2011 Protocol for On-Farm Research Trials: Evaluating Early-Applied Foliar Fungicide to Corn

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The objective of this trial is to determine the effects of early-applied (growth stage V6) and later-applied (silking) foliar fungicide on disease control and yield of corn. The specific intent behind this objective is to better understand if yield benefits can be attributed to early fungicide applications and to determine if this practice is economically sound.

Due to the complications of spraying more than one fungicide product in a field for comparative purposes, we will suggest that each on-farm location use only one fungicide program (products from a single company, e.g. Headline and Headline AMP) in the trial. Please select a fungicide program focusing on a strobilurin mode of action. Fungicide programs typically have one product applied at V6, and then another product within the company applied at R1 (silking). For example, the BASF program promotes a Headline application at V6, and Headline AMP at R1. Fungicides within programs are acceptable, but only fungicide products from the same company should be compared within the trial to compare similar modes of action. Also, programs may promote half or reduced rates of the fungicide at the early application timing. For this trial, we will focus on full rates at each application timing. Please contact Wise to determine the appropriate rates for certain products.

Ideally, we would like an even distribution of trials across each region in the state examining different products (for example: 3 trials each with BASF, Syngenta, and Bayer products in the NW region of the state). While this approach will not allow us to directly compare product efficacy and yield results, it will increase the odds of success by not overly complicating the logistics of product application, and it will allow us to compare trends across regions. Please contact Wise to discuss the choice of products for your trial.

Participating growers will be responsible for obtaining or otherwise providing the chemical products or other inputs required for the trial, as well as providing or arranging for the necessary field equipment required to conduct the trial. Local Purdue Extension Educators and/or I will provide assistance with designing the trial, establishing the trial, complete any disease assessments, and work with the producer to obtain trial background information and aid in harvest and yield estimates. Standard weed control and other sound agronomic production practices should be followed in the trial.

The experiment will be designed within each cooperator's field as a randomized, replicated complete block. Individual plot lengths should be no less than 350 feet and, in practice, are often simply the length of the field. The width of each individual plot should

be no less than the width of one sprayer pass and no less than twice the width of the combine header. The intent should be to harvest a combine header width from the center of an individual plot for the yield data while leaving extra space on each side of the plot to serve as buffer areas that will eliminate any confounding of data due to spray drift. Contact either one of us if you have questions on how to best match individual plot width with your field equipment widths.

Each on-farm research trial will consist of four experimental treatments:

- Control treatment (no fungicide application)
- Fungicide applied at growth stage V6 (six-collars visible on plant)
- Fungicide applied at VT/R1 (tasseling/silking)
- Fungicide applied at V6, followed by fungicide at VT/R1.

We prefer four replicates of the four treatments within a field, but no less than three replicates. **Our intent is for the fungicide treatments to be applied with ground-applied sprayers available to the producer. The design of these trials is NOT suited for aerial applications of the fungicide treatments.** Figure 1 at the end of this document illustrates a typical plot layout. Contact one of us for help in customizing the design for your specific field situation.

Before each application, the equipment should be calibrated to apply the fungicide at the recommended rates and pressures. In practice, early fungicide applications are sometimes combined with post-emergence herbicide applications. If the cooperator would like to apply the fungicides with a herbicide program, please contact Wise to make the appropriate adjustments to the protocol.

Three disease assessments are needed for each plot in the trial. The disease assessments will provide data that will help determine if any resulting yield increase due to a fungicide application can be attributed to disease within the plots. The first disease assessment should be taken one day prior to each fungicide application (V6 and/or VT/R1), and at growth stage R5 (dent stage). If the fungicide application is delayed after the first assessment is taken, another disease assessment will be necessary prior to the actual application. Each plot should be rated for disease incidence and severity. Foliar disease incidence (number of total plants per plot showing symptoms of foliar disease) will be rated for 100 plants per plot at the time of each application and again at growth stage R5. Disease severity (percent of ear with foliar disease symptoms) will also be assessed for 10 consecutive plants in three locations in each plot at growth stage R5. Please also note if fields are affected by soil-borne diseases such as seedling blights at the early assessment, and lodging at the R5 assessment. Data collection sheets and disease assessment keys will be provided.

