Agrociencia Uruguay 2023 | Volume 27 | Number NE2 | Article e1251
DOI: 10.31285/AGRO.27.1251
ISSN 2730-5066

IUFRO Conference 2023

Drought effects on water status, plant hydraulics and growth in *Eucalyptus grandis* and clonal hybrids with red gums and *E. urophylla*

Gándara, J.[1]; Nión, M.[1]; Ross, S.[1]; Gatica, G.[2]; Basile, P.[3]; González-Tálice, J.[1]; Fernández, M. E.[2]

[1] *Universidad de la República, Montevideo, Uruguay*
[2] *Consejo Nacional de Investigaciones Científicas y Técnicas, Buenos Aires, Argentina*
[3] *Universidad de la República, Tacuarembó, Uruguay*

Received *29 Aug 2023*
Accepted *01 Sep 2023*
Published *20 Nov 2023*

Correspondence
José Gándara,
jgandara@fagro.edu.uy

Afforestation with *Eucalyptus* species occupies over a million hectares in Uruguay, and *E. grandis* is one of the most cultivated species, mainly for the timber industry. However, the increasing frequency of drought and heat waves in the region raises the need to evaluate hybrids with red gums (*E. camaldulensis* and *E. tereticornis*), since they are known to sustain gas exchange and growth even under severe drought conditions. Hybrids with *E. urophylla* are also evaluated for plantations in subtropical regions. This study aimed to compare the effects of drought on plant water status, hydraulics, and growth of *E. grandis* (one clone; G), *E. grandis* × *camaldulensis* (one clone; GC), *E. grandis* × *tereticornis* (one clone; GT), and *E. grandis* × *urophylla* (two clones; GU1 and GU2). Two drought-stress cycles were applied to six-month rooted cuttings from mid-spring to early fall under greenhouse environmental conditions. Predawn leaf water potential (?pd), midday leaf water potential (?md), relative leaf water content (RWC), stomatal conductance (gs), and plant growth were measured across each cycle. Daily fluctuation of Ψ was calculated as $\Delta\Psi = \Psi_{pd} - \Psi_{md}$. Specific (kS) and leaf-specific (kL) hydraulic conductivities and specific leaf area (SLA) were measured at the end of the experiment. Percentage loss of hydraulic conductivity (PLC) was calculated after removing the xylem embolism. Preliminary results suggest that both red-gum hybrids had higher PLC under moderate-to-severe drought, as a consequence of maintaining high water potential gradients to sustain transpiration and carbon fixation throughout the experiment. Under the well-watered condition, no clonal difference was observed. Also, GT showed a three-fold increase in cavitation and had 1.5 times stomatal opening (gs) than the most drought-sensitive clone (*E. grandis*, G), and exhibited the lowest reduction (17%) in diameter growth under drought. Also, GC attained the highest height at the end of the study, 40% higher than *E. grandis*, and increased by 25% the SLA under drought. GU clones reached the highest diameter at the end of the study. Correlations among functional variables are explored, and the water supply capacity to the foliage among clones is discussed for a better understanding of drought resistance strategies and growth performance of the different taxa.

Keywords: water deficit, cavitation, eucalypt, transpiration

Gándara J, Nión M, Ross S, Gatica G, Basile P, González-Tálice J, Fernández ME. Drought effects on water status, plant hydraulics and growth in *Eucalyptus grandis* and clonal hybrids with red gums and *E. urophylla*. Agrociencia Uruguay [Internet]. 2023 [cited dd mmm yyyy];27(NE2):e1251. Doi: 10.31285/AGRO.27.1251