

U.S. Wheat and Barley Scab Initiative
Annual Progress Report
September 15, 1999
Cover Page

PI:	Gary Bergstrom
Institution:	Cornell University
Address:	Dept. of Plant Pathology 334 Plant Science Building Ithaca, NY 14853
Email:	gcb3@cornell.edu
Phone:	607-255-7849
Fax:	607-255-4471
Year:	FY1999
Grant Number:	59-0790-9-027
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$40,000.00¹

Program Area	Objective	Requested Amount
Chemical & Biological Control	Identify safe, effective fungicides for FHB through evaluation across of wheat and/or barley varieties grown in relevant environments.	\$4,000
Chemical & Biological Control	To identify other fungal antagonists, such as bacteria, that may be effective in controlling FHB when used as a heading time field spray, seed treatment, or residue treatment. Also, to examine other residue treatments that might interfere with perithecial development or spore release.	\$35,000
Chemical & Biological Control	Maintain information base on fungicide and application trials and on biological and residue treatment studies; collect and compile research data and reports, provide summaries of results.	\$1,000
Chemical & Biological Control	Develop and implement systems for disseminating research information in a timely fashion to producers.	\$1,000 (<i>not funded</i>)
	Requested Total	\$41,000

Principle Investigator

Date

¹ Note: The Requested Total and the Amount Granted are not equal.
(Form – PR1)

Project 1: Identify safe, effective fungicides for FHB through evaluation across of wheat and/or barley varieties grown in relevant environments.

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

There is a need for safe, affordable and efficacious foliar fungicides and bioprotectants in the integrated management of FHB. The objective was to develop a uniform set of fungicide treatments to be evaluated across a number of locations and crops, to achieve more information on potentially useful fungicides and bioprotectants to control FHB. Background and description of the Uniform Fungicide Trial is provided in the progress report by Marcia McMullen. In addition to standardized fungicide treatments, we also evaluated in the New York location a promising bacterial bioprotectant, *Paenibacillus macerans*, and the biocompatible fungicide potassium bicarbonate (Armicarb).

2. Please provide a comparison of the actual accomplishments with the objectives established.

We carried out all the procedures as outlined in the New York test location and produced a valuable data set on the effects of sprays on crop yield and quality, albeit in a season with extremely low disease pressure.

3. What were the reasons established objectives were not met? If applicable.

It was a drought year in New York. There was not sufficient natural moisture at flowering through grain formation to produce significant scab or foliar disease. We inoculated the plots with infected corn kernel inocula and plentiful ascospores were detected. This still did not result in disease under such very dry conditions. The experiment would have been aided greatly had irrigation equipment been available at the site. We did not have an adequate budget to pay for irrigation equipment. Such would be a worthwhile investment in the future.

4. What were the most significant accomplishments this past year?

We were able to demonstrate in a very dry year (NO DISEASE) that the fungicides and bioprotectants under evaluation exerted no negative effects on crop yield or quality. One exception that requires further examination may be Stratego at 14 fl oz/A which appeared to have a phytotoxic effect on yield (10 bu decrease, but not statistically significant). Our results demonstrate the need for irrigation to produce reliable results.

Project 2: To identify other fungal antagonists, such as bacteria, ...

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

One of the key issues in the development of efficient biocontrol agents is *adaptability*. Organisms which give good control in *in vitro* assays may be ineffective or unreliable under field conditions. For this reason, emphasis has been given in this project to the selection of organisms which are likely to be robust under harsh field conditions. Several bioassays have been employed to identify organisms which are tolerant to environmental stresses in addition to their ability to inhibit the fungus.

Binary combinations of biocontrol agents or combinations of one or more biologicals with fungal weakeners, elicitors, UV protectants, or a selective food base have been proposed as methods for boosting the efficacy of biocontrol agents. Complimentary organisms which differ in their mechanism of control (e. g. antibiosis vs. competition) or optimal growth requirements are expected to increase reliability under field conditions. A bioassay has been developed which allows for the evaluation of combinations of agents for their ability to inhibit growth of the pathogen.

2. Please provide a comparison of the actual accomplishments with the objectives established.

This project may be divided into 3 phases.

Phase 1 Isolation, preliminary characterization, and preservation of potential biocontrol organisms. Development of bioassays to characterize and screen accessions.

This phase is well underway.

Phase 2 Screening of culture collection and non-biological treatments using bioassays. Evaluating selected treatments on artificially infested stubble/maize grain over-wintered under ambient exterior environmental conditions for its effect on perithecial development and ascospore discharge. **Work on this phase has recently begun.**

Phase 3. Fall/Winter- Testing of the more promising treatments in the greenhouse. Spring 2000 - Inclusion of one or more of the most promising treatments in field tests on winter wheat.

To be accomplished.

3. What were the reasons established objectives were not met? If applicable.

Established objectives are being met in a timely manner.

4. What were the most significant accomplishments this past year?

In the 4 months that this project has been funded, we have accomplished the following:

A. Isolation, preliminary characterization, and preservation of approximately 120 candidate biocontrol organisms, from 70 different sources including agricultural material, wild grasses and sedges, and air-borne samples. We are also evaluating 14 promising biocontrol organisms provided by Dr. Wilmar Luz of EMBRAPA, Brazil.

B. Development of bioassays used to screen potential biocontrol agents. A number of bioassays have been adopted in order to efficiently evaluate a large number isolates and choose the most promising organisms and other treatments for inclusion in greenhouse and field trials.

C. We have co-authored a review article with a Brazilian colleague and research collaborator, Wilmar Corio da Luz, entitled, "PRESENT STATUS AND THEORETICAL ASPECTS OF THE BIOLOGICAL CONTROL OF *FUSARIUM GRAMINEARUM*."

Project 3: Maintain information base on fungicide and application trials and on biological and residue treatment studies; collect and compile research data and reports, provide summaries of results.

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

Information from across the participating states is being compiled and will be summarized at the 1999 National FHB Forum. New York results will be shared with New York growers, agribusiness and extension personnel.

2. Please provide a comparison of the actual accomplishments with the objectives established.

Summaries are being prepared now for the National Scab Forum and for individual states, including New York.

3. What were the reasons established objectives were not met? If applicable.

All objectives will be met by the time of the National FHB Forum in December 1999.

4. What were the most significant accomplishments this past year?

Results and accomplishments will be summarized by the time of the National FHB Forum in December 1999.

Project 4: Develop and implement systems for disseminating research information in a timely fashion to producers.

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

Our objective is to provide growers and product registration personnel with information on fungicide performance that they can utilize in a timely manner. More detail is given in the Progress Report by Marsha McMullen.

2. Please provide a comparison of the actual accomplishments with the objectives established.

Research results will be distributed to growers, extension personnel, and agribusiness this winter in time for making disease control decisions for cereal crops in 2000.

3. What were the reasons established objectives were not met? If applicable.

Objectives were met.

4. What were the most significant accomplishments this past year?

National accomplishments were reported by Marsha McMullen. The fungicide evaluation plots at Aurora, New York were featured at a June 1999 field day and were viewed by more than 75 people. Results from those trials and from other states will be shared with New York producers.

Year: 1999

Progress Report

PI: Gary Bergstrom

Grant: 59-0790-9-027

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.

None to date.