

Preliminary Research Results on the Use of Foliar Fungicides in Alfalfa Production

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Summary and Implications

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 appears to offer good profitability when used during cooler wetter seasons that are most favorable for leaf disease development. The fungicides appear to offer some consistency in profitability when used in normal seasonal environments, but are not profitable when used during droughty weather conditions. The greatest profitability is likely with fungicide use prior to 1st crop in established stands.

Management details 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 leaflet provides a starting point, addressing some of these factors. In addition, producers would likely benefit from education regarding proper stewardship of fungicide use in alfalfa production, a responsibility that the private sector appears to be ignoring.

Introduction

Within the last two years the EPA approved pesticide labels for two foliar fungicide products for use on alfalfa. However, University research regarding potential economic benefits of these products is extremely limited. In addition, aggressive chemical company 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 4 research trials at the ISU Northeast Research Farm, Nashua in 2011 and 2012. Another 4 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 what 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 2 established alfalfa stands were used in these trials. The 4 trials included 2 alfalfa varieties and 6 replications in a randomized complete block design. Fungicide treatments included: 1) timing of fungicide application comparisons made at either 3-4 inches of growth or 6-8 inches of growth; 2) fungicide applications prior to 1st or 2nd crop for new seedings, and prior to 1st, 2nd, 3rd, or 4th crop for established stands; 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. The other 3 trials only used Headline SC.

Product rates used were 6 to 7 oz. per ac. for Headline SC, 10 oz. per ac. for Quadris, and 2 lbs per ac. for Champ. The Headline rate is on the lower end of the recommended range on the label. The Quadris rate is in the middle of the recommended range on the label.

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 flail chopper, weighed, 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 per ton and milk per acre calculated.

Seasonal temperatures and rainfall were near normal in 2011 through May of 2012, after which temperatures were a little above normal and rainfall was 50% 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%, with an average yield response to fungicide applications of 7%, and the net profit to fungicide applications averaging a net loss of -\$5/ac. 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 timeframe, incidence of leaf disease averaged 43%, the average yield response to fungicide applications was 15%, and the net profit to fungicide applications was \$15 per acre. We assume alfalfa production in cooler and wetter environments would achieve even greater financial benefit from foliar fungicide use.

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We compared the timing of fungicide applications to a very short 3-4 inch canopy, and a bit taller 6-8 inch canopy. Since foliar fungicides only protect what they land on, an application to the 6-8 inch canopy should offer more protection. However, the differences were small. On average, applications to 3-4 inch canopies versus 6-8 inch canopies provided similar responses to % disease incidence and % yield increase. The overall average profit advantage of applications at 6-8 inch canopies versus 3-4 inch canopies was only \$1.70 per acre. If this holds true with additional research, it suggests a rather 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. So an application prior to first crop versus any other crop should be the most profitable. Our trials showed an average net profit to 1st, 2nd, 3rd and 4th crop harvest of +\$40, +\$6, -\$7 and -\$6 per ac., respectively. No doubt the droughty 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 for 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 1st crop of the new seeding in 2011 averaged a 9% yield increase to fungicide application, the rather low yield potential of the direct seeded 1st crop relative to fungicide expense resulted in a net loss of -\$9 per ac. However, the 2nd crop in the seeding year, yielding 50% more alfalfa per acre than the 1st crop, showed a net profit of \$13 per ac. 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 RFV and milk per 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 per 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 4 fungicide trials included two alfalfa varieties (A and B). Variety A average 14% 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. With this recent technology, Headline labeled in 2010 and the Quadris labeled in 2011, comes the responsibility to preserve the use of these technologies. While the labels of these products state that they can be applied up to 3 times per season, if you read the entire labels, they also provide recommendations on stewardship. For example, the Quadris label states: "Do not apply more than 2 sequential applications of Quadris or other Group 11 fungicides before alternating with a fungicide that is not in Group 11." And the Headline label states: "Do not make more than 3 applications of Headline per year. Refer to the Headline fungicide main label for complete Directions for Use and all applicable restrictions and precautions." Main label: "When using Group 11 fungicides as a solo product, the number of applications should be no more than 1/3 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 relative to Headline and Quadris. 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 will provide a reasonable alternative to Group 11 fungicides, thus providing an option for rotating chemical families and reducing the chance for resistance development.

Research with foliar fungicides on alfalfa will continue in 2013 at the ISU Northeast Research Farm. There is no substitute for conducting additional trials to build upon the limited information we currently have available regarding the use of foliar fungicides in alfalfa production to help define best management practices.



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.