



Nutritive Value and Cattle Preferences in an Old Boer Lovegrass Stand Treated with Biosolids in Cananea, Sonora, México

Salomón M. Moreno
University of Sonora, Mexico

Martha R. Martin
University of Sonora, Mexico

Fernando Ibarra
University of Sonora, Mexico

Roque Martínez
University of Sonora, Mexico

Agustín Cabral Martell
University Antonio Narro-Laguna, Mexico

See next page for additional authors

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/22/2-4/15>

The 22nd International Grassland Congress (Revitalising Grasslands to Sustain Our Communities) took place in Sydney, Australia from September 15 through September 19, 2013.

Proceedings Editors: David L. Michalk, Geoffrey D. Millar, Warwick B. Badgery, and Kim M.

Broadfoot

Publisher: New South Wales Department of Primary Industry, Kite St., Orange New South Wales, Australia

Presenter Information

Salomón M. Moreno, Martha R. Martin, Fernando Ibarra, Roque Martínez, Agustín Cabral Martell, Francisco B. Denogean, and Rafael Retes

Nutritive value and cattle preferences in an old Boer lovegrass stand treated with biosolids in Cananea, Sonora, México

Salomón Moreno^A, Martha Martín^A, Fernando Ibarra^A, Roque Martínez^A, Agustín Cabral Martell^B, Francisco Denogean^A, Fernando Ibarra^A and Rafael Retes^C

^A University of Sonora, Campus Santa Ana, Sonora, Dept. of Administration, Mexico

^B University Antonio Narro-Laguna, Department of Sciences and Socioeconomics, Mexico

^C University of Sonora, Hermosillo, Sonora, Dept. of Agriculture, Mexico

Contact email: salomon@santana.uson.mx

Keywords: Forage quality, crude protein, available phosphorus, digestibility, crude fibre, animal preference.

Introduction

Boer lovegrass (*Eragrostis curvula* var. *conferta*) is an introduced species planted to increase productivity on deteriorated rangelands in northern Mexico. Forage production with Boer lovegrass achieves an increase of two to three fold when compared to native grasses, however, as stands became old, pasture productivity and forage quality declines due to a reduction in available nutrients causing a reduction in grazing capacity and beef production. Previous studies have shown that biosolids enhance seedling establishment, plant growth and increases forage production in the species, but no data is available to measure changes in forage quality and animal performance. This study was conducted to evaluate pasture nutritive value and cattle preferences on a 15 year old Boer lovegrass stand three summers following biosolids application.

Methods

The study was conducted from 2006-2008 at Cananea, Sonora, México (Latitude 30° 58' 00" N and Longitude 110° 08' 30" W). Type "A" biosolids were hand-applied at rates of 0, 25, and 50 t DM/ha during 2006 on triplicate 5 m x 5 m plots. Plant samples were harvested during the summer growing season of 2008 from 10 randomly selected Boer lovegrass plants on each plot. Forage samples were sent to the University of Sonora laboratory and were analyzed by triplicate (AOAC 1984). Variables evaluated were crude protein, available phosphorus, crude fibre, digestibility and animal preference. A mature Hereford cow was used to test grazing preferences during the summer of 2008. Three grazing periods of 60 minutes each were allowed and each was considered as a replication. A different cow was used on each grazing event. Time spent grazing was recorded on each plot. A completely randomized block design was used to set the experiment. Data was analysed by ANOVA ($P \leq 0.05$).

Results and discussion

Records show that precipitation was close to average during the study period with 412, 425 and 420 mm for 2006, 2007 and 2008, respectively. All variables except

crude fibre were different ($P \leq 0.05$) between treatments (Table 1). Crude protein was 5.1 % in the control and averaged 7.5 and 9.9 % on plots treated with biosolids at rates of 25.0 and 50.0 t DM/ha respectively. Available phosphorus was 0.078 % in the control and averaged 0.11 and 0.13 % on plots treated with biosolids at the rates of 25.0 and 50.0 t DM/ha respectively. Crude fibre was similar among treatments ($P \geq 0.05$) and varied from 27.2 to 31.5 %. Digestibility averaged 37.1 % in control and averaged 40.5 and 46.3 % on plots treated with biosolids at rates of 25.0 and 50.0 t DM/ha respectively. Cattle preferred ($P \leq 0.05$) to graze Boer lovegrass plants on plots treated with biosolids.

