U.S. Wheat and Barley Scab Initiative
FY00 Final Performance Report (approx. May 00 – April 01)
July 30, 2001

Cover Page

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Year:	**FY2000 (approx. May 00 – April 01)**
Grant Number:	
Grant Title:	**Fusarium Head Blight Research**
2000 ARS Award Amount:	**$39,024**

Project

Program Area	Project Title	Requested Amount
Chemical & Biological Control	Optimization and field testing of biocontrol agents active against FHB.	$116,200.00
	Requested Total	$116,200.00[1]

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Principal Investigator Date

[1] Note: The Requested Total and the Award Amount are not equal.

Project 1: Optimization and field testing of biocontrol agents active against FHB.

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

This research is part of an ongoing investigation on the use of naturally occurring biological control agents to reduce the severity of Fusarium head blight (FHB) in wheat and barley. The overarching goal of this research is to develop key strategies and microorganisms that may ultimately play a vital role in the integrated management of FHB. The primary goals of this research were to optimize liquid culture fermentation conditions to maximize biocontrol agent activity and to subsequently evaluate the efficacy of biocontrol agents produced using the aforementioned liquid culture techniques in greenhouse bioassays and field tests in sites located in North Dakota, Illinois and Ohio. To accomplish these objectives, seven highly efficacious FHB biocontrol strains representing yeasts and *Bacillus* species were selected for media optimization studies. A defined medium was developed that allowed for nutritional control over metabolite accumulation. Medium composition factors such as carbon and nitrogen sources and C:N ratios were evaluated along with pH and O_2 effects. Biomass produced in media capable of promoting superior cell accumulation was tested for biocontrol efficacy in both greenhouse bioassays and field trials located in Peoria, IL, Wooster, OH, and Langdon, ND.

2. What were the most significant accomplishments?

A liquid culture nutrient medium was developed that produced antagonist biomass with enhanced efficacy when tested on durum wheat in both greenhouse and field efficacy trials. All 7 antagonists evaluated for biocontrol efficacy in 1998 and 1999 were screened in 2000 at Peoria, IL, Wooster, OH and Langdon, ND. All 7 biocontrol strains effectively reduced FHB severity on the winter wheat cultivar Pioneer 2545 (Peoria, IL and Wooster, OH) as compared to the buffer controls. FHB severity was reduced by as much as 65% (yeast OH 71.4). On tests on the more resistant winter wheat cultivar Freedom, disease severity was less than 1% in Peoria and no significant reduction was seen at Wooster. Results from the Langdon, ND site indicate that 2 of 6 antagonists reduced FHB severity compared to the noninoculated control on variety Russ, whereas 5 of the 6 antagonists reduced FHB severity on variety Grandin. Disease severity on variety Grandin was reduced by as much as 50% (yeast antagonist OH181.1).

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.

Khan, N.I., Schisler, D.A., Boehm, M.J., Slininger, P.J., and Bothast, R.J. 2000. Choline utilization, a method for screening organisms for biocontrol of Fusarium head blight of wheat incited by *Gibberella zeae*. Plant Dis. 84:(in press)

Schisler, D.A., Khan, N.I., Boehm, M.J., and Lipps, P.E. 2000. USDA-ARS, Ohio State University cooperative research on biologically controlling Fusarium head blight: Field tests of antagonists. pp. 105-109. *In:* Proceedings of the 2000 National Fusarium Head Blight Forum, Erlanger, KY, December 10-12.

Schisler, D.A., Khan, N.I., and Boehm, M.J. 2000. Biological control of scab of wheat incited by *Gibberella zeae*. pp. (*In press*). *In:* Proceedings of the 2000 Annual Meeting of the American Chemical Society, Washington D.C., August 20-24.

Khan, N.I., Schisler, D.A., Boehm, M.J., and Lipps, P.E. 2000. Biocontrol of Fusarium head blight (FHB) of wheat; influence of spray order of pathogen and antagonist inoculum, and field evaluation of antagonists. Phytopathology 90:S42.

Schisler, D.A., Khan, N.I., and Boehm, M.J. 2000. Application of naturally occurring yeasts and bacteria to reduce the severity of Fusarium head blight. Proceedings of the 3rd Annual National Wheat Industry Research Forum, pg 37.

MacNeil, J.S. 2000. Hungry fungi blight less wheat. ScienceNOW 823:3, (http://sciencenow.sciencemag.org - Verified September 17, 2000).