The Proceedings of the 2020(2021)

National Conference on Urban Entomology and Invasive Pest Ant Conference

Held Virtually
May 24-25, 2021

Edited by: Molly Keck
Texas A&M AgriLife Extension Service

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INTRODUCTION

This publication documents the National Conference on Urban Entomology and Invasive Pest Ant Conference which took place virtually May 24-25, 2021 using the platform Zoom. During the 2020 COVID-19 Pandemic, the in-person conference was postponed, then cancelled and held virtually. This was the 17th NCUE and, like the conferences before, it met its mission to open channels of communication and information between scientists in industry, academia, and government, and to foster interest and research in the general area of urban and structural entomology.

The objectives of NCUE as an organization include:

1. Promoting the interest of urban and structural entomology.
2. Providing a forum for the presentation of research, teaching and extension programs related to urban and structural entomology.
3. Preparing a written/electronic proceedings of all invited and accepted papers given or prepared at the biennial meeting.
4. Promoting scholarship and the exchange of ideas among urban entomologists.
5. Awarding scholarships to students pursuing scholastic degrees in urban entomology.
6. Hosting an onsite student competition for students who are currently involved in their undergraduate or graduate programs.

The 2020(2021) NCUE & IPA Conference continued to meet all these objectives with new research, students, and attendees. The conference gathered 295 professionals from several countries and across the United States, who came with ideas to share and left with new knowledge and a stronger network of colleagues and friends.

The next NCUE & IPA Conference will take place in Salt Lake City, UT May 15-18, 2022. The planning committee encourages everyone to keep in touch throughout the years by joining the NCUE Facebook Group and subscribing to the mailing list.

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DISTINGUISHED ACHEIVEMENT AWARD

MALLIS MEMORIAL AWARD LECTURE

Urban Entomology Through the Eyes of a Molecular Ecologist

MEDWARD L. VARGO, Department of Entomology, Texas A&M University
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It is a great honor to give the Mallis Memorial Lecture and to be recognized with the NCUE Distinguished Achievement Award. I would like to thank the awards committee for their recognition. My title includes two terms that we don't usually see together—urban entomology and molecular ecology. This is too bad, because the two fields of study have a lot to offer each other. Molecular ecology is a branch of evolutionary biology that uses molecular genetic tools to address traditional ecological questions. This is a large and growing field of biology that offers many new insights into the behavior, dispersal and reproduction of organisms. As urban entomologists, molecular ecology can teach us a lot about the pests we study. And conversely, the pests we study have some amazing biology that has a lot to offer molecular ecologists.

I first got interested in molecular ecology as a graduate student at the University of Georgia when Ken Ross joined our lab as a postdoc and began his now famous work on the genetic structure of fire ant colonies. I took the lessons I learned and applied them to studies of subterranean termites when I started my first faculty position at NC State University. In this talk I want to highlight some of the findings of my lab group and my collaborators, partly to show the power of molecular ecology to shed light on the biology of urban pests, and partly because some of the details revealed are basic biological traits that all urban entomologists should know.

The first series of findings I would like to highlight concerns the breeding system of subterranean termites. The application of molecular markers has shed important new light on the breeding structure of this group. Due to the cryptic nature of their nesting and foraging habits, it is difficult to find the reproductive of subterranean termites to determine which colonies have primary reproductives and which have secondary reproductives (neotenics). By collecting workers and genotyping them with biparentally inherited markers, such as microsatellites, we can infer the breeding structure of colonies. In addition, we can determine how inbred colonies are. Results from our lab and other groups show that there is variation in colony breeding structure among species and among populations within a species. For example, populations of the eastern subterranean termite, *Reticulitermes flavipes*, tend to have mostly colonies headed by primary reproductive in the southern portion of its range, while colonies in the north tend to have multiple inbreeding neotenics. Work on termite breeding systems was reviewed in Vargo and Husseneder (2011) and Vargo (2019). One of the most exciting things we discovered is that colonies of some subterranean termites have female neotenics that are half clones of the original founding queen, a system we named asexual queen succession (AQS). In collaboration with Kenji Matsuura, we first found AQS in the Asian species, *Reticulitermes speratus,* which we reported in a 2009 paper (Matsuura *et al.* 2009). This is an amazing reproductive system that was totally unknown in termites. AQS has many advantages over the production of neotenics through normal sexual reproduction, such as rapid colony growth and the large colony size afforded by the large number of reproducing neotenics (up to 600), and all this while avoiding the production of inbred workers. Plus, the original queen's

genetic contribution to offspring is never diluted as it would be under normal sexual reproduction. Shortly thereafter, we found AQS in the U.S. species *Reticulitermes virginicus* (Vargo *et al.* 2012). It has now been found in many species of termites and appears to be widespread (Vargo 2019).

Another area of research that has greatly expanded by molecular methods is genetic fingerprinting of colonies to track their fate after insecticide treatment in the field and to delineate the foraging areas of colonies. We have done a number of studies to track the effect of baits and liquid termiticides on field colonies. A couple of examples are reported in Vargo (Vargo 2003) and Vargo and Parman (2012). This method of genetic fingerprinting has many advantages over older methods such as using dyes to mark foragers, but it is still not widely referenced by urban entomologists. I encourage us all to embrace these newer, more powerful methods.
These same approaches can be used to study the breeding structure of ants, as we did in a study of the Asian needle ant, *Brachyponera chinensis*, an invasive species in the southeastern U.S. (Eyer *et al.* 2018). This species invades both urban and natural areas where it forms large polydomous colonies. We found that although colonies could be spatially expansive, with linear foraging distances of 75 m, it was not unicolonial. One of the most amazing things about this species is that colonies are founded by a single queen. As the colony grows, it produces daughter queens and males that mate in the colony and the daughter queens remain in their natal colony, supplementing reproduction of the original queen. This breeding system is much like that of termites, in which the original founding reproductives are replaced by inbreeding reproductives. (As a side note, termite comprise a large part of the diet of this ant.) Surprisingly, we found that this ant exhibits the same breeding system in both the native and introduced ranges. We hypothesize that the ability of this ant to tolerate inbreeding in its native range pre-adapted it to become established in its invasive range, where, at least initially, it would have been subject to inbreeding as is common in invasive species.

The dark rover ant, *Brachymyrmex patagonicus*, is a recent invader to the U.S., first seen in Louisiana in 1976. It has since spread throughout the Gulf Coast area and the Southwestern U.S. It frequently infests buildings and is emerging as a major structure infesting ant in the southern U.S. We have conducted genetic studies to show that some 80% of the colonies of this ant have a single queen, where as 20% have multiple queens, usually only two queens (Eyer *et al.* 2020). This species forms very dense populations in urban areas. By genetically fingerprinting foraging trails on residential properties, we found that most colonies used a single foraging trail and these foraging trails were stable over a period of at least one month (Eyer *et al.* 2021). We also found a high density of colonies on residential properties, with up to 28 colonies in one yard, including 21 trailing up the exterior of a house, at a frequency of one colony every 2.5 m (8 ft.). In some unpublished work, we found that an ant bait containing imidacloprid was effective in eliminating colonies, but the high level of trail fidelity exhibited by colonies, likely requiring placement of a bait station on or near every trail to eliminate all ants from a property.

In conclusion, I have tried to highlight just a few examples of how the approaches of molecular ecology can advance the field of urban entomology. I have used examples of social insects—termites and ants—but these techniques can be used to provide insights into the biology and management of all urban pests. Some recent reviews on the dispersal and population genetics of bed bugs (Booth *et al.* 2018) and cockroaches (Vargo 2021) illustrate how molecular genetic tools can add important new information on our most significant urban pests. Many of the newer insights provided by molecular ecology have already made it into the Mallis Handbook of Pest Control, and we can expect this to increase in future editions. Although Arnold Mallis may not have heard of molecular ecology, a field that did not exist during his time, his tremendous legacy and the field of molecular ecology are now inextricably linked through his seminal book, and that is a good thing for urban entomology.

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AWARDS PRESENTATIONS

BACHELOR OF SCIENCE

Undergraduate Award – Marlo Black, University of Tennessee

Growth Dynamics of Blattabacterium, an Endosymbiont of German Cockroaches

MARLO BLACK, University of Tennessee

Abstract

Blattabacterium is an obligatory endosymbiotic bacterium found in most cockroach species, including the German cockroach (*Blattella germanica*). *Blattabacterium* is involved in nitrogen recycling and uric acid metabolism in its host, and appears to play an important role in the growth and development of cockroaches. We observed significant variations in the abundance of *Blattabacterium* among field-collected populations of German cockroaches. The factors that determine the abundance and fluctuations of this bacterium in its host are poorly understood. Therefore, we investigated the dynamics of *Blattabacterium* in German cockroaches in relation to developmental stage, mating, sex and diet. German cockroaches were reared and sampled at intervals, followed by DNA extraction of each sample. Genomic DNA from different treatments was analyzed with qPCR to quantify the growth kinetics of *Blattabacterium,* using specific primers validated for this endosymbiont. The work is ongoing and we hypothesize that *Blattabacterium* abundance will vary with sex, diet and the reproductive cycle in female cockroaches. A deeper understanding of host-symbiont association might open new approaches for controlling German cockroach populations.

