

Plant Path

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7. Title Biology, Control and Risk Management of Soybean Diseases in Louisiana			
12. Investigator Name(s) (Last Name and Initials) Schneider, R. W.			
20. Termination Date 09/30/2013		40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011	
Outputs: These projects resulted in seven published abstracts, three published proceedings, two popular press articles, and one refereed journal paper currently in print.			
Outcomes/Impacts: Findings confirmed an extended latent period after infection of soybean leaves by the <i>Cercospora</i> leaf blight pathogen, <i>Cercospora kikuchii</i> . Fungicide efficacy is greatly impacted by when the fungicide is applied relative to time of infection, this research demonstrated that a single application at first flower was the most efficacious treatment. An 18% yield loss was attributed to <i>Cercospora</i> leaf blight in these experiments. PCR assays used to quantify infection by the <i>Cercospora</i> leaf blight pathogen allowed us to rank fungicides for efficacy and to monitor their residual activity. Triazole fungicides were superior to other chemistries for management of <i>Cercospora</i> leaf blight. Foliar applications of iron significantly reduced disease severity and physiological concentrations of iron in agar media suppressed cercosporin biosynthesis by the pathogen. Field and laboratory experiments documented that <i>Simplicillium lanosoniveum</i> increases in population on soybean leaf surfaces in response to the presence of urediniospores of the soybean rust pathogen. Active pustules are not required to support phylloplane populations of this organism; however, its population increases dramatically after pustules emerge from infected leaf surfaces. The net effect is a reduction in numbers of pustules per unit area, a reduction in spores per uredinium, and accelerated aging of rust spores in the uredinium. Microscopic studies revealed that <i>S. lanosoniveum</i> is a mycoparasite as opposed to being a colonist of uredinia. Currently used molecular diagnostic assays for <i>P. pachyrhizi</i> resulted in false positive and false negative findings. These erroneous results could lead to unnecessary and costly fungicide applications, or, in the case of false negatives, producers would not receive adequate warnings of an imminent severe outbreak of soybean rust. These alerts are used to decide whether or not to apply protectant fungicides on millions of acres of soybeans. In addition, Mississippi Valley and Atlantic Seaboard populations of <i>P. pachyrhizi</i> are found to be different, and explains why breeding lines display different resistance patterns in Florida as compared with Louisiana. It is likely that the Atlantic Seaboard population originates in south Florida or the Caribbean Basin, while the Mississippi Valley population originates in Central and South America.			
Publications: Chanda, A. K., Chen, Z., and Schneider, R. W. 2011. Functional characterization of two genes involved in cercosporin biosynthesis in <i>Cercospora kikuchii</i> . <i>Phytopathology</i> 101:S30. Chanda, A. K., Chen, Z., and Schneider, R. W. 2011. The roles of light induced proteins in the biosynthesis of cercosporin by <i>Cercospora kikuchii</i> . <i>Phytopathology</i> 101:S264. Padgett, G. B., Schneider, R. W., and Hollier, C. A. 2011. Soybean disease management. <i>Louisiana Agriculture</i> 54(2):10-12. Leonard, B. R., Boquet, D. J., Padgett, B., Davis, J. A., Schneider, R. W., Griffin, J. L., Valverde, R. A., and Levy, Jr., R. J. 2011. Soybean Green Plant Malady Contributing Factors and Mitigation. <i>Louisiana Agriculture</i> 54(2):32-34. Robertson, C. L., Ward, N. A., and Schneider, R. W. 2011. Chemical control of <i>Cercospora</i> leaf blight of soybean: Evaluation of fungicide efficacy and time of application. <i>Phytopathology</i> 101:S268. Rush, T.A., Schneider, R.W., Hartman, G.L., Hambleton, S., Ward, N.A., and Aime, M.C. 2011 Validation of diagnostic assays for <i>Phakopsora pachyrhizi</i> in the United States. <i>Inoculum</i> 62:45.			

Rush, T., Schneider, R. W., Aime, M. C., Ward, N. A. and Hambleton, S. 2011. Evaluation of the qPCR assay for *Phakopsora pachyrhizi*. Proceedings, Southern Soybean Disease Workers.

Rush, T. A., Schneider, R. W., Aime, M. C., Hartman, G. L., Hambleton, S., and Ward, N. A. 2011. Assessing the validity of diagnostic quantitative PCR assays for *Phakopsora pachyrhizi* and *P. meibomia*. *Phytopathology* 101:S157.

Schneider, R. W., Padgett, G. B., Bollich, P., and Romero, G. 2011. Yield loss models for several soybean diseases and development of a yield loss calculator. Proceedings, Southern Soybean Disease Workers.

Walker, D. R., Boerma, H. R., Phillips, D. V., Schneider, R. W., Buckley, J. B., Shipe, E. R., Mueller, J. D., Weaver, D. B., Sikora, E. J., Moore, S. H., Hartman, G. L., Miles, M. R., Harris, D. K., Wright, D. L., Marois, J. J., and Nelson, R. L. 2011. Evaluation of USDA soybean germplasm accessions for resistance to soybean rust in the southern United States. *Crop Science* 51:678-693.

Ward, N. A., Maruthachalam, K., Subbarao, K. V., Brown, M., Xiao, Y., Robertson, C. L., Giles, C. G., Schneider, R. W. 2011. Mycoparasitism of *Phakopsora pachyrhizi* by *Simplicillium lanosoniveum* and its effects on soybean rust: A microscopy study. Proceedings, Southern Soybean Disease Workers.

Ward, N. A., Robertson, C. L., Schneider, R. W., Warr, M. 2011. Effects of mineral nutrients on *Cercospora kikuchii* and *Cercospora* leaf blight in soybean. *Phytopathology* 101:S269.

Ward, N. A. and Schneider, R. W. 2011. Documentation of an extended latent infection period with *Phakopsora pachyrhizi* in soybean. *Phytopathology* 101:S269.

Ward, N. A., Schneider, R. W., and Aime, M. C. 2011. Colonization of soybean rust sori by *Simplicillium lanosoniveum*. *Fungal Ecology* 4:303-308.

Participants:

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Target Audiences:

Soybean producers and fellow scientists.

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date
		