

USDA-ARS Mid South Area

SOUTHERN INSECT MANAGEMENT
RESEARCH UNIT

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 CONGRATULATIONS

Dr. OP Perera

ARTICLE IN PRESS
Journal of Invertebrate Pathology xxx (2014) xxx-xxx
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Journal homepage: www.elsevier.com/locate/jip

The complete genome sequence of a single-stranded RNA virus from the tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois)
Omathage P. Perera^{a,*}, Gordon L. Snodgrass^a, Kerry C. Allen^a, Ryan E. Jackson^a, James J. Becnel^{b,1}, Patricia F. O'Leary^c, Randall G. Luttrell^d

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ABSTRACT
The complete genome sequence of a single-stranded RNA virus infecting the tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), was identified by sequencing cDNA prepared from insects collected from the Mississippi Delta. The 1055 nucleotide positive-sense single-stranded RNA genome of the *L. lineolaris* single-stranded RNA virus (LNV-1) contained a single open reading frame of 808 nucleotides encoding a 268kDa capsid protein. The open reading frame was flanked by conserved regions of 423 and 499 nucleotides. The 5' and 3' ends of the genome were highly conserved. The 5' and 3' non-coding regions were used to identify four capsid proteins (VP1-VP4), beta- and alpha-ATPase, cytosine proteinase (CP), proteinase 2A, and the structural RNA polymerase (Rp19). In addition, a region with weak similarity to the myristic structural maintenance of chromosomes (SMC) domain was identified near the amino terminal of the polyprotein and adjacent to the VP1 domain. The amino acid sequence of LNV-1 was approximately 44.4% similar to that of sacbrood virus (SBV) of the honey bee. The genome organization of both viruses showed remarkable similarity with the exception of highly divergent amino acid regions. Analysis of the conserved structural domains revealed that the polyprotein region, which contains the VP1 gene, was similar to the genome organization and amino acid sequence with the viruses of the family Phlebotomidae suggesting that LNV-1 was a novel member of this family. Virus particles were 29 nm in diameter and appeared to transmit vertically via eggs. Although this virus may only cause covert infections under normal conditions, the potential for using this virus as a biological control agent is discussed.
Published by Elsevier Inc.

NEW PUBLICATION CONGRATULATIONS

Dr. Yu Cheng Zhu

OPEN ACCESS freely available online PLUS ONE

Down Regulation of a Gene for Cadherin, but Not Alkaline Phosphatase, Associated with Cry1Ab Resistance in the Sugarcane Borer *Diatraea saccharalis*
Yunlong Yang¹, Yu Cheng Zhu^{2,*}, James Ortea³, Claudia Husseneder⁴, B. Rogers Leonard⁵, Craig Abel^{6,7}, Randall Luttrell⁸, Fangping Huang⁹

¹Department of Entomology, Louisiana State University Agricultural Center, Baton Rouge, Louisiana, United States of America; ²Insect Pest Management Research Unit, Agricultural Research Service, United States Department of Agriculture, Stoneville, Mississippi, United States of America; ³ICM Research and Crop Genetics Research Unit, Agricultural Research Service, United States Department of Agriculture, Ames, Iowa, United States of America

Abstract
The sugarcane borer, *Diatraea saccharalis*, is a major target pest of transgenic corn expressing Bacillus thuringiensis (Bt) proteins (i.e., Cry1Ab) in South America and the mid-southern region of the United States. Evolution of insecticide resistance in such target pests is a major threat to the durability of transgenic Bt crops. Understanding the pest's resistance mechanisms will facilitate development of effective strategies for delaying or reducing insecticide resistance. Alterations in expression of cadherin and alkaline phosphatase (ALP) have been associated with the resistance in several species of pest insects. In this study, whether the activity and gene expression of ALP was associated with Cry1Ab resistance in *D. saccharalis*. Total ALP enzymatic activity was similar between Cry1Ab-susceptible (Cry1AB-SC) and resistant (Cry1AB-RR) strains of *D. saccharalis*. In addition, expression levels of three ALP genes were also similar between Cry1AB-SC and RR, and cDNA sequences did not differ between susceptible and resistant larvae. In contrast, altered expression of a single cadherin (DCAD1) was associated with the Cry1Ab resistance. Whereas cDNA sequences of DCAD1 were identical between the two strains, the transcript abundance of DCAD1 was significantly lower in Cry1AB-RR. To verify the involvement of DCAD1 in susceptibility to Cry1Ab, RNA interference (RNAi) was employed to knock-down DCAD1 expression in the susceptible larvae. Down-regulation of DCAD1 expression by RNAi was functionally coincided with a decrease in Cry1Ab susceptibility. These results suggest that down-regulation of DCAD1 is associated with resistance to Cry1Ab in *D. saccharalis*.

