

2013

# Foliar Fungicides for Alfalfa Production

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## Recommended Citation

Lang, Brian J. and Pecinovsky, Kenneth T., "Foliar Fungicides for Alfalfa Production" (2013). *Iowa State Research Farm Progress Reports*. 1942.

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# Foliar Fungicides for Alfalfa Production

## **Abstract**

Within the last two years, the EPA approved pesticide labels of two foliar fungicide products for use on alfalfa. However, university research regarding potential economic benefits of these products is extremely limited. In addition, aggressive salesmanship recommending multiple applications per season raise concerns about following proper stewardship for these products to insure effectiveness long term.

## **Disciplines**

Agricultural Science | Agriculture | Agronomy and Crop Sciences

## Foliar Fungicides for Alfalfa Production

### RFR-A12110

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#### Introduction

Within the last two years, the EPA approved pesticide labels of two foliar fungicide products for use on alfalfa. However, university research regarding potential economic benefits of these products is extremely limited. In addition, aggressive salesmanship recommending multiple applications per season raise concerns about following proper stewardship for these products to insure effectiveness long term.

To begin to address the economic issues above, we established four research trials at the ISU Northeast Research Farm, Nashua, Iowa in 2011 and 2012. Another four trials are in place for 2013. Normally, we would wait to comment on results until more research results become available, however, producer demand is strong for any university research that can be provided at this time. Thus, the purpose of this report is to provide the preliminary information we have at this time, with the understanding that future conclusions may vary as more research results become available from more trials, other locations and treatments, and the influence of different weather patterns.

#### Materials and Methods

Two direct seedings of alfalfa and two established alfalfa stands were used in these trials. The four trials included two alfalfa varieties and six replications in a randomized complete block design. Fungicide treatments included: 1) timing of fungicide application comparisons made at either 3–4 in. of growth or 6–8 in. of growth, 2) fungicide application prior to first or second crop for new seedings

and prior to first, second, third, or fourth crop for established stands, and 3) one trial compared the fungicide products Headline SC, Quadris, and Champ. Headline SC and Quadris are Group 11 strobilurin fungicides. Champ is a Group M copper hydroxide fungicide. Product rates used were 6–7 ounces/acre for Headline SC, 10 ounces/acre for Quadris, and two pounds/acre for Champ.

Disease infestations were evaluated prior to each harvest by assessing the percent leaflets with or without the presence of foliar disease. Plots were harvested with a self-propelled flail chopper with mounted weigh hopper and dry matter determined from subsamples collected at harvest and oven dried. Composite subsamples were collected for each treatment and analyzed for feed analysis with milk/ton and milk/acre calculated.

Seasonal temperatures and rainfall were near normal in 2011 through May 2012, after which temperatures were above normal and rainfall was 50 percent below normal causing a serious drought.

#### Results and Discussion

Limited rainfall and above average temperatures occurred in the summer of 2012. For trials conducted within this timeframe, incidence of leaf disease averaged only 15 percent, with an average yield response to fungicide applications of seven percent, and the net profit to fungicide applications averaging a net loss of \$5/acre. This is a logical cause and effect and suggests foliar fungicide applications under very dry climatic conditions are not profitable.

Normal rainfall and near normal temperatures occurred in 2011 through May of 2012. For trials conducted within this period, incidence of leaf disease averaged 43 percent, the

average yield response to fungicide applications was 15 percent, and the net profit was \$15/acre. We assume alfalfa production in cooler and wetter environments would achieve greater financial benefit from foliar fungicide use.

We compared the timing of fungicide applications to a very short 3–4 in. canopy and a bit taller 6–8 in. canopy. Since foliar fungicides only protect what they land on, an application to the 6–8 in. canopy should offer more protection. However, the differences were small. On average, applications to 3–4 in. canopies vs. 6–8 in. canopies provided similar responses to percent disease incidence and percent yield increase. The overall average profit advantage of applications at 6–8 in. canopies vs. 3–4 in. canopies was only \$1.70/acre. If this holds true with additional research, it suggests a flexible application window for foliar fungicide use on alfalfa.

