Effect of irrigation and boron fertilizer on yield and forage quality of alfalfa

Sapkota, A.1*, J.A. Torrion2, R.N. Stougaard2, E.C. Glunk1
1Department of Animal and Range Sciences, Montana State University, Bozeman MT.
2Northwestern Agricultural Research Center (NWARC), Kalispell, MT
*Corresponding author: anishsapkota@montana.edu

Abstract

Alfalfa (Medicago sativa L.) is a high water-use crop that has the highest boron (B) demand among many commercially-grown crops. Many soils in the state of Montana have potential to be deficient in B which can have significant impacts on alfalfa yield and quality; however, this has yet to be determined. This study was conducted to determine whether the yield and forage quality would be affected by irrigation and B fertilization. The research was done at Creston, MT on a fine sandy loam soil. Three irrigation treatments were determined using crop evapotranspiration (ET; rainfed check, 50ET, and 100ET) as the main plot and five levels of B (0, 0.28, 0.56, 1.12 and 2.24 kg ha\(^{-1}\)) as subplot laid in a split plot experimental design and replicated four times. Dry matter yield was increased up to 45% because of irrigation and demonstrated that a less than sufficient irrigation applied (50ET) was not inferior in relation to 100ET. A positive impact of B on yield was not observed. An inconsistent effect of B and irrigation were found on forage quality but the overall forage quality obtained from all of the treatments was of very good quality. Irrigating alfalfa with just 50% of the water required by the plant may increase the yield compared to a no-irrigation check. A second-year study will help to determine whether or not B is critical to a specific water regime in alfalfa production.

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Materials and Methods

Research site: NWARC, Creston, MT

Harvested at 10% bloom

Drop tapes to irrigate the field

10% B Agri solution was used as B fertilizer

Results and Discussion

Effect of irrigation on forage quality

Effect of boron on forage quality

Conclusions and Implication

- Preliminary results shows that deficit irrigation (50ET) did not impact yield in relation to 100ET
- An inconsistent effect of B and irrigation were found on forage quality but the overall forage quality obtained from all of treatments was of very good quality.
- Second-year study of B x irrigation regime association will help to determine whether or not B is critical to a specific water regime and alfalfa production in Montana
- Alfalfa yield may significantly increase in Montana, if irrigated

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References:
