



INTRODUCTION

The organo-zeolitic amendment (OZA) obtained by the mixture of natural zeolites-clinoptilolite and organic residues like feedlot organic wastes is considered an economical, less chemical fertilizer dependent, and practical management tool for increasing soil fertility, water availability and forage productivity under semi-arid or sub-humid environments (Schwartz & Dao, 2005; Lu *et al.* 2010; Tahir *et al.* 2012).

The aim of the study was to evaluate the effect of OZA on rye grass (*Lolium perenne* L) dry biomass production and water consumption under different soil water contents.

MATERIALS & METHODS

Experimental design & statistical analysis

- ✓ CRBD with 4 replications
- ✓ Factorial arrangement (2 x 2)
- ✓ Factors:
 - 1.- Amendment type
 - 2.- Soil water content (60% and 90% of field capacity)
- ✓ Results were analyzed by ANOVA (factorial arrangement) and mean comparisons



General view of the greenhouse pot experiment

Treatments evaluated at each water condition

1. Control (soil, S)
2. Soil + Zeolite (SZ)
3. Soil + Feed lot residue (SF)
4. Soil+ Zeolite + Feed lot residue (SZF)

Soil characteristics

- ✓ Entic Haplustoll (pH: 6.1; EC: 1.0; OM: 11.2 g kg⁻¹; P Bray: 64.2 mg kg⁻¹ CEC: 5.8 cmol_c kg⁻¹)
- ✓ Texture: loamy sandy (sand: 69.5%; silt: 23 %; clay: 7.5%).

Feed lot organic residue: general chemical composition.

- ✓ pH: 6.0; EC: 3.4 dS m⁻¹; OM: 133 g kg⁻¹; N: 6.4 g kg⁻¹; P: 5.8 g kg⁻¹
- ✓ Feed lot residue rate: 15 Mg ha⁻¹

Zeolite (clinoptilolite): chemical properties

- ✓ SiO₂, 71 %; Al₂O₃, 12.4 %; Fe₂O₃, 2.2 %; TiO₂, 0.22 %; P₂O₅, 0.02 %; MnO, 0.02 %; CaO, 2.4%; MgO, 0.7 %; K₂O, 1.3 %; NO₂, 1.5 %. CEC 1.5 meq.g⁻¹
- ✓ Clinoptilolite rate: 5% p/p



Zeolite sample

RESULTS AND DISCUSSION

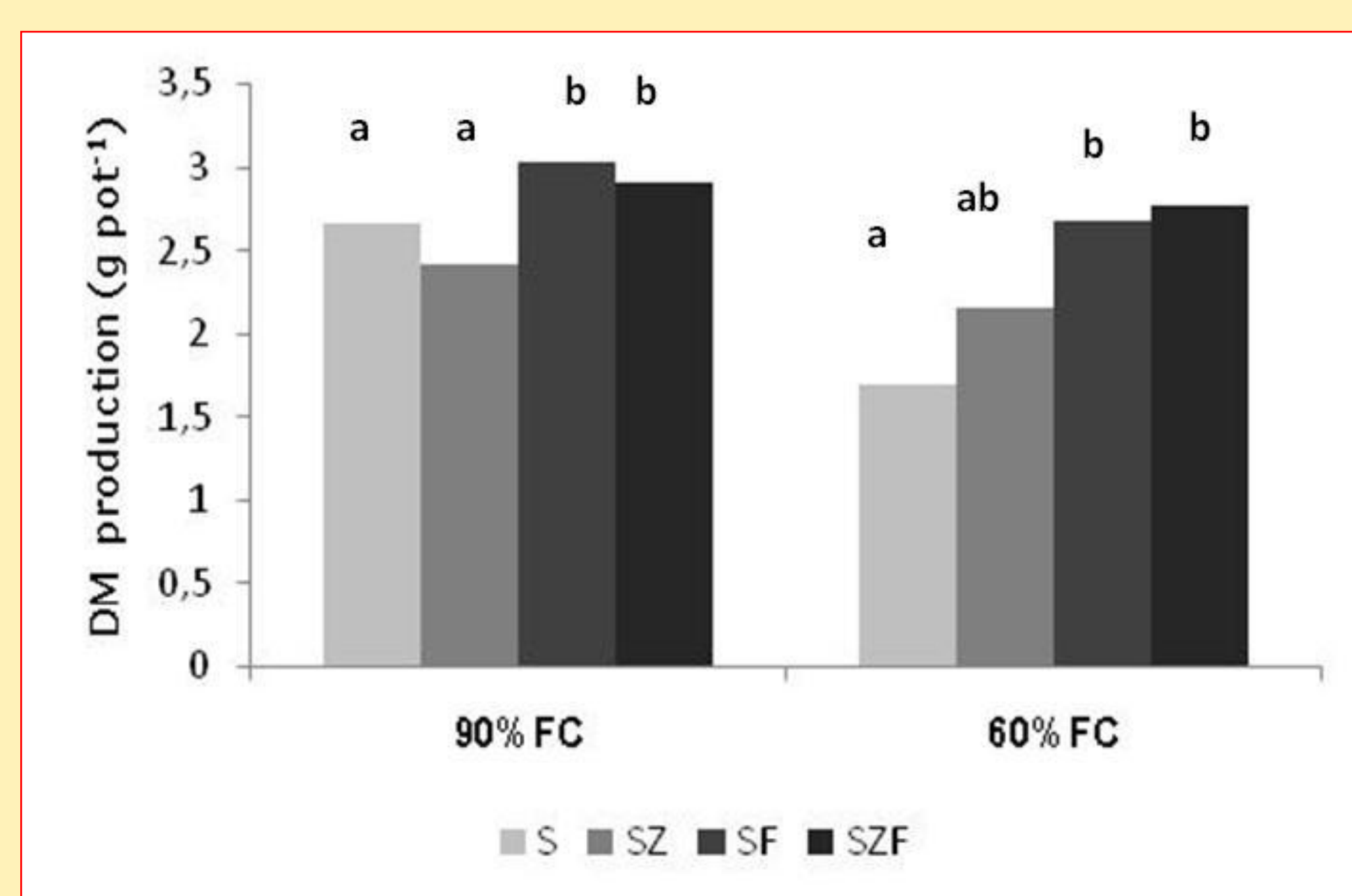


Fig 1. Effects on forage productivity ($\alpha=0.05$, Tukey test)