DOCTORAL

Seasonal Activity, Spatial Distribution, and Physiological Limits of Subterranean Termites, *Reticulatermes spp.* (Blattodea: Rhinotermitidae) in an East Texas Forest

MARK JANOWEICKI and Edward Vargo, Texas A&M University

Seasonal activity, spatial distribution, and physiological limits of subterranean termites (*Reticulitermes* species) in an East Texas forest

Mark Janowiecki[1,2] and Edward Vargo[1]
[1]Department of Entomology, Texas A&M University
[2]City of New Orleans Mosquito, Termite, and Rodent Control Board

1

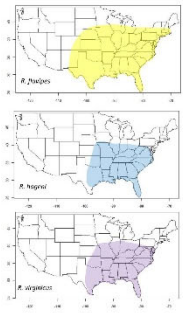
Resource Partitioning

- Gause's Law: two organisms cannot occupy same niche without one outcompeting the other
- Exemplified in social insects with colony recruitment
- Resources can be partitioned through:
  - Competition
  - Behavioral differences
  - Use under different climatic conditions

2

Subterranean Termite Resource Partitioning

- Multiple species of *Reticulitermes* occur in sympatry
  - All feed on decomposing wood
  - Multiple species occur in single log
- Partition resources by:
  - Selecting different log size
  - Foraging under different climatic conditions



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Influence of Climatic Factors

- Foraging preference for temperature and moisture (Houseman et al. 2001):
  - *R. flavipes* more active in cool, wet months
  - *R. hageni* more active in hot, dry months
- *R. flavipes* can withstand flooding longer than *R. virginicus* (Forschler and Henderson 1995)

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Objectives

To understand how resource partitioning may enable subterranean termites to coexist on the same resources:

- Compare species-specific foraging behavior in *R. flavipes, R. hageni,* and *R. virginicus*
- Assess the impact of soil temperature and moisture on foraging activity
- Test if physiological limits of species predict impact of climate on their foraging patterns

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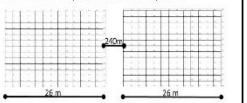
Methods



- Field site at Sam Houston State University Center for Biological Field Studies
- Two plots containing two 14x14 grids of pine stakes spaced 2 m apart
- Soil temperature and moisture measured
- Samples collected monthly (28 mo)
  - Identified genetically (24 mo)
  - Colonies characterized with microsatellite markers (6 mo)
- Foraging duration measured as number of consecutive months monitor active with same species



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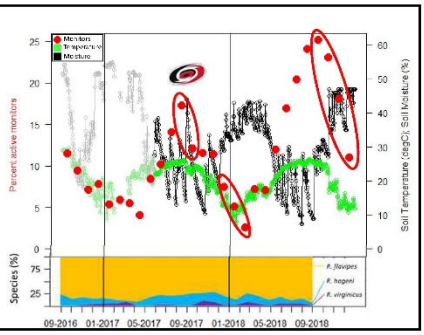
Foraging

- Variable with the season
- Correlated to temp positively ($P < 0.001$) and negatively to moisture ($P < 0.001$)
- Declines with floods



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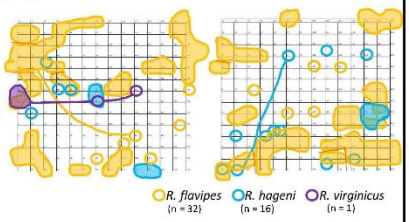
Colony Foraging Areas

- Species have overlapping foraging ranges
- Colonies of the same species do not overlap



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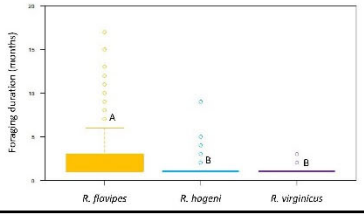
Foraging Duration by Species

- *R. flavipes* forages longer than other species in the monitor



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Species Turnover in Monitors

- 165 occurrences where monitor occupied by two different species in consecutive months
  - *R. virginicus* has disproportionate number of takeovers
  - No intraspecific turnover events in first six months

Takeover Species	Occurrences	Out of (species total)	Scaled Occurrences (%)
R. flavipes	87	2455	3.54
R. hageni	51	406	12.56
R. virginicus	27	109	24.77

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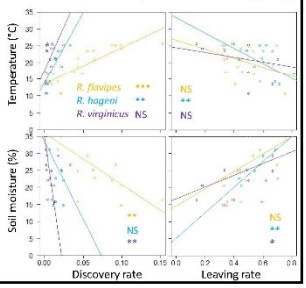
Impact of Temperature and Moisture on Species Foraging

- Discovery rate
  - *R. flavipes*: both temperature and moisture
  - *R. hageni*: mainly temperature
  - *R. virginicus*: mainly moisture
- Leaving rate
  - *R. flavipes*: neither temperature or moisture
  - *R. hageni*: both temperature and moisture
  - *R. virginicus*: only correlated to moisture alone



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Physiological Ability

Upper lethal limit
(Esch et al. 2017)

- Exposed individually on heat block (n = 24)
- Start at 33 °C and increase 1 °C per 5 min
- Declared dead when no visible movement

Desiccation assay
(Burdine and McCluney 2019)

- Exposed group to desiccation chamber (n = 100)
- Mortality assessed every 3 hrs

Submersion assay
(Forschler and Henderson 1995)

- Forced group (n = 10) underwater for variable amounts of time (1 to 36 hrs)
- Assessed mortality 24 hrs after removal

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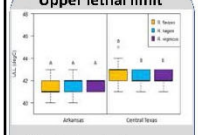
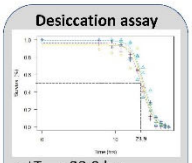
Physiological Ability

Upper lethal limit



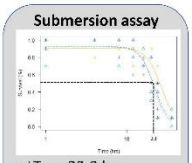
- ULL higher in Texas (42.6 °C) than in Arkansas (41.6 °C)
- No difference in ULL by species

Desiccation assay



- LT_{50} = 23.9 hrs
- No difference by species

Submersion assay



- LT_{50} = 23.0 hrs
- No difference by species

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Discussion

- Species may coexist by foraging under different climatic conditions
  - *R. flavipes* continued foraging after high moisture events, more stable
  - *R. hageni* increased foraging under higher soil moisture
  - *R. virginicus* increased foraging under lower temperatures, may utilize resources abandoned by other species
- However, we detected no difference in heat, submersion, or desiccation tolerances
  - Possibility of avoiding extreme conditions by moving through soil profile

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Discussion

- Species-specific preferences may extend to habitat selection
  - *R. flavipes* leaving rate not impacted by environmental conditions -> may hold on to food resources
  - *R. hageni* foraged during wetter periods -> selects shaded, humid areas
  - *R. virginicus* forages during cool periods -> may feed on deep tree roots
- Heterogeneity of microhabitats may reduce interspecific competition

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Above Ground Resources

- We observed below ground foraging, above ground resources have more variability
- *R. virginicus* prefers larger resources, may be buffered from moisture variation, while *R. hageni* prefers smaller resources and can withstand variation
  - However, opposite pattern with temperature, despite *R. hageni* experiencing greatest temperature variability

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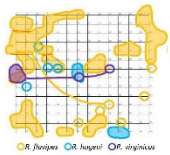
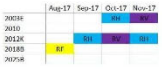
Nest Relocation

- *Reticulitermes* colonies remain in defined area, but can switch between food resources
- When enemy encountered, can relocate or fight
  - *R. virginicus* may be better competitor, high rate of turnover events
  - Large, widespread colonies of *R. virginicus* may adapt it for interspecific competition because more likely to encounter other species
- Competitive interactions may be important to resource partitioning





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Conclusion

- Differential response to climatic factors help partition resources for these species
- Additional factors:
  - Microhabitat heterogeneity
  - Different above ground resources
  - Extreme weather events
  - Nest relocation

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- TAMU Urban & Structural Entomology Laboratory
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Questions?

