U.S. Wheat and Barley Scab Initiative
FY02 Final Performance Report (approx. May 02 – April 03)
July 15, 2003

Cover Page

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Year:	**FY2002 (approx. May 02– April 03)**
Grant Number:	**NA**
Grant Title:	**Fusarium Head Blight Research**
FY02 ARS Award Amount:	**$ 14,634**

Project

Program Area	**Project Title**	**USWBSI Recommended Amount**
CBC	Biological Control of Wheat Scab with the Endophytic Bacterium Bacillus mojavensis.	$15,000
	Total Amount Recommended	**$15,000**

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Principal Investigator **Date**

Project 1: Biological Control of Wheat Scab with the Endophytic Bacterium Bacillus mojavensis.

1. What major problem or issue is being resolved and how are you resolving it?

One major issue was the necessary shoring up of funds to complete the project that relied heavily on the use of the Ribotyper for bacterial recovery/identification from infected plants. This is a very costly ($2,500 per kit) but highly accurate procedure. We decided to use this method of identifying bacteria because of upcoming field trials, which require monitoring the bacterium and this was also a preliminary test to validate this procedure for potential use in field trials. The usual method uses an organism transformed with one of the reporter genes and would have been the more economical method, but this would require approval from FDA. Approval, if granted, would require more time than the experimental window that we had available to do the work. An alternative is to initiate the approval process well in advance of the field trials. However, in some of our trials we have experienced a slight but statistical difference when transformed bacteria are used for fungal protection and antagonism compared to the wild type stain. Thus, in-house funds were used to accommodate the use of the organisms of choice, the non-transformed strain.

2. What were the most significant accomplishments?

- Established that under greenhouse conditions, scab was significantly reduced on plants infected with the bacterial endophyte and that the yield of wheat was significantly the same as that in uninfected control. It was determined that the bacterium prevented the spread of infection in the head, generally referred to as Type 2 resistance. Infection, Type 1 resistance, was not inhibited. Scab was reduced within the range of 50 to 75%, which preliminarily appears to relate to variety. The wheat varieties included the highly susceptible Norm as a positive control, and four other varieties of wheat, two rated as being tolerant of scab and two as being susceptible to scab.
- Although not a component of scab research directly, we established that coating wheat seeds with the bacterial endophyte eliminated seedling blight caused by *Fusarium graminearum.*
- Established that all 7 commercial varieties of wheat were compatible with the bacterium, and that all showed a significant growth rate and yield response compared to plants not infected with bacteria.

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Peer-reviewed articles:

Bacon, C.W., and D. M. Hinton. 2002. Endophytic and biological control potential of *Bacillus mojavensis* and related species. Biol. Contol. 23:274-284

Bacon, C. W. and D. M. Hinton. 2003. Potential control for seedling blight of wheat with the bacterial endophyte *bacillus mojavensis.* Can. J. Bot. (submitted)

Technical Presentations:

Bacon, C. W. and D. M. Hinton. 2002. *Bacillus mojavensis*, a New Endophytic Bacterium with Biocontrol Potential of Plant Diseases and mycotoxin reduction. Florida Technology Transfer Showcase, U.S. Horticultural Research Laboratory, Fort Pierce, Florida, October 29.

Abstracts:

Bacon, C.W. and D. M. Hinton. 2001. Control of seedling blight in wheat by *Bacillus mojavensis.* Phytopathology. 91: Abstract S4.

Bacon, C. W. and D. M. Hinton.. 2002. Ribotyping as a means to delineate groups within the biocontrol bacterium *Bacillus mojavensis.* Phytopathology 92: Abstract S230.