Bromegrass Hay Response to Nitrogen Fertilization

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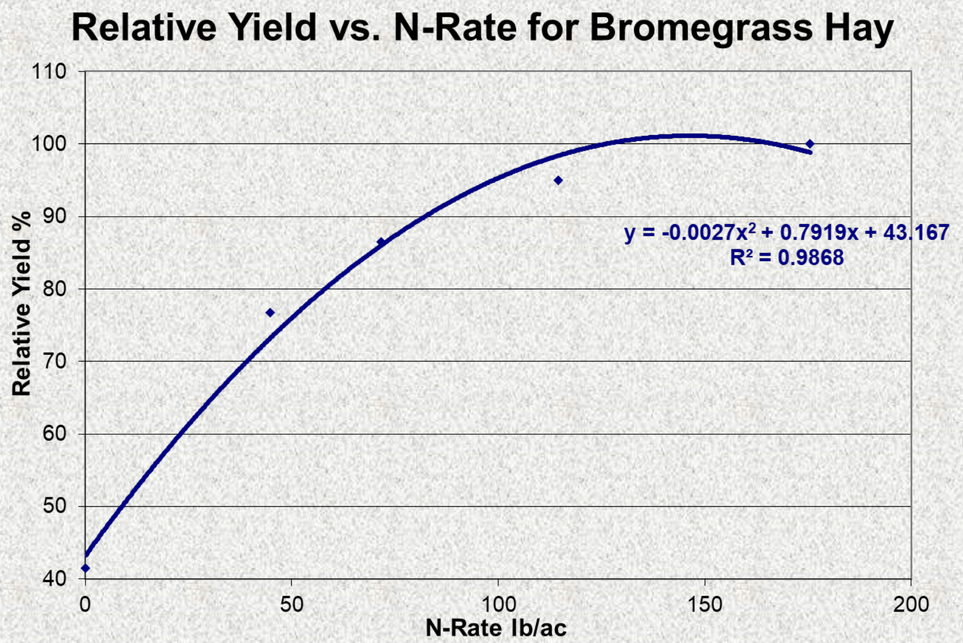
Introduction

In times of highly variable nitrogen fertilizer prices, bromegrass hay prices, or both; producers are faced with a decision regarding how much nitrogen can they afford to apply. K-State's bromegrass nitrogen recommendation is based on yield goal and is not directly adjusted for economics. Therefore, the use of a nitrogen response curve for bromegrass developed from many site-years of data is beneficial to address the ultimate question of what is the maximum nitrogen rate that will still provide a positive return at a given nitrogen fertilizer and bromegrass hay price.

Procedures

- Bromegrass nitrogen fertilizer data published in K-State Fertilizer Reports from 1975-2003 was compiled
- Relative yields for 1621 treatment averages included in 105 site-years were calculated
- Data included multiple nitrogen sources and application timings, but the majority were spring applications of urea or ammonium nitrate
- A regression response curve was fit to the data for nitrogen rate versus relative yield
- The formula for the curve was used to predict the relative yield and calculate the predicted bromegrass hay yield for given nitrogen fertilization rates
- Simplified economic evaluations were made considering financial returns to nitrogen fertilization of bromegrass hay

Results



Return to N Fertilization

Rate	Yield	Yld. Increase	Return to N
lbs/ac	tons/ac	tons/ac	$/ac to 10 lb/ac investment
0	1.3		
10	1.6	0.24	$ 10.46
20	1.8	0.22	$ 8.94
30	2.0	0.20	$ 7.43
40	2.2	0.19	$ 5.91
50	2.4	0.17	$ 4.40
60	2.5	0.15	$ 2.88
70	2.7	0.14	$ 1.37
80	2.8	0.12	$ (0.15)
90	2.9	0.10	$ (1.66)
100	3.0	0.09	$ (3.18)
110	3.0	0.07	$ (4.69)
120	3.1	0.05	$ (6.21)
130	3.1	0.04	$ (7.72)

* Used $1.10/lb N and $90/ton bromegrass hay

* KSU N recommendation for 3 ton yield is 90 lbs/ac

N Rate Adjustments for Nitrogen and Hay Price

Nitrogen	$/lb	$ 0.50	$ 0.60	$ 0.70	$ 0.80	$ 0.90	$ 1.00	$ 1.10	$ 1.20
Hay $/ton		Maximum N Rate with Positive Return to Fertilizer							
		lbs/ac							
$ 70.00		105	95	85	80	70	60	55	45
$ 80.00		110	100	95	85	80	70	65	60
$ 90.00		115	105	100	95	85	80	75	65
$100.00		115	110	105	100	95	85	80	75
$110.00		120	115	110	105	100	95	85	80
$120.00		120	115	110	105	100	95	90	85
$130.00		125	120	115	110	105	100	95	90

Summary

Producers should take into account variation in nitrogen input costs and bromegrass hay commodity prices when making nitrogen fertilization rate decisions. However, they should also be aware that their rate decisions will impact potential yield and hay quality.

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