

SOUTHERN INSECT MANAGEMENT  
RESEARCH UNIT  
**USDA-ARS**  
**Mid South Area**

### Mission

- *The mission of the Southern Insect Management Research Unit (SIMRU) is to generate new knowledge of arthropod pest biology, ecology and management and integrate this knowledge into contemporary farming systems that will promote economical and environmentally stable pest management practices for the southern U.S.*
- *The vision of SIMRU is to be a recognized center of innovation for negating agricultural pest problem through deployed scientific knowledge of pest biology, ecology and management options.*

### CRIS PROJECT

**Insecticide Resistance Management and New Control Strategies for Pests of Corn, Cotton, Sorghum, Soybean, and Sweetpotato**

PROJECT INVESTIGATORS

- Clint Allen
- **Ryan Jackson (Project Leader)**
- Randall Luttrell
- OP Perera
- Gordon Snodgrass
- Yu Cheng Zhu

### CRIS PROJECT

**Control of Tarnished Plant Bugs by Biocontrol and Other Methods**

PROJECT INVESTIGATORS

- Randall Luttrell
- Maribel Portilla
- **Gordon Snodgrass (Project Leader)**

## CRIS PROJECT

Effect of Resistance on Insect Pest Management in Transgenic Cotton

### PROJECT INVESTIGATORS

- Clint Allen
- Ryan Jackson
- Randall Luttrell
- OP Perera (Project Leader)

## NEW PUBLICATION CONGRATULATION DR. YU CHENG ZHU

OPEN ACCESS Freely available online



### Microarray Analysis of Gene Regulations and Potential Association with Acephate-Resistance and Fitness Cost in *Lygus lineolaris*

Yu Cheng Zhu<sup>1,2</sup>, Zhibiao Guo<sup>1</sup>, Yueping He<sup>1</sup>, Randall Luttrell<sup>1</sup>

<sup>1</sup> Louisiana State University Research Unit, Agricultural Research Service, United States Department of Agriculture, Baton Rouge, Louisiana, Mississippi, United States of America, <sup>2</sup> State Key Laboratory Breeding Base for Insect Pest Control Biology, Plant and Disease Control Institute of Plant Protection and Microbiology, Zhejiang Academy of Agricultural Sciences, Hangzhou, Zhejiang, People's Republic of China

#### Abstract

The tarnished plant bug has become increasingly resistant to organophosphates in recent years. To better understand acephate resistance mechanisms, biological, biochemical, and molecular experiments were systematically conducted with susceptible (L1S) and acephate-selected (L1R) strains. Selection of a field population with acephate significantly increased resistance ratio to 5.9-fold, coupled with a significant increase of esterase activities by 2.6-fold. Microarray analysis of 6,628 genes revealed 329 up- and 323 down-regulated (≥2-fold) genes in L1R. Six esterase, three P450, and one glutathione S-transferase genes were significantly up-regulated, and no such genes were down-regulated in L1R. An unligandase and eggplant protein genes were significantly down-regulated in L1R. Thirteen protease genes were significantly down-regulated and only 3 were up-regulated in L1R. More than twice the number of catalytic genes and more than 3.6-fold of metabolic genes were up-regulated, respectively, as compared to those down-regulated with the same molecular and biological functions. The large portion of metabolic or catalytic genes with significant up-regulation indicated a substantial increase of metabolic depuration in L1R. Significant increase of acephate resistance, increases of esterase activities and gene expressions, and variable esterase sequences between L1S and L1R consistently demonstrated a major esterase-mediated resistance in L1R, which was functionally provable by abolishing the resistance with esterase inhibitors. In addition, significant elevation of P450 gene expression and reduced susceptibility to imidacloprid in L1R indicated a concurrent resistance risk that may impact other classes of insecticides. This study demonstrated the first association of down-regulation of reproductive and digestion-related genes with resistance to conventional insecticides, suggesting potential fitness costs associated with resistance development. This study shed new light on the understanding of the molecular basis of insecticide resistance, and the information is highly valuable for development of chemical control guidelines and tactics to minimize resistance and cross-resistance risks.

## SEMINAR June 20, 2012 NBCL Conference Room 10:00 a.m.

"Biodiversity and community structure of insects associated with Common Salvinia (*Salvinia minima* Baker) and its biological control with *Cyrtobagous salviniae*"



Dr. Katherine Parys  
Louisiana State University  
Department of Entomology  
Baton Rouge, LA

## Outreach Les Price



- Assisted 5 beekeepers with stinging bee colonies
- Assisted with the removal of 9 bee swarms for public safety
- Presented a presentation on pollination and beekeeping to ~50 to 75 students and volunteers at the Memphis Master Gardeners Youth Summer Camp



## JUNE BIRTHDAYS CELEBRATION

Kenya, Emily, Julian, Donny, and Cavishia



## WEDDING ANNOUNCEMENT



*Mr. and Mrs. Andrew Wilson  
request the honor of your presence at  
the marriage of their daughter*

*Carley Andrea Wilson  
to  
Corey Ashton Douglas*

*son of  
Mr. and Mrs. Chad Summers*

*June Twenty-Third  
Two Thousand and Twelve  
at Two O'Clock in the Afternoon*

*Maples Memorial United Methodist Church  
8745 Goodman Road  
Olive Branch, MS*



## ATTENTION SIMRU SUMMER STEP STUDENTS



All SIMRU (**SUMMER**) STEP Students are to park in the north gravel parking lot by the swing place

**No Exceptions!!!**

## ATTENTION Summer Employee Safety Orientation

- B.F. Smith Auditorium
- June 29, 2012 from 8:30 a.m. to 12:00 p.m.
- All SIMRU summer employees are required to attend



### SIMRU's 2012 STEP Employees



3<sup>rd</sup> row (L to R) Thomas Sherman, Julian Beamon, Julian Henry, Dustin Picklemann, Frank Chandler, and John Austin Coleman  
2<sup>nd</sup> row (L to R) Andrea McNish, Jesse King, Bailey Tubertini, Christopher Morris, Emily Mosow, Russel Godbold, David Liang, and Maria Benavides  
1<sup>st</sup> row (L to R) June Jones, Laura Sipes, Cavishia Robinson, Rebecca Worsham, Jana Slay, Jordan Tullos, and Padmapriya Chatakondi  
Not pictured: Flenadia Moore, Dquan Wilson, Sydney Holleman, Darshanisha Warren, Ari Esters, and Taylor Dobbins

### Dr. Clint Allen's Summer Workers



David Liang and Laura Sipes

### Dr. O. P. Perera's Summer Workers



Padmapriya Chatakondi  
Not pictured: Darshanisha Warren and Ari Esters

### Dr. Gordon Snodgrass' Summer Workers



Jordan Tullos  
Not pictured: Sydney Holleman

### Dr. Ryan Jackson's Summer Workers



Back: Julian Henry, Dustin Piskelmann, and Frank Chandler,  
Front: Emily Mosow, Jana Slay, Russell Godbold, and John Austin Coleman

### Larry Adams' Summer Workers



Julian Beamon, Bailey Tubertini, Christopher Morris,  
and Thomas Sherman

### Dr. Randall Luttrell's Summer Workers



Andrea McNeal, Jesse King, Cavishia Roberson, and  
Dquan Wilson  
Not pictured: Taylor Dobbins

### Dr. Maribel Portilla's Summer Workers



Flenadia Moore, Maria Benavides, and June Jones

**Dr. Yu Cheng Zhu's Summer  
Workers**



Rebecca Worsham