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insects

Article

Seasonal Activity, Spatial Distribution, and Physiological Limits of Subterranean Termites (*Reticulitermes* Species) in an East Texas Forest

20

STUDENT PAPER COMPETITION

Field Evaluations of Sulfuryl Fluoride Fumigation for Control of the Common Bed Bug, *Cimex lectularis* (Hemiptera: Cimicidae) Using a 1.9x Dosage Factor in Motor Vehicles and filled Cargo Trailers

DAKOTAH B. TODD, Virginia Tech University

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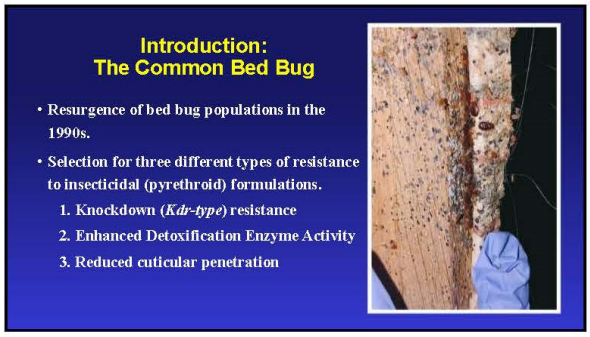

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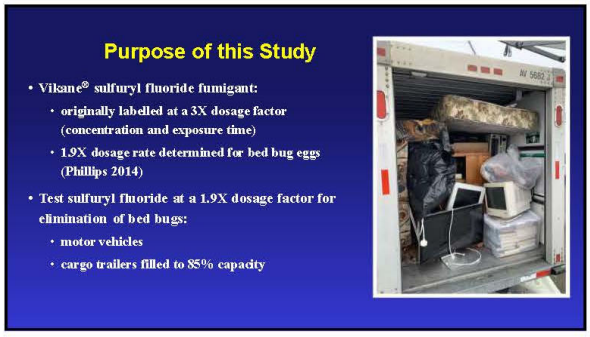

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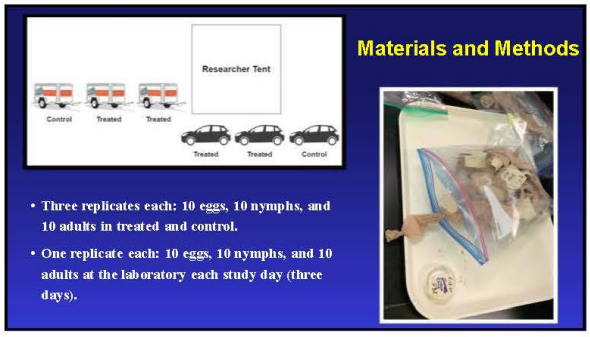

6

Materials and Methods

- For each trailer replicate, eggs were placed in three specific arenas:
  - plastic container of books
  - artificial wall void
  - bag of clothes.
- Nymphs and adults were placed in other hard to reach areas.

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Results

Vehicles	Treated			Controls		
Average Mortality	Eggs	Nymphs	Adults	Eggs	Nymphs	Adults
	100% (±0.0%)	100% (±0.0%)	100% (±0.0%)	9.9% (±6.7%)	0.0% (±0.0%)	0.0% (±0.0%)

Trailers	Treated			Controls		
Average Mortality	Eggs	Nymphs	Adults	Eggs	Nymphs	Adults
	100% (±0.0%)	100% (±0.0%)	100% (±0.0%)	6.4% (±0.2%)	5.6% (±5.6%)	0.0% (±0.0%)

10

Materials and Methods

- For each van replicate, at least one group of eggs was placed into stow-n-go seating and the other two groups were placed in hard to access locations.
- Nymphs and adults also placed in hard-to-reach areas.

7

Materials and Methods

- For each van replicate, at least one group of eggs was placed into stow-n-go seating and the other two groups were placed in hard to access locations.
- Nymphs and adults also placed in hard-to-reach areas.

8

Statistical Analysis

- Fisher's Exact Test
- Two-by-two contingency test between treated vs control and successful vs unsuccessful
- Successful = 100% mortality, unsuccessful = <100% mortality
- "Success" in fumigated spaces significantly greater than in controls
  - *P*-value = 0.0119
  - C.I. value of 2.22 Inf. (infinity)

11

Discussion

- First field evaluation verifying that the 1.9X dosage factor is sufficient for eliminating insecticide-resistant bed bugs (in particular, eggs).
- Eliminates need to store or throw away resident's infested personal belongings.
- Sulfuryl fluoride may become a more widely used for elimination of bed bug infestations in vehicles, homes, chambers, and more.

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Acknowledgements

- Dr. Dini Miller
- Dr. Jennifer Gordon
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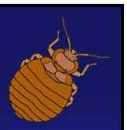

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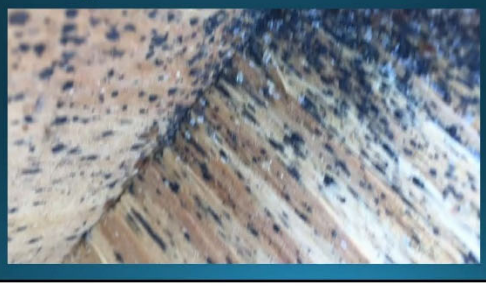
Quantification of Daily Feces Production for each Bed Bug *Cimex lectularius* (Hemiptera: Cimicidae) Life Stage

MORGAN M. WILSON, Dini Miller, Virginia Tech University

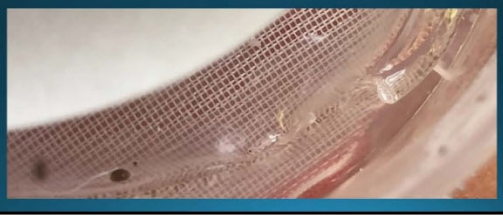
Bed Bug Evidence Under a Couch



1

Quantification of daily feces production for each bed bug (*Cimex lectularius*) life stage

Morgan M. Wilson & Dini Miller, Ph.D.
Department of Entomology at Virginia Tech



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Introduction

- Bed bug feces (frass) are small, smooth spots that stick to any surface
- Dark spots are easily identified, but bed bugs also produce light colored spots
- Stain furniture and fabrics
- Feces are important indicators in determining the severity of a bed bug infestation
  - Evidence for litigation

3

Bed bug feces contain histamines that can potentially trigger allergies

- DeVries et al. (2018) found that bed bug infested homes contained high levels of histamine (mean 54 µg per 100 mg of household dust)
- Histamines persist in homes for up to 3 months after a population has been eliminated

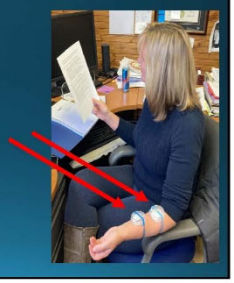
4

Objectives

- Objective 1. Determine the average number of fecal spots produced by each bed bug life stage
- Objective 2. Quantify the different types of bed bug fecal spots produced after each blood meal (light vs. dark)
- Walk into an infested apartment and get an idea of how many bed bugs there are

5

Bed bugs were provided with a human blood meal



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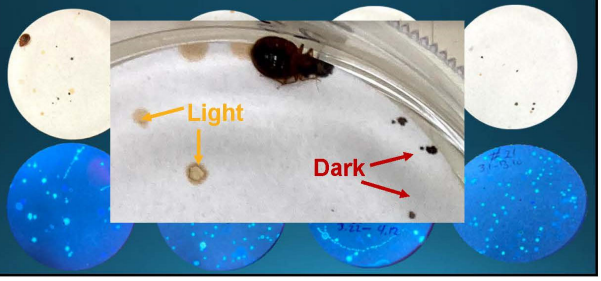
Materials and Methods

- Start date: January 2021
- Lex8 (resistant) bed bug strain
  - Collected in Lexington, KY in 2012
  - Acquired by our laboratory in 2020
- 50 females were fed and placed in individual Petri dishes with a filter paper to lay eggs
- One egg was selected from each female and placed in its own Petri dish
- All bed bugs and eggs were stored in an incubator (25°C, ~55% RH, 12:12 L:D)

6

Counting feces



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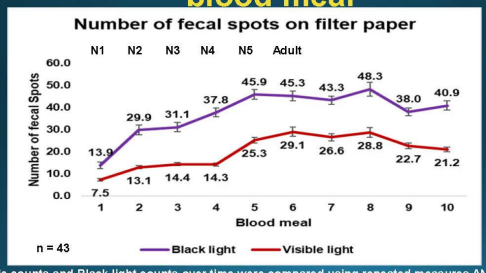
Results: number of fecal spots per blood meal



DF = 9, F-value = 5.7, $P < 0.0001$

Visible counts and Black light counts over time were compared using repeated measures ANOVA ($P < 0.05$).

10

Fecal spots were recorded daily after each blood meal

- Bed bugs were fed and provided with a new filter paper after defecation has stopped
  - Nymphs were fed every week
  - Adults were fed every 2 weeks
- All bed bugs received a total of 10 blood meals

8

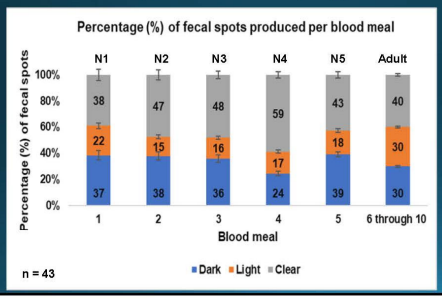
Average number of fecal spots produced per day (visible counts)

Blood meal	1	2	3	4	5	6-10	*P*-value
Life stage	N1 - N2	N2 - N3	N3 - N4	N4 - N5	N5 - Adult	Adult	n = 33
Average number of feces produced per day	1.8 ± 0.1 A	2.4 ± 0.2 ABC	2.2 ± 0.1 AB	2.4 ± 0.1 ABC	2.6 ± 0.2 BC	2.8 ± 0.1 C	DF = 5, F-value = 6.3, $P < 0.0001$
Average duration (days)	4.6 ± 0.3 A	6.3 ± 0.3 B	6.9 ± 0.1 B	6.4 ± 0.2 B	9.3 ± 0.2 C	10.1 ± 0.2 C	DF = 5, F-value = 88.2, $P < 0.0001$

Changes in fecal production between life stages were evaluated using a one-way ANOVA ($P < 0.05$). Means were separated using Tukey HSD.