Chattam Y, Zhu Y, Ortea J, Husseneder C, Leonard BR, et al. (2013) Down Regulation of a Gene for Cadherin, but Not Alkaline Phosphatase, Associated with Cry1Ab Resistance in the Sugarcane Borer *Diatraea saccharalis*. PLoS ONE 8(10): e76786. doi:10.1371/journal.pone.0076786

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Competing Interests: The authors have declared that no competing interests exist.

* Yu Cheng Zhu is a PLOS ONE Fellow.

NEW PUBLICATION CONGRATULATIONS

Dr. Clint Allen

Temporal and Spatial Distribution of *Helicoverpa zea* and *Heliothis virescens* (Lepidoptera: Noctuidae) Moths in Pheromone Traps across Agricultural Landscapes in Arkansas¹

K. Clint Allen² and Randall G. Luttrell

USDA-ARS Southern Insect Management Research Unit, 141 Experiment Station Road, Stoneville, Mississippi 38776 USA

J. Invertebr. Pathol. 94(4): 399-403 (October 2013)

Abstract Pheromone trap captures of *Helicoverpa zea* (Boddie) and *Heliothis virescens* (F.) from 2002 - 2005 were used to examine the distribution of these species across a multiple crop environment in southeast Arkansas. The greatest number of *H. virescens* moths was collected during 2003, but densities were low compared with *H. zea* throughout the study. Overall, fewer *H. virescens* moths were captured near to Bt corn and Bt cotton than near to nonBt cotton and early-maturing soybean. A significant relationship was not detected between pheromone trap captures of *H. virescens* and the percentage of these moths that fed on cotton as larvae. More *H. zea* moths were captured in traps located near to Bt corn and nonBt corn during the month of June than in traps located near to cotton, soybean, or soybean, whereas traps located adjacent to early- and late-maturing varieties of soybean, Bt cotton, nonBt cotton, and grain sorghum captured greater numbers of moths than those traps located near to corn during July. Therefore, the distribution of *H. zea* appeared to be influenced by corn acreage during the month of June. Later in the season, this species was widely distributed across the agricultural landscape. Compared with other regions of AR, fewer *H. zea* moths were captured during the month of June and more *H. virescens* moths were captured during August in Mississippi Co., an area of intense cotton production.

Columbus Day October 10th

- Columbus Day is a U.S. holiday that commemorates the landing of Christopher Columbus in the New World on October 12, 1492



OCTOBER BIRTHDAYS CELEBRATION

Roise and Phil



SOUTHERN INSECT MANAGEMENT RESEARCH UNIT

OVER ACHIEVER CLUB

GOING ABOVE AND BEYOND

- We would like to take this time to thank all those who went the extra mile this fiscal year.
- For their efforts the individuals in this group received a spot award during FY2011.



We All Are Scientist (Awarded by Dr. Perera)

- Calvin Pierce – Timely, diligent actions that preserved the integrity of highly valuable research material
- Gerald Gipson – Outstanding technical assistance in characterizing and new strain of the entomopathogenic fungus *Beauveria bassiana*
- Tabatha Ramsey - Outstanding technical assistance in characterizing and new strain of the entomopathogenic fungus *Beauveria bassiana*



Building 10 Clean Out Volunteers (Awarded by Dr. Luttrell)

- | | |
|-----------------------|----------------|
| Padmapriya Chatakondi | Tabatha Ramsey |
| Kenya Dixon | Chad Roberts |
| Rosie Ford | Amanda Walters |
| Lily Luo | Cathy Warren |
| Sakinah Parker | Sandra West |
| Calvin Pierce | Essanya Winder |
| OP Perera | Yu Cheng Zhu |



Building 10 Clean Out Volunteers (con't) (Awarded by Dr. Luttrell)

