Influence of Nitrogen Fertilizer on Alfalfa Harvested on Short Intervals

M. J. Ottman

Introduction

Application of nitrogen fertilizer to alfalfa is a controversial practice. Alfalfa is a leguminous crop and fixes its own nitrogen from the air. Starter fertilizer is sometimes applied at planting time to enhance growth until the crop is able to fix its own nitrogen, but this practice contributes to weed growth and inhibits the formation of nitrogen fixing nodules. Previous work has generally shown that established alfalfa does not respond to nitrogen fertilizer or that any yield increase could not be paid for by the cost of the fertilizer. However, if alfalfa is cut on short cycles as is common for green chop or to achieve high quality hay, nitrogen fertilizer application may be beneficial. The objective of this study is to determine the response of alfalfa cut on short cycles to nitrogen fertilizer.

Procedure

The alfalfa cultivar CUF 101 was planted at a rate of 25 pounds of seed per acre on a sandy loam soil at the Campus Agricultural Center in Tucson, AZ in October of 1993. The field was irrigated using the border flood method. Plots 3 ft. x 15 ft. in size were established before the first cutting on 12 April 94. The field was divided in half and a short (>21 d) and medium (>28 d) cutting intervals were established. Nitrogen fertilizer was applied by hand at a rate of 100 lbs N/acre/cutting on the short cutting interval plots and 150 lbs N/acre/cutting on the medium cutting interval plots. The source of nitrogen was half urea and half ammonium nitrate. The dry granular fertilizer was applied the day after cutting and incorporated with an irrigation. Irrigations of about 6 inches each were applied every 10 days during the warmest part of the season. The control and treated plots were separated by a buffer plot of the same size. The experimental design was a randomized complete block with two treatments (control and treated) and six replications. The plots were cut with a sickle-bar mower, the forage was raked, placed on a tarp, and weighed, and yield was expressed as a fresh weight per plot.

Discussion

Nitrogen had no effect on forage yield except in a few cases. Nitrogen fertilizer application in the short cutting interval plots (Table 1) decreased yield at the 22 Aug 94 cutting and increased yield at the 11 Jan 95 cutting. We were not able to detect a difference in yield for the medium cutting cycle in any individual cutting due to nitrogen fertilizer application, but the total yield for all these cuttings was increased almost 5% due to nitrogen application (Table 2). It is doubtful that this yield increase would ever pay for itself. This results of this study suggest that alfalfa yield increase from nitrogen fertilizer is most likely at the first cutting of the year. Also, alfalfa cut on a short cycle does not appear to be more responsive to nitrogen fertilizer than alfalfa cut on a medium interval.

Table 1. Response of alfalfa cut on a short interval to nitrogen fertilizer applied after each cutting at a rate of 100 lbs N/acre. Multiply forage yield by 0.11 to obtain hay yield in tons per acre.

Nitrogen	1994								1995			
Applied	11May	31May	21Jun	11Jul	01Aug	22Aug	19Sep	11Oct	11Jan	12Apr	09May	Sum
	Forage yield, lbs/plot											
Yes	20.0	24.1	23.3	8.6	15.5	9.3	9.4	9.2	8.8	9.0	18.2	156
No	20.4	23.2	23.2	8.4	15.4	10.8	9.3	8.8	7.1	10.3	18.9	156
P>F[1]	NS	NS	NS	NS	NS	+	NS	NS	*	NS	NS	NS

[1] NS, +, * = Not significant at P=0.10 and significant at P=0.10 and P=0.05, respectively.

Table 2. Response of alfalfa cut on a medium interval to nitrogen fertilizer applied after each cutting at a rate of 150 lbs N/acre. Multiply forage yield by 0.11 to obtain hay yield in tons per acre.

Nitrogen	1994					1995		
Applied	18May	21Jun	20Jul	22Aug	29Sep	11Jan	12Apr	Sum
	Forage yield, lbs/plot							
Yes	17.6	26.4	18.2	17.2	13.2	11.1	12.6	116
No	16.6	25.6	17.7	16.9	12.8	9.9	11.9	111
P>F[1]	NS	NS	NS	NS	NS	NS	NS	+

[1] NS, + = Not significant at P=0.10 and significant at P=0.10, respectively.