11

Percentage of dark, light & clear spots



Bed bug evidence that you cannot see

Bed bug evidence that you can see

12

Discussion

- The original goal of this study was to make residents (and litigators) aware of crucial evidence because feces are so prevalent
- We discovered that many fecal spots go undetected
- This is important because it shows that bed bugs are contaminating more household items that we may not be aware of

13

Acknowledgements

- Dr. Dini Miller
- Technical assistance: Dakotah Todd & Mark Petersen

15

Conclusion

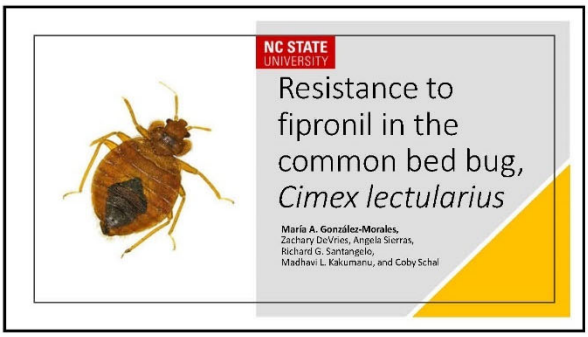
- Fecal spots are a reliable form of evidence for identifying bed bug infestations
- An adult bed bug can produce between 40 to 50 fecal spots per blood meal
  - Only 1/3 can been easily seen
- We have not fully appreciated the amount of contaminants that bed bugs leave behind

14

Resistance to Fipronil in the Common Bed Bug, *Cimex lectularius* (Hemiptera: Cimicidae)

MARIA A. GONZALES-MORALES, Zachary DeVries, Angela Sierras, Richard G. Santangelo, Madhavi L. Kakumanu, Coby Schal, North Carolina State University

Cimex lectularius L. populations have been documented worldwide to be resistant to pyrethroids and neonicotinoids, insecticides that have been widely used to control bed bugs. There is an urgent need to discover new active ingredients with different modes of action to control bed bug populations. Fipronil, a phenylpyrazole that targets the GABA receptor, has been shown to be highly effective on bed bugs. However, because fipronil shares the same target site with dieldrin, we investigated the potential of fipronil resistance in bed bugs. Resistance ratios in eight North American populations and one European population ranged from 1.4- to >985-fold, with highly resistant populations on both continents. We evaluated metabolic resistance mechanisms mediated by cytochrome P450s, esterases, carboxylesterases, and glutathione S-transferases using synergists and a combination of synergists. All four detoxification enzyme classes play significant but variable roles in bed bug resistance to fipronil. Suppression of P450s and esterases with synergists eliminated resistance to fipronil in highly resistant bed bugs. Target-site insensitivity was evaluated by sequencing a fragment of the Rdl gene to detect the A302S mutation, known to confer resistance to dieldrin and fipronil in other species. All nine populations were homozygous for the wild-type genotype (susceptible phenotype). Highly resistant populations were also highly resistant to deltamethrin, suggesting that metabolic enzymes that are responsible for pyrethroid detoxification might also metabolize fipronil. It is imperative to understand the origins of fipronil resistance in the development or adoption of new active ingredients and implementation of integrated pest management programs.


NC STATE UNIVERSITY
Resistance to fipronil in the common bed bug, *Cimex lectularius*
María A. González-Morales,
Zachary DeVries, Angela Sierras,
Richard G. Santangelo,
Madhavi L. Kakumanu, and Coby Schal

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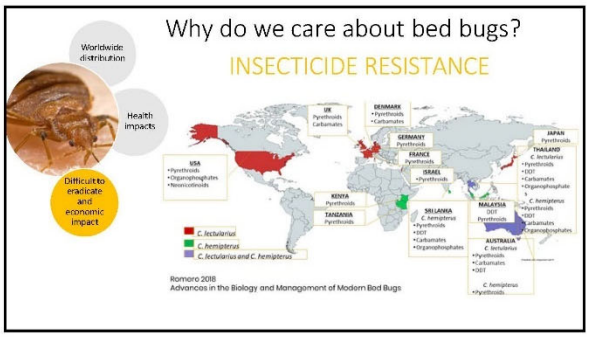
Why do we care about bed bugs?
INSECTICIDE RESISTANCE
Worldwide distribution
Health impacts
Difficult to eradicate and economic impact
C. lectularius
C. hemipterus
C. lectularius and C. hemipterus
Romero 2018
Advances in the Biology and Management of Modern Bed Bugs

2


The need for new active ingredients
Fipronil
Broad-spectrum insecticide commonly used to control cockroaches and termites
Also used in veterinary products to control ectoparasites
Not saturated MOA for bed bugs
Ingestion and topical treatments of fipronil showed promising results in lab populations (A. sierras and Schal 2017)

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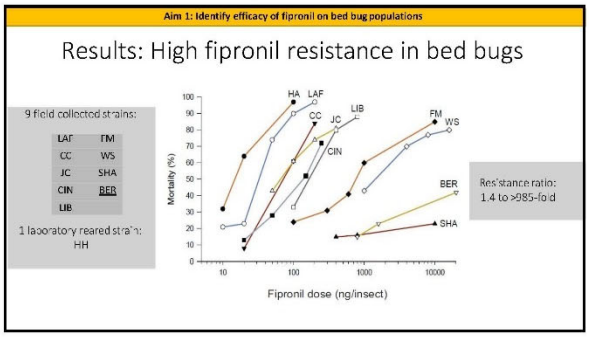
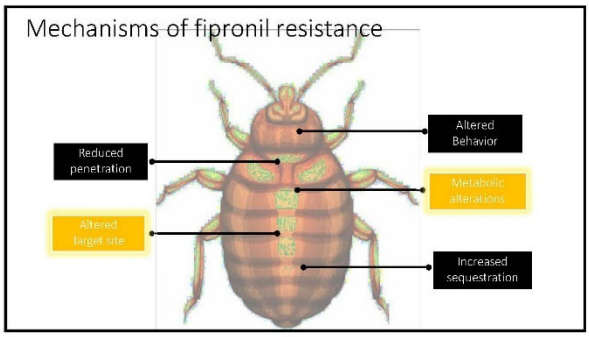
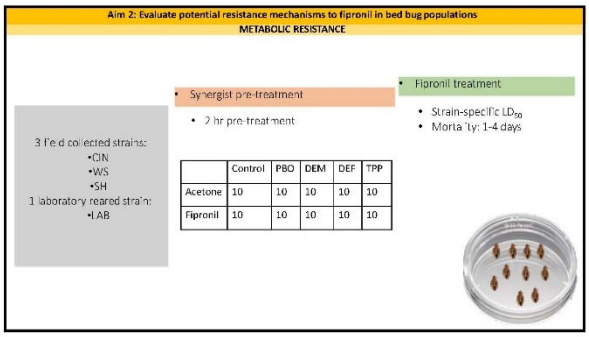

Aim 1: Identify efficacy of fipronil on bed bug populations
Results: High fipronil resistance in bed bugs
9 field collected strains:
LAF FM
CC WS
JC SHA
CIN BER
LIB
1 laboratory reared strain:
HH
Mortality (%)
Fipronil dose (ng/insect)
Resistance ratio: 1.4 to >985-fold

4

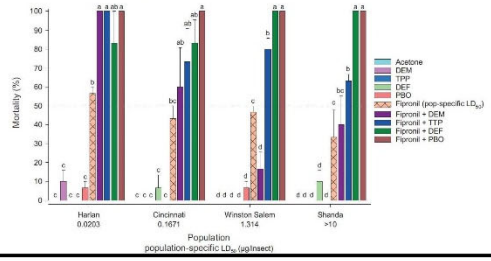

Mechanisms of fipronil resistance
Reduced penetration
Altered target site
Altered Behavior
Metabolic alterations
Increased sequestration

5


Aim 2: Evaluate potential resistance mechanisms to fipronil in bed bug populations
METABOLIC RESISTANCE
3 field collected strains:
•CIN
•WS
•SH
1 laboratory reared strain:
•LAB
Synergist pre-treatment
2 hr pre-treatment
Fipronil treatment
Strain-specific LD50
Mortality: 1-4 days
Control PBO DEM DEF TPP
Acetone 10 10 10 10 10
Fipronil 10 10 10 10 10

6

Results: Detoxifying enzymes are highly involved in fipronil resistance



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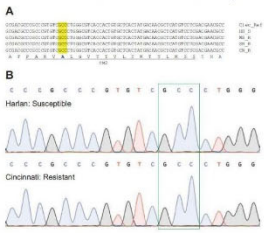
Aim 3: Evaluate potential resistance mechanisms to fipronil in bed bug populations

TARGET SITE INSENSITIVITY

A302S Mutation: Not present in any of our bed bug populations



Population	RR_{50}	n	No. of bed bugs		
			A302/ A302 (S/S)	S302/ S302 (R/R)	A302/ S302 (S/R)
Harlan-NCSU	—	10	10	0	0
Lafayette	1.4	10	10	0	0
Courtyard	3.8	10	10	0	0
Jersey City	4.4	10	10	0	0
Cincinnati	8.4	10	10	0	0
Liberty	10.7	10	10	0	0
Fuller Miller	44.4	10	10	0	0
Winston Salem	65.7	10	10	0	0
Shanda	>492	10	10	0	0
Beroun	>985	10	10	0	0

8

Overall conclusions

- Bed bugs have a relatively high resistance to fipronil (phenylpyrazole)
- Metabolic resistance plays an important role in bed bug fipronil resistance
- Mutation A302S does not provide resistance to fipronil in the common bed bug

What does it mean to pest control?

