

**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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Grant Number:	59-0790-1-079
Grant Title:	Fusarium Head Blight Research
FY01 ARS Award Amount:	\$ 4,867

Project

Program Area	Project Title	Requested Amount
Chem/Bio	Biocontrol of scab with <i>Stenotrophomonas maltophilia</i> C3	\$ 10,353
	Total Amount Requested	\$ 10,353

Principal Investigator

Date

Project 1: Biocontrol of scab with *Stenotrophomonas maltophilia* C3

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

The bacterium *Lysobacter enzymogenes* strain C3 (formerly called *Stenotrophomonas maltophilia* strain C3) was found in previous studies to control foliar diseases of turfgrass under field conditions and to suppress certain foliar diseases of wheat in greenhouse experiments. The ability of C3 to inhibit *Fusarium* head blight (FHB), however, was unknown.

The objectives in this study were:

1. to determine whether or not C3 has the potential to control FHB in wheat;
2. to develop strategies for propagation and application of C3 in future field trials.

A series of greenhouse experiments were conducted to accomplish these objectives. Initially, C3 was cultured on TSA medium and in chitin broth. Cells from these two media were applied to 'Bobwhite' wheat heads at anthesis. Plants were then held overnight in 90-100 % relative humidity, inoculated with a sprayed suspension of *Fusarium graminearum* conidia, and then held in high humidity for another 48 hours. Disease severity in each inoculated head was assessed 9 days later. In later experiments, application parameters (i.e., dilutions of broth cultures, intervals between bacterial treatment and pathogen inoculation) were varied.

2. What were the most significant accomplishments?

- **C3 has found to suppress FHB in greenhouse tests.** C3 treatments reduced the percent of infected spikelets to less than 10 %, whereas the controls typically exhibited greater than 50% infected spikelets.
- **We found the most consistently effective treatment method to involve growing C3 in chitin broth and then applying the entire broth culture (cells and fluid).** Other treatments involving C3 (e.g. C3 cells alone collected from chitin broth cultures, cell-free fluid from chitin broth cultures, C3 cells produced on other media) also reduced FHB severity as compared to the controls, but the effectiveness of these other treatments varied from experiment to experiment. The effectiveness of the whole chitin broth culture could be related to a combination of antagonism by the cells and to the direct antifungal activity of enzymes and antibiotics excreted into the medium.
- **We found C3 chitin broth cultures potentially can be practical for field applications.** In greenhouse experiments, chitin broth cultures of C3 diluted over 100-fold were as suppressive to FHB as undiluted cultures. In addition, FHB was controlled with diluted C3 broth cultures even when the treatments were applied 7 days prior to pathogen inoculation. The results suggest there C3 chitin broth cultures can be tested in the field in relatively dilute form and have the potential to remain active on wheat heads throughout the most of the flowering period.

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.

Poster presented at 2001 Fusarium Head Blight Forum:

C.C. Jochum and G.Y.Yuen. Potential For Biological Control Of Fusarium Head Blight By *Lysobacter Sp.* Strain C3.

Published abstract:

Jochum, C.C. and Yuen, G.Y. 2001. Potential for biological control of Fusarium head blight by *Lysobacter sp.* strain C3. Proceedings of the 2001 National Fusarium Head Blight Forum, pg. 64.