - 1st generation weevil 80-100% mortality
 - 2nd 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

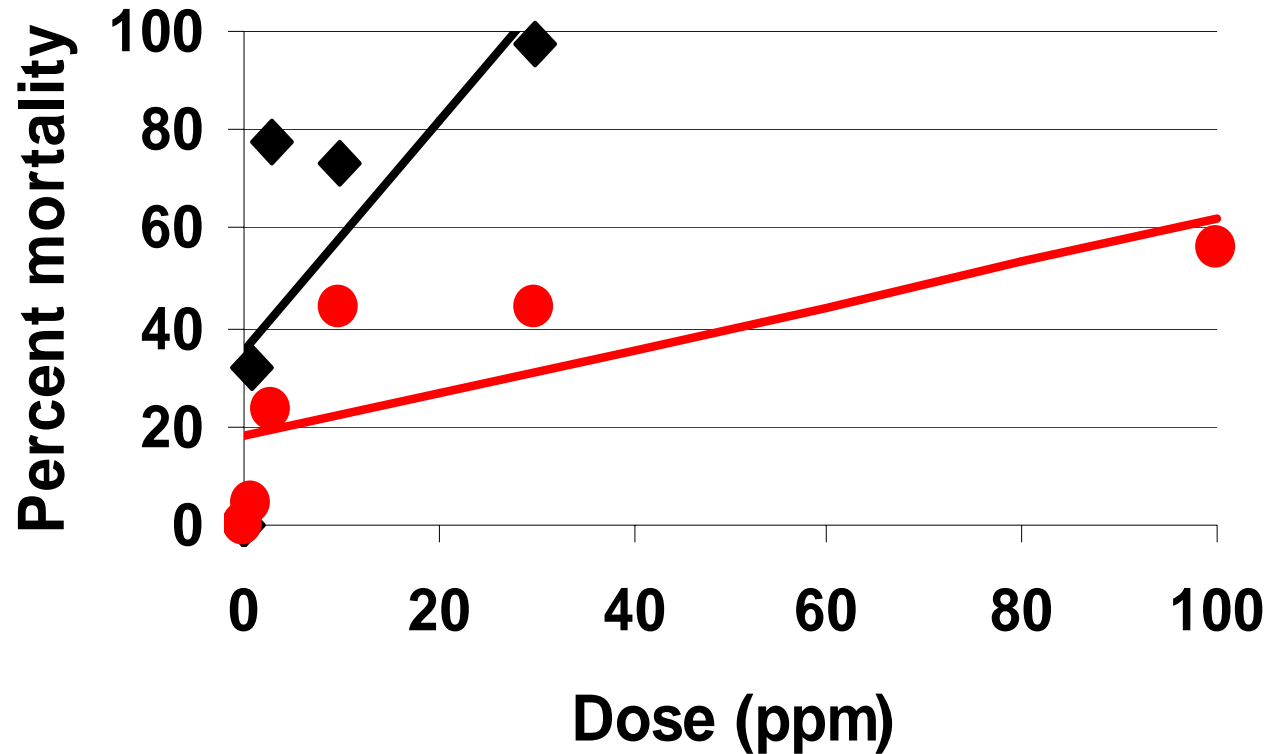
- Monitoring of LD₅₀ of generations
- LD₅₀ dose-response test
- 1 upright per cell
- Treatments were control and 1, 10, 30, 100, 300 ppm indoxacarb
- 16 reps per treatment (16 weevils)



