Optimizing Boron Maintenance Fertilization for Alfalfa

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Alfalfa (*Medicago sativa* L.) utilizes boron (B) for processes such as carbohydrate regulation, nitrogen fixation and flowering. Strategic B application in alfalfa has the potential to significantly impact alfalfa yield response. However, specific B fertilization recommendations for alfalfa in Montana have not yet been evaluated. The objective of this project was to evaluate the effect of five B application rates on alfalfa quality and yield. We hypothesized that alfalfa yield and quality would increase with increasing B application. Five B treatments were applied at two research sites (Dillon and Creston, MT) in a randomized complete block design: 0 kg B/ha, 0.280 kg B/ha in a split application, 0.560 kg B/ha in a split application, 1.123 kg B/ha in a split application, and 2.242 kg B/ha in a single application. All treatments were replicated four times. Treatments were harvested twice in Dillon and three times in Creston. In Creston, samples from a 1.52m x 4.57m strip of each plot and in Dillon, samples from 1m x 1m quadrat of each plot were weighed and subsampled for quality analysis. In year one, no significant differences ($P > 0.05$) were found in alfalfa yields at the Creston site, however, second harvest yields in Dillon were significantly impacted ($P<0.049$). The 0 kg B/ha treatment produced an average of 9190.98 kg/ha, and the 2.242 kg B/ha treatment producing an average of 10087.7 kg/ha. Protein content at the Dillon site was higher than expected, averaging 29.9% amongst all treatments. All other hay quality parameters were within expected ranges at both sites, and not affected by B treatment ($P > 0.05$). The effect of B application on yield observed at the Dillon site shows the potential of boron application on alfalfa performance. Insufficient precipitation at the Creston site likely resulted in no differences among treatments.

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