Is it Profitable to use Foliar Fungicides in Alfalfa Production?
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Is the use of foliar fungicides in alfalfa production profitable? The typical answer is "It depends!"

Over the past four years Iowa State University has conducted 14 site-years of foliar fungicide research trials with alfalfa at the ISU Northeast Research and Demonstration Farm near Nashua. These trials provided 179 fungicide treatment-by-harvest comparisons.

Comparisons in these trials included one or two alfalfa varieties, foliar applications ahead of 1st, 2nd, 3rd or 4th crops (cuttings), foliar application timing on 3 to 4 inch or 6 to 8 inch canopy heights, fungicide products Headline SC, Quadris, Fontelis, Aproach, and copper hydroxide. Data from copper hydroxide treatments were not included in this article due to its poor performance relative to the other products. Aproach does not yet have an approved label for use in alfalfa.

Weather during 2012-2015 included some extreme conditions from a droughty summer in 2012 to record rainfall in the spring of 2013. April through July of 2012 was much warmer than normal, and the 2014-2015 seasons were cooler than normal (Table 1).

Best response with first crop
On average, the first crop or cutting provided a higher percent yield response to a foliar fungicide application than for later crops. Three main factors contribute to this: 1) Spring environments are usually more favorable for alfalfa diseases; 2) Yield potential for first crop is higher than for later crops; 3) The growth period for first crop is considerably longer for that of later crops.

Also important is hay price. For example, a 10% yield increase from a fungicide application doesn't add as much value to $80 per ton hay as it would to $200 per ton hay. So, yield per cutting plus yield response to fungicide plus hay price are all critical in contributing to profitability.

Limited rainfall and above average temperatures occurred in the summer of 2012. For trials conducted within this timeframe, disease incidence was low and the average yield response to fungicide treatments was only about 5%. This resulted in a net loss in dollars per acre for fungicide treatments even with hay priced at $200 per ton (Table 2). This is a logical cause and

effect and strongly supports the notion and field experience of other researchers that foliar fungicide applications under dry climatic conditions are not profitable.

Also noteworthy is that fungicide treatments applied during the extremely wet spring of 2013 resulted in some of the most profitable net returns for both 1st and 2nd crop.

Timing of fungicide application

Some of the ISU trials compared timing of fungicide applications at a 3 to 4 inch canopy versus a 6 to 8 inch canopy. Since foliar fungicides only protect what they land on, an application to the 6 to 8 inch canopy should offer more protection. While there were small numerical differences in disease reduction and yield response with these treatments favoring the later application, they were not statistically significant.

Waiting for an 8-inch canopy height for 2nd, 3rd or 4th crop in a 4-cut system could be problematic in that these products have a 14 day preharvest interval. I suggest a compromise by targeting about a 5-inch canopy height for these applications. However, I still prefer the 6 to 8 inch canopy timing for treating first crop.

Forage quality?

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 forage quality differences in some of the ISU trials, subsamples were sent to forage testing labs. Even though we had some visual evidence of better leaf retention, the forage quality analyses and calculated RFV and milk per ton did not show significantly better forage quality test results with the vast majority of the fungicide treated plots. Thus, the main reason to use foliar fungicides is to achieve increased yield and not necessarily count on increased forage quality.

Varieties

Some trials included two alfalfa varieties. Variety 'A' averaged 14% lower in leaf disease incidence than variety 'B', and 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 industry standards in place to provide leaf disease ratings for alfalfa varieties to aid in the decision of foliar fungicide use in alfalfa production.

Final thoughts

Just as with fungicide applications for corn and soybeans, we need to select our opportunities with alfalfa as to where the probability of economic return is the greatest. To apply fungicides to alfalfa without much thought to harvest schedule or environmental conditions does not follow proper stewardship of pesticide use nor would result in maximizing profits.

Table 1. Average monthly weather data from the Northeast ISU Research Farm, Nashua.

	2012		2013		2014		2015		Long-term normal	
	Rain	Temp.	Rain	Temp.	Rain	Temp.	Rain	Temp.	Rain	Temp.
April	3.71	49.7	6.40	42.2	7.21	44.7	4.33	50.5	3.66	47.7
May	4.97	64.4	9.92	58.2	2.87	60.2	3.50	60.4	4.46	59.3
June	1.71	71.5	8.22	68.3	10.35	70.5	5.78	69.1	4.99	69.0
July	1.77	77.2	2.65	71.7	1.41	68.6	4.00	70.8	4.73	72.0
Aug.	3.19	69.1	3.29	70.3	3.82	71.2	4.63	67.9	4.28	69.6
Sept.	1.67	60.7	1.14	65.3	2.78	62.0	2.61	68.1	2.98	61.9
Total	17.02		31.62		28.44		24.85		25.10	

Table 2. Yield, % yield response to fungicide, and net return to three difference hay prices for individual crops during 2012-2015.

Year	Crop	Avg. DM yield of untreated control	Avg. % yield increase with fungicide treatment	Assumed hay prices below($/ton) results in avg. net return to fungicide treatment ($/ac)[1]		
				$80/ton	$140/ton	$200/ton
2012	1st	1.83	12.13	-4.68	+10.56	+25.80
	2nd	1.84	2.81	-19.46	-15.30	-11.14
	3rd	1.13	7.27	-18.09	-12.90	-7.71
	4th	1.21	5.32	-19.67	-15.67	-11.67
2013	1st	2.23	13.28	2.52	+23.16	+43.80
	2nd	1.62	10.64	-7.86	+5.00	+17.86
	3rd	1.50	9.47	-12.54	-3.20	+6.14
	4th	1.34	9.50	-13.80	-5.40	+3.00
2014	1st	2.29	6.58	-12.10	-2.43	+7.25
	2nd	2.06	7.14	-12.30	-2.78	+6.75
	3rd	1.57	7.54	-14.70	-6.98	+0.75
	4th	1.48	No treatments			
2015	1st	2.30	10.08	-3.53	+12.57	+28.67
	2nd	2.29	8.80	-7.40	+5.80	+19.00
	3rd	1.96	9.30	-8.87	+3.23	+15.33
	4th	1.41	No treatments			

[1] The net return calculations include the average cost of fungicide plus application.