

## Río de la Plata grasslands and *Lotus tenuis*

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Temperate subhumid grasslands, in the eastern part of South America, cover the vast plains of central-eastern Argentina, Uruguay and southern Brazil. This grassland region can be divided into two subregions: (1) the pampas, in Argentine and (2) the campos of Uruguay and Southern Rio Grande do Sul (Brazil) (Soriano, 1991). In the Pampas, some of the areas have seldom or never been cultivated. Grazing has been the only modifying agent in these areas, which are mostly in low-lying locations of the flooding Pampa, the western portion of the Pampa (Soriano, 1991). In the flooding Pampa, the natural grasslands and pastures constitute the basis of cattle breeding. These grasslands show a great floristic heterogeneity in which herbaceous plant communities are arranged forming intricate landscape mosaics (Burkart *et al.*, 1990). Four major grasslands habitat types have been defined: mesophyte prairies (MP), humid prairies (HP), meadows (M) and halophyte steppes (HS) (Ghersa *et al.*, 2007). In comparison to other grasslands in the world, these ones show a great proportion of exotic species: 10% within perennial grasses, 16% within annual grasses, 19% within perennial dicots and 55% within annual dicots. Native legumes in these communities are very scarce (7 species), the exotic ones are more numerous (14 species) and they are more significant in produced biomass (Ghersa *et al.*, 2007). The species of the *Lotus* genus are of the most recent introduction. In the north of the region, in 1968, *Lotus tenuis* (*Lotus glaber* Mill.) showed different constancy values in each one of the communities: MP=8.6, HP=11%, M=8%, HS=1%. In recent evaluations carried out in 51 sites of two of such communities, considerable increases were registered in the presence of *L. tenuis*: from 4 to 99% in MP and from 4 to 50% in HS (Ghersa *et al.*, 2007). In the south of the region the presence of this legume was already important 30 years ago: MP=8.5%, HP=34%, M=24% and HS=7% (Ghersa *et al.*, 2007). The wide distribution of *Lotus tenuis* in the humid prairies and meadows is considered of great relevance for forage production. The reason behind such distribution is the high tolerance of *L. tenuis* to long-term flooding, one of the major disturbances affecting these plant communities. In experiments carried out in these communities we have advanced in the identification of anatomical, morphological and physiological attributes conferring to *L. tenuis* tolerance to the lack of oxygen due to the flood (Striker *et al.*, 2005). In this sense, we have found that the flooded plants of *L. tenuis* increase the porosity notably in the stems (porosity 13%) and roots (porosity 28%), they locate a high proportion of their leaves above the water level (53%) and they can maintain unaffected their stomatal conductance and photosynthesis for more than three weeks (Striker *et al.*, 2005). These responses tend to facilitate the capture and transport of oxygen to roots and maintain carbon fixation and biomass production under flooding conditions. Besides,

we have studied the interaction between flooding and trampling, an unavoidable sequel of cattle grazing (Striker *et al.*, 2006). In this sense, we found that the roots of *L. tenuis* possess a low mechanical resistance (250 KPa) with relationship to the pressure that can generate on them the hoof of a cow (>300 KPa) (Striker *et al.*, 2006), in consequence their plants are much damaged when both disturbances are combined. This aspect should be taken into account for grassland management.

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