



TEXAS A&M AGRILIFE EXTENSION | TEXAS A&M UNIVERSITY

Red Imported Fire Ants and Tawny Crazy Ants: Texas-Sized Invasive Ant Problems

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 Texas A&M University
 College Station, TX

Outline:

- Invasive Ant Biology
- Ant IPM
- Tawny crazy ants

Red Imported Fire Ants (RIFA)

U.S. Range Expansion

- South American Migrants
- *S. richteri* arrived in Mobile, AL @ 1918
- *S. invicta* established in Mobile, AL between 1933 and 1945
- Stowaways in shipping ballast
- Contiguous range from Texas to east coast
- Western disjunct populations in California, Nevada Arizona, and New Mexico
- Disjunct northeastern population in Maryland

RIFA Impact

- Ecology
- Economy
- Quality of Life

RIFA Success Story

- Release from natural enemies
- Extremely efficient foraging behavior
- Success in disturbed habitats



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RIFA Management:

- Chemical Methods for Reducing Ant Populations
- Baits, baits, baits...



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- Ant baits are designed to exploit ant foraging behavior
 - Not all ants are attracted to the same baits
 - Some species prefer carbohydrates, others prefer protein, and some prefer BOTH depending on season
 - PROPER IDENTIFICATION IS CRITICAL!!!
 - Ant baits include granular and liquid/gel formulations

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 - Granular baits are typically broadcast throughout ant infested areas.

RIFA Management:



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RIFA Success Story

- Release from natural enemies



Fire Ant Decapitating Flies Phorid Flies

- Parasitic flies
- Native to South America
 - Argentina
 - Brazil
- *S. invicta* specialists
- 20+ Species

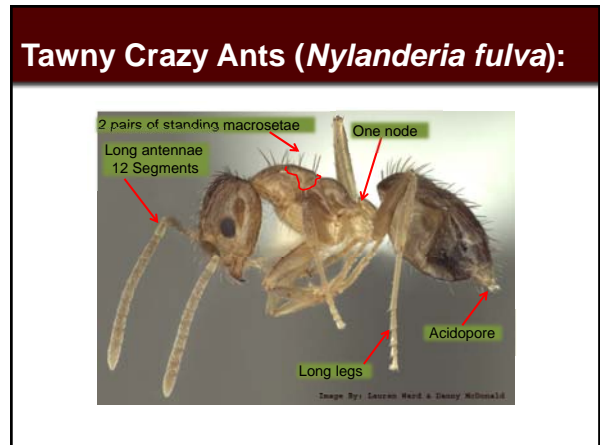
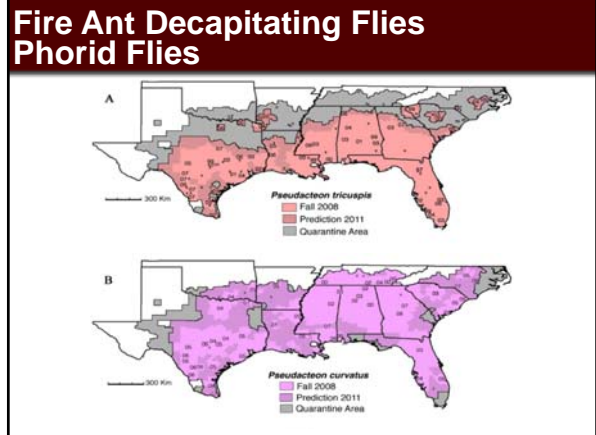


Fire Ant / Phorid Fly Interactions



Fire Ant / Phorid Fly Interactions





- ### Taxonomic Confusion:
- Originally, Texas populations thought to be the Caribbean crazy ant (*Paratrechina pubens*).
 - Caribbean crazy ants have a Caribbean origin and are a prominent pest ant in peninsular Florida.
 - However, nuanced morphological features led many to conclude that the Texas population was a different, but closely related, species.
 - This ant was assigned the scientific name '*Paratrechina* sp. nr. *pubens*' and common name 'Raspberry crazy ant'.
 - Gotzek et al. (2012) published a paper that conclusively separated the Texas and Florida ants and identified Texas population as *Nylanderia fulva* (S. American origin) based primarily on morphological differences in males of the two species.

