

Alfalfa response to boron application at various water regimes Anish Sapkota*, Jessica Torrion[†], Robert Stougaard[†], Breno Bicego[†], Emily Meccage*

Introduction

- Alfalfa is known for its high dry matter yield, forage quality, and adaptability to wide-range of soil types and climatic conditions (Dordas, 2006)
- It's yield increases with increase in water application (Donovan and Meek, 1983)
- Alfalfa removes larger amount of boron (B) compared to many other crops (Shorrocks, 1997)
- Boron fertilization for alfalfa has not been specifically evaluated under Montana conditions and different water regimes
- Evaluating strategic rates of B fertilization and irrigation for various soils and environmental conditions in Montana may help to improve alfalfa production and forage quality

Research Question

Can yield and forage quality of alfalfa be enhanced through B and water optimization?

Objective

To examine the effect of irrigation and B on yield and different forage quality parameters: crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), total digestible nutrients (TDN) and relative feed value (RFV)

Materials and Methods









- Research site: Northwestern Ag Research Center, Creston, MT
- Three irrigation (main-plot) and five B (subplot) treatments were replicated four times in split-plot design
- A foliar application of a 10% liquid B solution was applied using a CO₂-pressurized backpack sprayer
- Surface drip irrigation; irrigated when 35% plant-available water was depleted
- Evapotranspiration (ET) based soil water balance approach was used
- Harvested at 10% bloom
- Plant samples were collected to determine:
 - Dry Matter (DM) yield,
 - plant tissue B content, and
 - forage quality (CP, ADF, NDF, TDN, and RFV)
- Data were analyzed using the PROC GLIMMIX in SAS

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Results- Forage Quality



Conclusions

- Boron fertilization did not impact alfalfa yield

Acknowledgements and References

We would like to thank the Montana Agricultural Experiment Station and the Montana Fertilizer Tax Advisory Committee for their support on this project.

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 Boron application increased petiole B concentration Dashed (----) line indicates sufficiency level (Kelling, 1999)



Irrigation decreased forage quality in 2016 but not in 2017

Effect of boron on forage quantity remained inconsistent in 2016 and 2017

ETxB interaction was not significant in 2016. Some response variables were significantly affected in 2017, but rate response was inconsistent

Alfalfa yield was significantly increased with irrigation application

No difference in yield between 50ET and 100ET

Plant tissue B content was positively influenced by irrigation and B fertilization but did not correlate to alfalfa yield and quality