INFLUENCE OF PHOSPHORUS AND POTASSIUM FERTILIZATION ON ALFALFA YIELDS UNDER INTENSIVE HARVEST SYSTEMS

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In the northern part of the North Central (NC) states cutting management schedule and adequate fertilizer are important factors in maintaining alfalfa stands. Recent work in Minnesota by Sheaffer[1] indicates that fall cutting poses some risks to long-term stand persistance but should be considered as a management alternative to allow greater harvest flexibility. He further states that stand loss can be greatly reduced by high levels of fertilizer (particularly potassium).

The study I am reporting on today was set up to look at the long-term yields, stand persistance and soil tests resulting from phosphorus (P) and potassium (K) application to two alfalfa varieties under a normal 3 cutting schedule and also under a schedule where 4 cuttings are made by early September. This study was set up in 1983 on a Tara silt loam that had a pH of 7.9, an Olsen P level of 6 ppm, and an exchangeable K level of 117 ppm. The experiment was direct seeded on May 23-24, 1983. The design was four replications of a split-split plot. The main plot treatments were (1) 3 cuttings taken at about 1/10 bloom and (2) 4 cuttings taken at about 1/2 bud. The first split was various combinations of P and K fertilizer (Table 3) and the second split was variety. The varieties used were (1) Vernal which is winterhardy and susceptible to Phytophtora root rot and Anthracnose and (2) Answer which is moderately winterhardy, resistant to Phytophtora root rot, and partially resistant to Anthracnose. Yields were taken in both 1984 and 1985. The last cuttings on the 3-cut schedule were taken on August 17 and 20 in 1984 and 1985 respectively. On the 4-cut schedule the last cuttings were taken on August 29 and September 6 in 1984 and 1985 respectively. There were no quality measurements made on any of the cuttings.

After two crop years we have found no significant difference in yield between the two varieties used (Table 1). In 1984 there was no significant difference in yield (Table 2) between the two cutting schedules while in 1985 the 3-cut schedule yielded more than the 4-cut schedule (significant at the 6% level). The addition of P fertilizer

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[1]Sheaffer, C. C. 1985. Fall cutting management of alfalfa. Proc. of 10th Annual Minnesota Forage Day. "Conservation with Forages Makes $ense" pp. 50-52.

has increased yields significantly in both years, while the addition of K fertilizer has not affected yields (Table 3). Soil test levels in the fall of 1984 were significantly increased by fertilizer applications (Tables 4 and 5).

So far, visual observations of the plots has indicated no effect of any of the treatments on stands. The study will be continued and stand counts made at the termination of the study.

Table 1. Effect of variety on alfalfa yields at Morris, MN.

Year	Vernal	Answer
	- - Dry Matter (T/acre) - -	
1984	5.25	5.33
1985	4.63	4.67

Table 2. Effect of cutting schedule on alfalfa yields at Morris, MN.

Year	4 cuttings	3 cuttings
	- - Dry Matter (T/acre) - -	
1984	5.35	5.23
1985	4.27	5.03

Table 3. Effect of fertilizer application on alfalfa yields at Morris, MN.

Fertilizer Rate			
P_2O_5	K_2O	1984	1985
- lbs/acre -		- - Dry Matter (T/acre) - -	
0	200	5.10	3.11
50	200	5.38	4.88
100	200	5.28	5.17
50	0	5.24	4.71
50	100	5.28	4.60
50	200	5.22	4.85
50	300	5.51	4.92
50	400	5.30	4.98

Table 4. Effect of P application rate on Olsen P level.

Fertilizer Rate P_2O_5	0 - 2 inch Olsen P
- lbs/acre -	- ppm -
0	5
50	11
100	25

Table 5. Effect of K application rate on exchangeable K level.

Fertilizer Rate K_2O	0 - 2 inch Exch. K
- lbs/acre	- ppm -
0	156
100	177
200	202
300	226
400	270

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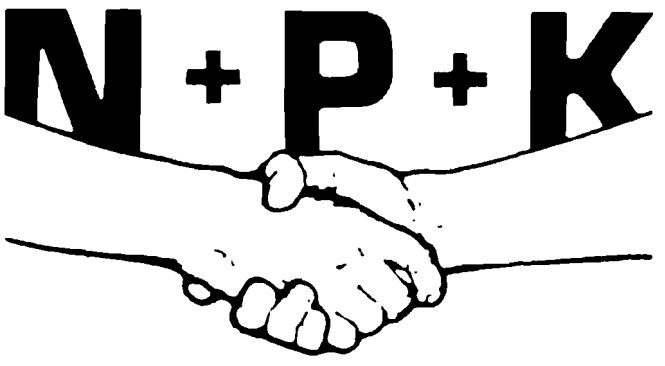

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