U.S. Department of Agriculture
Work Unit Description AD-416
U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions

Date (Month/Day/Year): 08/06/2012

1. Accession No.	Agency Identifiers		5. Work Unit/Project No.	6. Status
	2. NIFA	3. LA.B	LAB94142	A = New Project

7. Title
Enhance Soybean Production through Understanding its Interactions with Phakopsora Pachyrhizi and Cercospora Kikuchii

8. Performing Organization 0647 - 2010
Plant Pathology & Crop Physiol
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution

10. Multistate Project No.

11. Cooperating States

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14. Project Type	15. Contract/Grant/Agreement No.	16. Amount	17. FY
Hatch			

18. Award Date (Month/Day/Year)	19. Start Date (Month/Day/Year)	20. Termination Date (Month/Day/Year)
	10/01/2012	09/30/2016

Goals/Objectives/Expected Outputs

The overall objectives are to identify soybean and fungal genes that are important in host pathogen interactions, and to enhance soybean resistance to infection by Phakopsora pachyrhizi and Cercospora kikuchii. For easy presentation, the detailed objectives are listed based on the diseases: I. Identify soybean and fungal genes that are important in soybean-P. pachyrhizi interactions. A. Continue characterizing infection induced host proteins to determine their role in host resistance against fungal infection; B. Identify rust resistance related proteins using near isogenic soybean lines; II. Identify host and fungal genes/proteins that are important in soybean-C. kikuchii interactions. A. Screening soybean lines for resistance to Cercospora leaf blight under Louisiana field conditions; B. Identify additional key genes involved in cercosporin toxin biosynthesis using proteomics; C. Determine their importance of fungal proteins in the infection of soybean.

Methods

For objective I, the following studies will be conducted to better understand the host pathogen interactions between soybean and Phakopsora pachyrhizi: A. Continue characterizing rust infection induced proteins to determine their role in host resistance. B. Characterize the differentially expressed proteins between resistant and susceptible soybean lines with or without soybean rust infections. C. Screening of soybean Near Isogenic Lines (NILs) using detached leaf assay and greenhouse inoculation for differences in their resistance to Louisiana soybean rust population. D. Identification of differentially expressed proteins using proteomics. For objective II: A. Screening soybean lines for resistance to Cercospora leaf blight under Louisiana field conditions through visual assessment, time course determination of fungal growth using real time PCR. B. Identify key proteins/genes involved in the biosynthesis of cercosporin or its regulation through proteomic comparison of cultures grown under light and dark conditions. C. Determine their importance of these light induced proteins/genes in the CLB biosynthesis or in pathogenesity through insertional mutagenesis.

23. Non-Technical Summary

This HATCH project proposal intends to enhance host resistance to two major fungal diseases of soybean in the southern US: soybean rust caused Phakopsora pachyrhizi and cercospora leaf blight caused by Cercospora kikuchii through better understanding of host-pathogen interactions at the molecular level. The soybean genes induced during rust infection or differentially expressed between resistant and susceptible soybean lines can be used in future studies to enhance soybean resistance to rust disease. The Cercospora genes involved in either

cercosporin toxin biosynthesis or in the infection of soybean identified in this proposed study can be used in the future to reduce the fungal pathogenicity on soybean.

24. Keywords

soybean; soybean rust; cercospora leaf blight; Phakopsora pachyrhizi; Cercospora kikuchii; Cercosporin; Proteomics; Insertional mutagenesis;

****** The Original signed document is on file at this institution. ******

Signature	Title	Date
Dept: Admin:	*Associate Director*	8-6-12