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Key words : C₃/C₄ species, Flooding Pampa, glyphosate, stocking rate, temperate natural grasslands

Introduction The natural grasslands of the Flooding Pampas are characterized by a yearlong coexistence of C₃ and C₄ species. In the last decade there was a 2-fold increase in stocking rates above the historical levels as a consequence of the agricultural pressure. In addition, a technique called "annual ryegrass promotion" is being fostered to increase cool season herbage production. It is based on prescribed applications of glyphosate for removing the interference of C₄ vegetation to the establishment of over-sown or seed-bank resident annual ryegrass. At present, there is concern about the impacts of both driving forces for the ecosystem function. Our purpose was to carry out a vegetation inventory to diagnose the status of representative grassland types as related to the degree of modification generated by grazing and by the intensity of "promotion".

Materials and methods Data were collected from February to June 2007, 31 vegetation stands being sampled along a E-NW geomorphological gradient. Two landscape positions defined with GIS support were selected: 40-50% (Site L) and 30% (Site H) water lodging risk (Vázquez et al., 2007). A multi-scale botanical composition sampling was achieved in nested areas along a randomly placed 64m transect. Botanical composition and species functional groups (annual C₃ and C₄ grasses, perennial C₃ and C₄ native grasses-PC₃ and PC₄-, dicots and legumes-Leg-) contribution to total aerial biomass were estimated. ANVA and curve fitting was performed to data.

Results and discussion Lowest species number (19.7 ± 5.0) were observed for the oldest "promotions" (10-11 consecutives), no significant differences being detected between natural grasslands (NG), abandoned "promotions" (Abn) and 3 to 7 consecutive "promotions" (40.8 ± 8.5 , 38.0 ± 8.2 and 29.1 ± 8.9 , respectively). Botanical composition differed between vegetation groups: "promotions", annual ryegrass >80%; Abn, perennial native grasses $\leq 15\%$; NG, perennial native grasses $\leq 25\%$. A dimensionless classification of the degree of modification (Dm) was achieved: "Promotions" $y_{(i)} / y_{(max)}$ (y = years of consecutive "promotion"; negative x values in Figure 1); the rest, $\# PC_{3(i)} / \# PC_{3(max)}$ (PC_3 = perennial C₃ grasses; positive x values in Figure 1), according to Agnusdei et al. (1989) and Jacobo et al. (2000). "Promotion" abandonment would lead to an increase of PC₄ (11% per unit Dm) and no significant response of PC₃. This suggests a greater sensibility of the soil propagation bank (seeds, vegetative organs) with respect to PC₄. The reduction in the Dm was associated to increases of PC₄ and PC₃ groups in both sites. Abundance of C₄s was higher in Sites H than L, both sites having similar total C₃ abundance with maximums of $\leq 35\%$ made up by grasses or a combination of grasses and legumes, respectively. While positive results might be expected in response to rehabilitation practices applied to degraded highly stocked or "promoted" vegetation, more information is needed to analyze transitions and restoration likelihoods.

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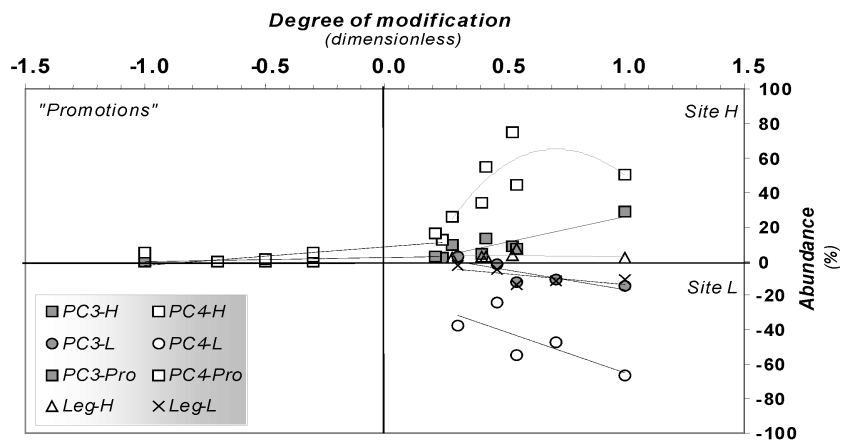


Figure 1 Functional groups abundance (% aerial biomass) and degree of modification. -1 and 1 denote oldest "promotions" and less stocked natural grasslands.