African Journal of Range & Forage Science 2020, 37(2): 151–157
Printed in South Africa — All rights reserved

AFRICAN JOURNAL OF RANGE & FORAGE SCIENCE
ISSN 1022-0119 EISSN 1727-9380
https://doi.org/10.2989/10220119.2020.1720293

Revegetation of marginal saline rangelands of southern Tunisia using pastoral halophytes

Abderrazak Tlili[1], Emna Ghanmi[1], Naziha Ayeb[2], Mounir Louhaichi[3], Mohamed Neffati[1] and Mohamed Tarhouni[1]*

[1] Institut des Régions Arides. Laboratoire des Ecosystèmes Pastoraux et Valorisation des Plantes Spontanées et des Microorganismes Associés, University of Gabes, Tunisia
[2] Institut des Régions Arides. Laboratoire d'Elevage et Faune Sauvage, University of Gabes, Tunisia
[3] International Center for Agricultural Research in the Dry Areas (ICARDA), Amman, Jordan
**Correspondence: medhtarhouni@yahoo.fr*

Revegetation of marginalised rangelands using pastoral halophytes is considered an appropriate scientific and environmental approach to rehabilitation. *Atriplex halimus* L. (Amaranthaceae), *A. mollis* Desf. (Amaranthaceae), *Cenchrus ciliaris* L. (Poaceae) and *Lotus creticus* L. (Fabaceae) are promising species for arid rangeland rehabilitation, because of their adaptation and palatability. Dry biomass, *in vitro* digestibility, ash, nitrogen, neutral detergent fibre, acid detergent fibre and lignin of 50% aboveground biomass (upper half of tufts assumed to be the firstly consumed parts by livestock) of these species were evaluated in the Sidi Makhlouf region of southern Tunisia, during December 2015, June 2016 and December 2016. Digestibility increased with nitrogen content and both of these variables are decreasing when the dry matter and fibre contents increased. Four groups of species were obtained, based on digestibility and nitrogen and lignin contents. *A. halimus* and *L. creticus* harvested in the winter of 2015 have superior forage quality. *A. mollis* was better able to regenerate after winter harvest. Forage quality of *C. ciliaris* and *L. creticus* decreased with seasonal variation. The rehabilitation of marginal saline dryland remains possible with local pastoral halophytes that produce good forage quality and may provide many economic and environmental benefits for local users.

Keywords: drylands, forage quality, rehabilitation, recovery, salinity

Introduction

Increased temperature, variability in rainfall and prolonged droughts are the main climatic conditions influencing dryland ecosystem productivity (Maestre et al. 2012). Soil salinisation is considered one of the major factors constraining plants' growth and their distribution, especially in arid zones (De Oliveira et al. 2013). In Tunisia, natural rangelands occupy 5.5 million hectares, of which two-thirds are arid (Rhouma and Souissi 2004; Aïdoud et al. 2006). These areas are known for their socio-economic and ecological importance; however, several biotic and abiotic factors have led to the natural rangeland degradation. In recent years, Tunisian rangelands have been unable to satisfy livestock forage demands mostly in seasons of low natural vegetation production (i.e. winter and summer) (Rekik and Ben Hammouda 2000). The resultant overgrazing reduced the palatable and most productive plant species (Ould Sidi Mohamed et al. 2002; Tarhouni et al. 2010). In addition, areas affected by salinity are expanding under a combination of climate (hot temperature, water evaporation) and human activities (mainly by the use of salty water for the crop irrigation). Biomass production, forage quality and digestibility of salt-tolerant species are influenced by environmental conditions, season and type of exploitation (Ben Salem 2010; Wamatu et al. 2017; Temel 2018; Temel and Keskin 2019). Forage quality is conventionally evaluated using protein content, digestibility and chemical composition (Corona et al. 1998; Mountousis et al. 2008).

Halophytes are considered to be an important part of the local flora of arid zones and can function as supplementary feed sources (Temel et al. 2015). Their use offers an economical solution to valorise marginalised saline lands and brackish water (Nedjimi 2012; Tlili et al. 2018). Most of the salt-tolerant forages are grasses and chenopods (Norman et al. 2013). Chenopods are defined as plant species belonging to Chenopodiaceae and Amaranthaceae families. Generally, legumes are characterised by their high protein content, digestibility and palatability, but the majority are non-tolerant to salinity (Manchanda and Garg 2008). However, grasses and some legumes have been described as moderate to high salt-tolerant species (Masters et al. 2007). The high salt-tolerant legumes are good candidates to repopulate saline areas (Temel et al. 2016). For example, alfalfa (*Medicago sativa* L.) tolerates moderate to high salinity conditions with the maintenance of its good forage quality (Ferreira et al. 2015). Many authors have shown that chenopods, especially *Atriplex* species (e.g. *A. halimus* L., *A. nummularia* Lindl. and *A. canescens* Pursh.), are among the most valuable plants for revegetation of saline areas on the basis of their tolerance to salinity, protein content and palatability (Khalil et al. 1986; Glenn et al. 1998; Norman