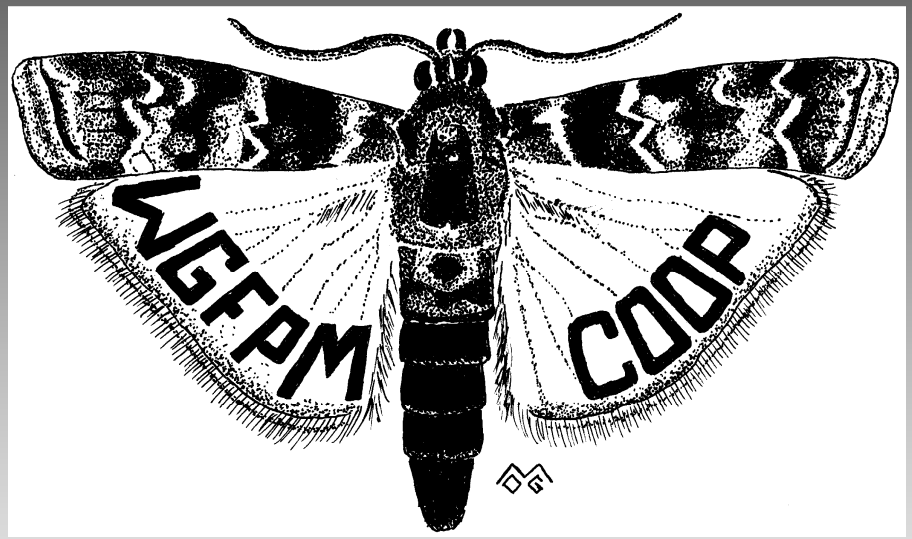
Protection of Young Pine Seedlings from Insect Pests



Don Grosman

Western Gulf Forest Pest Management Cooperative &

Texas Forest Service, Forest Pest Management

Lufkin, Texas

Western Gulf Forest Pest Management Cooperative

Mission

- To provide leadership and technical assistance in the development, evaluation, and implementation of pest management strategies which improve survival, growth, and yield in seed orchards and forest plantations.

Objective

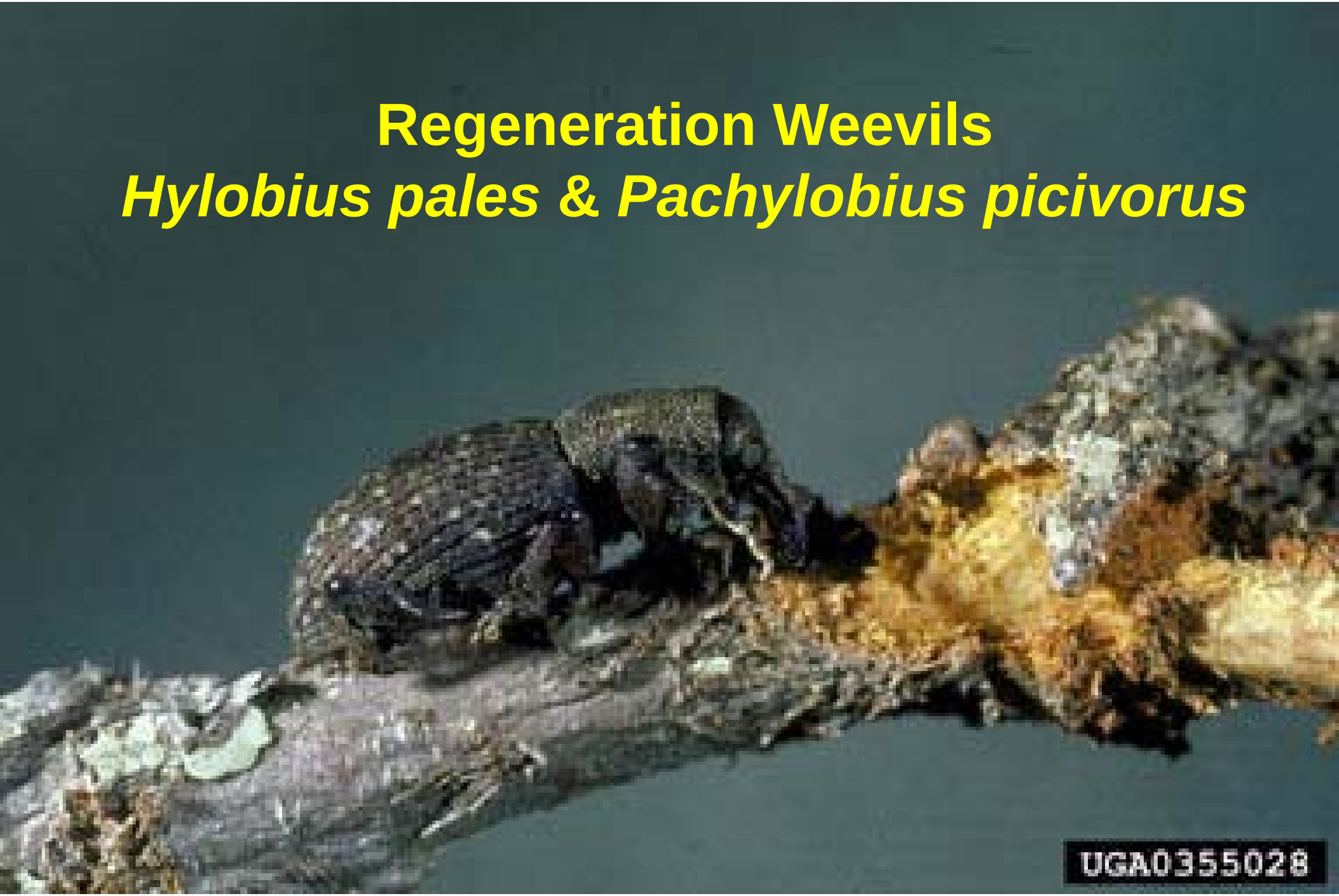
- **Develop innovative approaches to pest problems in pine seed orchards and young pine plantations.**