Availability of a combine with a GPS-equipped yield monitor greatly simplifies your harvest logistics for this trial. To ensure accurate yield estimates, yield monitors should be calibrated to the conditions of the test field (Questions on calibration? Talk to Nielsen before harvest).

If a yield monitor is not available, a weigh wagon can be used to measure the grain weight harvested from each plot, but the length of each plot must also be known and recorded. Harvest and record data from each treatment plot separately. Make sure the scales of the weigh wagon are accurate. Participating growers will be responsible for arranging for a weigh wagon prior to harvest.

Rep 1	Plot 1	Headline, 6 oz at V6
	Plot 2	Control (no fungicide application)
	Plot 3	Headline, 6 oz at V6, followed by Headline AMP, 10 oz, at VT-R1
	Plot 4	Headline AMP, 10 oz, at VT-R1
Rep 2	Plot 5	Control (no fungicide application)
	Plot 6	Headline, 6 oz at V6
	Plot 7	Headline AMP, 10 oz, at VT-R1
	Plot 8	Headline, 6 oz at V6, followed by Headline AMP, 10 oz, at VT-R1
Rep 3	Plot 9	Headline AMP, 10 oz, at VT-R1
	Plot 10	Control (no fungicide application)
	Plot 11	Headline, 6 oz at V6 application
	Plot 12	Headline, 6 oz at V6, followed by Headline AMP, 10 oz, at VT-R1
Rep 4	Plot 13	Headline, 6 oz at V6 application
	Plot 14	Headline AMP, 10 oz, at VT-R1
	Plot 15	Control (no fungicide application)
	Plot 16	Headline, 6 oz at V6, followed by Headline AMP, 10 oz, at VT-R1

Figure 1. Example of a randomized, replicated plot layout for a trial examining foliar-applied fungicide applications to corn. Each replicate must contain all fungicide treatments and an unsprayed control treatment. The order or sequence of the treatments should be randomly assigned within each replicate. The length of each plot would typically be the length of the field. The width of each plot would be the best compromise of the widths of the planter, sprayer, and combine header, but no less than twice the width of the combine header.

Use this form to record the requested information about the on-farm trial and return to:
Kiersten Wise, Purdue Univ., Botany & Plant Pathology Dept, 915 W State St, West Lafayette, IN 47907-2054.

The online PDF version[1] allows you to input the information directly.

Purdue On-Farm Research Trials – Plot Information								
Name:								
County:								
Soil series:			**Drainage [1]:**					
Most recent soil sample results [3]:	**OM**	**pH**	**P**	**K**	**Ca**	**Mg**	**CEC**	
Soil sample date?:		☐ **Lbs per acre or** ☐ **ppm?**						
Previous crop:		**Tillage [2]:**						
Invididual plot length (ft):		**Individual plot width (ft):**						
Hybrid (Company and brand):								
Planting date:		**Seeding rate:**						
Harvest date:		**Header width (ft):**						
Yield monitor?	**____ Yes**	**____ No**	**If yes, equipped w/ GPS?**	**____ Yes**	**____ No**			
Broadcast fertilizer [4]:								
Starter fertilizer [5]:								
Pre-plant nitrogen [6]:								
Sidedress nitrogen [6]:								
Rainfall amount: (Inches per month)	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct.**	

[1] Whether tiled or not plus assessment of overall drainage (e.g., poor, good, excellent).
[2] Tillage method preceding this crop, such as no-till, strip-till, disc, moldboard plow, etc.
[3] A copy of a recent soil sample for the field if it is available or record on sheet.
[4] Rate, analysis and date of broadcast fertilizer application if any (e.g., DAP).
[5] Rate/gallons, starter fertilizer and placement (2x2, surface band, etc.) if any.
[6] Type (UAN, urea, AA, etc.) and date of application.

Other comments:

[1] Online at http://www.agry.purdue.edu/ext/ofr (choose the corn fungicide trial protocol).