✓ The highest improvements in forage productivity over the control were observed for SZ and ZFZ treatment (+13.9 and +9.7, respectively; $P<0.05$, Fig.1) under no water restrictions (90% FC).

✓ The Z treatment did not affect forage productivity ($p>0.05$)

✓ Under water restrictions (60% FC), DM biomass production was more variable. However, SF and SZF increased the forage productivity by 59 and 63% over control.

- ✓ Total water consumption was reduced by 4.0 and 7.6% at SZ and SZF treatments.
- ✓ Under water restriction conditions, water consumption was reduced by 3.4% over control.

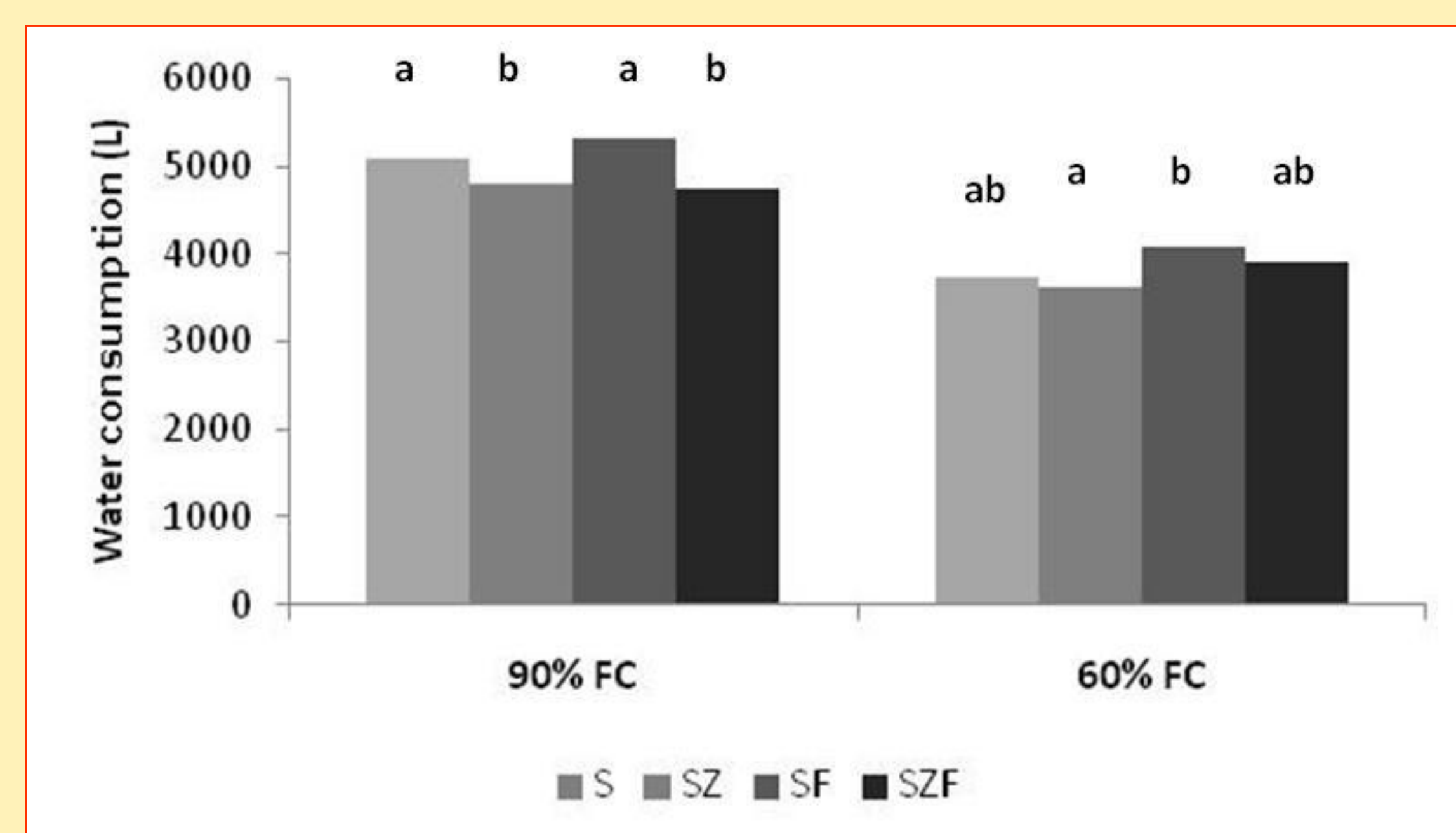


Fig 2. Effects on water consumption ($\alpha=0.05$, Tukey test)

The organo-zeolitic system (SZF treatment) produced the highest DM biomass and the lowest water consumption. Zeolite and organic feed lot residues seem promising amendments for improving soil fertility under sandy soil conditions.