Cows spent 28.2 min (15.7 %), 58.5 min (32.5 %), and 93.2 min (51.8 %) on plots treated with biosolids at rates of 0, 25 and 50 t/ha, respectively. Overall, cows spent 84.3 % of the time grazing plants on the biosolid treated plots. Our results agree with Fresquez *et al.* (1990) and Mata-Gonzalez *et al.* (2002) who have reported positive forage responses even 4 to 6 years after biosolid application. Increases in nitrogen, phosphorus, magnesium and sodium are common in plant tissue following biosolids application (Cuevas *et al.* 2000), and crude protein and digestibility increases in forage (Tiffany *et al.* 2000). These nutritive value changes in forage may account for the greater animal preference ratios reported in different environments (Pierce *et al.* 1998; Sullivan *et al.* 2006) and for the significantly greater animal gains reported in rangelands treated with biosolids (Wester *et al.* 2003).

Table 1. Forage quality and animal preference on old Boer lovegrass stands after hand application of several rates of biosolids at north Sonora, México.

Variable	Biosolids rates		
	0 (t DM/ha)	25 (t DM/ha)	50 (t DM/ha)
Crude protein (%)	5.100 c	7.50 b	9.90 a
Available phosphorus (%)	0.078 c	0.11 b	0.13 a
Crude fibre (%)	27.200 a	28.90 a	31.50 a
Digestibility (%)	37.100 c	40.50 b	46.30 a
Animal preference (min grazing)	28.200 c	58.50 b	93.20 a

Conclusion

We conclude that biosolids increase forage quality in Boer lovegrass plants. The residual nutritive effect of biosolids continues for three growing seasons after treatment application. Cows consistently preferred Boer lovegrass plants on plots treated with biosolids as compared to plants on the control areas. The uses of these nutrient-rich organic materials play an important role on the improvement of deteriorated rangelands in northern México.

References

- AOAC (1984) Official methods of analysis. Association of Official Agricultural Chemists. Washington, DC. USA.
- Cuevas G, Blázquez R, Martínez F, Walter I (2000) Composted MSW effects on soil properties and native vegetation in a degraded semi-arid shrubland. *Compost and Science Utilization* **8**, 303–309
- Fresquez PR, Francis RE, Dennis GL (1990) Sewage sludge effects on soil and plant quality in a degraded, semiarid grassland. *Journal of Environmental Quality* **19**, 324–329.
- Mata-Gonzalez R, Sosebee RE, Wan C (2002) Shoot and root biomass of desert grasses as affected by application of biosolids. *Journal of Arid Environments* **50**, 477–488.
- Pierce BL, Redente E, Barbarick KA, Brobst RB, Hageman P (1998) Plant biomass and elemental changes in shrubland forages following biosolids application. *Journal of Environmental Quality* **27**, 789–794.
- Sullivan TS, Stromberger ME, Paschke MW, Ippolito JA (2006) Long-term impacts of infrequent biosolids applications on chemical and microbial properties of a semi-arid rangeland soil. *Biology and Fertility of Soils* **42**, 258–266.
- Tiffany ME, McDowell LR, O'Connor GA, Nguyen H, Martin FG, Wilkinson NS, Cardoso EC (2000) Effects of pasture-applied biosolids on forage and soil concentrations over a grazing season in North Florida. II. Microminerals. *Communications in Soil Science and Plant Analysis* **31**, 215–227.
- Wester DB, Sosebee RE, Zartman RE, Fish EB, Villalobos JC (2003) Biosolids in a Chihuahuan Desert Ecosystem. *Rangelands* **25**, 27–32.