Regeneration Weevil

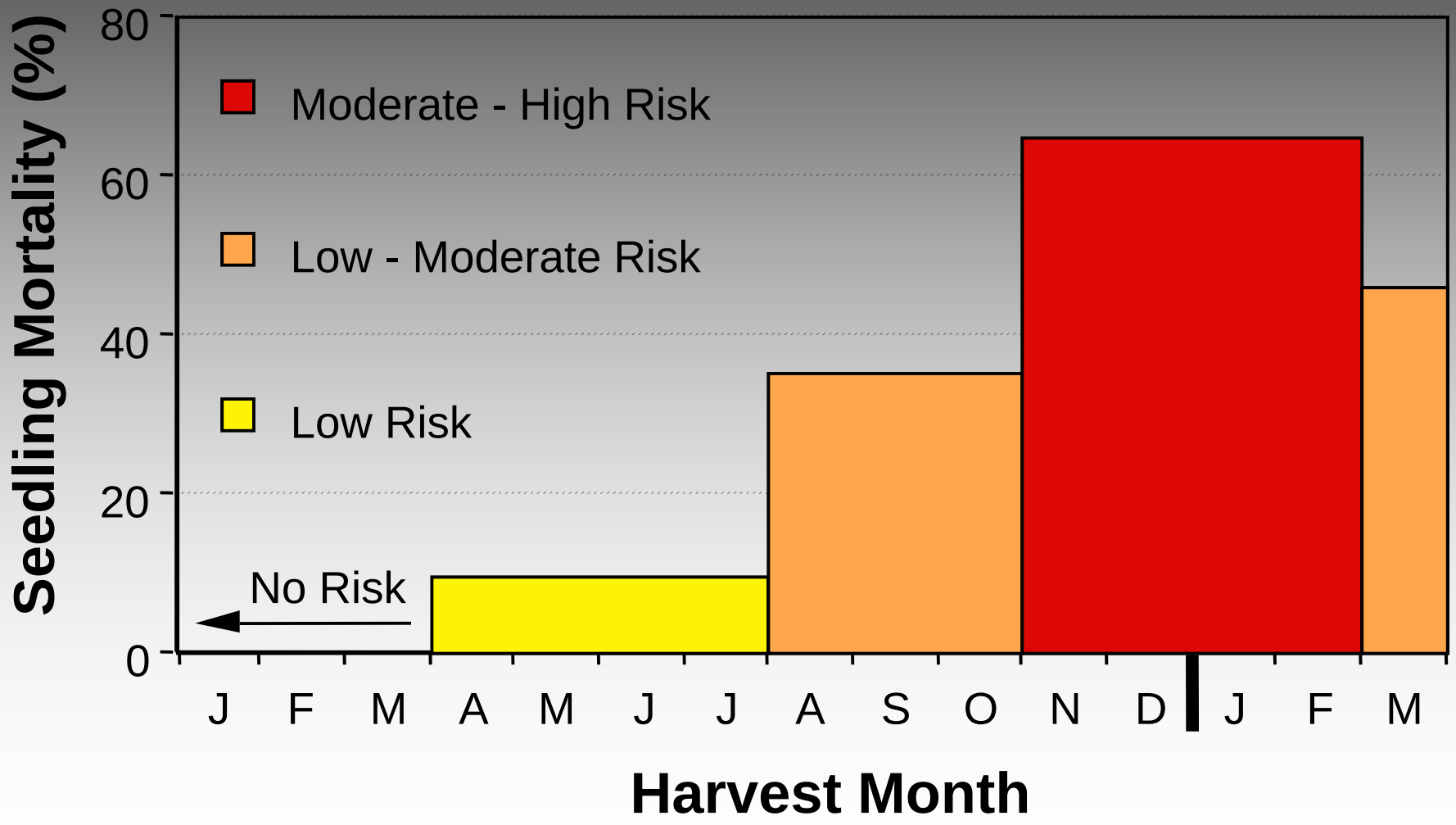
Nantucket Pine Tip Moth

Texas Leaf-cutting Ant

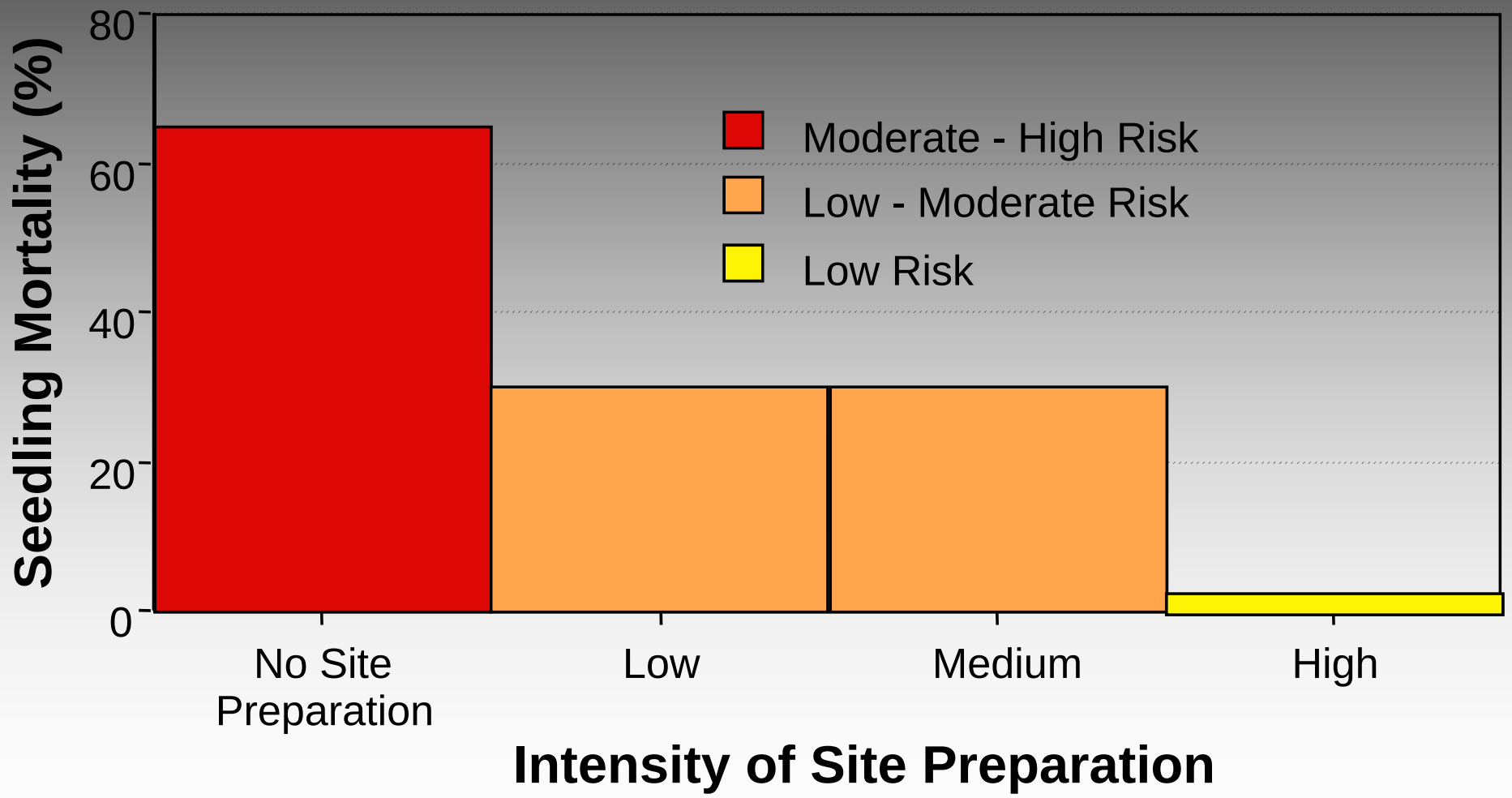
Regeneration Weevils
Hylobius pales & Pachylobius picivorus



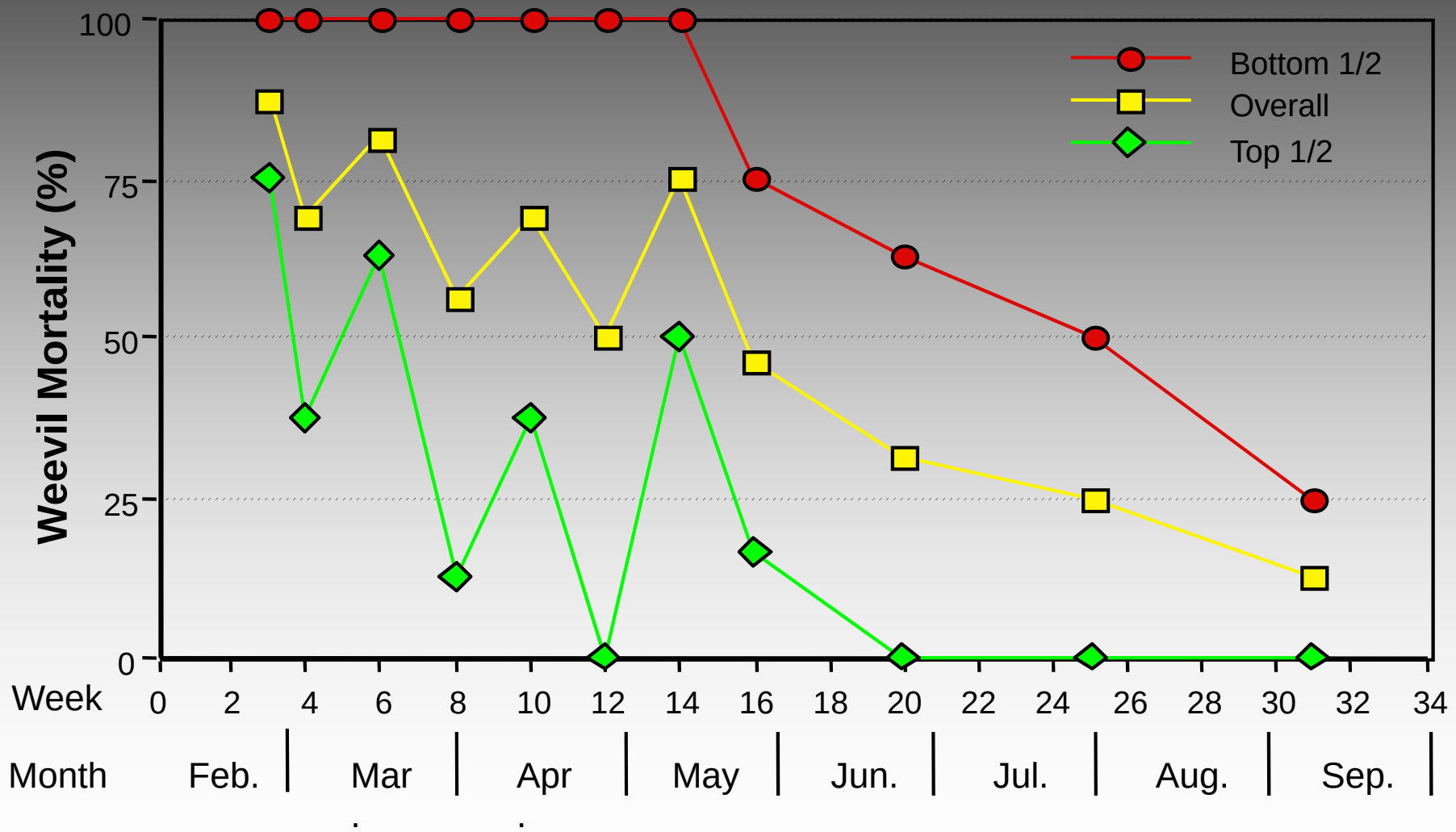
Potential Risk of Weevil-caused Pine Seedling Mortality Based on Harvest to April 1 Interval



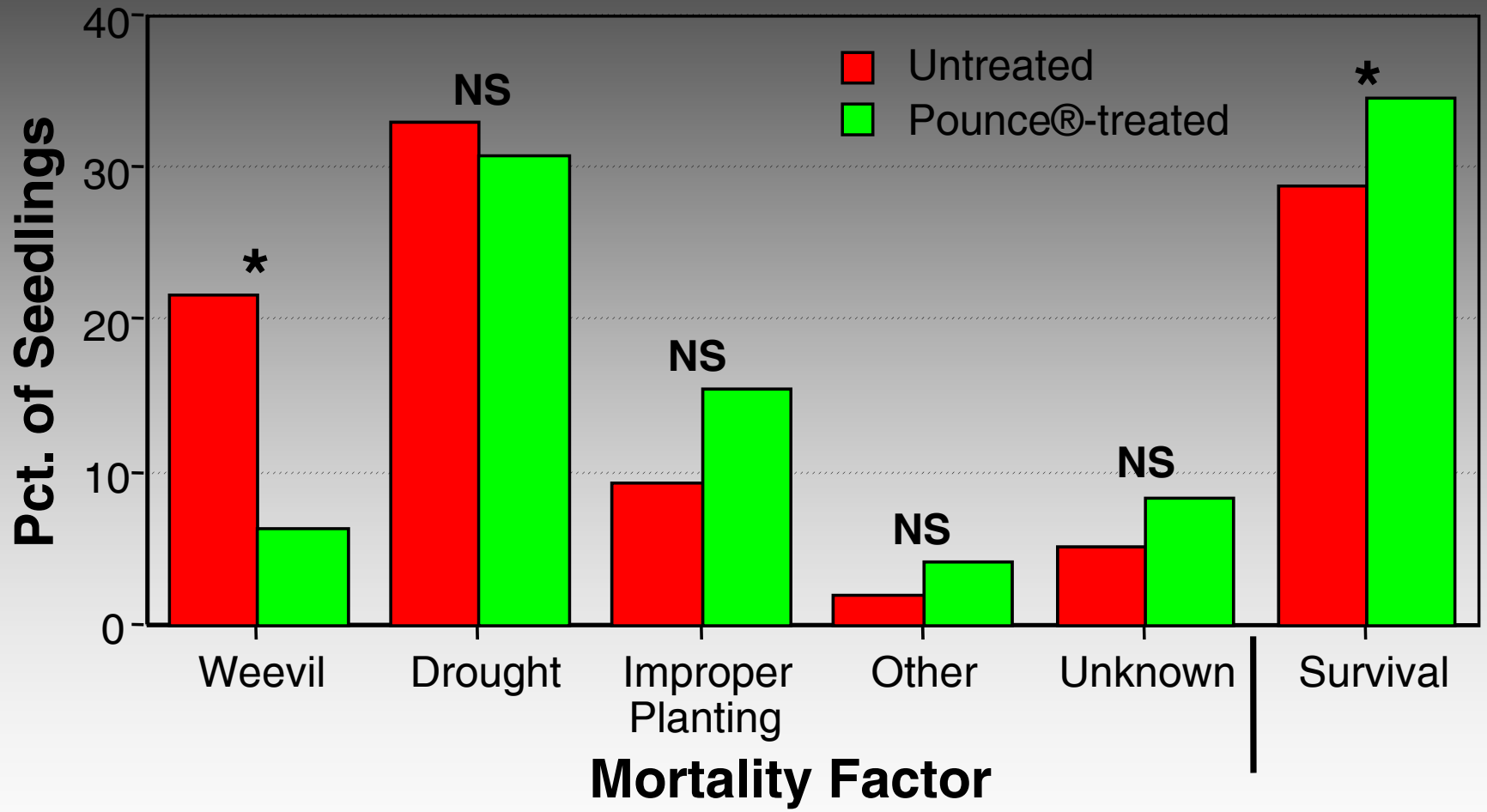
Potential Risk of Weevil-caused Pine Seedling Mortality Based on Intensity of Site Preparation



Reproduction weevil mortality after exposure to Pounce®-treated loblolly pine seedling sections.

