Drought Response of *Trichloris crinita* Plants with Different Aridity History: Water Use, Leaf Elongation and Senescence

R. E. Quiroga
Instituto Nacional de Tecnología Agropecuaria, Argentina

L. J. Blanco
Instituto Nacional de Tecnología Agropecuaria, Argentina

R. A. Golluscio
Universidad de Buenos Aires, Argentina

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Drought response of *Trichloris crinita* plants with different aridity history : water use , leaf elongation and senescence

R .E . Quiroga[1] , *L .J . Blanco*[2] , *R A . Golluscio*[3]
[1] *INTA Catamarca , E-mail : equiroga@correo .inta .gov .ar* , [2] *INTA La Rioja* , [3] *IFEVA-Univ . de Buenos Aires . Argentina*

Key words : intraspecific variability , drought resistance , common-garden experiment , Argentina , Chaco Arido region

Introduction An important part of the world presents arid climate . Investigating adaptive responses of plants to drought is central for genetic improvement and for ecological theory (Endler , 1986) . The aim of this work was to evaluate the effect that aridity , as a selective force , imprints over the drought response of plants of *Trichloris crinita* , a forage native grass of the Argentinean Chaco Arido region .

Materials and methods We collected seeds of *Trichloris crinita* plants from two sites with different aridity history : Dean Funes (humid site , H" ; mean annual precipitation = 625 mm) and Chepes (arid site , A" ; m .a .p .= 326 mm) . In September , 2005 , 40 experimental units (two 10-L pots with 1 plant each one = 1 experimental unit) per origin were established in a common garden at INTA La Rioja Experimental Station . Twenty experimental units of each origin were randomly assigned to each drought treatments : high watering level (control , 3-L/pot/week) and low watering level (drought , 1 .5-L/pot/week) . Treatments were imposed from 30 November , 2005 to 4 January , 2006 , in a randomized complete block design . Weekly we measured the volumetric soil water content (SWC) in 6 pots per origin and drought treatment combination , and the leaf elongation rate (LER) of the youngest leaf in a selected tiller per plant , for all plants . The percentage of senesced leaves (PSL) in all the selected tillers was measured on 28 December , 2005 . Data were analyzed using ANOVA models , with the MIXED procedure of the SAS package (SAS Institute , 1996) .

Results In general , drought reduced LER and SWC for plants of both origins . Within the high watering level no differences in LER and SWC were observed for H" and A" plants (Figure 1 and Figure 2) . By contrast , differences were observed within the low watering level : H" plants showed similar LER than A" plants during weeks 1 and 2 , but then H" plants showed lower LER than A" plants during weeks 3 to 5 (Figure 1) . Also , H" plants presented lower SWC than A" plants during weeks 1 and 2 , but no differences were observed between H" and A" plants in weeks 3 to 5 (Figure 2) . PSL of plants from both origins was also affected differentially by drought . Within the high watering level no PSL difference was observed between H" and A" plants (30% vs . 33% , respectively) ; but within the low watering level , H" plants showed a greater PSL than A" plants (62% vs . 42% , respectively) .

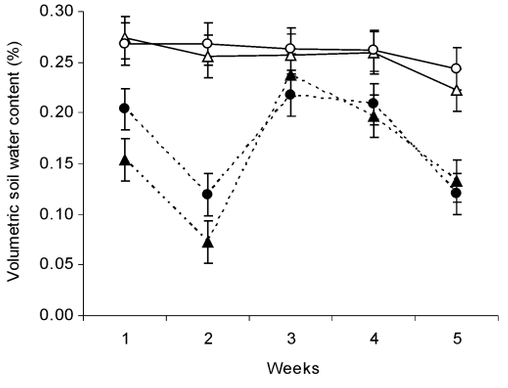

Figure 1 *Weekly variation in LER (mean ± SE) of plants from humid (H) and arid (A) sites , as affected by high (+) and low (−) watering levels .*

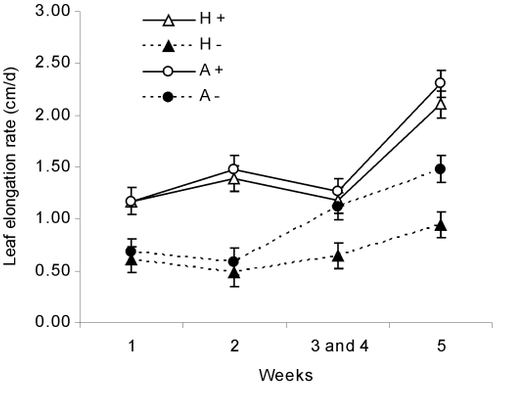

Figure 2 *Weekly variation in SWC (mean ± SE) on pots with plants from humid and arid sites , as affected by high and low watering levels (symbols are equal than in Figure 1) .*

Conclusions Aridity , as selective force , conferred a differential drought resistance within the grass *Trichloris crinita* . H" plants were more affected by drought than A" plants (in LER and PSL) . At low watering level , H" plants used water more intensely during the two first weeks , depleting SWC faster than A" plants . This could have contributed to the differences observed in LER and PSL between plants of both origins during the last three weeks .

References

Endler , J .A . (1986) . Natural selection in the wild . Princeton University Press , Princeton , New Jersey , USA .
SAS Institute (1996) . SAS/STAT software : changes and enhancements through Release 6 .11 . SAS Institute , Cary , North Carolina , USA .