- New formulations including fipronil should consider addition of inhibitors such as PBO to overcome resistance
- Ingestion is effective. Formulations that can overcome resistance: baits
- Not because is not labeled it means that is free of resistance

This research project raised a lot of questions that could be further developed. Such as, How do bed bugs become in contact with fipronil?, What other mutations could confer fipronil resistance in bed bugs?

9

Acknowledgements

NC STATE UNIVERSITY

SMART
SCIENCE, MATHEMATICS, AND RESEARCH FOR TRANSFORMATION
PART OF THE NATIONAL DEFENSE EDUCATION PROGRAM

SREB
Southern Regional Education Board

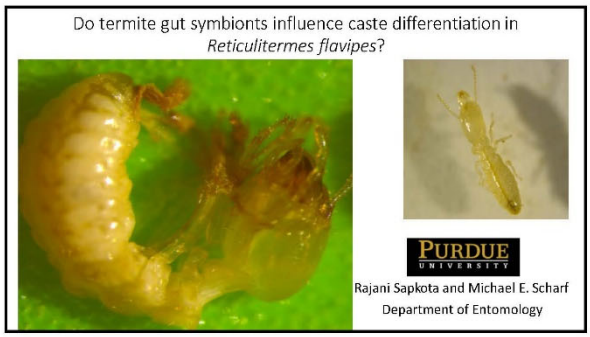
North Carolina Pest Management Association

10

11

Do the Termite Gut Symbionts Influence the Caste Differentiation in *Reticulatermes flavipes* (Blattodea: Rhinotermitidae)?

RAJANI SAPKOTA, Purdue University



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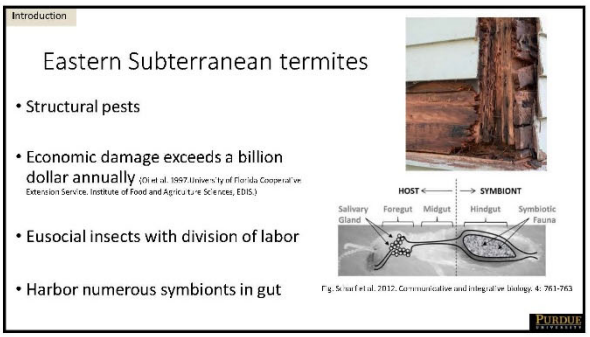

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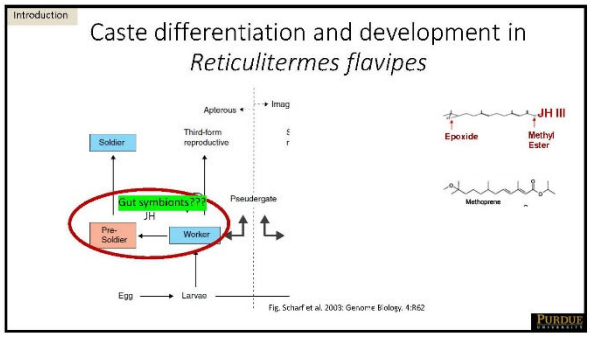

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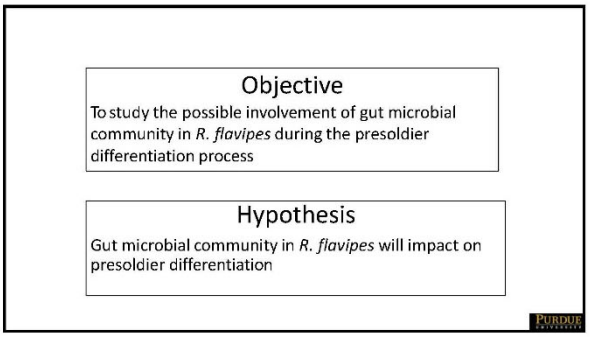

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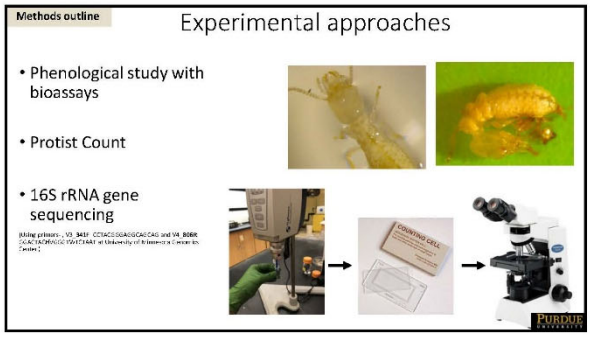

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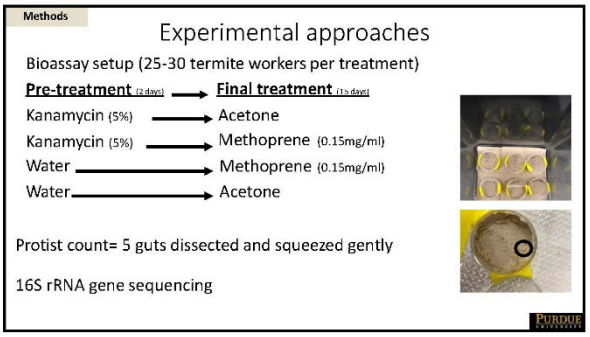

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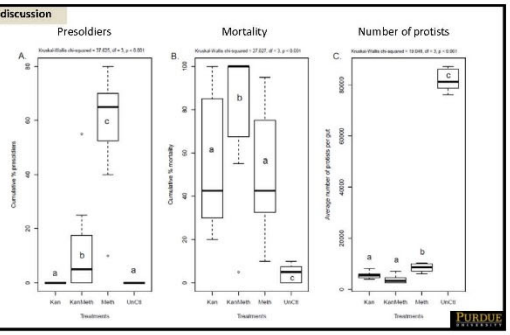
Results and discussion

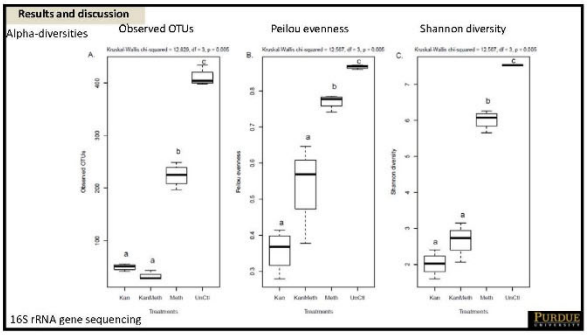


Bioassays

7

Results and discussion

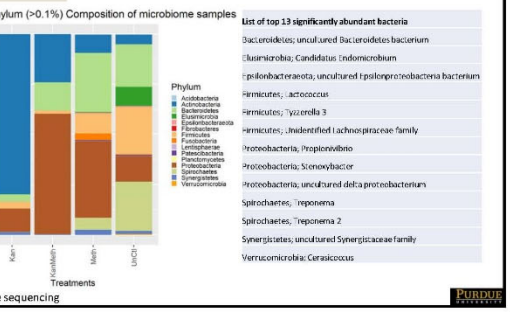
Alpha-diversities



16S rRNA gene sequencing

8

Results and discussion



16S rRNA gene sequencing

9

Conclusions

- JH selects for gut symbionts at certain abundance levels
- Gut symbionts under the influence of JH are directly linked to presoldier differentiation/emergence and are important in the survival of termites

10

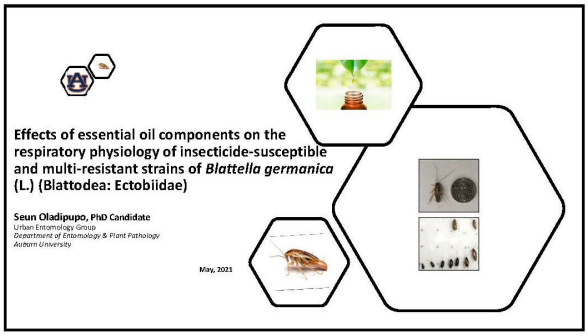
Acknowledgment

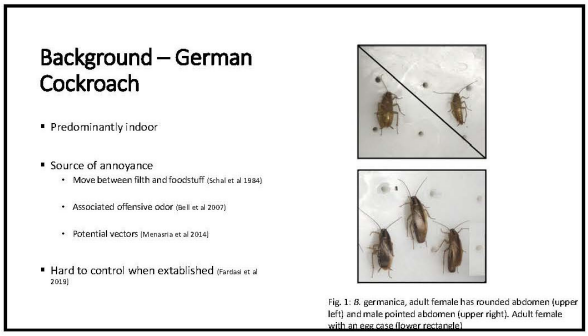
- Funding: O.W. Rollins / Orkin Endowment
- Major advisor: Dr. Michael E. Scharf
- PhD advisory committee
- Purdue graduate school: Ross fellowship