Common Name Confusion:

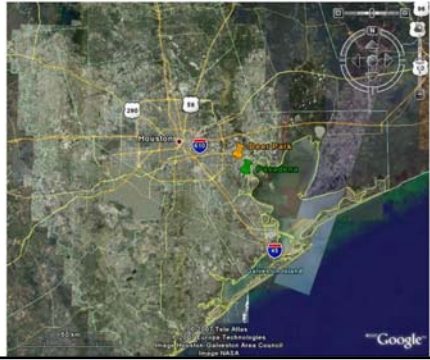
- Original common name 'Rasberry crazy ant' assigned based on discoverer in Texas
- Entomological Society of America is responsible for assigning official insect common names
- 'Rasberry crazy ant' deemed too uninformative by Oi and Gotzek (2012)
- 'Tawny crazy ant' proposed by Oi and Gotzek (2012) and accepted by ESA



Pasadena, TX (2002)



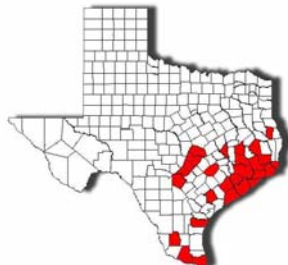
Texas Distribution (2002):



Texas Distribution (2007):



Texas Distribution (Current):



27 Counties

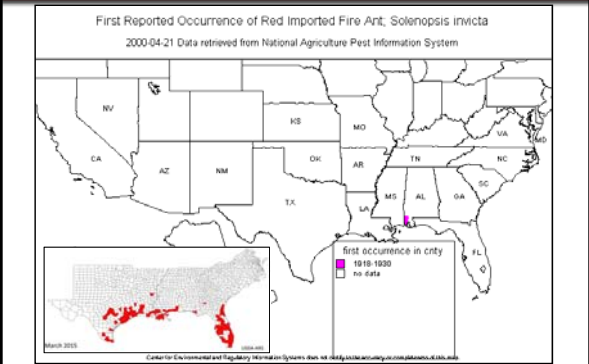
US Distribution (2015):



March 2015

USDA-ARS

Look Familiar?



Urban & Agricultural Impacts:



Urban & Agricultural Impacts:



Urban & Agricultural Impacts:



Management:



Tawny Crazy Ant Bait Preference:





Granular Ant Baits:


- Determine the effectiveness of Advance® Carpenter Ant Bait as a stand-alone treatment against *Nylanderia fulva*


Advance® Carpenter Ant Bait:



- Advance® Carpenter Ant Bait (ACAB)
 - Abamectin
 - gamma-aminobutyric acid (GABA) inhibitor
 - Residential areas
 - 1 lb/acre rate
- ACAB broadcast using a Herd seeder attached to ATVs
- 3 treatments per year
- Observations
 - Once per week
 - As weather and circumstances permit

