

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

**Cover Page**

<b>PI:</b>	<b>Ruth Dill-Macky</b>
<b>Institution:</b>	<b>University of Minnesota</b>
<b>Address:</b>	<b>Dept. of Plant Pathology 495 Borlaug Hall St. Paul, MN 55108</b>
<b>Email:</b>	<b>ruthdm@puccini.crl.umn.edu</b>
<b>Phone:</b>	<b>612-625-2227</b>
<b>Fax:</b>	<b>612-625-9728</b>
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<b>FY01 ARS Award Amount:</b>	<b>\$ 59,381</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Epid/Dis. Mgt.	Crop residues and the survival, production, and control of Fusarium inoculum	\$ 64,075
	<b>Total Amount Requested</b>	<b>\$ 64,075</b>

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Principal Investigator

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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?

Crop residues left in fields after harvest provide a substrate for the survival of *Fusarium graminearum* and the other fungal species that cause Fusarium head blight (FHB). These residues are the production site of inoculum (primarily ascospores) which incite FHB epidemics in subsequent growing seasons. An understanding of the role of crop residues in the survival and inoculum production of *Fusarium graminearum* is essential to evaluate management strategies aimed at the reduction of initial inoculum. These studies will also improve our understanding of the epidemiology of FHB by helping understand inoculum production and dispersal over small distances such as those seen within a growers field.

This project has examined the role of residues in the survival of *Fusarium* spp. through experimental work establishing the relative importance of residue components in contributing to inoculum, the effect of host species and the relative importance of plant tissues on the survival and inoculum production of *F.graminearum*. The impact of post-planting burning of crop residues on the survival of *F. graminearum* was also examined.

### 2. What were the most significant accomplishments?

Experimental plots of Norm wheat and Stander barley were planted at three locations on the residues of 2000 wheat or barley crops. One to five days following planting the previous crop residues were burned using a propane-powered burner. Residues were sampled and the number of nodes present was used to quantify the reduction of residue by burning. Data showed that burning significantly ( $P=0.05$ ) reduced the number of nodes in five of the six sites examined. We also demonstrated that there was no detrimental effect of burning on seedlings emergence. The study indicated that wheat and barley residues left on the field after harvest are frequently colonized by *F. graminearum* and that other Fusaria also colonize residues, but to a lesser extent. Recovery of *F. graminearum* from wheat residues was significantly ( $P<0.01$ ) reduced in burned nodes (1-12%) in comparison with the non-burned nodes (29-37%). Burning, also significantly reduced recovery of other *Fusarium* species such as *F. culmorum*, *F. poae*, *F. sporotrichioides*, *F. avenaceum*, *F. acuminatum*, *F. moniliforme*, *F. oxysporum*, and *F. equiseti*.

Studies of the colonization of wheat and barley plants by *F. graminearum* revealed that spike tissues were more commonly infested by Fusarium (17-43%) than other plant tissues, such as nodes and crowns (0-14%). Other cereal pathogens such as *Pyrenophora teres* (on barley only) and *Cochliobolus sativus* were more readily isolated from node and crown tissues, respectively. Indications of the distribution of *Fusarium* spp. within plants, and later their residues, may be useful if biocontrol agents are utilized to reduce the inoculum potential of crop residues.

Previous studies have show that *F. graminearum* will survive for at least two years in association with host crop residues, and that residues at the soil surface decompose slower than buried residues. The results of these studies suggest that burning after planting while not eliminating all residue at the soil surface may provide an additional control option for FHB while still meeting soil conservation objectives.

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.

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

Dill-Macky, R. and Salas B. 2001. Effect of burning wheat and barley residues on the survival of *Fusarium graminearum* and *Cochliobolus sativus*. *Phytopathology*, **91**:S23.

Dill-Macky, R. and Salas B. 2001. Effect of burning wheat and barley residues on the survival of *Fusarium graminearum* and *Cochliobolus sativus*. In: *Proceedings of the 2001 National Fusarium Head Blight Forum*, Erlanger Kentucky, USA, December 8-10, 2001, p.112.