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ORIGINAL ARTICLE

Xylem water potentials of native shrubs from northeastern Mexico

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Abstract

Xylem water potentials (Ψ) were evaluated in browse plants such as *Forestiera angustifolia* (Oleaceae), *Celtis pallida* (Ulmaceae), *Zanthoxylum fagara* (Rutaceae), and *Eysenhardtia texana* (Fabaceae). Collections were carried out at Linares County, a semi-arid region of northeastern Mexico. Ψ (MPa) were estimated at 10-day intervals between July 10 and September 30, 2008 by using a Scholander pressure bomb, and were monitored in five different plants per species at 06:00 h (predawn) and 14:00 h (midday). Air temperature, relative humidity, precipitation, and soil water content were registered throughout. Data were subjected to one-way ANOVA and linear correlation analysis. At the wettest period, Ψ at predawn varied from −0.29 (*C. pallida* and *E. texana*) to −0.37 (*F. angustifolia* and *Z. fagara*); in contrast, at the driest period, predawn Ψ ranged from −3.28 (*F. angustifolia*) to −4.50 (*Z. fagara*). At midday *E. texana* achieved the highest (−1.14) and lowest (−4.20) values at wettest and driest sampling dates, respectively. It seems that air temperature and vapor pressure deficit negatively influenced Ψ values in all species; conversely, Ψ values augmented as relative humidity increased. Since *F. angustifolia* and *C. pallida* maintained higher predawn and midday Ψ values under water stress, these species may be considered as drought-adapted species while, *Z. fagara* and *E. texana* that acquired lower values, may be less adapted to drought and in physiological disadvantage under limited water conditions.

Keywords: Celtis pallida, Eysenhardtia texana, Forestiera angustifolia, *water potential,* Zanthoxylum fagara.

Introduction

Vegetation of northeastern Mexico is characterized by an average annual precipitation that varies from 400 to 800 mm and a yearly potential evapotranspiration of about 2200 mm, and has been utilized as a forage source for domestic livestock and wildlife, fuel wood, timber for construction, and medicine (Reid et al., 1990; McMurtry et al., 1996). The great diversity of native shrub species in this region reflects the plasticity among these species derived from their development of effective mechanisms to cope with seasonal water stress. Therefore, shrub and tree plants have evolved key morphological and physiological traits suited for adaptation to environmental constraints, especially on drought-prone sites. The strategies include early leaf abscission, limited leaf area, an extensive and deeper root system, epidermal wax deposition, associated with reduction of water loss by stomatal closure and accumulation of organic and inorganic solutes (Newton et al., 1991).

The study of native species in this region provides an opportunity to investigate ecophysiological aspects of shrub species and their responses to changes in resource availability, particularly soil moisture content, in order to gain a better understanding of how to sustain and improve productivity. However, only three scientific publications (Stienen et al.,

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