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

Cover Page

PI:	**Michael J. Boehm**
Institution:	**Ohio State University**
Address:	**Dept. of Plant Pathology** **2021 Coffey Rd.** **Columbus, OH 43210-1087**
Email:	**boehm.1@osu.edu**
Phone:	**614-292-6807**
Fax:	**614-292-4455**
Year:	**FY2001 (approx. May 01 – April 02)**
Grant Number:	**N/A**
Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 4,867**

Project

Program Area	Project Title	Requested Amount
Chem/Bio	Integrated management of FHB with biocontrol agents, fungicides and host resistance	$ 61,050
	Total Amount Requested	**$ 61,050**

_____

Principal Investigator Date

Project 1: Integrated management of FHB with biocontrol agents, fungicides and host resistance

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

Although an unprecedented research effort has been initiated in both the U.S. and Canada, commercially acceptable management of Fusarium head blight (FHB) remains elusive. Major strides in breeding and extension programs have greatly aided in the identification and eradication of extremely susceptible cultivars and attempts to develop new lines with superior levels of FHB resistance are being made. Efforts in the chemical management arena also have shown promise, however, efficacy remains inconsistent. Cultural practices such as crop rotation and a shift from reduced- to conventional-tillage practices are neither economically nor environmentally viable. Early reports regarding the use of biocontrol agents effective against FHB have been optimistic. The overall goal of our USDA-ARS and Ohio State University research program is to develop strategies and microorganisms to play a key role in the integrated management of FHB. There were two specific goals of this proposed research: 1) to evaluate the tolerance of our top *Bacillus* and *Cryptococcus* biocontrol strains, *in vitro*, to two fungicides (Folicur and BAS 500) that possess potential for reducing FHB and 2) to determine whether multiplexing applications of our *Bacillus* and *Cryptococcus* strains with applications of the most efficacious fungicides would enhance FHB control when applied to wheat cultivars differing in susceptibility to FHB.

2. What were the most significant accomplishments?

Growth of bacterial biocontrol agent OH 131.1 was little changed from controls in liquid culture or on agar culture when exposed to 200 ppm of fungicide BAS 505 or 100 ppm of fungicide Folicur 3.6 F. The fungicides, both in liquid culture and agar culture, reduced the growth of yeast antagonist OH 182.9. As little as 50 ppm Folicur 3.6 F and 100 ppm BAS 505 severely inhibited growth of OH 182.9.

Biocontrol agent OH 182.9 was more effective than OH 131.1 on susceptible cultivar Pioneer 2545 and resistant cultivar Freedom in a field trial at Wooster, OH. On cultivar Freedom, yeast OH 182.9 reduced disease severity by approximately 25% compared to the buffer control. Fungicides BAS 505 and Folicur both reduced disease severity by 30-35%. A combination of OH 131.1 and OH 182.9 reduced disease by more than 40%. On cultivar Pioneer 2545, the most successful treatments in reducing FHB severity were BAS 505, and a combination treatment of both biocontrol agents with BAS 505.

The lowest disease severity across the entire trial was a rating of 8.5% (compared to a control rating of 16.8% on Freedom and 40.0% on Pioneer 2545) when combining BAS 505 and biocontrol agent OH 182.9 on the more resistant cultivar Freedom. These results indicate the promise of multiplexing control options of biocontrol, fungicide, and resistant cultivars so as to maximize the level of FHB control obtained.

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.

Publications

Khan, N.I., Schisler, D.A., Boehm, M.J., Slininger, P.J., and Bothast, R.J. 2001. Selection and evaluation of microorganisms for biocontrol of Fusarium head blight of wheat incited by *Gibberella zeae*. Plant Dis. 85:1253-1258.

Schisler, D.A., Khan, N.I., Iten, L.B., and Boehm, M.J. 2001. USDA-ARS, Ohio State University cooperative research on biologically controlling Fusarium head blight:pilot-plant-scale production and processing of biomass of yeast antagonists. Proceedings of the 2001 National Fusarium Head Blight Forum, Erlanger, KY.

Schisler, D.A., Khan, N.I, and Boehm, M.J. 2002. Biological control of Fusarium head blight of wheat and deoxynivalenol levels in grain via use of microbial antagonists. Pages 53-69 in: Mycotoxins and Food Safety. J.W. DeVries, M.W. Trucksess, and L.S. Jackson, eds., Kluwer Academic/Plenum Publishers, New York.

Abstracts of presentations

Khan, N.I., Schisler, D.A., Boehm, M.J. Biocontrol of Fusarium head blight of wheat:effect of Tween-80, culture age of antagonist and combining antagonists on disease suppression. Phytopathology. 2001. v. 91:6 (suppl.):Abstract p. S48.

Schisler, D.A., Khan, N.I., Iten, L.B., Boehm, M.J. Scale-up of biomass production, processing and storage for two yeast antagonists of *Gibberella zeae*. Phytopathology. 2001. v 91:6 (suppl.):Abstract p. S80.

Schisler, D.A., Jackson, M.A., and Slininger, P.J. Discovering, developing and deploying biological control agents. 223rd ACS National Meeting, Orland, Florida, April 7-11, 2002.

Popular press articles/interviews

"Yeast debuts in test on controlling wheat scab", Agricultural Research Magazine, USDA-ARS, June 2001.