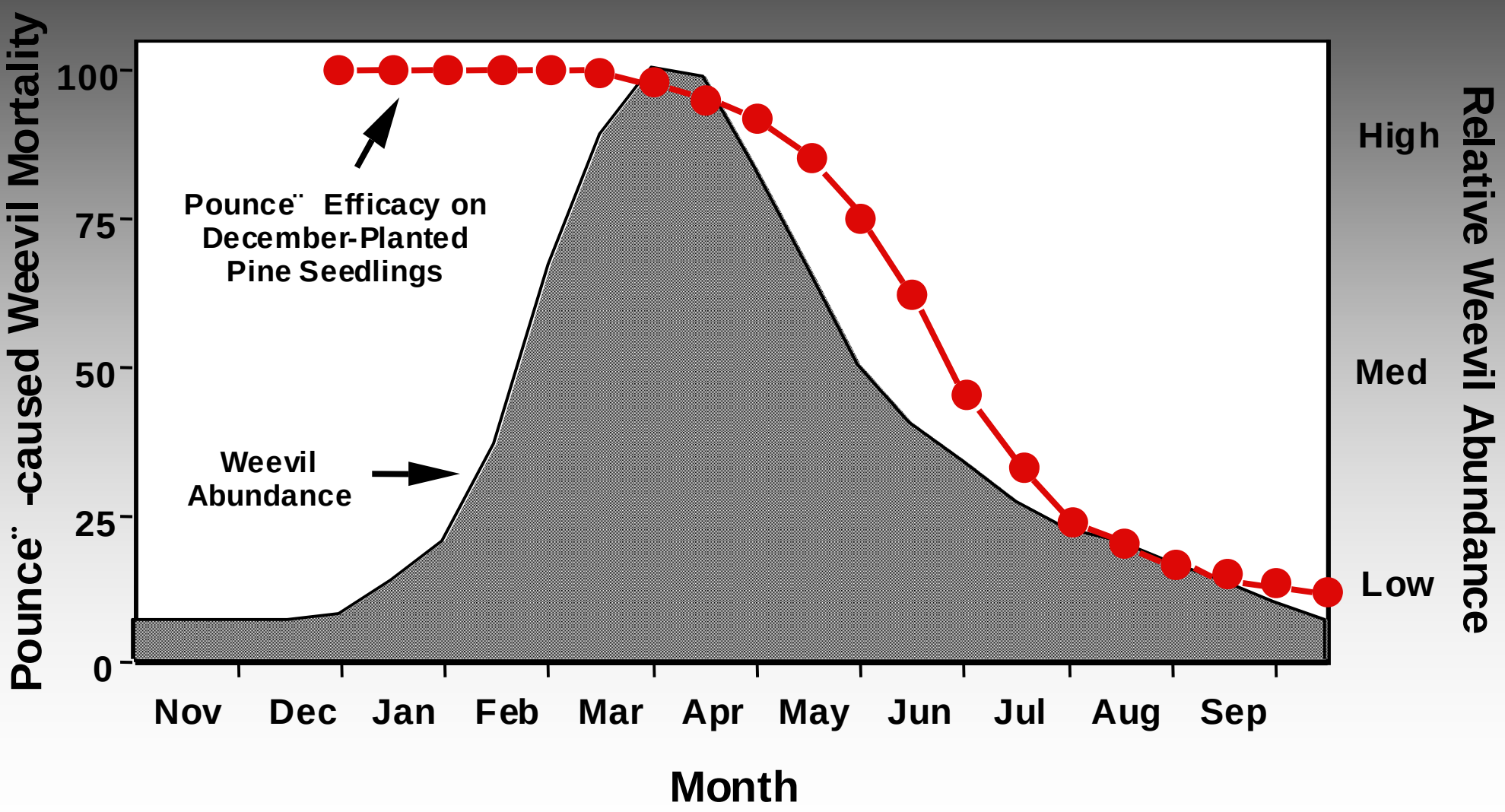


First-year loblolly pine seedling mortality and survival on East Texas sites planted with treated (N=21) and Pounce-treated (N=15) seedlings in 1998.



* = Significantly different at the 10% level; NS = not significant

Reproduction Weevil Mortality After Exposure to Pounce®-treated Loblolly Pine Seedling Sections



Pounce® Registrations as of 2005

- **Pounce® 3.2 EC (FMC) with 24C (Special Local Need) registrations in AL, AR, FL, GA, MD, NC, SC, TX, and VA.**
- **Agriliance's Pounce® 3.2 EC also with 24C registrations in AL, AR, FL, GA, MS, NC, SC, TN, TX and VA.**
- **Pounce® became extremely difficult to find in 2005.**

Note: Pounce® has a 2EE (supplemental label) that allows application to seedlings after planting for protection against weevils.

Regeneration Weevil Control: 2005

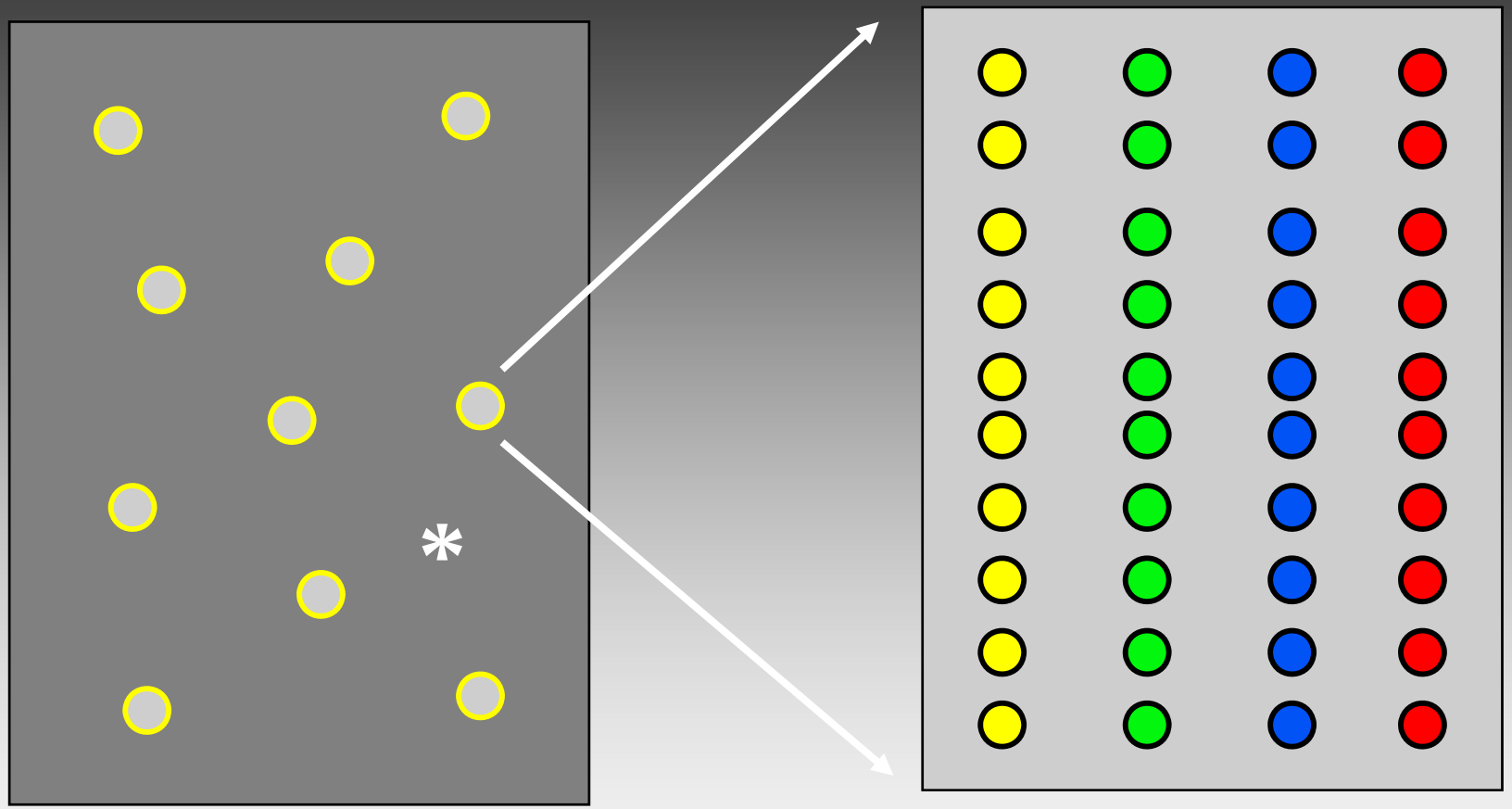
Objective

- **Evaluate fipronil as an alternative to foliar spray for protection of pine seedlings against pine regeneration weevils.**

Fipronil Weevil Trial - 2005

Chemical	Conc.	Trt. Tech.
Regent® 4X	(0.05%)	In Furrow (July)
Regent®	(0.3%)	Plant hole
Regent®	(0.3%)	Soil Injection
Check		

Study Plot Layout



Area planted w/ untreated seedlings

10 tree plot

Weevil trap

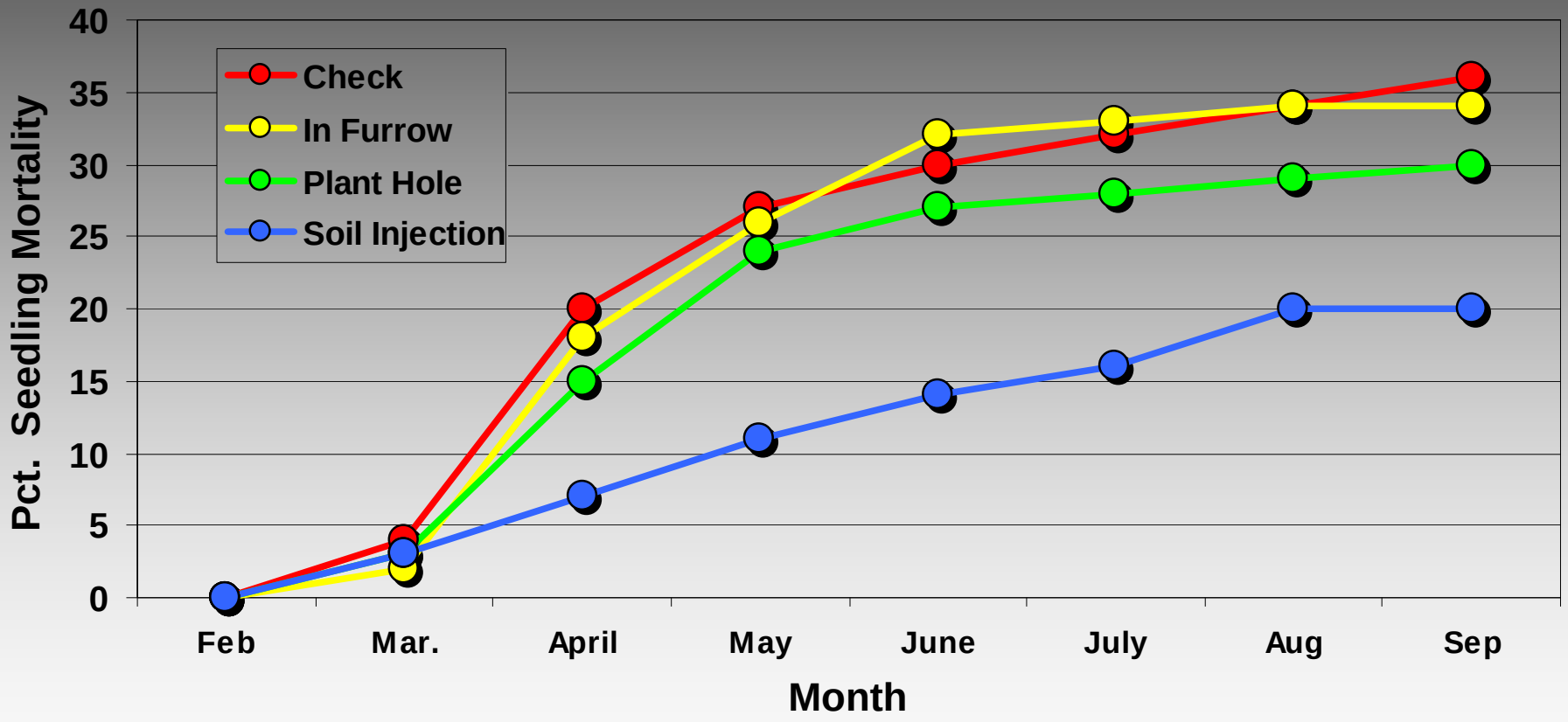
In-furrow 4x (July)

