

**U.S. Wheat and Barley Scab Initiative  
 FY02 Final Performance Report (approx. May 02 – April 03)  
 July 15, 2003**

**Cover Page**

<b>PI:</b>	<b>Ruth Dill-Macky</b>
<b>Institution:</b>	<b>University of Minnesota</b>
<b>Address:</b>	<b>Department of Plant Pathology      495 Borlaug Hall      1991 Upper Buford Circle      St. Paul, MN 55108</b>
<b>E-mail:</b>	<b>ruthdm@puccini.crl.umn.edu</b>
<b>Phone:</b>	<b>612-625-2227</b>
<b>Fax:</b>	<b>612-625-9728</b>
<b>Year:</b>	<b>FY2002 (approx. May 02– April 03)</b>
<b>Grant Number:</b>	<b>59-0790-9-031</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>FY02 ARS Award Amount:</b>	<b>\$ 68,429</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>USWBSI Recommended Amount</b>
EDM	Crop residues and the survival, production, and control of Fusarium inoculum.	\$70,140
	<b>Total Amount Recommended</b>	<b>\$70,140</b>

\_\_\_\_\_  
 Principal Investigator

\_\_\_\_\_  
 Date

**Project 1: Crop residues and the survival, production, and control of *Fusarium inoculum*.**

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

*Fusarium*-infested plant residues facilitate the survival and production of inoculum that initiates Fusarium head blight (FHB) epidemics. An understanding of the role of crop residues in the survival of the pathogen and production of primary inoculum is essential to evaluate management strategies aimed at the reduction of inoculum. While such strategies may include biological or cultural control practices, this project has focused on examining the epidemiology of *Fusarium graminearum* by using burning treatments, implemented between planting and crop emergence, to remove the *Fusarium*-infested crop residues. Our preliminary studies conducted in a previous USWBSI project indicated that populations of *F. graminearum* were significantly reduced following burning and resulted in lower FHB incidences (Dill-Macky and Salas, 2002; Dill-Macky and Salas, 2001). Further studies examining crop residues were conducted in 2002. One study, with experiments at two locations in Minnesota, examined the effect of burning on the production of primary inoculum, quantifying residue destruction and examining FHB severity of the crop in burned and control plots at maturity. A survey of soil populations of FHB pathogens in fifty Minnesota wheat fields was conducted to examine the impact of previous crop on *Fusarium* populations. Experiments at three Minnesota locations were also conducted to examine the impact of host resistance on inoculum production from the residues of cultivars developed with improved FHB resistance.

2. What were the most significant accomplishments?

- i) Studies confirmed that burning overwintered wheat residues following planting, but before crop emergence, did not affect stand establishment of either wheat or barley.
- ii) Burning decreased the amount of residues at the soil surface and reduced the incidence of *F. graminearum* (FG) in plots although in 2002 FHB levels were low in Minnesota and while differences were detected among treatments the differences were generally not significant.
- iii) We established that crop rotation influenced the populations of *Fusaria* present in soils. *F. graminearum* (FG) in the soils of fifty wheat fields ranged from 18 CFU/g to 1435 CFU/g. FG populations were highest following corn (1159 CFU/g), intermediate following wheat (642 CFU/g) and dry beans (497 CFU/g) and lowest following soybeans (356 CFU/g) and sugarbeets (341 CFU/g). Populations of *F. culmorum*, *F. sporotrichioides*, and *F. avenaceum* were also highest following corn.
- iv) The colonization of kernels by *F. graminearum* was affected by host genotype. Despite a significant cultivar by location interaction, the wheat cultivars, Alsen and Gunner had lower levels of *F. graminearum* colonization at all locations than Dandy, Norpro, 2375, Oxen, and AC Vista which were more highly colonized. The six-rowed barley lines MN109, MN110 and Lacey were generally more highly colonized by *F. graminearum* than Robust, Drummond, Foster, and Legacy. The two-rowed barley cultivar Conlon, had the lowest incidence of *F. graminearum* of the barley lines tested. This data suggests that the colonization of residues by *F. graminearum* may be influenced by host genotype, inoculum availability, and site-specific environmental conditions.

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.

Salas, B., Dill-Macky, R., and Wilhelm, K.P. (2003). Previous crop affecting soil populations of *Fusarium* head blight pathogens in Minnesota. *Phytopathology*, **93**:S75.

Dill-Macky, R., and Salas, B. (2002). Effect of cereal residue burning on incidence and stratified distribution of *Fusarium graminearum* and *Cochliobolus sativus* in wheat and barley plants. In: *Proceedings of the 2002 National Fusarium Head Blight Forum*, Erlanger, Kentucky, USA, December 7-9, 2002, p. 140.

Salas, B., Dill-Macky, R., and Wiersma, J.J. (2002). Incidence of *Fusarium graminearum* and *Cochliobolus sativus* in wheat and barley cultivars at three locations in Minnesota. In: *Proceedings of the 2002 National Fusarium Head Blight Forum*, Erlanger, Kentucky, USA, December 7-9, 2002, p. 177.

Dill-Macky, R., and Salas, B. (2002). Effect of cereal residue burning on incidence and stratified distribution of *Fusarium graminearum* and *Cochliobolus sativus* in wheat and barley plants. *Phytopathology*, **92**:S20.