In established stands, the first crop has the highest yield potential of any cutting during the season, and it grows under environmental conditions typically more favorable for leaf disease development. Thus, an application prior to first crop vs. any other crop should be the most profitable. Our trials showed an average net profit or loss to first, second, third, and fourth crop harvest of \$51, \$5, - \$17, and \$0/acre, respectively. No doubt the dry weather conditions in the summer of 2012 significantly influenced these results with little to no response to fungicides in the summer. But summer weather patterns are usually drier than spring, suggesting that this trend should hold true, just not necessarily having this large of a difference in profitability between spring and summer harvests.

In new seedings, the most favorable economic response to fungicide applications was not to the first crop, but rather the second crop. Even though first crop of the new seeding in 2011

averaged an eight percent yield increase to fungicide application, the rather low yield potential of the direct seeded first crop relative to fungicide expense resulted in a net loss of \$8/acre. However, the second crop in the seeding year, yielding 50 percent more alfalfa/acre than the first crop, showed a net profit of \$14/acre to fungicide use.

It is reasonable to assume that if foliar fungicide applications reduce disease infestations, leaf retention may be improved and result in higher forage quality at harvest. To interpret quality differences in these trials, we calculated relative feed value (RFV) and milk/ton from the forage quality analyses. Even though we have some visual evidence of better leaf retention (Figure 1), the forage quality analyses and calculated RFV and milk/ton failed to provide evidence of improved forage quality in the fungicide treated plots. This is contrary to a 2011 trial conducted by the University of Minnesota, but is similar to a 2011 trial conducted by the University of Wisconsin.

All four fungicide trials included two alfalfa varieties (A and B). Variety A average 14 percent lower in leaf disease incidence than variety B. Variety A yielded better than variety B in absence of a fungicide treatment, but both yielded the same when treated with a fungicide. It is understandable that alfalfa varieties may have different tolerances to leaf diseases; however, there are no seed company leaf disease ratings for alfalfa varieties to aid in the decision of foliar fungicide use in alfalfa production.

Just as with fungicide applications for corn and soybeans, we need to pick our opportunities where the probability of economic return is the greatest. To apply fungicides to alfalfa without much thought to harvest schedule and environmental conditions is not economically or

environmentally sound. This brings up the issue of stewardship and fungicide use. While the labels of Headline and Quadris state that they can be applied up to three times per season, reading the entire labels also provide recommendations on stewardship. For example, the Quadris label states: “Do not apply more than two sequential applications of Quadris or other Group 11 fungicides before alternating with a fungicide that is not in Group 11.” And the Headline supplemental label for alfalfa states: “Do not make more than three applications of Headline per year. Refer to the Headline fungicide main label for complete Directions for Use and all applicable restrictions and precautions.” The main label states: “When using Group 11 fungicides as a solo product, the number of applications should be no more than one-third of the total number of fungicide application per season.”

At this time, the only other fungicide labeled for alfalfa that is not a Group 11 fungicide is copper hydroxide, a Group M fungicide. However, so far our research results with this product have been disappointing. Granted, our only trial so far was in the drought year of 2012. We will continue with a trial in 2013 to see if this product might provide a reasonable alternative to Group 11 fungicides, thus providing an option for rotating chemical families and reducing the chance for resistance development.

### Conclusions

Recently, two fungicides received EPA labels for use in alfalfa production. Through numerous personal communications, we find that producers are eagerly seeking unbiased research based information from universities to help with their decision making process on the use of this new management tool. University research has been initiated, but at this time results are extremely limited.

Currently, limited research indicates that, in general, the use of foliar fungicides on alfalfa seems to offer excellent profitability when used during cooler wetter seasons that are most favorable for leaf disease development. The fungicide use also seems to offer reasonable profitability when used in normal seasonal environments, but is not profitable when used during droughty weather conditions. The greatest profitability is likely with fungicide use prior to first crop in established stands.

Research with foliar fungicides on alfalfa will continue in 2013 at the ISU Northeast Research Farm. Management factors regarding product rate, canopy height at application, sequential applications during the season, and use in new seedings vs. established stands all require additional research. This article provides a starting point addressing some of these factors. Producers would also likely benefit from a more complete understanding of proper stewardship of fungicide use in alfalfa production.

### Acknowledgements

Thanks to BASF Corporation, Monsanto, Pioneer Hi-Bred, and Syngenta Crop Protection.



Figure 1. Shoots above the yardstick from a fungicide treated plot show more leaf retention than the shoots below the yardstick from an untreated control plot.