Plant hole

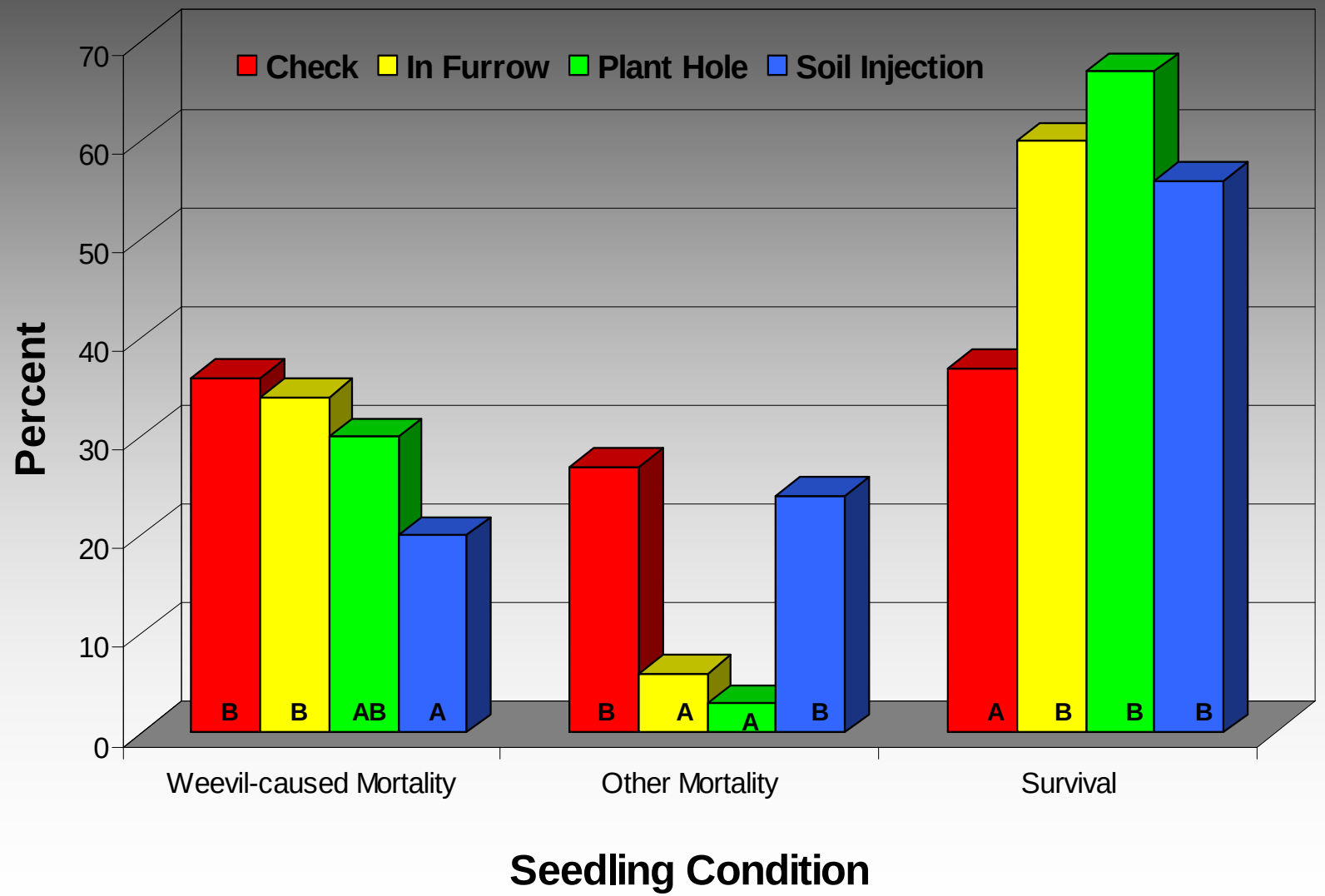
Soil injection

Check

Effect of Fipronil Treatments on Weevil-caused Mortality of Loblolly Pine Seedlings – Livingston, TX



Condition of pine seedlings in September 2005 after attack by pine regeneration weevils; Livingston, Texas, 2005.



Current Weevil Control Options

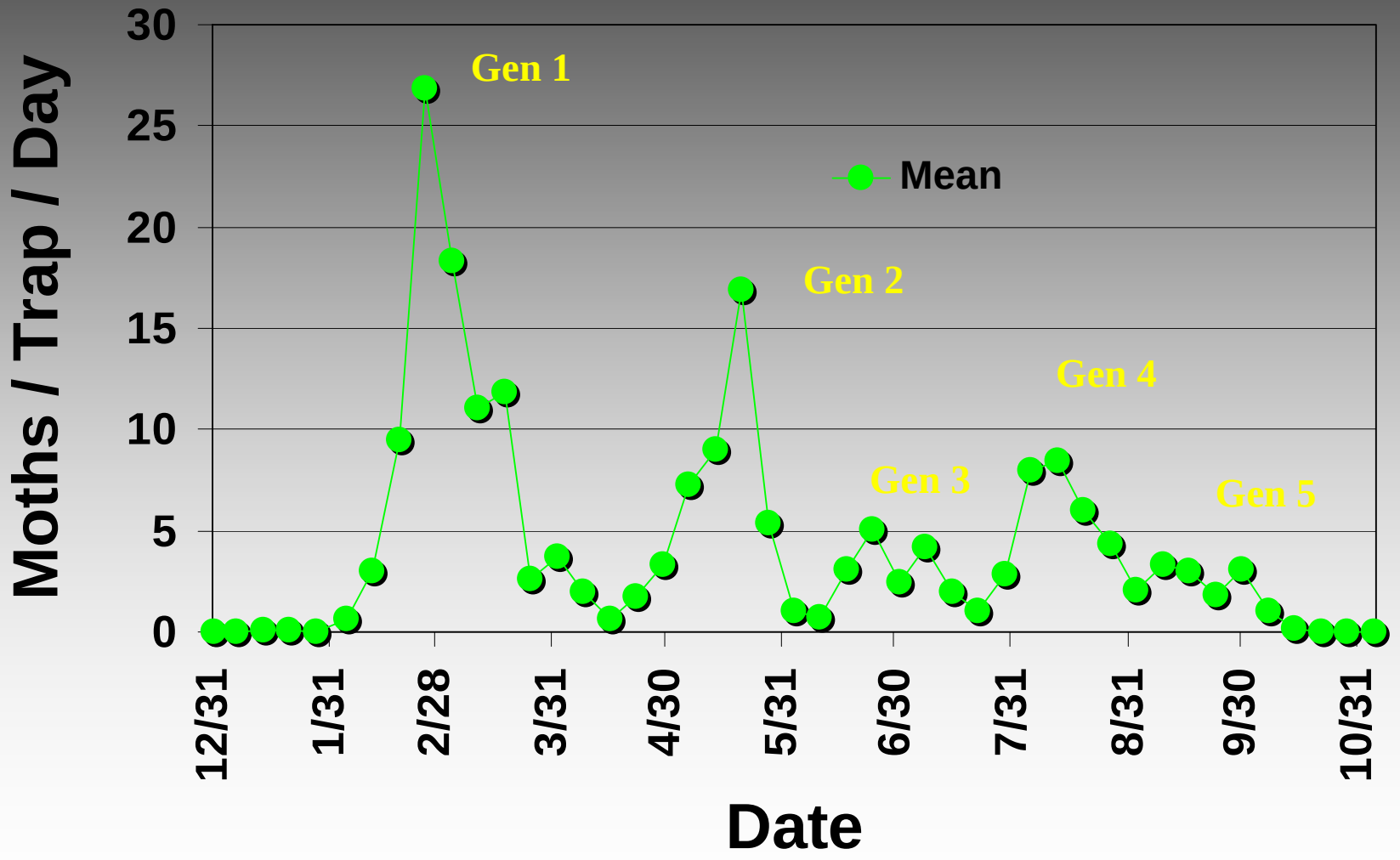
- **Pounce® apparently is being phased out by FMC. Extremely difficult to find.**
- **Waylay 3.2 AG (Control Solutions) registered in 2005 through 24C (Special Local Needs) in AL, AR, GA, LA, MS, SC, TX and VA.**
- **Arctic 3.2 EC (Agriliance) was also registered through 24Cs in FL, GA, MS, SC, TN, TX and VA.**

<u>Note</u>: Neither Waylay nor Arctic have 2ee (supplemental label) that allows application to seedlings after planting like Pounce.

