Report on the USWBSI-Supported – Uniform Fungicide Tests conducted in 2013

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INTRODUCTION

Foliar fungicide application is a component of an integrated management system to control Fusarium head blight (FHB) of wheat and the associated mycotoxin deoxynivalenol (DON). From multi-state research trials, Prosaro and Caramba fungicides applied at Feekes growth stage (FGS) 10.5.1 (early anthesis) have been shown to be the most effective fungicides for controlling FHB and DON, but there is still room for improvement of efficacy. Poor weather during this narrow application window may be present, which may delay fungicide applications by a few days. More research is needed to better understand how applications made a few days post-anthesis will affect FHB and DON. The objectives of the 2013 uniform fungicide testing program were to:

1. Compare fungicide combinations of thymol + tebuconazole and metconazole + tebuconazole with the standard fungicides tebuconazole, Prosaro, and Caramba when applied at FGS 10.5.1. (Note that tebuconazole used in these trials was either formulated as Folicur or Tebucon, and that metconazole was formulated as Caramba).
2. Evaluate the efficacy of Prosaro and Caramba on FHB and DON control when sprayed 3-7 days post-anthesis.

MATERIALS AND METHODS

Field trials were established in Arkansas, Illinois, Minnesota, New York, North Dakota, Ohio, South Dakota, and Wisconsin. Three wheat market classes were represented in these trials (soft red winter, hard red spring, and hard red winter). All trials evaluated fungicide treatments on one wheat cultivar, except for the Ohio location and the three South Dakota hard red spring wheat trials, which evaluated treatments on two cultivars. Trials at each location were set up to have the most favorable conditions for FHB development as possible. To achieve high levels of FHB, cooperators utilized some or all of the following practices: planting into corn stubble; spreading *F. graminearum*-infested grain across the experimental area; inoculating with *F. graminearum* spores; and/or using a mist-irrigation system.

The fungicide treatments evaluated in these trials were:

1. Non-treated control
2. Prosaro @ 6.5 fl oz applied at FGS 10.5.1*
3. Caramba @ 14 fl oz applied at FGS 10.5.1*
4. Folicur or Tebucon @ 4 fl oz applied at FGS 10.5.1*
5. Tebucon @ 4 fl oz + Caramba @ 10 fl oz applied at FGS 10.5.1*

6. Tebucon @ 4 fl oz + Thymol @ 0.35 oz applied at FGS 10.5.1*
7. Prosaro @ 6.5 fl oz applied 3-7 days post-anthesis*
8. Caramba @ 14 fl oz applied 3-7 days post-anthesis*

*Treatment also included a non-ionic surfactant. Prosaro (Bayer CropScience) is a combination of prothioconazole and tebuconazole. Caramba (BASF Corp.) is metconazole. Folicur (Bayer CropScience) and Tebucon (Repar Corp.) are tebuconazole. Thymol fungicide was supplied by Repar Corp.

All plots were rated for FHB severity and incidence around the soft-dough stage. A FHB index was calculated for each plot using the formula: (FHB severity * FHB % incidence) / 100. Plots were harvested with small-plot combines and yields and test weights were calculated. Harvested grain samples were collected to visually estimate the percentage Fusarium-damaged kernels (FDK) from each plot. Sub-samples of harvested grain were sent to laboratories, where DON contamination levels were determined.

RESULTS

Treatment effects varied by location, but only effects averaged across all locations will be discussed here (Table 1).

FHB. All treatments significantly ($P \leq 0.05$) reduced FHB index compared to the non-treated control. The treatments that resulted in the lowest FHB index values were Caramba applied at either FGS 10.5.1 or 3 to 7 days later, the mixture of Tebucon and Caramba, and Prosaro applied at FGS 10.5.1.

DON. All treatments except Tebucon + Thymol significantly reduced DON in harvested grain samples compared to the non-treated control. Caramba applied at 3-7 days post-anthesis resulted in the lowest DON value, but did not significantly differ from Caramba applied at Feekes 10.5.1, Tebucon + Caramba applied at Feekes 10.5.1, or Prosaro applied at 3-7 days post-anthesis.

FDK. All treatments except Tebucon + Thymol significantly reduced FDK compared to the non-treated control. The treatments that resulted in the lowest FDK values were Caramba applied at FGS 10.5.1 or 3 to 7 days later, Tebucon + Caramba, Prosaro applied 3-7 days post-anthesis, and Prosaro applied at FGS 10.5.1.

Test weight. All treatments significantly improved test weight over the non-treated control. Prosaro applied at 3 to 7 days post-anthesis resulted in grain with the highest test weight, but was only significantly different from the non-treated control and the Tebucon/Folicur treatment.

Yield. All treatment significantly improved yield over the non-treated control. The treatments that resulted in the greatest yields were Prosaro applied at either FGS 10.5.1 or 3 to 7 days later, Caramba applied at either FGS 10.5.1 or 3 to 7 days later, and Tebucon + Caramba.

Table 1. Effect of fungicide treatments on Fusarium head blight index (FHB), deoxynivalenol (DON) in harvested grain, percentage of Fusarium-damaged kernels (FDK), test weight, and yield of wheat. Means are averaged across multiple trials conducted on different wheat classes (soft red winter, hard red spring, and hard red winter) during the 2013 growing season at Arkansas, Illinois, Minnesota, New York, North Dakota, Ohio, South Dakota, and Wisconsin).

Treatment	FHB index (0-100)	DON (ppm)	FDK (%)	Test weight (lb/bu)	Yield (bu/A)
Nontreated	14.4	4.7	22.5	52.3	53.1
Prosaro @ 6.5 fl oz, Feekes 10.5.1	7.1	3.5	15.8	54.9	60.2
Caramba @ 14 fl oz, Feekes 10.5.1	6.3	3.1	13.4	55.4	59.6
Tebucon or Folicur @ 4 fl oz, Feekes 10.5.1	9.4	4.0	19.3	54.7	56.9
Tebucon @ 4 fl oz + Caramba @ 10 fl oz, Feekes 10.5.1	6.3	3.3	14.5	55.4	60.6
Tebucon @ 4 fl oz + Thymol @ 0.35 oz, Feekes 10.5.1	9.3	4.5	20.1	54.5	56.8
Prosaro @ 6.5 fl oz, 3-7 days post-Feekes 10.5.1	8.7	3.4	14.1	55.7	59.4
Caramba @ 14 fl oz, 3-7 days post-Feekes 10.5.1	6.8	2.8	13.6	55.6	59.6
P > F	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**
LSD 0.05	**1.7**	**0.7**	**2.9**	**1.0**	**1.9**
CV %	**68.1**	**66.4**	**56.9**	**6.3**	**11.2**