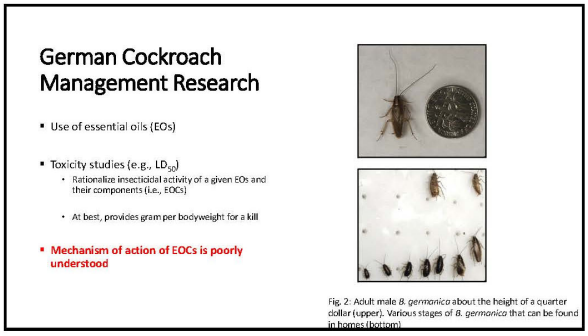
11

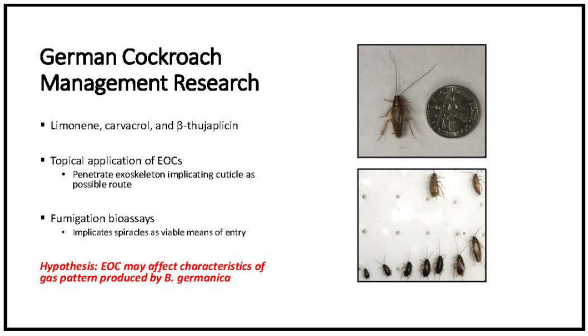
Effects of Essential Oil Components on the Respiratory Physiology of Insecticide-Susceptive and Multi-Resistant Strains of *Blatella germanica* (Blattodea: Ectobiidae)

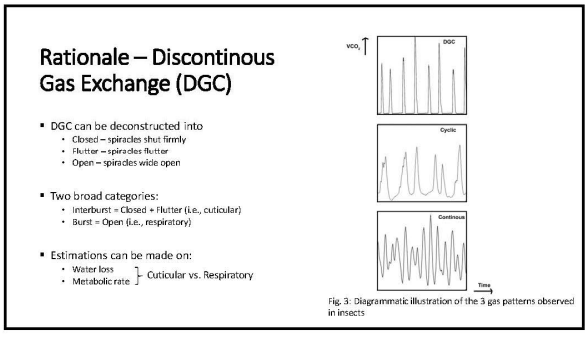
SEAN OLADOPUPO, Auburn University

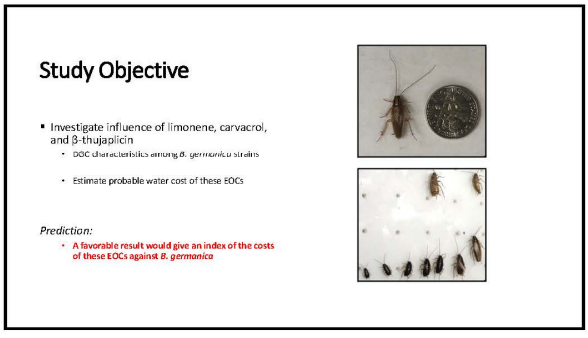












Materials & Methods – Flow-through Respirometry

- *B. germanica* strains
  - Susceptible (strain S)
  - Resistant (strains D & E)
- 3 groups:
  - Group 1 – untreated control
  - Group 2 – acetone
  - Group 3 – EOC (limonene, carvacrol, β-thujaplicin)
- 1 µl of each EOC dose using a repeating dispenser; 9 reps. each (Oledlouso et al 2020)
- Data was captured using ExpeData

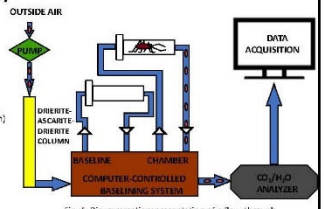


Fig. 4: Diagrammatic representation of a flow-through respirometry system

Results & Discussion – DGC recovery rate

- Each strain exhibited DGC, cyclic, and continuous *(data not shown)*
- Inverse relationship between dose and DGC recovery rate (%)
  - Greatest in acetone
  - Least recovery rate (20-42.8%) in carvacrol (Fig. 5B)
- Among strains, recovery rate was D> S> E

Conclusion: Carvacrol could be used where cuticular permeability is a limiting factor (i.e., as a synergist)

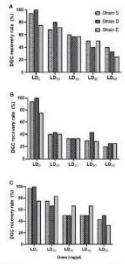


Fig. 5: DGC recovery rate in susceptible (S) and resistant strains (D and E) strains topically treated with (A) limonene, (B) carvacrol, and (C) β-thujaplicin

Results & Discussion – Typical DGC

- Two comparisons were made between before and after topical treatment
- First, DGC cycle:
  - Before versus after EOC treatment
- Second, water loss:
  - 20 minutes before topical treatment
  - 20 minutes immediately after topical treatment

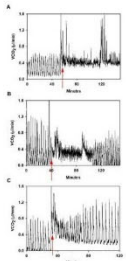


Fig. 6: A typical recording of DGC in a male (A) susceptible and (B-C) resistant *B. germanica* strains. Red arrow indicates the topical application of 1 µl of an EOC

Results & Discussion – metabolic rate

- Metabolic rates, volume, and duration were significant for limonene (Fig 7A)
- Increased metabolic rate for Carvacrol (Fig 7B)
- Volume and duration of DGC significantly increased β-thujaplicin (Fig 7C)

Hypothesis: From a control standpoint, these increases is likely to drive substantial water loss

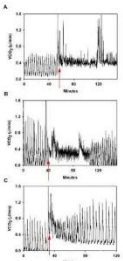


Fig. 7: Typical recording of DGC in a male (A) susceptible and (B-C) resistant *B. germanica* strains. Red arrow indicates the topical application of 1 µl of an EOC

Results & Discussion – water loss

- Water loss costs were not absolute (Fig. 8)
- Generally, carvacrol triggered a significant water loss in resistant strains
- Limonene:
  - S exhibited greatest water loss; while D was least
  - Trend was not so clear for carvacrol and β-thujaplicin

Conclusion: Our data suggests that water loss is likely to depend on insect's resistance profile and insecticide chemistry

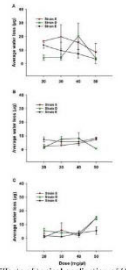
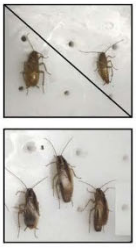


Fig. 8: Effects of topical application of (A) limonene, (B) carvacrol, and (C) β-thujaplicin on average water loss (µg) of susceptible and resistant *B. germanica* strains

Summary of findings

- **DGC can be used as a metric to infer physiological effects of EOCs**
- These effects are likely to be influenced by resistance profile of an insect
- One trend in our data was immediate cessation of DGC following EOC treatment
  - *Implicates gamma-aminobutyric acid receptor*
- **Carvacrol inflicts the most cost to *B. germanica***



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Acknowledgments

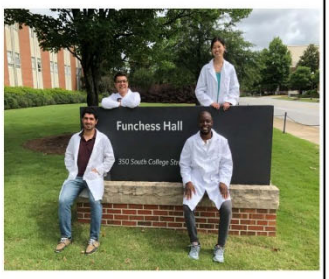
USDA United States Department of Agriculture National Institute of Food and Agriculture

AUBURN

THE PESTMANAGEMENT FOUNDATION

BLACK IN ENTO

Department of Entomology and Plant Pathology, AU



2020(2021) NCUE & IPA Program

2021 Virtual National Conference on Urban Entomology & Invasive Pest Ant Conference

Register – tinyurl.com/2tkaaqal
Missing your unique join link? Email aallen@pestworld.org

Day 1 – Monday, May 24 Eastern Time

2:00-2:05	**Welcome**
2:05-2:35	**Student Award Presentations**
2:05-2:20	Undergraduate Award – Marlo Black, University of Tennessee
2:20-2:35	Doctoral Award – Mark Janowiecki, Texas A&M University
2:35-	**Student Paper Competition**
2:35-2:40	Instructions
2:40-2:50	Decade-long Upsurge in Target Site Insecticide Resistance in Bed Bug populations in the United States. Cari Lewis, University of Tulsa
2:50-3:00	Field Evaluations of Sulfuryl Fluoride Fumigation for Control of the Common Bed Bug *Cimex lectularius* L. (Hemiptera: Cimicidae), Using a 1.9× Dosage Factor in Motor Vehicles and Filled Cargo Trailers. Dakotah B. Todd, Virginia Tech University
3:00-3:10	Quantifying Daily Feces Production of Different Bed Bug *Cimex lectularius* L. (Hemiptera: Cimicidae) Life Stages. Morgan Wilson, Virginia Tech University
3:10-3:20	Resistance to Fipronil in the Common Bed Bug, *Cimex lectularius* L. (Hemiptera: Cimicidae). Maria A. Gonzales-Morales, North Carolina State University
3:20-3:30	Characterization of the Spatial Distribution of Histamine in Bed Bug Infested homes. Johnalyn Gordon, University of Kentucky
3:30-3:40	Video Analysis of Termite Colony, *Reticulitermes flavipes*, Throughout Exposure to Trelona Termiticide Bait. Richard Murphy, Auburn University
3:40-3:45	BREAK
3:45-3:55	Old Tactics, New Tools: A Survey of *Reticulitermes* in Georgia. Allison Johnson, University of Georgia
3:55-4:05	Do the Termite Gut Symbionts Influence the Caste Differentiation in *Reticulitermes flavipes*? Rajani Sapkota, Purdue University
4:05-4:15	Distribution of *Tapinoma sessile* (Say) in Eastern Tennessee and Adaptive Convergence to Higher Elevations. Gary Edwards, University of Tennessee
4:15-4:25	The Effect of Ant-Produced Compounds on Microbes. Ashley Marin Morris, University of Florida
4:25-4:35	Effects of essential oil components on the respiratory physiology of insecticide-susceptible and multi-resistant strains of *Blattella germanica* (L.) (Blattodea: Ectobiidae). Seun Oladipupo, Auburn University
4:35-4:55	Open Q&A
5:00	**Closing Remarks**

