

U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
July 15, 2002

Cover Page

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Year:	FY2001 (approx. May 01 – April 02)
Grant Number:	59-0790-0-061
Grant Title:	Fusarium Head Blight Research
FY01 ARS Award Amount:	\$ 6,814

Project

Program Area	Project Title	Requested Amount
Chem/Bio	Management of Fusarium head blight with biological control agents	\$ 9,400
	Total Amount Requested	\$ 9,400

Principal Investigator

Date

Project 1: Management of Fusarium head blight with biological control agents

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

- a) Starting in Fall of 2001, the greenhouses on the SDSU campus started to be renovated. The greenhouse we use in our USWBSI project was unavailable from winter of 2001 until late spring of 2002. This renovated greenhouse is available again for use, and is being used as much as practical in ground-bed and bench trials to test the efficacy of different bacteria in controlling FHB.
- b) Further trials have been and will be conducted in the greenhouse and in field plots with the *Bacillus* strains we have isolated and characterized in the lab, to evaluate their efficacy in controlling FHB.
- c) Our field plot results in the past have suffered from drought, insects, herbicide drift from other investigators, and/or lack of FHB development even in controls that should have developed severe disease. The insect and herbicide drift issues cannot be totally controlled and predicted, but will hopefully not be an issue again. The plots are equipped with a misting system, which should help encourage disease development. Greater amounts of disease inoculum will also be used in the field plots this year, to help assure that adequate inoculum is available to infect plants.

2. What were the most significant accomplishments?

- a) More attempts were made to identify the four *Bacillus* strains (designated 1B-A, 1B-C, 1B-E, and 1D-3) that we have used in most of our work at SDSU. The first 500 base pairs (bp) of each strain were sequenced and compared to other sequences in the 16S ribosomal DNA (rDNA) database. All four strains had identical sequences in the first 500 bp of their 16S rDNA, and were most closely related to *Bacillus amyloliquefaciens*, with less but significant relatedness to *Bacillus atrophaeus*. Analysis of membrane fatty acid methyl esters (FAME analysis) indicated that strains 1B-A and 1D-3 were *Bacillus lentimorbus*, and that strains 1B-E and 1B-C were *Bacillus subtilis*. This and other studies have found that FAME analysis will not necessarily agree with the results of 16S rDNA sequencing. These results do give us information to help evaluate the antibiotics and enzymes these strains might produce to antagonize FHB.
- b) Closer ties were made to other USWBSI investigators who are working with biocontrol agents to antagonize FHB. These included David Schisler (USDA-ARS, Peoria), and Gary Yuen (University of Nebraska, Lincoln) (both of whom visited SDSU and gave lectures about their research), and Gary Bergstrom (Cornell). We will share cultures of biocontrol agents with these other investigators, and grow cultures of their agents to apply to field plots in South Dakota in Summer of 2002.

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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.

Baye, N., and B. H. Bleakley. 2001. Identification (based on membrane fatty acid methyl ester analysis and partial sequencing of 16S ribosomal RNA) of bacterial strains used in the biological control of Fusarium Head Blight, abstract, p. 45. *In* 2001 National Fusarium Head Blight Forum, December 8-10, 2001. Cincinnati, OH.

Draper, M.A., B.H. Bleakley, K.R. Ruden, and N. Baye. 2001. Greenhouse screening of biological control agents for suppression of Fusarium Head Blight, abstract, p. 48. *In* 2001 National Fusarium Head Blight Forum, December 8-10, 2001. Cincinnati, OH.

Bleakley, B.H. 2002. Biological control of foliar and head diseases of wheat. AD-421 Progress Report (CRIS Report).