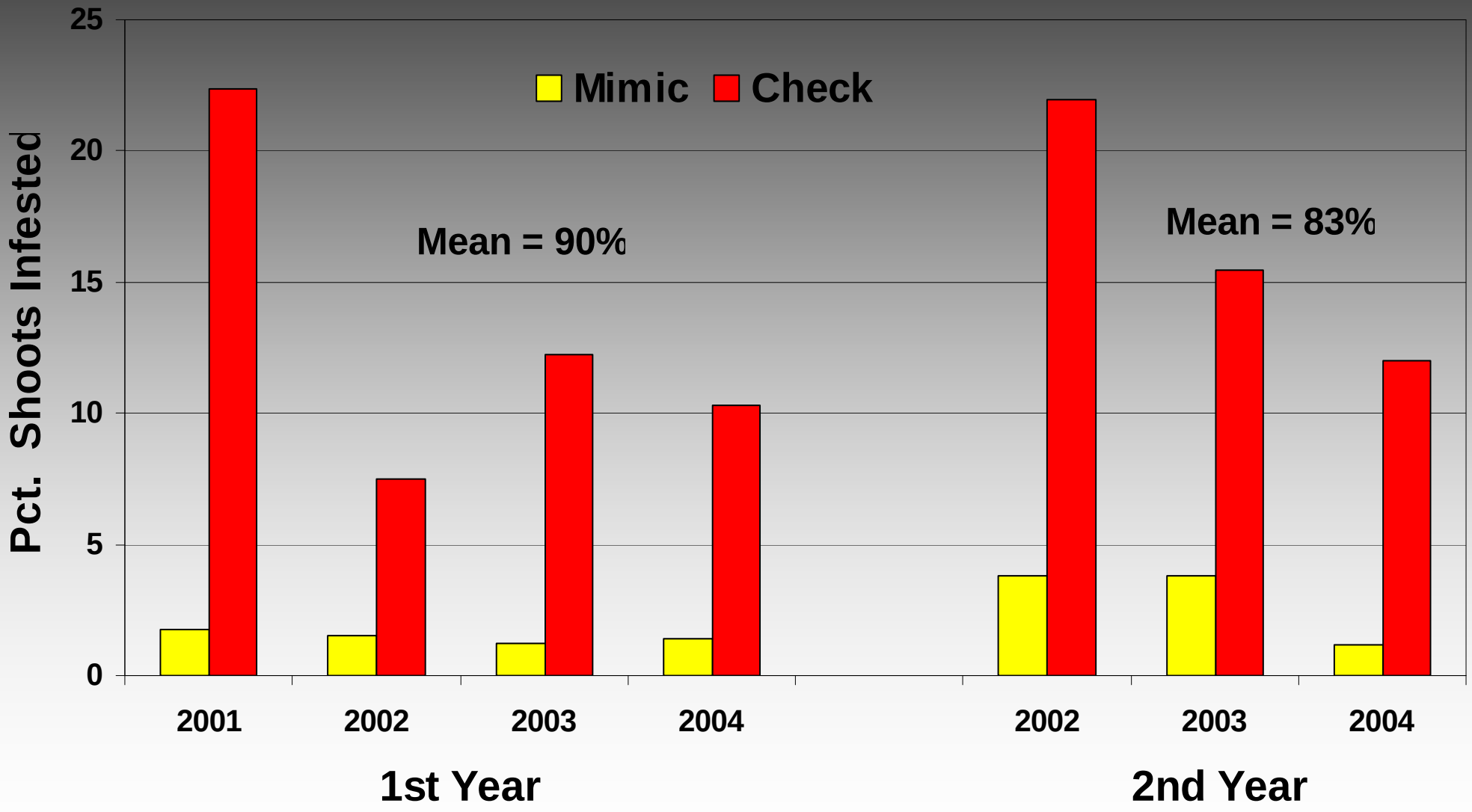
Nantucket Pine Tip Moth

Rhyacionia frustrana

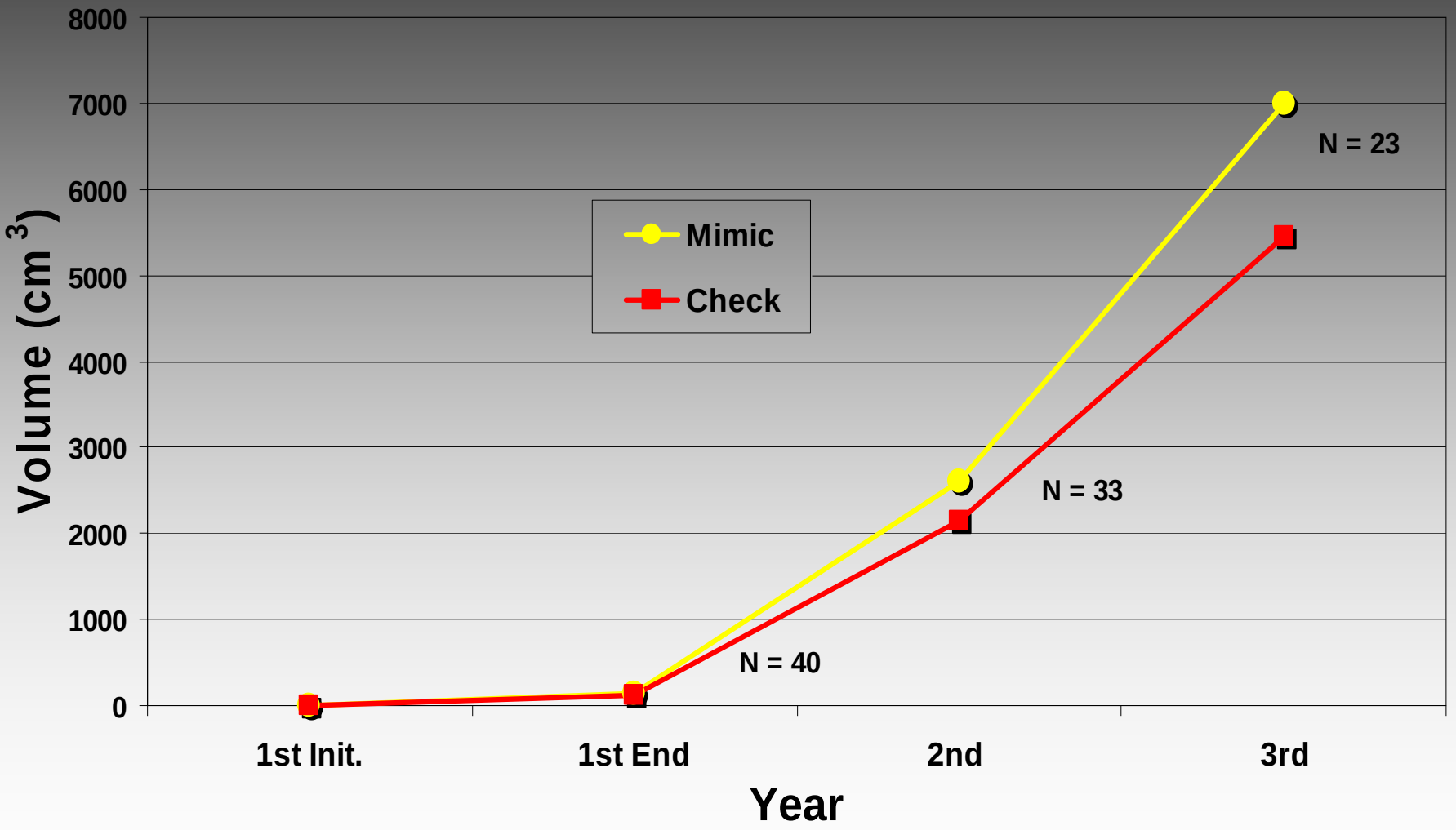
Mean Tip Moth Catch from 8 Sites in TX, LA and AR in 2001.



Mean Tip Moth Infestation of 1st and 2nd Year Mimic®-treated vs. Untreated Trees: 2001 - 2004



Volume Index (cm^3) of 1st, 2nd & 3rd Year Mimic®-treated vs. Untreated Trees: 2001 - 2004



Current Tip Moth Options

- **According to Greenbook, there are 56 products registered for use against pine tip moth, . . . 22 can be applied in forestry-related sites.**

- **Chris Fettig, USFS, recently developed a model that easily predicts the optimal spray timing for numerous sites across the South. Two publication are accessible on the web:**

  Use http://www.srs.fs.usda.gov/pubs/rp/rp_srs018.pdf for sites in MS, AL, GA, FL, SC, NC and VA.

  Use http://www.srs.fs.usda.gov/pubs/rp/rp_srs032.pdf for sites in TX, AR and LA.

Tip Moth Control: 2002 - 2005

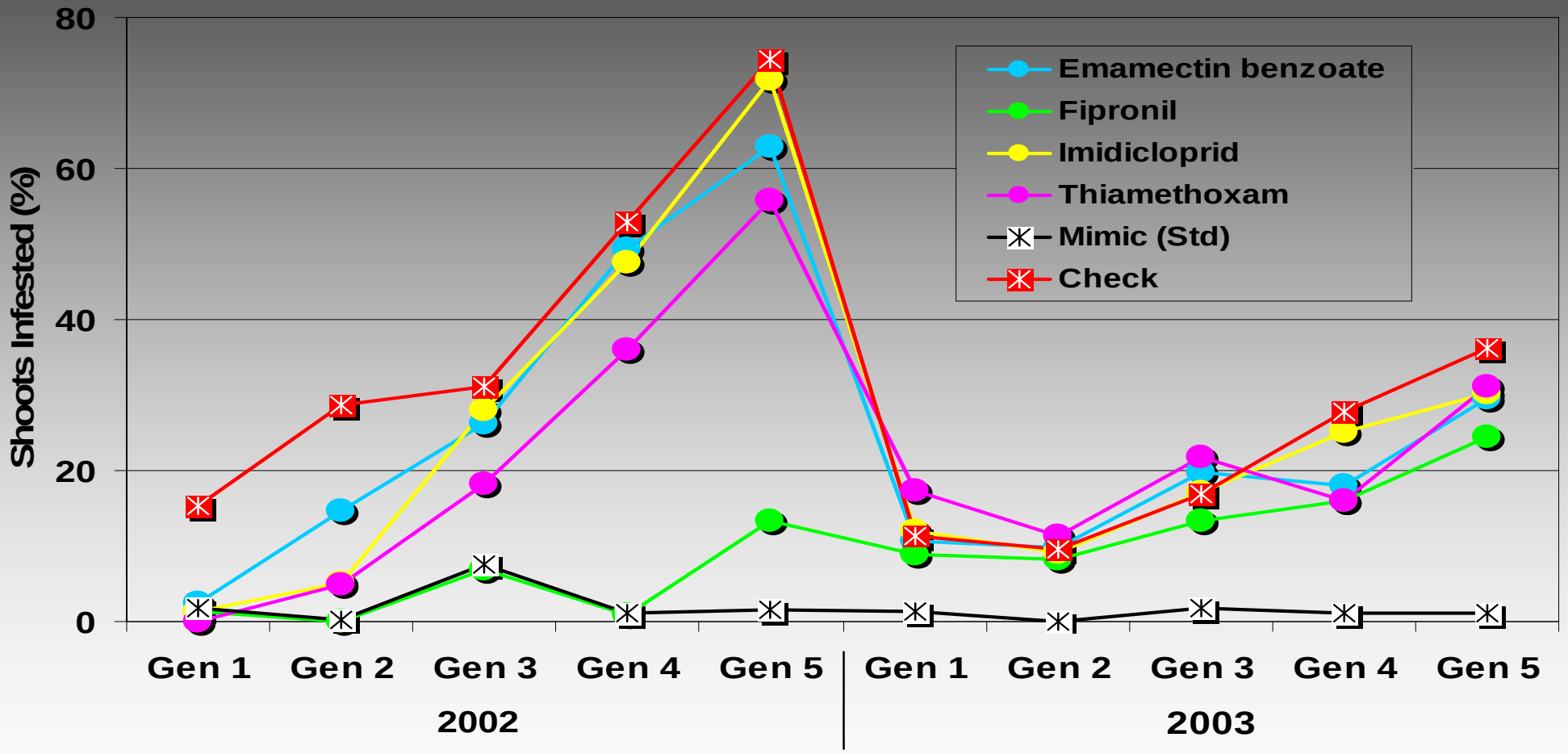
Objective

- **Evaluate and register an economic alternative to foliar spray for control of pine tip moth.**