Sampling Transects and Treatment Areas

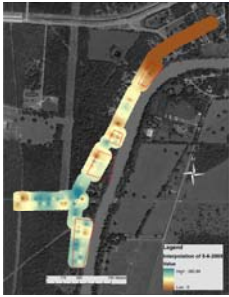


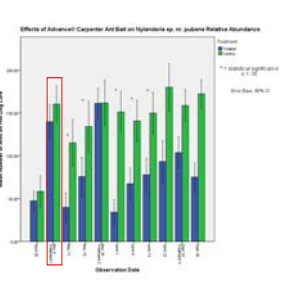


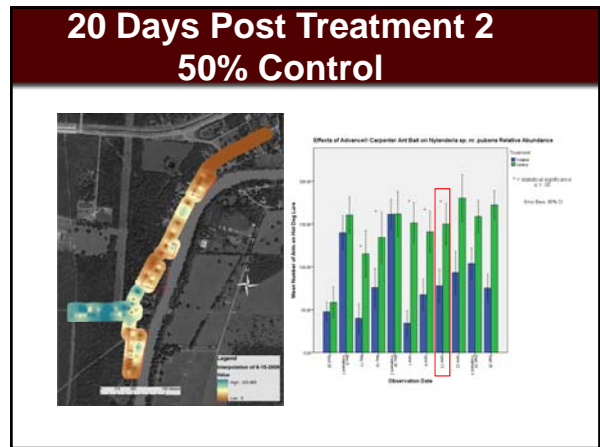
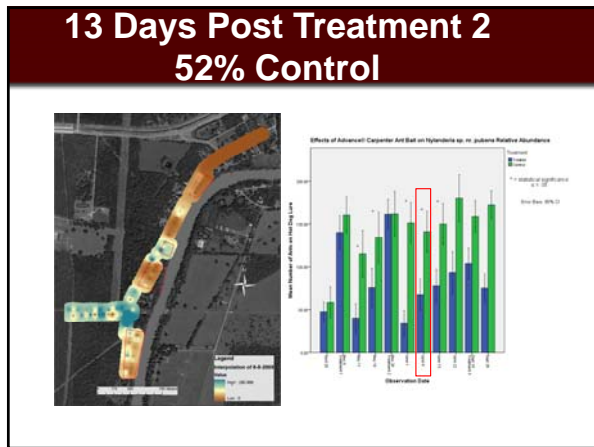
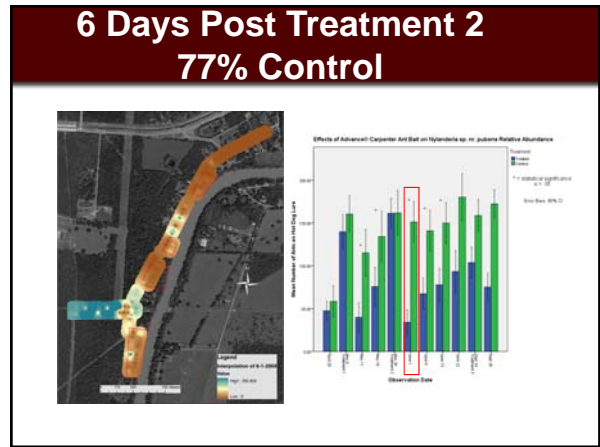
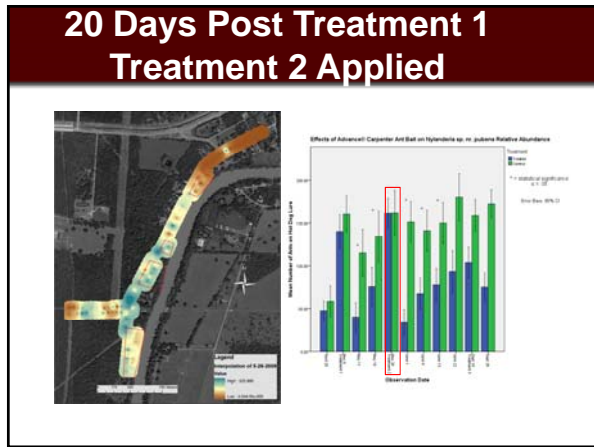
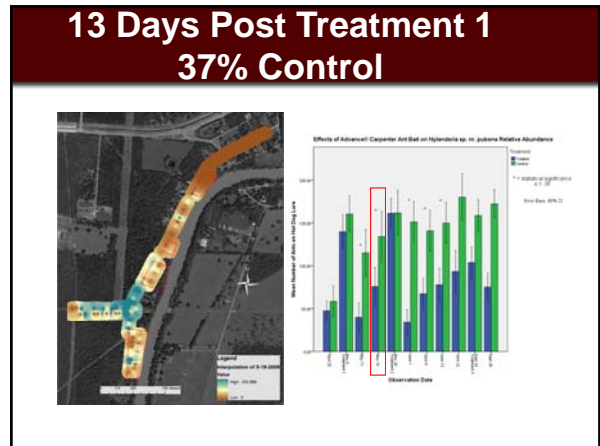
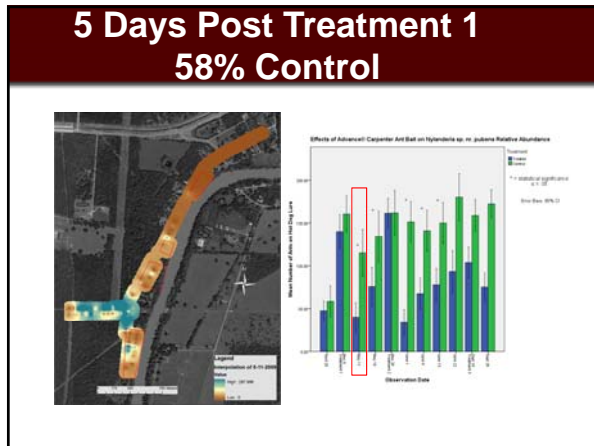
- Food lure (Bar-S Hot Dogs)
 - 60 min. exposure
 - Collected in zip-lock bags
 - Ants identified and counted

