Lotus Newsletter (2008) Volume 38 (2), 75-77.

Abstract, Workshop held at Chascomus, 17-19 November 2008

Seedling emergence and biomass production of *Lotus tenuis* sown at different densities in a grassland of the Flooding Pampa.

OSVALDO R VIGNOLIO* and OSVALDO N. FERNÁNDEZ

Facultad de Ciencias Agrarias (UNMdP)-EEA. INTA Balcarce.

* *Corresponding author*

click here for Spanish version

Safe-sites, seed availability and physical and biological stresses occurring during seed germination and seedling establishment are critical for the species that spread by seeds. *Lotus tenuis* is a forage legume that has been naturalized in the Flooding Pampa grasslands and propagates only through seeds. This species constitutes a good alternative to improve the quality and productivity of these grasslands (Cauhépé, 2004). Seedling emergence and survival of *L. tenuis* in the grasslands depend on climatic and soil conditions of the plant community (Colabelli and Miñón, 1993; Miñón and Colabelli, 1993). The objective of the present work was to analyze under field conditions the seed density dependence for the establishment and aerial biomass production of *L. tenuis*. The study paddocks (3) were located in a private beef cattle breeding range of Ayacucho County (Buenos Aires, Argentina). Plant communities were representative of semi-natural saline-alcaline grasslands (Table 1) degraded by continuous uncontrolled cattle grazing. They were dominated by *Ambrosia tenuifolia*, *Cynodon dactylon*, *Stenostaphrum secundatum*, *Distichlis spicata*, *Carex* spp., *Juncus* spp., *Lolium multiflorum* , *Chaetotropis sp.*and *Stipa sp*., and *L. tenuis*, which was at very low plant density. Experimental treatments consisted in five seeding rates (D1: 0; D2: 0.557; D3: 2.23; D4: 8.95 and D5: 17.90 kg / ha; being 0, 57, 229, 917 and 1833 seed/m², respectively). In autumn 2004, scarified, inoculated (*Rizobium loti*, strain 733) *L. tenuis* seeds were surface-broadcast by hand on 3 replicate (plots of 1.5 x 1.5 m) by density. In each experimental paddock the plots were randomly assigned to each seeding density. Previous to sowing, the grassland was cut to 5 cm height in order to uniformize vegetation cover, and each paddock was wire fenced to exclude cattle grazing during the experimental period ending on April 2006. During the first year, seedling emergence was periodically recorded on each plot and aerial biomass was harvested on December 30, 2004; March 31, 2005; December 15, 2005 and April 25, 2006. ANOVA for repeated data in the time were used to compare (P < 0.05) plant density and biomass production among treatments. Maximum seedling density was recorded early in spring in all treatments and then decreased at the begging of summer (Table 2), coinciding with the low precipitations and drying soil conditions. Clorotic and dead seedlings were recorded during the experimental period. *Lotus tenuis* aerial biomass production varied significantly with seeding rate (Figure 1). Total biomass accumulated varied between 7,000 – 10,500 Kg d.m. / ha and the contribution of *L. tenuis* was between 4 to 11% of the total aerial biomass in the plot. The highest percentage of *L. tenuis* biomass was observed in the paddock 3 (Figure 2) and the lowest in paddock 2. This was consistent with the most limiting soil conditions. In paddock 1, percent *L. tenuis* biomass was also lower than in paddock 3, probably associated

to the highest proportional biomass of other dicots, competing with *L. tenuis* seedlings. *Lotus tenuis* biomass was higher for densities 4 and 5 (avg.109 ± 30 g d.m. / m²) than for densities 1, 2 and 3 (avg. 43 ± 8 g d.m./m²). The contributions of *L. tenuis* biomass also varied with seeding densities. As observed in previous studies (Colabelli and Miñón, 1993) the establishment efficiency of *L. tenuis* from seeds was very low (ca. 10 %), and most probably it decreased during summer due to that young plants are susceptibility to water stress. Management practices, such as strategic grazing exclusion, that allow increment of soil seed bank and abundant natural reseeding of *L. tenuis*, would increase the biomass production in these grasslands.