- | | |
|-----------------|-----------------------|
| • Donny Adams | • Ryan Jackson |
| • Larry Adams | • Christopher Johnson |
| • Lou Andrews | • Arnell Patterson |
| • Cody Burns | • Logan Phillips |
| • Corey Douglas | • Phil Powell |
| • Owen Houston | • Henry Winters |



Collateral Duty (Awarded by Dr. Luttrell)

- Kenya Dixon – For superior leadership and organization of unit-wide safety programs and research support inventories
- Chris Johnson – For leadership and representation of the SIMRU on the Location Modernization and Communication Committee
- Les Price – For leadership and service on the Location Chemical Inventory Committee



Substitute IT Support (Awarded by Dr. Luttrell & C. Warren)

- Dustin Pickelmann
 - Julian Henry
 - Logan Phillips
 - Sakinah Parker
- For serving as substitute IT support while SIMRU's IT Specialist was on extended sick leave
 - For serving as the liaison with the Area IT department while SIMRU's IT Specialist was on extended sick leave



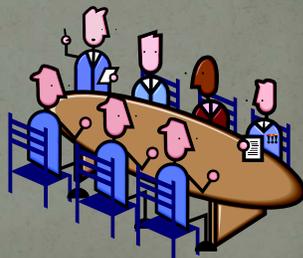
Insect Rearing Room Construction (Awarded by Dr. Luttrell)

- Owen Houston
- Phil Powell



Summer Employee Screening Committee (Awarded by Dr. Luttrell)

- Donny Adams
- Carlean Horton
- Chris Johnson
- Sakinah Parker



Summer Employees Interview Committee (Awarded by Dr. Luttrell)

- Kenya Dixon
- Ryan Jackson
- Sandra West
- Yu Cheng Zhu



2011 STEP Employee Report Seminar (Awarded by Dr. Luttrell)

- Julian Beamon
- Parker Brocato
- Antia Cain
- Corey Douglas
- D'Anice Dishmon
- Julian Henry
- Nicholas Holmes
- Jesse King
- Tashanika Knight
- David Liang
- Gwen Lee
- Dana May
- Michael McCain



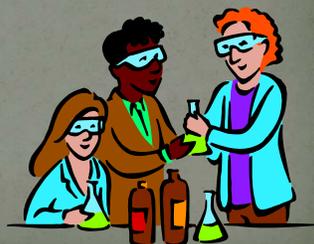
2011 STEP Employee Report Seminar (con't) (Awarded by Dr. Luttrell)

- Flenadia Moore
- Chris Morris
- Emily Mosow
- Breanna Pennington
- Dustin Pickelmann
- Shelby Reister
- Cavishia Roberson
- Chastity Scott
- Thomas Sherman
- Jana Slay
- Latoyia Slay
- Jordan Tullos
- Bailey Tubertini
- Jasmine Warren



2011 Summer Employees Mentors (Awarded by Dr. Luttrell)

- Clint Allen
- Kenya Dixon
- Gerald Gipson
- Ryan Jackson
- Larry Adams
- OP Perera
- Maribel Portilla
- Tabatha Ramsey
- Gordon Snodgrass
- Yu Cheng Zhu



Collateral Duty (Awarded by Dr. Luttrell)

- Cathy Warren – For Mentoring of the new Catfish Genetics Program Support Assistant



- Yolanda Harvey – For creativity and assistance in compiling video records of STEP student presentations

**FY 2011
CONGRATULATIONS**

*Well done to All!!!
The fruit of your labor is
sweet,
and SIMRU must say you
deserve it.*

CONGRATS.....

SERVICE AWARDS

- Gerald Gipson (40 years)
- Dr. Gordon Snodgrass- (25 years)
- Kenya Dixon- (10 years)



2011 Mid-South Office Professional of the Year

Cathy Warren

*For outstanding administrative leadership, creative
information management and encouragement of a
professional image within the Southern Insect Management
Research Unit.*



**TABATHA RAMSEY
&
DR. O.P. PERERA**

Congrats Clint Allen!!!!

President of the Mississippi Entomological Society



Awarded a \$7,000 grant from the United Soybean Board



Dr. Maribel Portilla

- July 2011, Dr. Portilla filled one of the vacant Research Entomologist positions within the unit.

Congratulations!!!!!!