Lotus Newsletter (2007) Volume 37 (1), 28-29.

Abstract, Workshop held at Chascomús, Argentina, 31 May-1 June 2007

Evaluation of physiological, morphological and biochemical parameters in salt stress response of different *Lotus tenuis* accessions

JULIETA PESQUEIRA[1*], VANINA FRACAROLI[1], PATRICIO VÉRTIZ[1], ADRIANA ANDRÉS[2], BEATRIZ ROSSO[2], OSCAR A. RUIZ[1] and FERNANDO PIECKENSTAIN[1]

[1] *IIB-INTECh UNSAM-CONICET CC 164 (7130) Chascomús, Argentina*

[2] *INTA-EEA Pergamino CC 31 (2700) Pergamino, Argentina.*

[*] *Corresponding author* ***click here for Spanish version***

Agricultural expansion to areas traditionally devoted to cattle production, raises the need to increase forage production under stressful conditions. An approach to improve pasture productivity is based on the collection, characterization and selection of germplasm well adapted to marginal environments.

Lotus tenuis (= *Lotus glaber* Mill) is an herbaceous legume native from the Mediterranean Sea region, which has been naturalized in the so called 'Salado River Basin' in Buenos Aires Province, Argentina. This species has proved to be able to colonize saline-alkaline lowlands and is highly valuable because of its contribution to forage offer in the region. Given that *L. tenuis* is an allogamous species and exhibits a high morpho-physiological variability, it is expected that during the process of naturalization, populations have developed different degrees of tolerance to the various adverse conditions typical of the region, such as soil salinity and alkalinity, and alternating cycles of flooding and summer drought.

In order to select tolerant germplasm and contribute to the understanding of the mechanisms involved in the response of *L. tenuis* to salt stress, different accessions of this species were exposed to salinity. For this purpose, a trial was done under controlled conditions, in which NaCl concentration in the irrigation solution was increased gradually to 150 mM during 16 days, and this condition was maintained for an additional 19 day period. Accessions were obtained from the germplasm collection of the *Estación Experimental Agropecuaria Pergamino* of the *Instituto Nacional de Tecnología Agropecuaria* in Pergamino, Argentina, and were originally isolated from different environments in the Salado River Basin. Other species of the genus *Lotus* (*L. japonicus, L. burtii and L. filicaulis*) considered as models for studies on molecular genetics and functional genomics were included in the trial for comparison.

Growth parameters such as fresh and dry weight of shoots and leaves, and the number of shoots per plant, as well as sodium, potassium and calcium levels were determined. Salt-induced growth inhibition showed a high variability between *L. tenuis* accessions. In addition, salinity induced morphological and anatomical changes, resulting in leaf blade thickening and a reduction in the number of shoots per plant. When exposed to salinity, all

the accessions showed an increase in sodium concentration and decreased levels of potassium and calcium in leaves. After comparing the results obtained with different *Lotus* species exposed to salinity, sodium levels in leaves proved to be positively correlated with growth inhibition. However, a similar correlation was not evident between different *L. tenuis* accessions or different plants of a given accession.

A multivariate analysis of the effects of salinity on plant growth led to a clustering of accessions on the basis of salt tolerance. Genetic variability for salt tolerance between different *L. tenuis* populations was evident, thus raising the possibility of including salt tolerance as a criterion for genetic improvement of this species. Even though sodium accumulation proved to be associated with salt-induced growth inhibition at the species level, this parameter seems not to be a good indicator of salt tolerance in *L. tenuis* accessions. This fact limits the potential for using sodium accumulation as an indicator of salt sensitivity in plant breeding programs. The relation of other physiological parameters with salt tolerance in different *L. tenuis* accessions is in progress.

Acknowledgements

OAR and FP are members of the Research Career of Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Comisión de Investigaciones Científicas de la Provincia de Buenos Aires (CIC), respectively. The present work has been financed by the Project: **‘**Bridging Genomics and Agrosystem Management: Resources for Adaptation and Sustainable Production of forage *Lotus* species in Environmentally-Constrained South-American Soils’. The Sixth Framework Programme: Integrating and Strengthening the European Research Area, Specific Measures in Support of International Cooperation-INCO, Developing Countries (DEV), 2006-2008 (www.lotassa.org)