Table 1. Soil analysis of the experimental paddocks.

Paddock	pH	E.C. (mmohs)	P (Bray 1) ppm	O.M. %	Na (meq/L)
1	8.2	1.7	5.6	5.2	9.2
2	9.2	2.7	6.8	3.7	20.7
3	9.5	2.2	7.2	4.1	15.0

Table 2. Means (± SE) *Lotus tenuis* seedling density for different seed density (D) in four census dates.

Date	D1	D2	D3	D4	D5
24 May	2.46 ± 0.8	16.35 ± 4.8	29.93 ± 2.5	144.13 ± 32.5	291.97 ± 58.1
1 Jul	0.69 ± 0.6	7.63 ± 3.4	31.94 ± 6.1	212.49 ± 37.5	388.85 ± 42.2
27 Sept.	4.85 ± 3.0	20.13 ± 6.9	56.24 ± 11.0	270.83 ± 23.0	459.71 ± 25.3
14 Dec.	4.08 ± 2.6	7.77 ± 0.8	25.77 ± 6.5	89.44 ± 20.2	172.88 ±18.6

Figure 1. Mean aerial biomass of *Lotus tenuis* (n =9) for different seed density (D) in four harvest dates. References as in Table 2.

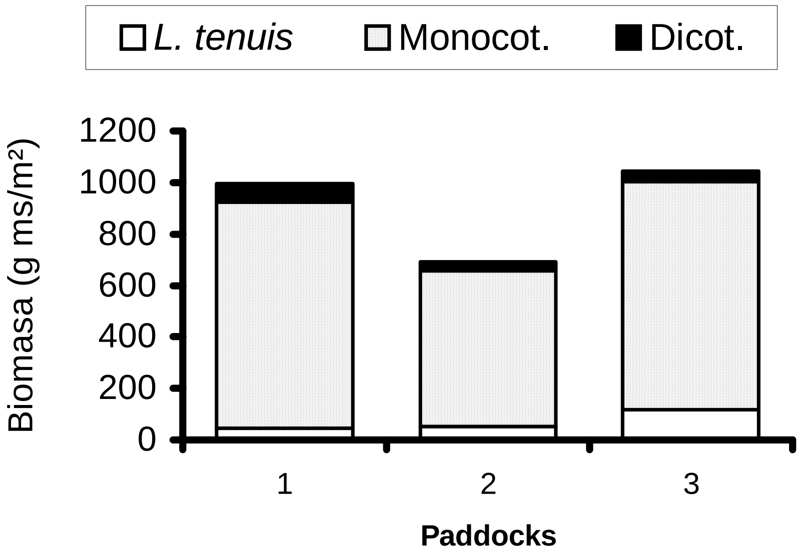

Figure 2. *Lotus tenuis*, *Monocotyledoneae* and non-legume *Dicotyledoneae* accumulated aerial biomass in 3 experimental paddocks. References as in Table 2.

References

CAUHÉPÉ M.A. 2004. Does *Lotus glaber* improve beef production at the Flooding Pampas? *Lotus Newsletter*, **34**, 30-35.

COLABELLI M,R. and MIÑÓN D.P. 1993. Métodos de intersiembra de *Lotus tenuis* y *Trifolium repens* en pastizales de la Pampa Deprimida bonaerense. [Oversown methods of *Lotus tenuis* and *Trifolium repens* in grasslands of Pampa Deprimida from Buenos Aires.] *Revista Argentina de Producción Animmal*, **13**, 225-233. [In Spanish]

MIÑÓN D.P. and COLABELLI M.R. 1993. Intersiembra de *Lotus tenuis* en tres comunidades nativas de la Pampa Deprimida. [Oversown of *Lotus tenuis* in three native communities of Pampa Deprimida] *Revista Argentina de Producción Animmal,* **13**, 133-140. [In Spanish]