Day 2 – Tuesday, May 25 Eastern Time

2:00-2:05	**Welcome**
2:05-2:10	**Presentation of Student Competition Awards**
2:10-3:05	**Mallis Memorial Award Lecture** – Urban Entomology Through the Eyes of a Molecular Ecologist. Dr. Ed Vargo, Texas A&M University
3:05-4:00	**Industry Update from Sponsors**
4:00-5:00	**Networking –** Choose Your Own Breakout Session State of Industry, Insecticide Resistance, Multi-unit Housing, Bed Bugs Today, Post-Pandemic Working Strategies, Invasive Ants, Termites
5:00	**Closing Remarks**

Thank you to our Sponsors!

Save the Date! NCUE & IPAC Future Conferences

May 15-18, 2022 – Sheraton Salt Lake City Hotel, Salt Lake City, UT.
May 19-22, 2024 - Renaissance Riverview, Mobile, AL

2021 Committee

Awards Chair – Kyle Jordan
Conference Chair – Allie Allen
Program Chair – Molly Keck
Treasurer – Ed Vargo
Sponsorship Chair – Dan Suiter
Sponsorship Committee – Dini Miller, Shripat Kamble, Gary Bennett

2020(2021) NCUE Planning Committee

Conference Chair: Allie Allen (NPMA)
Program & Proceedings Chair: Molly Keck (Texas A&M AgriLife Extension)
Secretary: Carrie Cottone (City of New Orleans Mosquito, Termite & Rodent Control)
Awards Chair: Kyle Jordan (BASF)
Treasurer: Ed Vargo/Lisa Jordan (Texas A&M University)
Sponsorship Chair: Dan Suiter (UGA)

Local Arrangements Co-Chair: Kelly Palmer (Washington County Extension)
Local Arrangements Co-Chair: Fudd Graham (Auburn University)

2022 NCUE Planning Committee

Conference Chair: Molly Keck (Texas A&M AgriLife Extension)
Program & Proceedings Chair: Carrie Cottone (City of New Orleans Mosquito, Termite & Rodent Control)
Secretary: Awards Chair: Allie Allen (NPMA)
Treasurer: Ed Vargo/Lisa Jordan (Texas A&M University)
Sponsorship Chair: Dan Suiter (UGA)

Local Arrangements Chair: Ary Faraji, Salt Lake City Mosquito Abatement District

NCUE Bylaws

BYLAWS

NATIONAL CONFERENCE ON URBAN ENTOMOLOGY

ARTICLE I- NAME
The name of this organization is the National Conference on Urban Entomology.

ARTICLE II-BACKGROUND
In the spring of 1985, individuals representing urban entomology and the pest control industry came together to organize a national conference to be held biennial. The mission of these conferences was to open channels of communication and information between scientists in industry, academia, and government, and to foster interest and research in the general area of urban and structural entomology.

The primary scope of the National Conference is to emphasize innovations and research on household and structural insect pests. It is the intent; however, to provide flexibility to include peripheral topics that pertain to the general discipline of urban entomology. It is anticipated that the scope of the conference could change through time, but the emphasis would be to provide an opportunity for urban entomologist to meet on a regular basis. It is not anticipated that any specific memberships would be required or expected, but that the cost associated with the conference would be met through registration fees and contributions. In the event that funds become available through donations or from the sale of conference proceedings, that these resources will be spent to meet expenses, to pay the expenses for invited speakers, and to provide scholarships to qualified students working in urban entomology. It is the intent of this organization to be non-profit, with financial resources provided to the Conference to be used entirely in support of quality programming and the support of scholarships.

ARTICLE III-OBJECTIVES
The objectives of this organization are:

1. To promote the interest of urban and structural entomology.

2. To provide a forum for the presentation of research, teaching and extension programs related to urban and structural entomology.

3. To prepare a written/electronic proceedings of all invited and accepted papers given or prepared at the biennial meeting.

4. To promote scholarship and the exchange of ideas among urban entomologists.

5. As funds are available, scholarships will be awarded to students pursuing scholastic degrees in urban entomology. Three levels of scholarships will be offered: the first level is for Bachelor students; the second level is for Masters students; and the third level is for Ph.D. candidates. These students must register for, and attend, the conference and present the paper in order to receive funding. These scholarships will be awarded based solely on the merits of the candidates, and the progress that they have made towards completion of their research and scholastic degrees. The student will receive funding only if they are currently enrolled in a university at the time that the conference is held.

6. There may also be first, second, and third place recipients of an onsite student competition for students who are currently involved in their undergraduate or graduate programs. These students can compete for scholarship funds; however, if any student has already been awarded a scholarship for the current meeting, and wishes to participate in this onsite competition, their presentation must be completely separate, and they must be properly registered in advance for this competition.

ARTICLE IV-JURISDICTION

The jurisdiction of this conference is limited to events held within the United States of America; however, we will be supportive of international urban entomology conferences as they are organized and held.

ARTICLE V-MEMBERSHIP

There are no membership requirements associated with this organization except for the payment of registration fees which go to offset the cost of holding the conference, preparation/printing of proceedings and the offering of scholarships. All persons with an interest in urban entomology are invited to attend the conferences and associated events.

ARTICLE VI-OFFICERS

Leadership for the Conference will be provided by the Chair of the Conference Committee. The Executive committee will be composed primarily of representatives from academia, industry and government. There will be seven officers of the Executive Committee and will include the following:

Chair of the Conference Committee
Chair of the Program Committee
Chair of the Awards Committee
Secretary to the Conference
Treasurer to the Conference
Chair of the Sponsorship Committee
Chair of the Local Arrangements Committee

The Chair of the Conference Committee will preside at all Committee meetings, and will be the Executive Officer for the organization, and will preside at meetings. In the absence of the Chair of the Conference Committee, the Chair of the Program Committee may preside. The voting members for executive decisions for the

conference will be by a majority vote of a quorum which is here defined as at least five officers.

The duties of the officers are as follows:

Chair of the Conference Committee: To provide overall leadership for the Conference, to establish ad hoc committees as needed, and to solicit nominations for new officers as needed.

Chair of the Program Committee: To coordinate the conference in terms of arranging for invited speakers and scientific presentations as well as oversee the printing of announcements, programs and proceedings.

Chair For Awards: To oversee and administer the Mallis Award, scholarships and other honors or awards as approved by the executive committee.

Secretary: To take notes and provide minutes of meetings.

Treasurer: Provide documentation of expenditures, and the collection and disbursement of funds. To act on behalf of the executive committee in making arrangements with hotels, convention centers and other facilities in which conferences are held.

Chair For Sponsorship: This committee will be involved in fund raising and in seeking sponsorship for various aspects of the conference. It will also contact contributors and potential contributors to seek donations and support for the conference and associated events. It is anticipated that the committee will be composed of at least one member representing academia, and one member representing industry.

Chair For Local Arrangements: To gather information on behalf of the executive committee for hotels, convention centers and other facilities in which the conference is to be held. To arrange for audio/visual equipment, and to oversee the general physical arrangements for the conference.

ARTICLE VII-TERMS OF OFFICE & SUCCESSION OF OFFICERS:
Officers may serve for a maximum of four conference terms (8 years); however, if no new nominations are received, the officers may continue until such time as replacements are identified and installed.
The Awards Chair is the last position to be served, and may be relieved from NCUE officer duties unless asked or willing to serve NCUE in another capacity.
The Conference Chair may serve for one conference after which time they will become the Chair of the Awards Committee.
The Program Chair may serve for one conference term after which time they will become the Conference Chair.
The Secretary may serve for one conference term, after which time they will become the Program Chair.

The Chair for Local Arrangements should change with each conference unless the meetings are held in the same location.
The Chair the Sponsorship Committee (to include both an academic and industry representative) will serve for two conferences.
The Treasurer will serve for two conference cycles, unless reappointed by the Executive Committee.

ARTICLE VIII-NOMINATION OF OFFICERS
Nominations for any of the chair positions may come from any individual, committee, or subcommittee, but must be forwarded to the Chair of the Conference before the final business meeting of each conference. It is further anticipated that individuals may be asked to have their names put into nomination by the Chair of the Conference. In the event that there are no nominations, the existing Chair may remain in office with a majority vote of the Executive Committee for the conference. It is clearly the intent of these provisions that as many new people be included as officers of this organization as is possible, and no one shall be excluded from consideration.