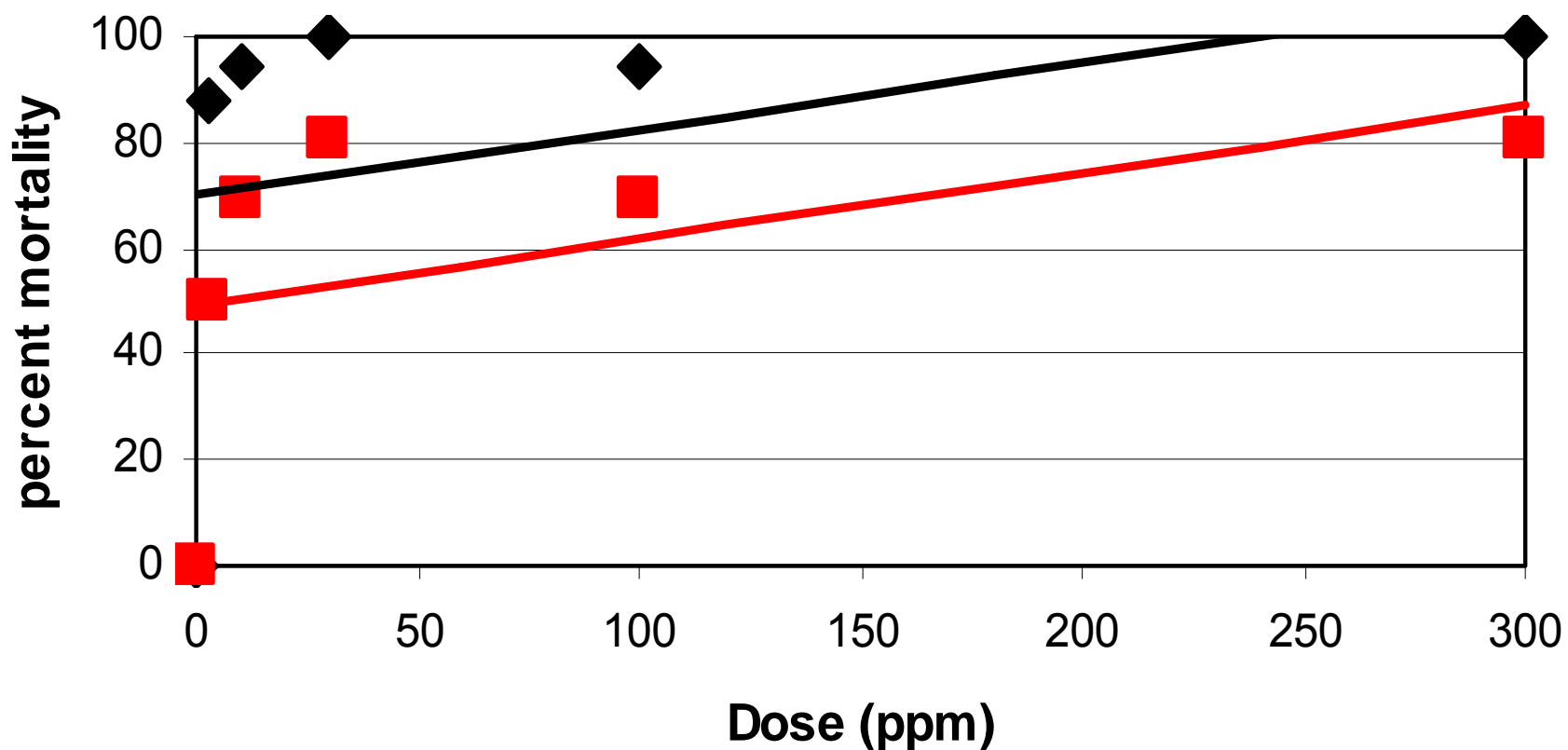
Dose-response bioassay for Avaunt: Mean results for six commercial bogs

