

***Lotus tenuis* as a keystone species for the Salado River Basin (Argentine)**

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Agricultural expansion to areas traditionally devoted to animal production in the Argentinean Pampas generates the need to increase forage production in restrictive environments and conditions. In order to improve pasture productivity, *Lotus tenuis* (= *L. glaber* Mill.) germplasm was collected, characterized and selected. *L. tenuis* is a perennial legume naturalized in saline-alkaline lowlands in the Salado River Basin, highly valuable because of its contribution to forage offer in the region and its influence on growth of associated species. For this reason, *L. tenuis* is considered as a “Keystone species”. Taking into account that *L. tenuis* is alogamous, it can be supposed that during naturalization, diverse ecotypes have developed different aptitudes to tolerate stress conditions typical of the region, including soil alkalinity and salinity, flooding and summer droughts, among others. In order to select for tolerant materials and to better understand the mechanisms involved in the response to salinity, different *L. tenuis* accessions were exposed to salinity under controlled conditions. Stress responses of the model species *L. japonicus*, *Lotus burtii* and *Lotus filicaulis* were also evaluated. Growth parameters, osmolites, ion (Na^+ , K^+ and Ca^{++}) and polyamine levels (Cuevas *et al.*, 2004; Sanchez *et al.*, 2005) were determined. *L. tenuis* and *L. corniculatus* transgenic lines harboring the oat arginine decarboxylase gene (coding for a key enzyme involved in polyamine biosynthesis) under the control of the stress inducible promoter RD29A have been obtained (Chieza *et al.*, 2004) and their response to salinity is under evaluation at the present. In addition, the biodiversity of symbiotic microorganisms (rhizobia and vesicular arbuscular mycorrhizal fungi) associated to *L. tenuis* has been studied and the influence of these organisms on salt stress tolerance will be discussed (Estrella *et al.*, 2007; Echeverría *et al.*, 2006; Sannazzaro *et al.*, 2004, 2006, 2007).

References

- CHIESA, M.A., RUIZ, O.A. and SÁNCHEZ, D.H. 2004. *Lotus* hairy roots expressing inducible arginine decarboxylase activity. *Biotechnology Letters*, **26**, 729-733.
- CUEVAS J.C., SÁNCHEZ D.H., MARINA M. and RUIZ O.A. 2004. Do polyamines modulate the *Lotus glaber* NADPH oxidation activity induced by the herbicide methylviologen?. *Functional Plant Biology (ex-Australian Journal of Plant Physiology)*, **31**, 921-928.
- ECHEVERRÍA M., MARINA M., MENÉNDEZ A., MONTES M., RUIZ O.A., SANNAZZARO A., SCAMBATO A. and SOSA M. 2006. Plant polyamine metabolism and arbuscular mycorrhizal colonization. 5th International Conference on Mycorrhiza, Granada, España. 23-27 July 2006.
- ESTRELLA M.J., CASTAGNO L.N., MUÑOZ S., CASSAN F., RUIZ O.A., OLIVARES J., SOTO M.J. and SANJUÁN J. 2007. Evaluación taxonómica, simbiótica y fisiológica de simbiontes de *L. tenuis* para la formulación de inoculantes de alta calidad en la región de la Pampa Deprimida del Salado. Reunión Latinoamericana de Rizobiología – RELAR 2007. Los Cocos, Córdoba, Argentina. 25 – 28 Marzo 2007.
- SÁNCHEZ D.H., CUEVAS J.C., CHIESA M.A. and RUIZ O.A. 2005. Free spermidine and spermine content in *Lotus glaber* under long-term salt stress. *Plant Science*, **2**, 541-546.
- SANNAZZARO A., ECHEVERRÍA M., EDGARDO A., RUIZ O.A. and MENÉNDEZ A. 2007. Modulation of polyamine balance in *Lotus glaber* by salinity and arbuscular mycorrhiza. *Plant Physiology and Biochemistry*, **45**, 39-46.
- SANNAZZARO A., RUIZ O. A., ALBERTÓ E. and MENÉNDEZ A. 2004. Presence of different arbuscular mycorrhizal infection patterns in *Lotus glaber* growing in the Salado River Basin. *Mycorrhiza*, **14**, 139-142.
- SANNAZZARO A., RUIZ O.A, ALBERTÓ E. and MENÉNDEZ A. 2006. *Lotus glaber* salt stress alleviation by *Glomus intraradices*. *Plant and Soil*, **285**, 279-287.