

Do Fungicides Increase Yield and Grain Quality of Wheat Enough to Cover the Cost of Treatment?

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INTRODUCTION

This study investigates different fungicide application timings and modes of action to identify which fungicide approach is most cost-effective for the grower. Effects of the treatments on both yield and quality were measured. This project was conducted so that we can update our science-based disease management recommendations for North Carolina small grain growers of soft red winter wheat. The recommendations currently state that it is not economically beneficial to apply fungicides in the absence of fungal disease.

HYPOTHESIS

Growers have perceived an increase in yield and quality when fungicides are applied, even in the absence of disease. We are testing this hypothesis and evaluating if the cost of the fungicide pays for itself by producing wheat that is high enough quality to sell at a premium to the milling and baking market for flour, versus wheat for animal feed.

MATERIALS & METHODS

The replicated (n=4) and randomized small plot research examined the effects of these combinations:

2 Varieties

- USG 3536 (Moderately resistant to scab and powdery mildew)
- Croplan 9606 (Susceptible to scab, moderately susceptible to powdery mildew)

3 Fungicides

- None (check)
- Miravis Ace – pydiflumetofen+propiconazole
- Tilt – propiconazole

3 Application Timings

- Top-dress (before GS 20)
- Flowering
- Top-dress & Flowering

Figure 1. Project plots at the NCDA&CS Piedmont Research Station, Salisbury, NC on 9-Apr-2021



ACKNOWLEDGEMENTS

Project funded by the NC Small Grain Growers Association. Thanks to Andrew Baucom and Mikayla (Graham) Berryhill for their contributions to year-one of the project and NCDA&CS station staff for their work. Ryan Heinger for harvesting. Brian Moore for seed donations.



Figure 3. Project plots at the NCDA&CS Piedmont Research Station on 31-May-2022.

RESULTS

In both 2021 and 2022, no significant fungal diseases appeared in the test. In 2022 the results were similar to the 2021 findings.

	2021	2022
Yield	117 bu/A	112 bu/A
Test Weight	58.0 lbs./bu	59.4 lbs./bu
Moisture	12.9%	12.2%
Falling Number	339.5 sec	317.0 sec
Protein	8.8%	8.9%
DON	None	None

Figure 2. Means for harvest years 2021 and 2022.

Here are our findings for the 2022 harvest season:

YIELD - Not significantly impacted by use of a fungicide ($P \geq 0.19$)

PROTEIN - No effect of fungicides on protein was found ($P = 0.94$)

TEST WEIGHT - Miravis Ace significantly increased test weight when applied at flowering or when applied twice. The increase was less than 0.5 lbs./bu ($P \leq 0.05$)

FALLING NUMBER - Not significantly impacted by use of a fungicide ($P = 0.60$)

DON - None found in any of the samples.

ECONOMICS

The following data were used in the 2022 Return on Investment (ROI) analysis:

- Miravis Ace - \$20.02/Acre per application
- Tilt - \$4.69/Acre per application
- Milling wheat price on harvest day was \$9.72/bushel

Miravis Ace significantly increased test weight by 0.5 lbs./bu versus the control when applied both at top-dress and at flowering, but there was no effect of fungicides on yield. Based on the costs of the fungicide material it is unlikely that the benefit to the grower, although statistically significant from a biological perspective, would have a positive impact on income received. More work is needed to determine potential benefit to the grower in a year with higher disease pressure.

NEXT STEPS

The project has been funded for a third year and was planted in 2023 at the NCDA&CS Caswell Research Station in Kinston, NC. This location is in the Coastal Plain region where fungal disease pressure tends to be higher.



Figure 4. Locations of trial sites.

TAKE HOME MESSAGE

The use of fungicides did not increase yield or quality enough to cover the cost of the product in years with low disease pressure. Therefore applying fungicides in the absence of fungal disease is still not cost effective in the Piedmont. Data from another growing season and an environment with fungal disease pressure are needed to accurately determine ROI to the grower.



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