

Comparative responses between *Lotus glaber* and *Paspalum dilatatum* to the flooding-grazing interaction.

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Flooding and grazing are the two most important factors of the disturbance regime that affects the natural grasslands of the Flooding Pampa. There is enough evidence that indicates that two functional groups of these grasslands, native gramineous and exotic dicotyledonous differ in the tolerance of the above-mentioned disturbances (Insausti *et al.*, 1999). *Paspalum dilatatum* and *Lotus glaber*, representatives of these two groups, respectively, are frequently subject to the action of cattle trampling and defoliation, as sequelae from grazing during large flooding periods. Our aim was to assess a series of response variables that characterize the water relations, the tissue aeration and the growth of the plants of *L. glaber* and *P. dilatatum* when they are simultaneously affected by grazing and flooding. In this hypothesis we propose that *L. glaber* does not tolerate the simultaneous action of trampling, defoliation and flooding, such as the gramineous *P. dilatatum*. We predict that *L. glaber* responds to these disturbances with a lower water potential, conductance, and foliar transpiration than *P. dilatatum*. Besides, it shows lower porosity in their tissues and it does not place its leaves above water level, as fast as *P. dilatatum* does.

In order to test this hypothesis, an experiment was carried out in 25 individuals of each species extracted from the grassland in soil blocks. After a two-month acclimatizing period, the treatments were initiated in an experimental garden: 1) flooding (F), 15 days at a 6 cm level, 2) simulated cattle trampling (T), at the onset of the experiment, 3) defoliation (D), at the onset, by cutting above 6 cm, 4) control without alterations (C). The flooding period was followed by a recovery period of 30 days. The design was a factorial arrangement with 5 treatments (C-F-T-D-FTD) and 5 replicates. The following response variables were measured: a) leaf waterpotential (Ψ_w), b) stomatal conductance (g_s), c) transpiration (E), at 3-5 day intervals, d) porosity of roots and shoots/sheaths, by pycnometry at the end of the flooding, e) time record of the height of 10 young shoots/tillers and f) number of green and dry shoots/tillers.

The results showed an increase in the porosity of the roots and sheaths of *P. dilatatum* in the treatments with flooding or in the FTD interaction. Besides, in this species the greater values of Ψ_w , g_s and E were recorded in the days of high atmospheric demand with respect to the control ones and, as from the 5th day of the flooding, the tillers were above water level. The number of tillers was lower with the trampling (T) and increased with the defoliation (D or FTD), compared to the control ones, but there were no differences with respect to the flooding. The *L. glaber* plants with FTD treatment died five days after the onset of the

experiment. The ones that were only subject to flooding increased their porosity, in the roots and shoots, however they showed lower values of Ψ_w , g_s and E along the time with respect to the control ones. Once the flooding was discontinued, such plants recovered. The control shoots of the *L. glaber* plants took three times less time than the flooded ones to reach the height that the water level had in the flooding treatment. In this species, trampling caused a decrease in the radical porosity and the quantity of shoots. This last variable was also reduced with the flooding but increased with the defoliation. It is concluded that flooding and grazing show a differential effect on these species, in their water relations and their growth, and that these responses would be related to the different tolerance that they express with respect to those grassland disturbances.

References

- INSAUSTI P., CHANETON E.J. and SORIANO A. 1999. Flooding reverted grazing effects on plant community structure in mesocosms of lowland grassland. *Oikos*, **84**, 266-276.