◆ 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

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

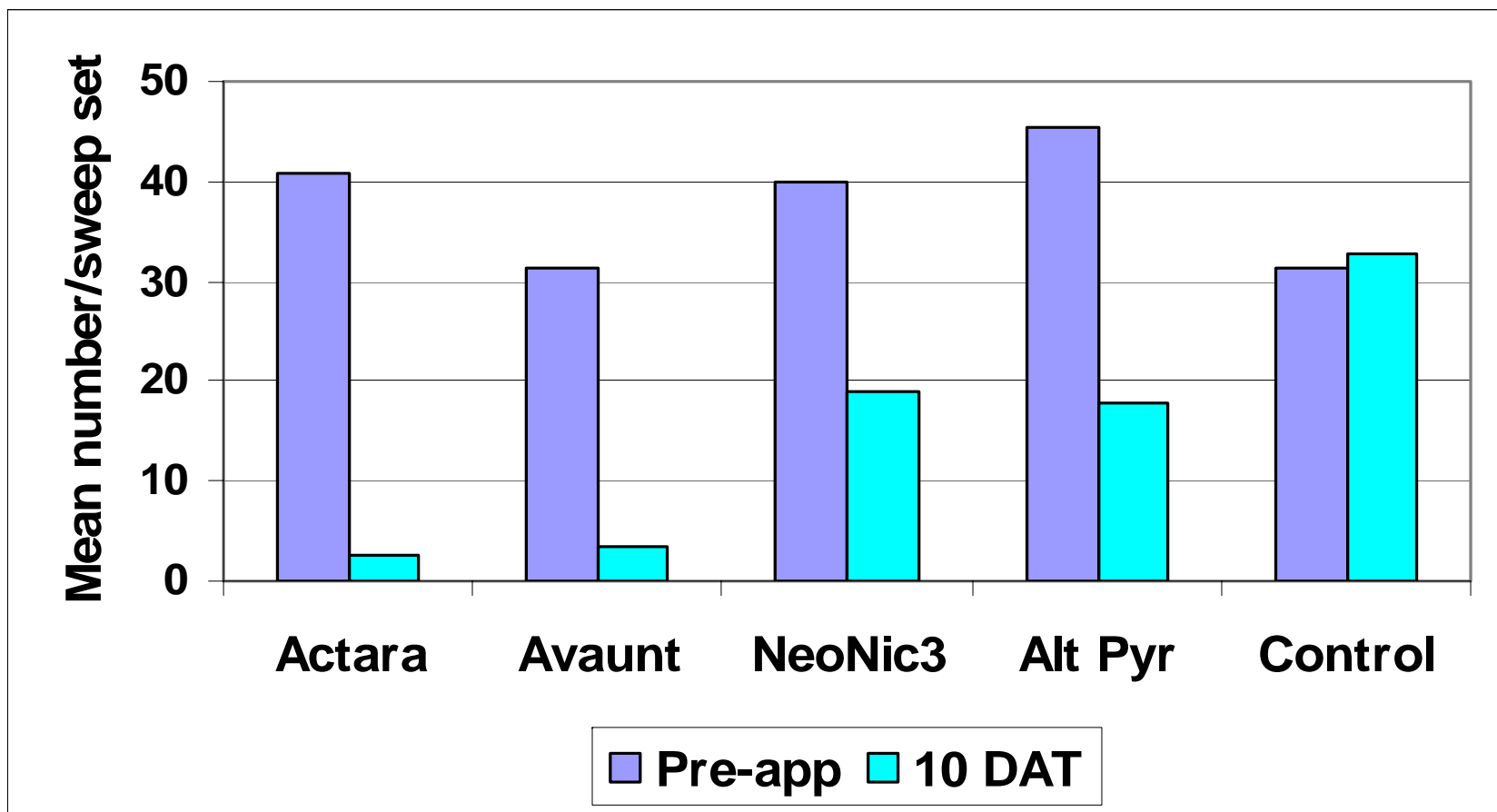
Population Differences

- 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

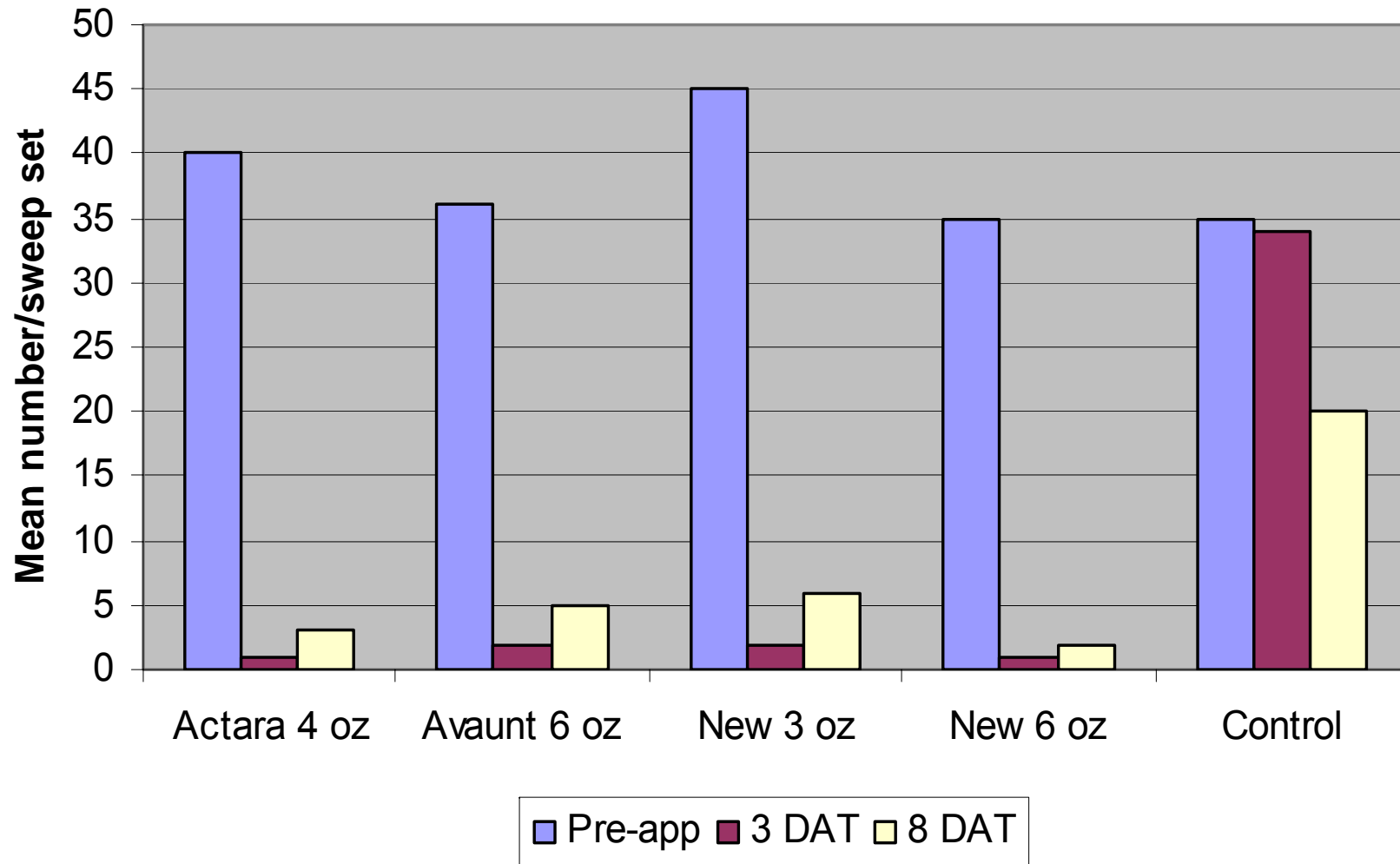
SPRAYS



Simulated chemigation; field trials; Spring population 2003

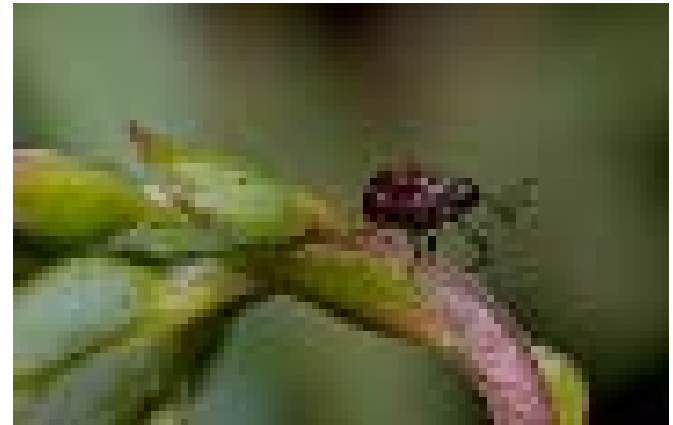


Simulated chemigation, field trials; Spring population 2004

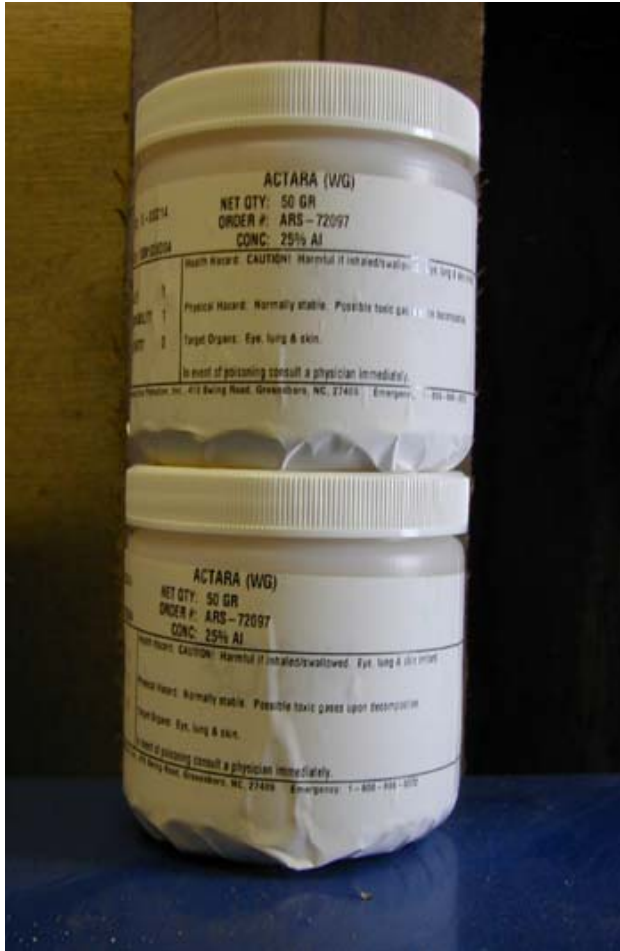


2005 Weevil

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



Actara vs. Avaunt



No Avaunt in 2005

EPA will likely not approve a Section 18 for Avaunt in 2005

Full label (Section 3) will not be available until 2007



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 acetyl choline 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 |
|---------------|-----------------------------------|--------------------|-------------------|--------|---------|-------|--------|
| 4 oz | thiamethoxam (Actara 25WDG) | 30.0 g 120 g | 35.2 | 2.4 a | 2.8 a | 4.6 | 5.0 |
| 2 oz | thiamethoxam (Actara 25WG) | 15.0 g 60 g | 36.0 | 2.0 a | 3.4 a | 6.4 | 7.0 |
| 1 oz | thiamethoxam (Actara 25WG) | 7.5 g 30 g | 29.8 | 6.4 a | 11.2 a | 8.0 | 9.6 |
| 0.5 oz | thiamethoxam (Actara 25WG) | 3.75 g 15 g | 32.6 | 7.6 a | 11.0 a | 10.8 | 7.4 |
| 2 pts | Chlorpyrifos Lorsban 75WG | 680.0 g 906.7 g | 29.4 | 11.8 a | 14.4 ab | 7.4 | 8.4 |
| | Control | -- | 26.2 | 27.6 b | 38.8 b | 21.2 | 9.6 |

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