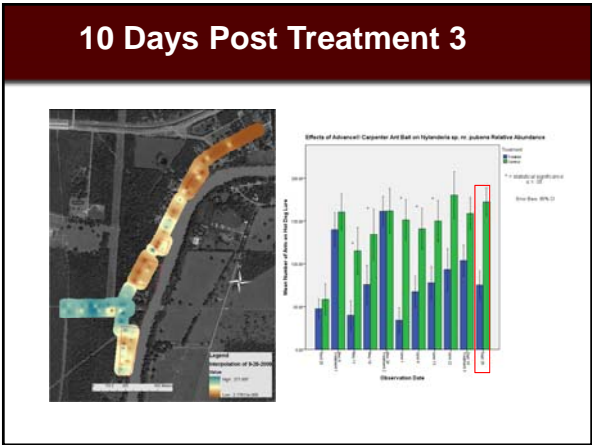
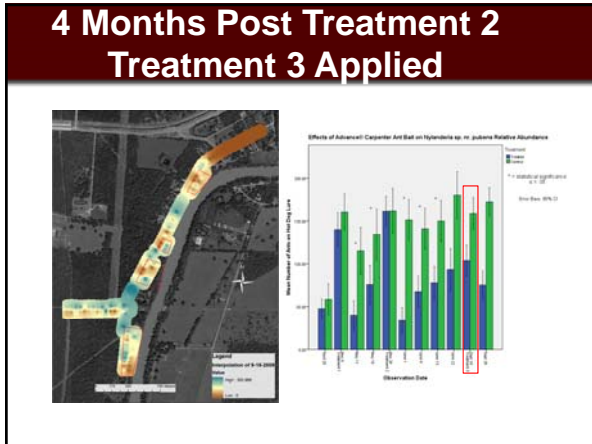
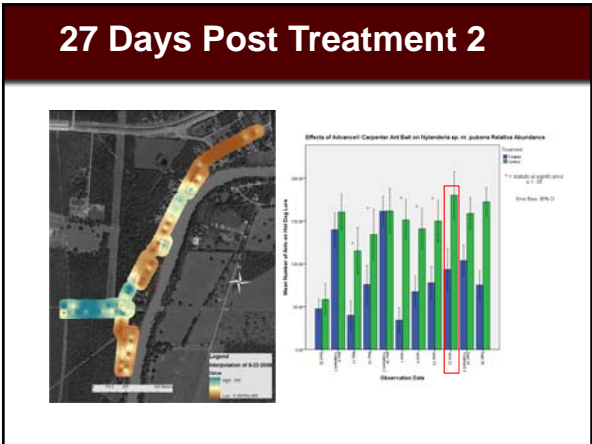
Results:

Treatment 1 Applied





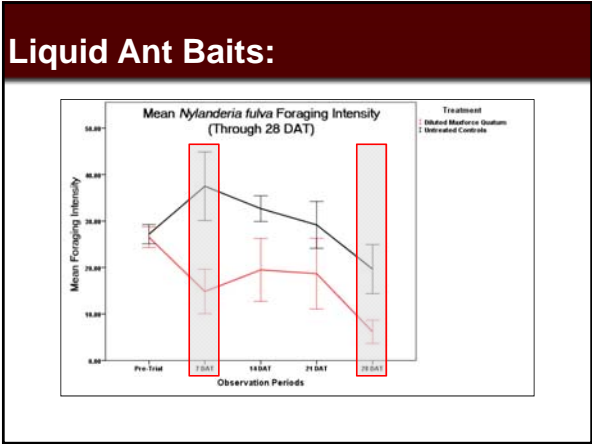




Liquid Ant Baits:

- **Treatments:**
 - Diluted MaxForce Quantum*
 - Untreated Controls
- **KM AntPro Stations**
- **TCA foraging intensity measured at multiple locations/structure**

*A sugar water solution at 25% concentration (i.e., 250 grams sucrose in 1.0 L of water) was prepared. This concentration was at or near saturation. ONE PART Quantum was mixed with NINE PARTS sugar water, to prepare a 0.003% (30 ppm) imidacloprid liquid bait. This liquid bait was mixed within 24hrs of use.



