USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY05 Preliminary Final Performance Report
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Cover Page

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Fiscal Year:	**2005**
FY05 ARS Agreement ID:	**59-0790-4-126**
Agreement Title:	**Control Wheat Scab with Improved Fungicide Application Technology.**
FY05 ARS Award Amount:	**$ 9,756**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
CBC	Control Wheat Scab with Improved Fungicide Application Technology.	$ 9,756
	Total Award Amount	**$ 9,756**

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Principal Investigator Date

* BIO – Biotechnology
CBC – Chemical & Biological Control
EDM – Epidemiology & Disease Management
FSTU – Food Safety, Toxicology, & Utilization
GIE – Germplasm Introduction & Enhancement
VDUN – Variety Development & Uniform Nurseries

Project 1: *Control Wheat Scab with Improved Fungicide Application Technology.*

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

The seven variables that significantly influence fungicide efficacy are: application timing, AI selection, "post application" weather, target plant, application rate, deposition efficiency, and coverage uniformity. Currently US growers trying to control FHB on wheat have only one fungicide available and it is on EUP label ("Emergency Use Permit"). Folicure is Bayer product and it application timing and maximum rate is specified by the EUP. A second experimental chemistry named JAU by Bayer is currently undergoing field testing. A third product, a blended JAU / Folicure, is also being field tested with the anticipation that it may be labeled by the Spring of 2007. Current field results show that none of the fungicides applied at full rate with current application technology can assure control of FHB or result in DON values below .5 ppm in the grain. Growers can select the variety of wheat or barley but they have no control of the weather. Thus the application technology researcher is left with two variables to optimize: deposition efficiency and coverage uniformity.

Deposition efficiency and coverage uniformity are affected by spray volume, drop size, and the methodology of droplet transport. North Dakota research documented that replacing one vertically mounted flat fan nozzle with two half flow rate, flat fan nozzles aimed forward and backward 60° from vertical improves efficacy. 2004 field studies extensively tested the effects of varying spray volumes and drop sizes for both aerial and ground application. Nearly all the sprayed plots were significantly better than the checks, but due to low disease pressure resulting from below average summer temperature none of the application variables had a significant effect. 2005 field research results show some interesting trends that indicate there is an optimal droplet size and nozzle orientation and that application ground speed affects optimal nozzle orientation.

2. List the most important accomplishment and its impact (how is it being used?). Complete all three sections (repeat sections for each major accomplishment):

Accomplishment:

1. 2005 field studies indicate that adding blue food dye to the experimental fungicide spray solution and then measuring the color intensity in the alcohol rinseate from grain head samples is an effective method to approximate fungicide deposition.
2. 2005 field studies showed that a spray nozzle that produces 250 to 300 micron vmd (volume mean diameter) is the most effective at depositing AI onto the grain heads.
3. As application ground speed exceeds 3 mph the forward oriented nozzle most effectively deposits AI into the grain heads. At 6 mph the forward only nozzle configuration matched the performance of the more complex F&B (forward and back) nozzle configuration.

Impact:

1. Using the blue food dye tracer is much less expensive that AI residue studies and provides deposition information within a few hours of application.
2. Traditional wisdom implies that drops less than 200 micron vmd are needed to maximized fungicide efficacy with in a plant canopy. Due to the unique structure and location of grain heads relative to the spray boom the approximate 275 micron produced optimum efficacy. This is very significant because it enables the grower to select a that both reduces spray drift and minimized nozzle "clogging" while improving efficacy.
3. Currently growers and commercial applications have been resistant to adopting the F&B nozzle configuration due to its complexity, cost, and inconvenience. Because both grower and commercial applications typically apply fungicides a speeds that exceed 6 mph it is expected that the single "275 micron vdm" nozzle oriented 60 degrees forward of vertical will received greater acceptance.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?:

1. Researchers have a cost effective deposition measurement tool that provides rapid feedback.
2. Sprayer operators are more likely to adopt the newly recommended nozzle configurations that will result in both improved efficacy and reduced drift potential.

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.

Hofman, V., S. Halley, G Van Ee, M. Draper, M. McMullen, C. Hollingsworth. 2006. Ground Application of Fungicide for the Suppression of Fusarium Head Blight in Small Grains. NDSU Extension Service Bulletin AE-1314, Fargo, North Dakota