Project Title: Effects of Boron Fertilizer on Alfalfa Yield and Quality — 2015

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Objective: To evaluate the effects of boron fertilizer rate and timing on alfalfa yield and quality.

Summary:

Boron treatments were applied to evaluate the impact on alfalfa yield and quality, which included 5 rates of 0, 0.25, 0.5, 1, and 2 lbs/A at begin season (April 16) and 4 rates of 0, 0.25, 0.5, and 1 lbs/A at midseason (June 23). The experimental design was a randomized complete block with five treatments and four replications. Treatments were applied when the crop averaged 2-3 inches in height. There was a full soil profile beginning of green up in spring as rainfall received in the fall and early spring was above average. From the first green up to the last cutting (April to September, 2015) only 3.5 inches of rain was received and supplemental irrigation was needed. Height measurements were taken prior to cutting when plants averaged 10% flowering. Three cuttings were made.

No significant differences were observed for height or yield (Table 2). Average total yields were 6.1 T/A. First harvest had the highest yield at 3 T/A while third had the lowest at 1.4 T/A. The initial soil test for Boron in spring was low, but the average Boron tissue test (Table 3) were near or at sufficiency level for low Boron application, thus, no consistent hay quality trend can be observed. Alfalfa Boron trial was conducted on the second year of alfalfa establishment. Future studies will consider irrigation as an additional factor to Boron uptake and hay quality.

Table 1. Materials and methods.

Seeding Date:	5/15/14	1st Application Date:	4/16/15
Julian Date:	135	Julian Date:	106
Seeding Rate:	12 lbs/A	2nd Application Date:	6/23/15
Previous Crop:	Barley	Julian Date:	174
Tillage:	Conventional	1st Harvest Date:	6/10/15
Irrigation:	Yes	Julian Date:	161
Soil Type:	Fine sandy loam	2nd Harvest Date:	7/14/15
Soil Test:	30-21-201	Julian Date:	195
Fertilizer:	Liquid Boron 10% -Agrisolutions	3rd Harvest Date:	10/2/15
Rates:	0.0, 0.25, 0.5, 1.0, 2.0 lbs/A	Julian Date:	275

Table 2. Effects of boron fertilizer on alfalfa yield — 2015

	1st Harvest - Jun 10		2nd Harvest -Jul 14		3rd Harvest - Oct 2		Harvest Total
	HT	YLD	HT	YLD	HT	YLD	YLD
Treatment	in	T/A	in	T/A	in	T/A	T/A
0 lbs B	27	3.0	22	1.9	21	1.6	6.5
0.25 lb B begin + mid season	28	3.1	22	1.7	21	1.5	6.2
0.5 lb B begin + mid season	27	2.9	21	1.7	23	1.4	6.0
1 lb B begin + mid season	29	3.0	21	1.6	21	1.4	6.0
2 lbs B begin season	28	3.0	20	1.6	20	1.3	5.9
Mean	28	3.0	21	1.7	21	1.4	6.1
CV	8	11	10	9	17	13	8
LSD	ns	ns	ns	ns	ns	ns	ns
Pr>F	0.5978	0.9730	0.5875	0.0855	0.8307	0.3720	0.4408

HT: height, YLD: yield, ns: nonsignificant, B: boron (amount applied begin season same as mid season)

Table 3. Boron uptake and hay quality — 2015

	CP	ADF	NDF	TDN	RFV	B
Treatment	%	%	%	%	%	ppm
	1st Harvest - Jun 10					
0 lbs B	25.6	30.0	44.1	66.3	138	25
0.25 lb B begin + mid season	25.7	27.7	38.8	68.8	161	34
0.5 lb B begin + mid season	27.7	28.6	36.0	67.8	172	30
1 lb B begin + mid season	22.9	33.0	38.5	63.1	153	30
2 lbs B begin season	28.9	30.4	34.7	65.9	175	38
	2nd Harvest - Jul 14					
0 lbs B	22.7	35.0	40.3	60.9	142	25
0.25 lb B begin + mid season	22.4	36.3	42.5	59.5	133	33
0.5 lb B begin + mid season	22.8	37.8	45.7	57.9	121	34
1 lb B begin + mid season	28.3	28.2	31.9	68.2	195	30
2 lbs B begin season	25.6	34.5	40.2	61.5	144	38
	3rd Harvest - Oct 2					
0 lbs B	25.6	22.1	29.1	74.8	229	32
0.25 lb B begin + mid season	27.4	24.3	29.0	72.5	224	41
0.5 lb B begin + mid season	25.0	25.7	31.0	71.0	207	32
1 lb B begin + mid season	24.7	22.9	30.4	74.0	217	43
2 lbs B begin season	25.1	25.8	29.7	70.8	215	40

CP: crude protein, ADF: acid detergent fiber, NDF: neutral detergent fiber, TDN: total digestible nutrients, RFV: relative feed value, B: boron (amount applied begin season same as mid season)