Plant Path

| U.S. Department of Agriculture<br>**Accomplishments Report AD-421**<br>U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions | | | Date (Month, Day, Year)<br>03/22/2012 |
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| 1. Accession<br>0224155 | Agency Identification No.<br>2. NIFA 3. LA.B | 5. Work Unit/Project No.<br>**LAB94070** | 6. Status<br>**Annual Report** |

7. Title

Biology and Control of Sugarcane Diseases

12. Investigator Name(s) (Last Name and Initials)

Hoy, J. W.

| 20. Termination Date 09/30/2015 | 40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011 |
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Outputs:

Research was conducted on multiple pathogens and diseases affecting Louisiana sugarcane, graduate student training was provided, healthy seedcane programs were supported through disease testing and operation of a local quarantine, and research results were disseminated to appropriate target audiences through an extension outreach program. Graduate training was provided to one PhD student and two MS students. Participation in conferences included the American Society of Sugar Cane Technologists and the American Phytopathological Society Field Crops Rust Symposium. Research results were disseminated to County Agents through two training sessions, to Louisiana Agricultural Consultants, and to sugarcane growers through field days and electronic and print media.

Outcomes/Impacts:

Experiments evaluated whether inoculation under controlled conditions could be used to determine brown rust resistance levels in the sugarcane variety selection program, evaluate the efficacy of fungicides for brown rust management, determine the tolerance of new varieties to billet planting, if chemical control of stalk rot could improve billet planting yields, the molecular basis of resistance to leaf scald, and whether a quantitative, real-time polymerase chain reaction assay could provide an alternative resistance screening method, and evaluate resistance to smut and leaf scald in the variety selection program. In addition, testing for ratoon stunt and yellow leaf supported the tissue culture seedcane certification program and healthy seedcane programs for the Louisiana sugarcane. A local quarantine was provided healthy source material for the commercial tissue culture seedcane companies. Variable levels of rust severity were obtained in a collection of current parents using inoculation under controlled conditions. This inoculation approach provides more reliable information about potential parent brown rust resistance levels that will allow better cross selection in the sugarcane variety development program. Inoculation of seedlings offered a method to obtain information about cross performance. Evaluation of billet planting tolerance indicated differences among varieties, and breeding and selection may provide a long-term solution. Chemical control of stalk rots has improved yields and offers the potential to reduce the planting rate and high cost of billet planting. Quantitative real-time polymerase chain reaction can distinguish resistant and susceptible varieties to leaf scald and may provide an alternative method for resistance screening. Proteins differentially regulated during infection by the leaf scald pathogen, Xanthomonas albilineans, indicated resistance is an induced systemic response. Molecular markers for more effective selection of resistance may be developed from the proteins associated with resistance. Inoculated tests for smut and leaf scald are an on-going component of the interdisciplinary breeding program that will support development of disease resistant varieties with improved agronomic potential. The availability of healthy vegetative planting material is the most important method to control sugarcane diseases after varietal resistance.

Publications:

Gravois, K., Bischoff, K.P., Pontif, M.J., LaBorde, C.M., Hoy, J.W., Reagan, T.E., Kimbeng, C.A., Legendre, B.L., Hawkins, G.L., Sexton, D.R., and Fontenot, D.P. 2011. Registration of L 01-299 sugarcane. J. Plant Reg. 5:191-195.

Hoy, J. 2011. The challenge of plant cane in a temperate climate. Sugar J. 73(11):22-23,25.

Hoy, J.W., Savario, C.F., Arceneaux, A.E., and Barrera, W.A. 2011. Effects of cultivar and environmental conditions on billet planting tolerance. J. Amer. Soc. Sugar Cane Technol. 31:1-14.

Savario, C.F., and Hoy, J.W. 2011. Microbial communities in sugarcane soils with and without a sugarcane cropping history. Plant and Soil 341:63-73. DOI 10.1007/s11104-010-0622-9

Participants:

Jeff Hoy (PI), M. Pontif, K. Gravois, C. Kimbeng, M. Pontif, N. Baisakh, Z. Chen, C. Savario, F. Garces, A. Gutierrez, C. Avellaneda, LSU AgCenter; Partner Organizations included: USDA-ARS Sugarcane Research, Houma, LA, and the Louisiana Department of Agriculture and Forestry.

Target Audiences:

The project target audience was all parties associated with the production of sugarcane in Louisiana and graduate training in plant pathology in the Department of Plant Pathology and Crop Physiology. Graduate training consisted of research supervision, formal classroom instruction, laboratory instruction, and a practicum. Extension efforts targeting sugarcane extension agents and growers consisted of disseminating research results through oral presentations at Cooperative Extension meetings, web-site based information, and print publications. High school biology teachers and students were the target audience for a two-week teaching component of a NIFA-AFRI grant.

Project Modifications:

Nothing significant to report during this reporting period.

| Approved (Signature) | Title | Date |
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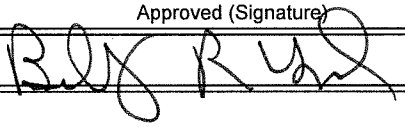
|  | | |