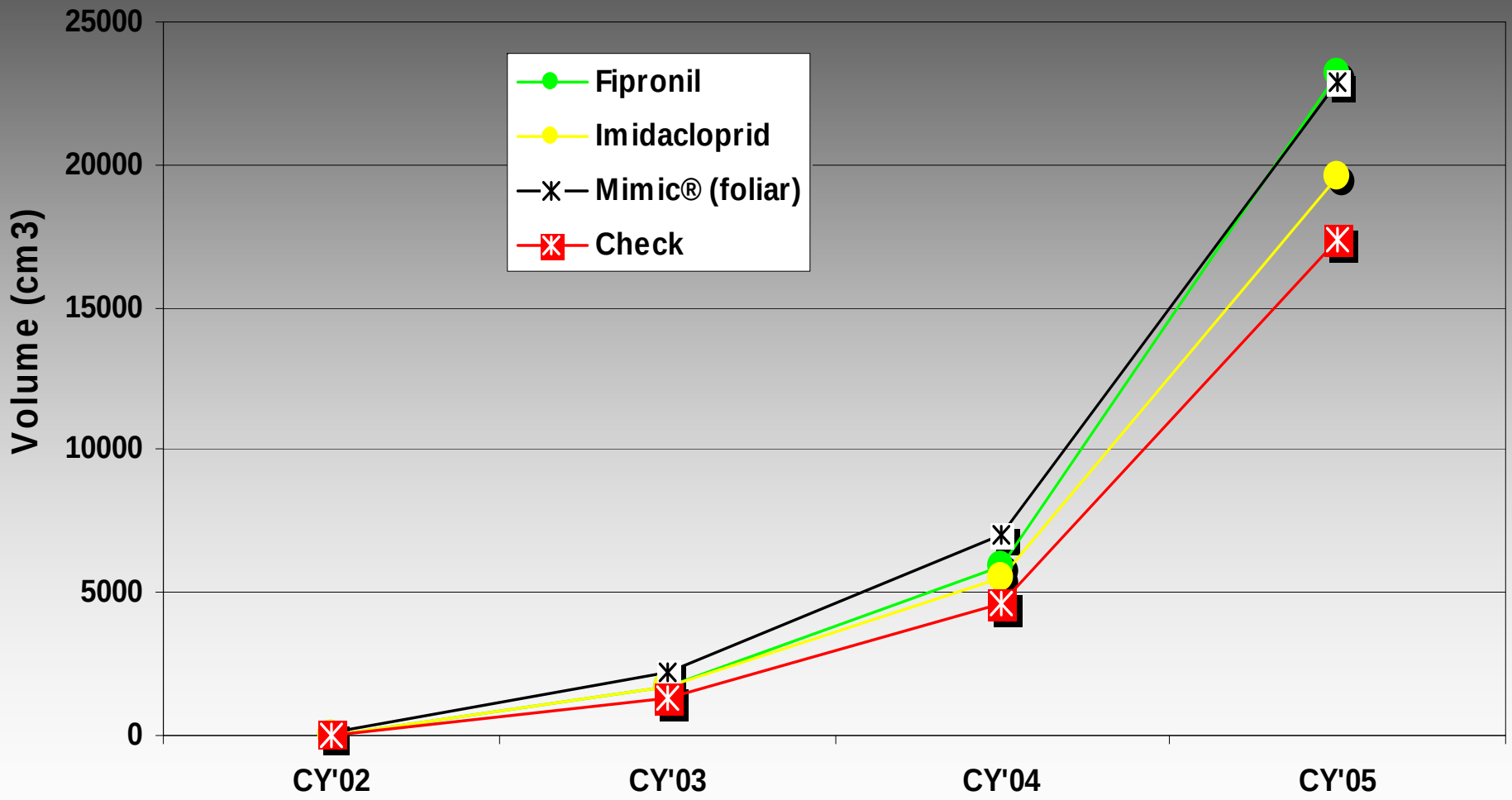
Treatments - 2002

Emamectin benzoate (0.12%)	BR soak (2 hr)
Fipronil (0.146%)	BR soak (2 hr)
Imidacloprid (0.53%)	BR soak (2 hr)
Thiamethoxam (0.17%)	BR soak (2 hr)
Tebufenozide (Mimic®)	Foliar (5X in ’02 & ‘03)
Check	

Tip Moth Infestation per Generation after Treatment with Different Systemic Chemicals – 2002 & 2003



Volume (cm^3) growth of loblolly pine treated with systemic or foliar treatments relative to check trees.



Seedling Treatments - 2003

- Fipronil (0.0246% T*) in furrow to nursery bed (Oct. only)
- Fipronil (0.0123% T) In furrow to nursery bed (Oct. & Dec.)

- Fipronil (0.003% T) bareroot soak (2h)
- Fipronil (0.03% T) bareroot soak (2h)
- Fipronil (0.3% T) bareroot soak (2h)
- Fipronil (0.3% R*) bareroot soak (2h)

- Fipronil (0.3% T) + TerraSorb™ bareroot dip

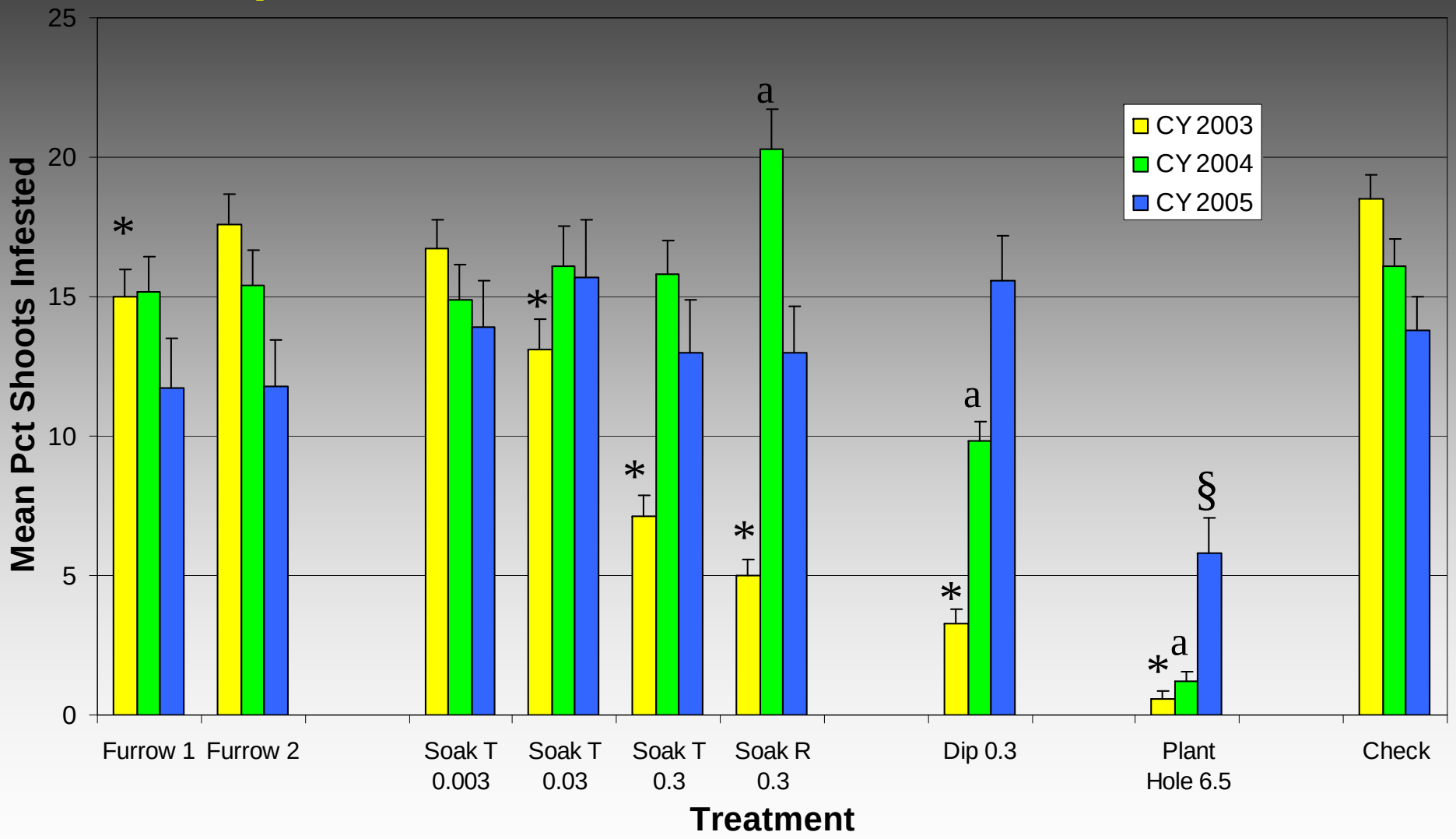
- Fipronil (6.5% T) 30 ml in plant hole

- Tebufenozide (Mimic®) or Permethrin (Pounce) Foliar (5X)

- Check

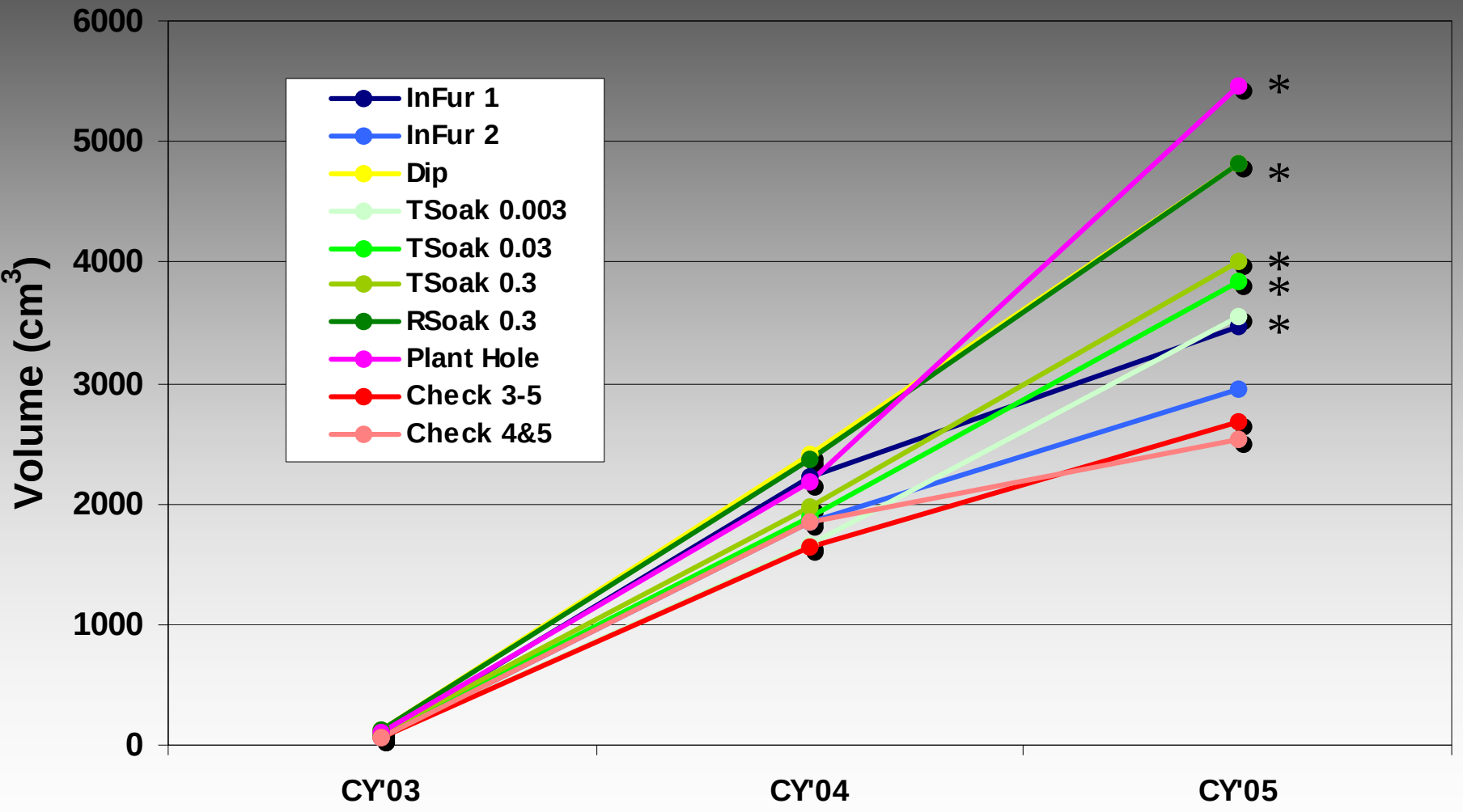
* T = Termidor®, R = Regent®

Effect of fipronil treatments on tip moth infestation - TX sites, 2003 - 2005



*, **a** or § Means are significantly different from check.

