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) .

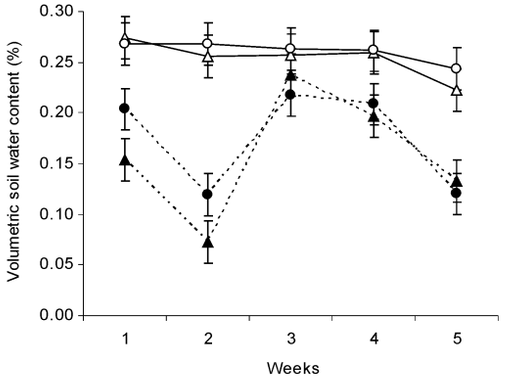

Figure 1 *Weekly variation in LER (mean ± SE) of plants from humid (H) and arid (A) sites , as affected by high (+) and low (−) watering levels .*

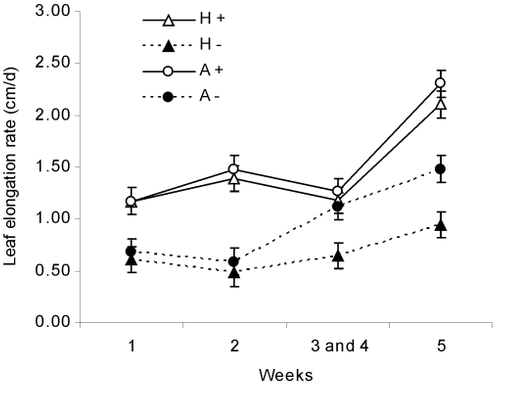

Figure 2 *Weekly variation in SWC (mean ± SE) on pots with plants from humid and arid sites , as affected by high and low watering levels (symbols are equal than in Figure 1) .*

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 .