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Palatable grasses have higher relative growth rate and competitive ability than unpalatable grasses in the Patagonian steppe

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Key words : grazing, desertification, arid steppe, palatability

Introduction In Patagonia, sheep grazing triggered processes of desertification of different magnitude (León y Aguiar, 1985). In the Patagonian shrub-grass steppe, grazing caused substitution of palatable species by unpalatable ones. Coughenour (1985) proposed that there is an evolutionary convergence between those adaptations allowing plants to tolerate water and nutrient deficits, and those conferring tolerance against herbivores. Plant populations evolved under severe resource limitations would have low relative growth rates and adaptations against both nutrient and water deficits and also against herbivory (Chapin *et al.*, 1993). The objective of this work was to evaluate the relative growth rate (RGR), water consumption and competitive ability of two grass species of the Patagonia steppe with contrasting palatability.

Materials and methods We conducted an experiment under glasshouse conditions, with a factorial arrangement that included three factors: species (*Bromus pictus*, palatable, *vs.* *Stipa speciosa*, unpalatable), competition (intraspecific *vs.* interspecific) and water availability (constant field capacity *vs.* initial field capacity without any posterior watering). We harvested aerial parts and measured soil water content at 81 and 102 days before emergence.

Results Palatable *B. pictus* showed a greater RGR than unpalatable *S. speciosa* in the interval between the beginning of the experiment and the first harvest (0-1) and in the average of all the experiment (0-2) while there were no significant difference between-species differences in the interval between the first and the last harvest (1-2) (Figure 1). Accordingly, the palatable species had greater water consumption than the unpalatable one ($P < 0.05$). Finally, the palatable species reached a greater number of tillers per plant when it grew under interspecific competition than when it did under intraspecific competition. Instead, *S. Speciosa* showed the opposite response (Figure 2). Similar responses to those described for the tillers per plant were recorded in the number of total leaves, live leaves and aerial biomass per plant, supporting the hypothesis of a greater competitive ability of palatable *B. Pictus* over unpalatable *S. speciosa*.

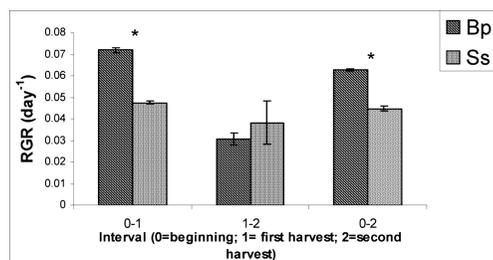


Figure 1 Maximum relative growth rate of each species. 0-1: beginning to first harvest; 1-2: first to last harvest; 0-2: average of the whole experiment. *: significant differences between species ($P < 0.05$).

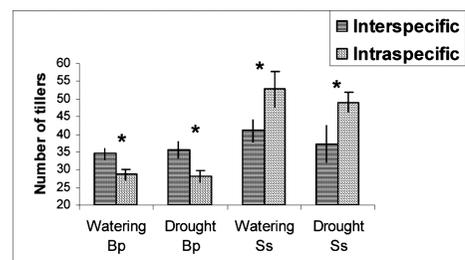


Figure 2 Number of tillers in *B. pictus* (BP) and *S. Speciosa* (SS), growing under interspecific and intraspecific competition and in condition of watering and drought. *: significant differences between competition levels for each species and water availability level.

Conclusions Palatable *B. pictus* had greater maximum relative growth rate, water consumption and competitive ability than unpalatable *S. speciosa*.

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