Percent gain in volume (cm^3) growth of loblolly pine treated with systemic or foliar treatments relative to check trees.

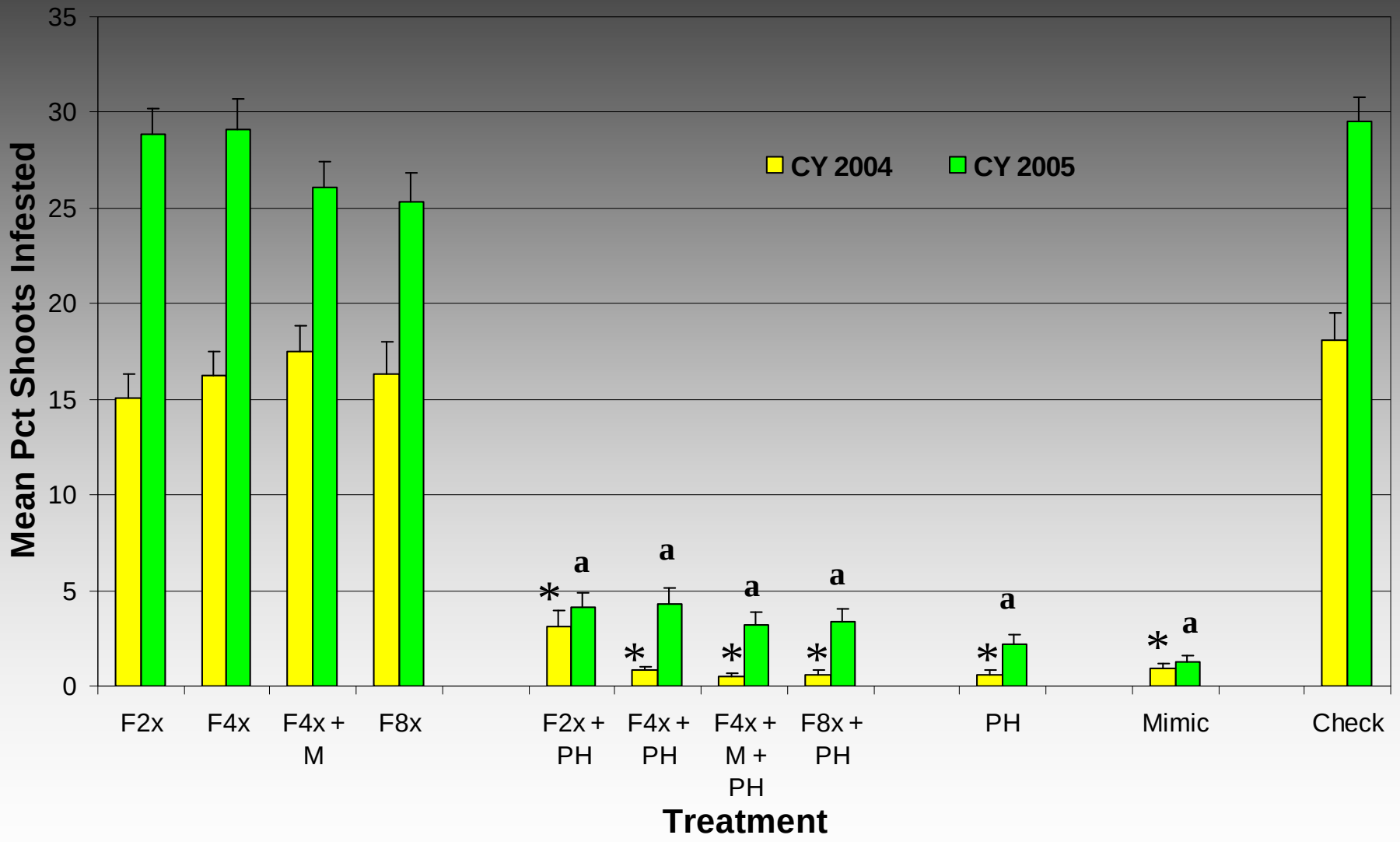


* Means are significantly different from check.

In-Furrow / Plant Hole Trial - 2004

Chemical	Conc.	Trt. Tech.
Regent® 2X	(0.02%)	In Furrow
Regent® 4X	(0.05%)	In Furrow
Regent® 4X+methanol	(0.05%)	In Furrow
Regent® 8X	(0.10%)	In Furrow
Regent® 2X	(0.02%+0.3%)	In Furrow+Plant hole
Regent® 4X	(0.05%+0.3%)	In Furrow+Plant hole Regent®
4X+methanol	(0.05%+0.3%)	In Furrow+Plant hole
Regent® 8X	(0.10%+0.3%)	In Furrow+Plant hole
Regent®	(0.3%)	Plant hole
Mimic® (Tebufenozide)		Foliar spray (5X)
Check		

Effect of fipronil in-furrow and plant hole treatments on tip moth infestation – TR#1, 4 WG sites, 2004 & 2005



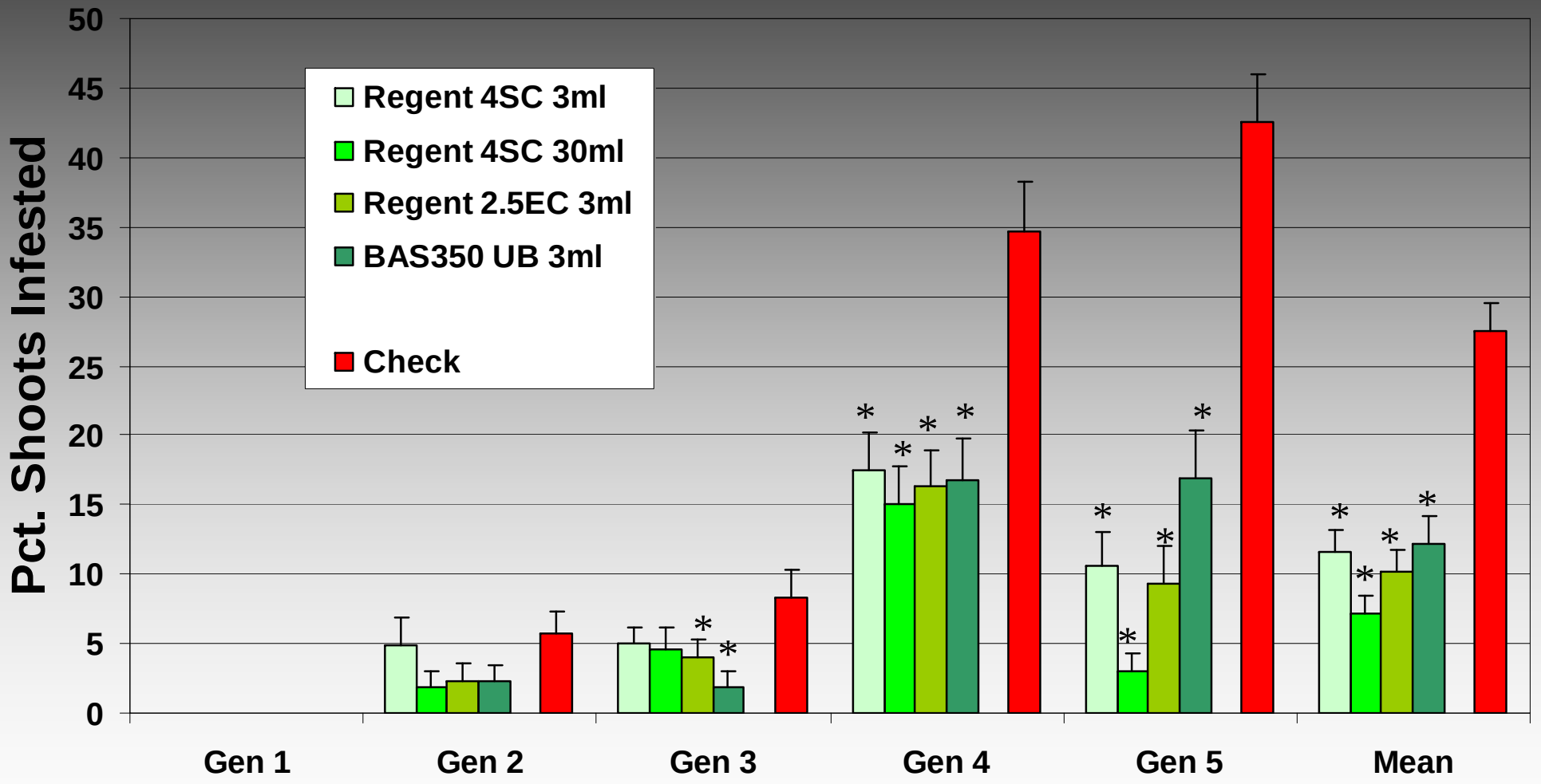
* or **a** Means are significantly different from check.

Fipronil Soil Injection Trial - 2005

Chemical	Rate
Regent® 4 SC	3 ml
Regent® 4 SC	30 ml
Regent® 2.5 EC	3 ml
BAS350 120 EC	3 ml
Check	

Kiortz Soil Injector

Effect of different fipronil formulations and soil injection volumes on tip moth infestation – 2 WG sites, 2005



* Means are significantly different from check.