Perimeter Treatment:

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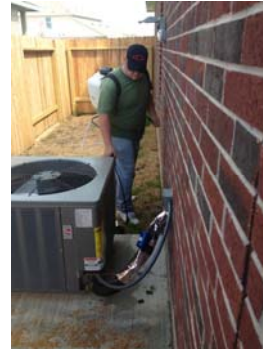
Trial Location: Texas City, TX

TREATMENTS (4 Reps):

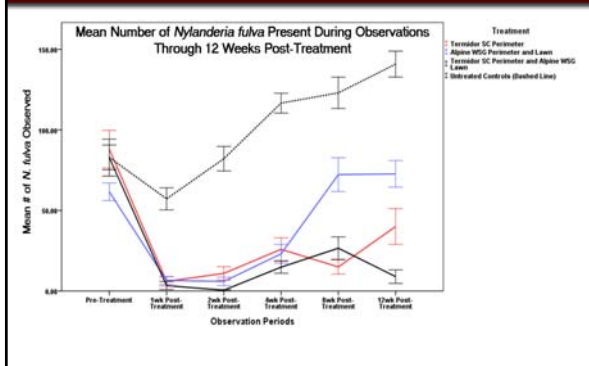
1. Termidor SC Perimeter Treatment (*Fipronil* 0.06%)
2. Alpine WSG Perimeter and Lawn Treatment (*Dinotefuran* 0.10%)
3. Termidor SC Perimeter and Alpine WSG Lawn Treatment
4. Untreated Controls



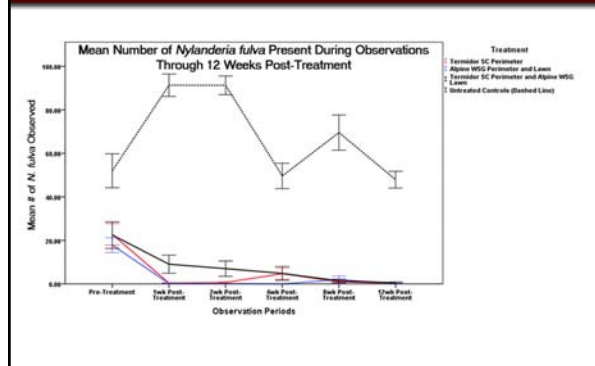
Perimeter Treatment:



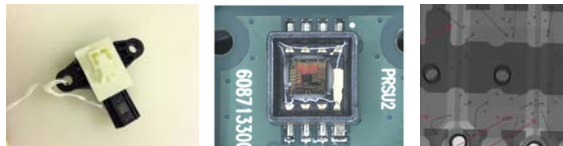
Results (Year 1):



Results (Year 2):

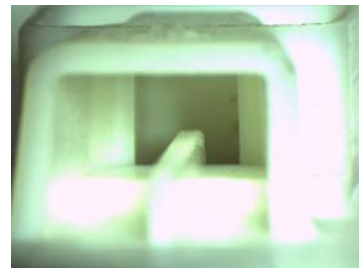


Automobile Airbag Sensor Trials:



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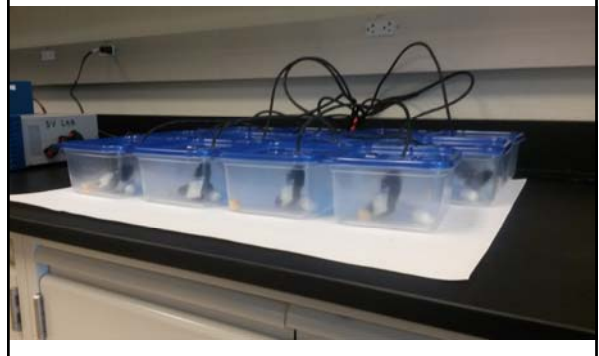
Standard Design



Automobile Airbag Sensor Trials:



Automobile Airbag Sensor Trials:



Automobile Airbag Sensor Trials:



Automobile Airbag Sensor Trials:



Automobile Airbag Sensor Trials:

- So far, 14 designs have been trialed
- Four additional designs to be trialed in 2016

Competitive Grants: Texas Invasive Ant Research and Management Project 

Genetic and behavioral characterization of colony and population structure of the tawny crazy ant, *Nylanderia fulva*

- **PI's: Ed Vargo and Robert Puckett**
 - Student: Bryant McDowell (MS)
- **Objectives**
 - Determine the spatial boundaries of colonies and whether they are unicolonial using genetic markers and behavioral assays
 - Determine the genetic relationships among populations in Texas and across the southeastern U.S.
- **Progress**
 - Marker development: Have several potential microsatellites identified and are in the process of optimizing them
 - Have samples from several states but need more!



