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NUTRITIVE VALUE OF ALFALFA LEAF AND STEM AS AFFECTED BY HARVEST DATE AND BORON RATE

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Background. Although there has been an increased interest in alfalfa selection and breeding for grazing tolerance during the past 10-15 years, the primary use of alfalfa is that of a hay crop. Numerous experiments with alfalfa have conclusively shown that maturity stage at time of harvest is the most important factor which controls nutritive value and forage regrowth. In general, forage yield is optimized at full flower (stage 6) and commercial operators usually target mid-bud (stage 3-4) to 10% flower (stage 5) to initiate hay harvest. Delaying harvest until seed pod formation (stages 7-9) will also delay regrowth. Generally, alfalfa may be harvested at 28 to 42-day intervals which is rainfall dependent in East Texas. Nutritive value of alfalfa hay is directly associated with plant age, season, and leaf:stem ratio. Alfalfa leaves are always more nutritious than stems; thus, hay harvest should adhere to those management practices which promote retention of a high percent leaf at time of cutting and in the baled hay. Usually, some external plant moisture (dew) at baling is beneficial in preventing excessive leaf shattering at time of baling. The objective of this experiment was to evaluate the influence of rate of boron (B) and season of harvest on nutritive parameters of leaf and stem components of 'Alfagraze' alfalfa..

Research Findings. An established stand of Alfagraze alfalfa was fertilized with 0-125-166-66-33 lbs/ac of N-P_2O_5-K_2O-S-Mg and with B rates of 0, 2, and 4 lbs/ac applied to four replications of a randomized complete block design. Alfalfa was harvested monthly from May-Aug, leaf-stem separations made, and nutritive parameters assessed (Table 1). Boron rate did not affect any nutritive entity of alfalfa stem sections except for crude protein (CP) at the Jun harvest ($P<.05$). Leaf CP was increased by rate of B at each harvest date (May, Jul $P<.05$; Jun, Aug $P<.10$). Leaf neutral detergent fiber (NDF) was reduced in Jun, Jul, and Aug, and lignin (LIG), which has been shown to be responsive to B rate, was reduced in leaves at the Aug harvest ($P<.10$).

Application. From this and another reported experiment, B should be used primarily to stimulate growth of alfalfa. However, there is some evidence that B may have indirect (delayed maturity) and direct (cell wall reduction) effects on nutritive value. Hay harvesting techniques which optimize percent leaf at time of cut and reduce leaf shattering will promote optimum nutritive value of alfalfa.

Table 1. Nutritive value of alfalfa leaf and stem sections at three rates of boron during summer period.

Boron lb/ac	Date	Plant Part	NDF %	ADF %	CEL %	LIG %	IVDMD %	CP %
0	May	Leaf	14.8	14.8	11.5	3.2	66.8	37.0
0	May	Stem	49.3	45.1	36.2	8.8	50.4	16.8
2	May	Leaf	13.4	14.0	10.8	3.2	66.7	39.0
2	May	Stem	46.1	43.5	35.1	8.1	52.4	17.7
4	May	Leaf	13.0	14.7	11.5	3.0	68.3	38.5
4	May	Stem	45.4	43.3	35.0	7.7	49.2	18.7
0	Jun	Leaf	18.1	15.1	12.1	3:1	65.2	29.1
0	Jun	Stem	49.4	43.2	34.2	8.8	48.3	13.5
2	Jun	Leaf	16.2	14.7	12.0	2.8	69.5	31.5
2	Jun	Stem	49.0	43.9	34.7	9.0	47.4	12.7
4	Jun	Leaf	17.3	14.5	11.8	2.9	68.9	31.7
4	Jun	Stem	48.7	43.4	34.6	8.4	47.4	14.4
0	Jul	Leaf	20.7	12.8	10.3	2.6	63.0	28.9
0	Jul	Stem	53.5	42.3	33.5	8.8	43.6	13.5
2	Jul	Leaf	17.9	12.6	10.2	2.5	62.0	33.3
2	Jul	Stem	57.8	47.2	37.2	9.6	42.8	13.0
4	Jul	Leaf	18.3	12.4	10.2	2.3	65.8	32.2
4	Jul	Stem	56.8	45.1	35.6	9.6	45.7	12.8
0	Aug	Leaf	19.4	13.1	10.6	2.6	65.7	28.7
0	Aug	Stem	53.1	43.6	33.8	9.5	41.8	13.9
2	Aug	Leaf	17.1	12.4	9.8	2.4	63.0	30.2
2	Aug	Stem	52.9	42.4	32.5	9.3	44.5	13.7
4	Aug	Leaf	17.0	11.8	9.6	1.9	67.2	29.1
4	Aug	Stem	51.4	42.1	32.3	9.3	44.8	13.7

NDF = neutral detergent fiber; ADF = acid detergent fiber; CEL = cellulose; LIG - lignin; IVDMD = *in vitro* dry matter digestibility; CP = crude protein