Status of Fipronil Product Registration

- **BASF has concerns about potential fipronil exposure to workers when treating and planting soaked or dipped seedlings.**
- **Plant hole / soil injection fipronil treatments can be applied with little or no worker exposure and provide consistent, extended protection against tip moth.**
- **BASF submitted a registration package to EPA in May 2006 for application of fipronil at- or post-planting of seedlings. They anticipate that a product will be registered and available for use by the winter of 2007 / 2008.**

Fipronil Research Efforts in 2006 & 2007

Objectives:

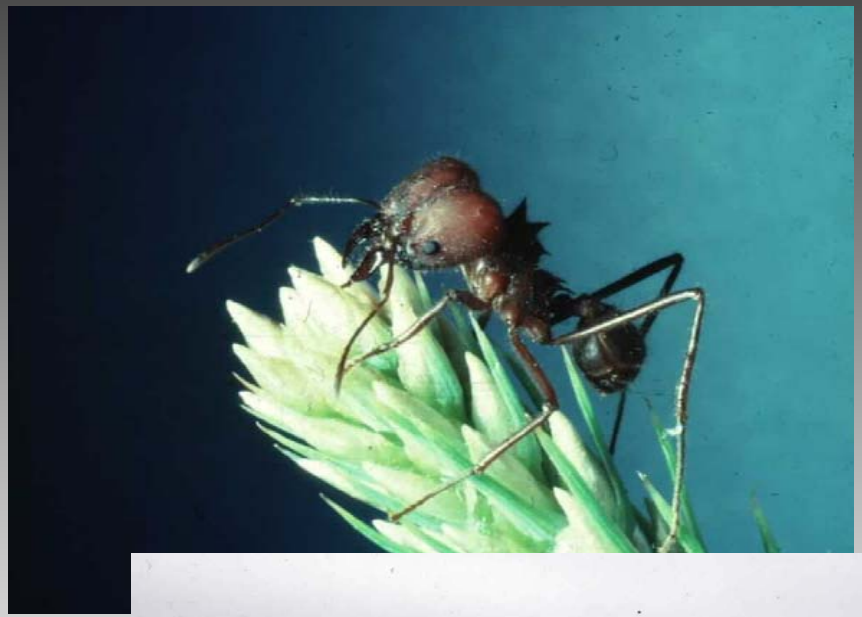
- **Continue to evaluate duration of plant hole / soil injection treatments for protection of pine trees against tip moth.**
- **Evaluate effect of soil injection fipronil volume on treatment efficacy against pine tip moth.**
- **Evaluate efficacy of fipronil applied via soil injection by hand or machine planter in reducing area-wide pine tip moth infestation levels on pine seedlings.**

Modified Drencher

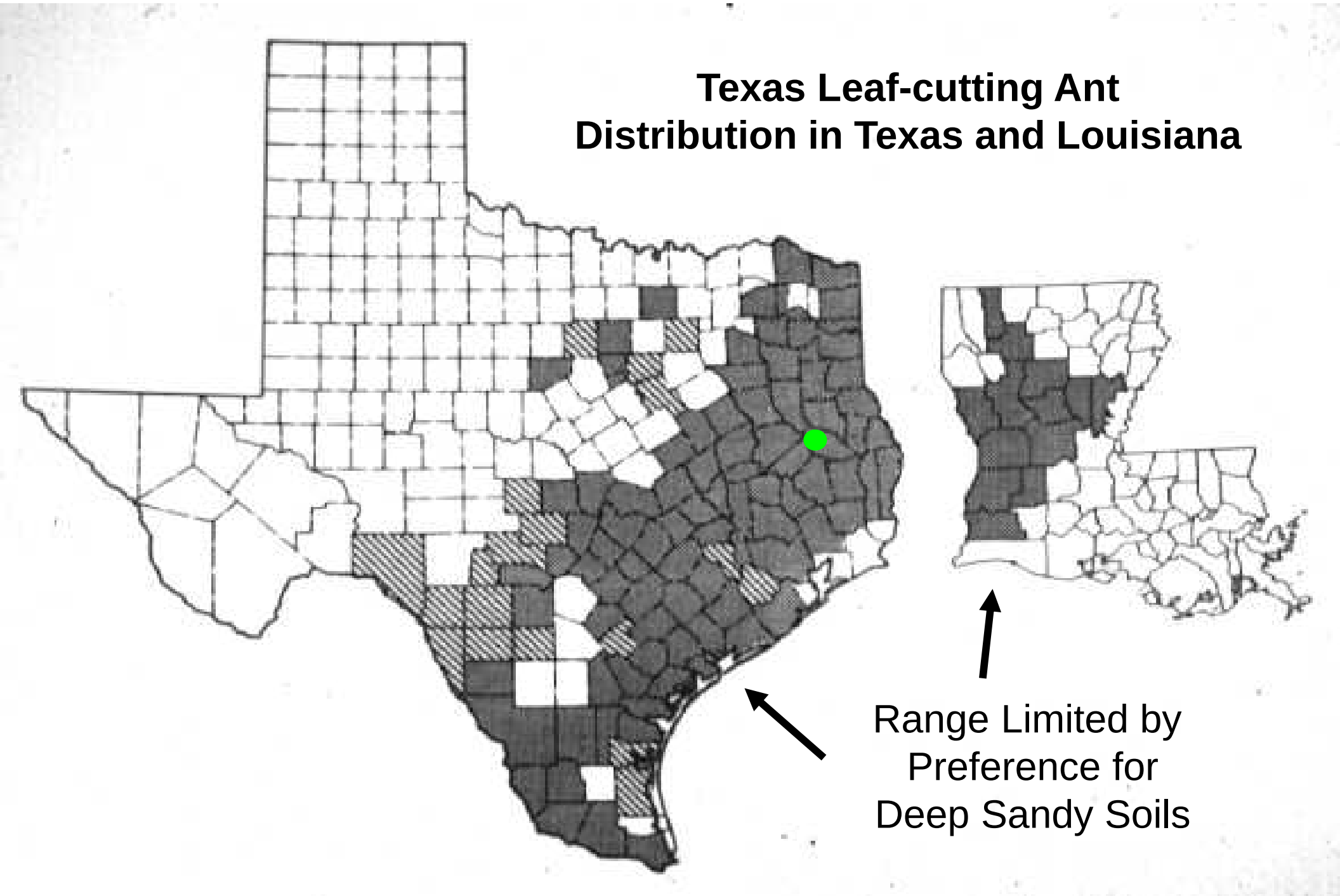
Kioritz

Fitted Machine Planter

Texas Leaf-cutting Ant, *Atta texana*



Texas Leaf-cutting Ant Distribution in Texas and Louisiana



Range Limited by Preference for Deep Sandy Soils

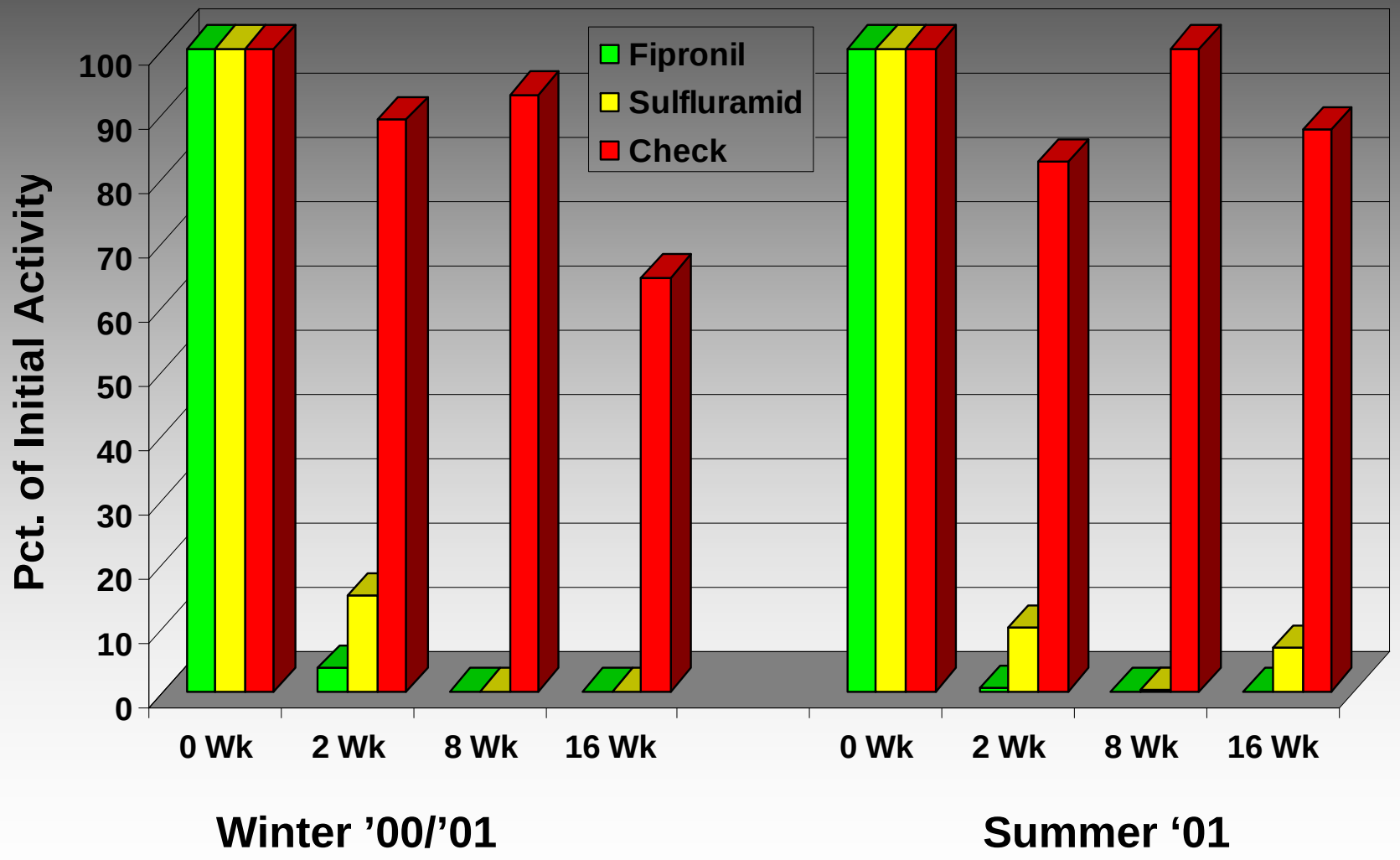
Leaf-cutting Ant Baits

sulfluramid bait (Volcano® / Patron®)

fipronil bait (Blitz®)

hydramethylnon bait (Amdro®)

Efficacy of Fipronil and Sulfluramid Baits Against Texas Leaf-cutting Ants



Current Status of Control Options

- Aventis had submitted registration package to EPA for BES-100 (= Blitz) in 2001. However, Aventis was acquired by Bayer in 2002. Recently, Bayer has decided not to support the market development and registration of BES-100.

- Alternatives, such as Amdro Ant Block and Grant's Total Ant Killer Bait, can be effective after first hard frost until leaf flush in spring. During the remainder of year, these baits are < 30% effective in halting ant activity.

- Pounce® has proven in the past to be an effective deterrent . . . but, does not deal with the primary problem – the ant colony. Waylay reported to be less effective than Pounce®. Arctic® should work as well as Pounce®.

- Possibility of developing a new bait with DuPont.

.

Acknowledgements

Field and Laboratory Assistance

Valena Bryan, Jamie Burns, Vladimir Cizek, Jason Helvey, Dustin Hollowell, Ted Moore, Libor Myslevic, and Brian Pope

Pine Seedlings

Harry Vanderveer, Texas Forest Service Indian Mound Nursery

Tip Moth Sites and Monitoring

Anthony Forest Products, International Paper, Forest Investment Associates, Plum Creek, Potlatch, Temple-Inland, and Weyerhaeuser

Financial Support

Western Gulf Forest Pest Management Cooperative

BASF


Questions?