ARTICLE IX-MEETINGS
Conferences of the National Conference on Urban Entomology will be held every two years. Meetings of the officers of this organization will meet at least annually either in direct meetings or by conference calls in order to plan the upcoming conference, and to conduct the business of the organization.

ARTICLE X-FINANCIAL RESPONSIBILITIES
All financial resources of the Conference will be held in a bank under an account named, “National Conference on Urban Entomology", and may be subjected to annual audits. Expenditures may be made in support of the conference, for scholarships and other reasonable costs; however, funds may **not** be used to pay officers’, or their staff’s salaries, or for officers’ travel expenses. In the event that this organization is disbanded, all remaining funds are to be donated to the Endowment Fund of the Entomological Society of America.

ARTICLE XI-FISCAL YEAR
The fiscal year will run from January 1 through December 31 of each year.

ARTICLE XII-AMENDMENTS
The bylaws for this organization may be amended by a two-thirds affirmative vote of the attendees at the business meeting, provided that the proposed amendments are available for review at least 48 hours in advance of the voting.

ARTICLE XIII-INDEMNIFICATION
The National Conference on Urban Entomology shall indemnify any person who is or was a party, or is or was threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative by reason of the fact that such person is or was an officer of the Committee, or a member of any subcommittee or task force, against expenses,

judgments, awards, fines, penalties, and amount paid in settlement actually and reasonably incurred by such persons in connection with such action, suit or proceeding: (I) except with respect to matters as to which it is adjudged in any such suit, action or proceeding that such person is liable to the organization by reason of the fact that such person has been found guilty of the commission of a crime or of gross negligence in the performance of their duties, it being understood that termination of any action, suit or proceeding by judgment, order, settlement, conviction or upon a plea of nolo contendere or its equivalent (whether or not after trial) shall not, of itself, create a presumption or be deemed an adjudication that such person is liable to the organization by reason of the commission of a crime or gross negligence in the performance of their duties; and (II) provided that such person shall have given the organization prompt notice of the threatening or commencement (as appropriate) of any such action, suit or proceeding. Upon notice from any such indemnified person that there is threatened or has been commenced any such action, suit or proceeding, the organization: (a) shall defend such indemnified person through counsel selected by and paid for by the organization and reasonably acceptable to such indemnified person which counsel shall assume control of the defense; and (b) shall reimburse such indemnity in advance of the final disposition of any such action, suit or proceeding, provided that the indemnified person shall agree to repay the organization all amounts so reimbursed, if a court of competent jurisdiction finally determines that such indemnified persons liable to the organization by reason of the fact that such indemnified person has been found guilty of the commission of a crime or of gross negligence in the performance of their duties. The foregoing provision shall be in addition to any and all rights which the persons specified above may otherwise have at any time to indemnification from and/or reimbursement by the organization.

Modified: 5/19/10-passed

Letters Certifying Compliance with IRS Filing Requirements

THOMPSON, DERRIG & CRAIG, P.C.
Certified Public Accountants

February 13, 2017

National Conference of Urban Entomology
Board of Directors
c/o Texas A&M University
Center for Urban and Structural Entomology
2143 TAMU
College Station, TX 77843-2143

Dear Board of Directors,

The organization's average annual gross receipts for the three-year period of 2014, 2015, and 2016 is $49,368. Therefore a Form 990 is not required. A Form 990-N (the e-Postcard) has been electronically filed with the IRS for the 2016 tax year to notify the IRS that the organization's average annual gross receipts are under the $50,000 threshold.

Sincerely,

Dillard Leverkuhn, CPA

Woody Thompson, CPA/CFP | Ronnie Craig, CPA | Dillard Leverkuhn, CPA | Lyn Kuciemba, CPA | James Larkin, CPA
Peggy Adcock, CPA | Sandy Beavers, CPA | Alline Briers, CPA | Priscilla Butler, CPA | Gay Vick Craig, CPA | Kay Dobbins, CPA | Harrison Fox, CPA
Emily Hogan, CPA | Logan Kendrick, CPA | Alice Monroe, CPA | Esther Parra, CPA | A.J. Taylor, CPA | Marian Rose Varisco, CPA
1598 COPPERFIELD PARKWAY, COLLEGE STATON, TX 77845 979.260.9696 F: 979.260.9683 firm@tdccpa.com/www.tdccpa.com

Form **990-N**

Electronic Notice (e-Postcard) for Tax-Exempt Organization Not Required to File Form 990 or 990-EZ

2016

Electronic Filing Only – Do Not Mail

For the 2016 calendar year, or tax year beginning 1/01 **, 2016, ending** 12/31 **, 2016**

Check if applicable
☐ Termination

Organization name and address
NATIONAL CONFERENCE OF URBAN ENTOMOLOGY
2143 TAMU, TEXAS A&M UNIVERSITY
COLLEGE STATION, TX 77843-2143

Employer identification number
57-0802364

Telephone Number
(979) 845-5855

Other names the organization uses

Website:>

Check > ☒ if the organization's gross receipts are normally not more than $50,000 ($5,000 for a 509(a)(3) supporting organization)

Principal Officer Information	**Name**	LAURA NELSON
	Address	2143 TAMU COLLEGE STATION, TX 77843-2143

Form 990-N, also known as the e-Postcard, must be filed electronically with the Internal Revenue Service. There will be no paper form accepted by the Internal Revenue Service.

Do Not mail this form to the Internal Revenue Service.

TEEL0801L 06/16/16

Client 60350 - National Conference of Urban E EIN: 57-0802364
US: Even Return.....$0

Activity

US - ACCEPTED 02/13 (Current Status)
Submission ID: 7410532017044009eb9n

Previous Activity
- 02/13 Sent to the IRS
- 02/13 Received at Lacerte
- 02/13 Sent to Lacerte
- 02/13 Ready To Send
- 02/13 Passed Validation

THOMPSON, DERRIG & CRAIG, P.C.
Certified Public Accountants

1598 COPPERFIELD PKWY
COLLEGE STATION, TX 77845-4674
(979) 260-9696

January 31, 2018

National Conference of Urban Entomology
2143 TAMU, Texas A&M University
College Station, TX 77843-2143

Dear Client:

Your 2017 Electronic Notice (e-Postcard) for Tax-Exempt Organizations will be electronically filed with the Internal Revenue Service. No tax is payable with the filing of this return.

Please be sure to call us if you have any questions.

Sincerely,

Dillard Leverkuhn, CPA

Form **990-N**

Electronic Notice (e-Postcard) for Tax-Exempt Organization Not Required to File Form 990 or 990-EZ

2017

Electronic Filing Only– Do Not Mail

For the 2017 calendar year, or tax year beginning 1/01 , 2017, ending 12/31 , 2017

Check if applicable
☐ Termination

Organization name and address
NATIONAL CONFERENCE OF URBAN ENTOMOLOGY
2143 TAMU, TEXAS A&M UNIVERSITY
COLLEGE STATION, TX 77843-2143

Employer Identification number
57-0802364

Telephone Number
(979) 845-5855

Other names the organization uses

Website:>

Check > ☒ if the organization's gross receipts are normally not more than $50,000 ($5,000 for a 509(a)(3) supporting organization)

Principal Officer Information	**Name**	EDWARD VARGO
	Address	2556 F&B RD COLLEGE STATION, TX 77843-2143

Form 990-N, also known as the e-Postcard, must be filed electronically with the Internal Revenue Service. There will be no paper form accepted by the Internal Revenue Service.

Do Not mail this form to the Internal Revenue Service.

TEEL0801L 07/06/17

Client 60350 - National Conference of Urban E EIN: 57-0802364
US: Even Return.....$0

Activity

US - ACCEPTED 01/31 (Current Status)
Submission ID: 74105320180310O2v168

Previous Activity
- 01/31 Sent to the IRS
- 01/31 Received at Lacerte
- 01/31 Sent to Lacerte
- 01/31 Ready To Send
- 01/31 Passed Validation

THOMPSON, DERRIG & CRAIG, P.C.
Certified Public Accountants

February 1, 2018

National Conference of Urban Entomology
Board of Directors
c/o Texas A&M University
2143 TAMU
College Station, TX 77843-2143

Dear Board of Directors,

The organization's average annual gross receipts for the three-year period of 2015, 2016, and 2017 is $26,298. Therefore a Form 990 is not required. A Form 990-N (the e-Postcard) has been electronically filed with the IRS for the 2017 tax year to notify the IRS that the organization's average annual gross receipts are under the $50,000 threshold.

Sincerely,

Dillard Leverkuhn, CPA

Woody Thompson, CPA/CFP | Ronnie Craig, CPA | Dillard Leverkuhn, CPA | Lyn Kuciemba, CPA | James Larkin, CPA
Peggy Adcock, CPA | Sandy Beavers, CPA | Alline Briers, CPA | Priscilla Butler, CPA | Kyle Cox, CPA | Gay Vick Craig, CPA | Kay Dobbins, CPA
Harrison Fox, CPA | Emily Hogan, CPA | Logan Kendrick, CPA | Alice Monroe, CPA | Esther Parra, CPA | A.J. Taylor, CPA | Marian Rose Varisco, CPA
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2020(2021) Attendee List

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