Competitive Grants: Texas Invasive Ant Research and Management Project

The *Nylanderia fulva* genome project: Transforming management of an invasive ant

- PI's: Aaron Tarone and Ed Vargo

- Student: Andrew Davitt (MS)

- Objectives**

- Sequence and annotate the genome of *N. fulva*
 - Conduct RNA seq experiments to compare gene expression levels in different castes and when exposed to different conditions

- Progress**

- Have a low coverage genome assembly (Illumina MiSeq)
 - Planning on doing a hybrid assembly combining reads from Illumina HiSeq with reads from a long-read platform, possibly PacBio or MinION
 - Will compare how different diets affect gene expression



Texas A&M University TCA Working Group:

- Monthly meetings of:
 - Texas A&M University Research and Extension Faculty
 - Graduate Students
 - Laboratory Technicians
- Presentations and discussions of on-going TCA research, funding opportunities, and recent literature pertaining to TCA



Conclusions:

- Tawny crazy ants appear to be here to stay, and are rapidly expanding to many areas of Texas and the southern US.
- Management of these ants is a challenge, but can be accomplished with acceptable results.
- Applications of pesticides must be made with thoroughness, and only after precise application calculations have been made.

Acknowledgements:

Texas Invasive Ant Research and Management Project



- Taylor Wade
- Danny Mueller
- Dr. Diane Silcox-Reynolds
- Dr. Danny McDonald
- Dr. Jason Meyers
- Dr. Paul Nester

Insect Specimens for Identification:



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Collection and Preservation of Specimens

- Place specimens in vials containing 70-80% ethyl-alcohol or 70% isopropyl alcohol.
- When possible, collect more than one specimen.
- Labels are absolutely necessary.
 - Should be kept with specimen, inside the vial.
 - Should be written on acid-free card stock or index cards
 - Use only permanent ink or pencil to write labels.

Texas: Brazos Co.
1020 Main St., Bryan
26 June 1997
Joe W. Smith

PLEASE DO NOT...



Photo: R. Puckett

PLEASE DO NOT...

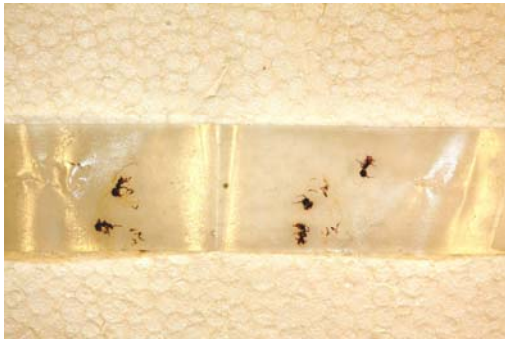


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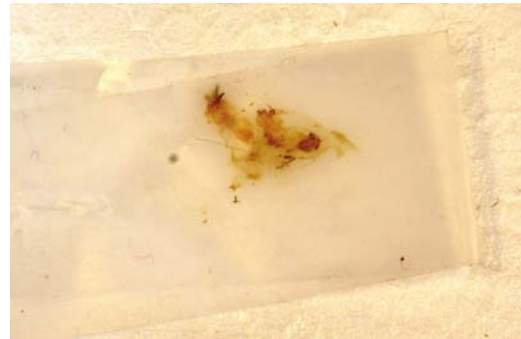


Photo: R. Puckett

PLEASE DO NOT...



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Use Your Technology...



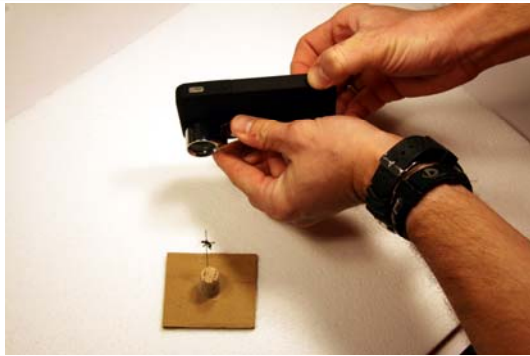
Use Your Technology...



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Use Your Technology...



Use Your Technology...



Use Your Technology...



Use Your Technology...





- **Please send specimens to:**
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College Station, TX 77843
ATTN: Robert Puckett



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 - urbanentomology.tamu.edu

Photo: R. Williams