

Effects of plant population density and harvest date upon seed yield of narrowleaf trefoil (*Lotus tenuis* Waldst et Kit). Preliminary results

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Lotus (*Lotus tenuis* Waldst et Kit) is a forage legume broadly accepted and used by ranchers in the Flooding Pampas (Cahuepé, 2004; Coria *et al.*, 2005) because its nutritional value, productivity, natural re-sowing and tolerance to grazing and soil flooding and alkalinity conditions (Montes, 1986; Mazzanti *et al.* 1988; Miñón *et al.*, 1990; Vignolio and Fernández 2006).

Although seed demand of *L. tenuis* has been increasing in Argentina, the production of legal-quality seed is very low: only 17.54 t in 59 Ha, with an overall mean seed yield of 261 kg/ha (INASE, 2005). Meanwhile, non-certified seed production is estimated in 200 t (Maceira *et al.*, 2003) and mostly came from occasional harvests in roadsides close to cattle rangelands (Castaño, personal communication), with yields ranging over 25 – 150 kg/ha (Mazzanti *et al.*, 1988). This wide range of seed yield is due to climatic variability, indeterminate flowering of *L. tenuis*, pollination management, difficulties to control weeds, non adjusted harvest date and pod shattering (Carámbula, 1981, Formoso, 2001; Miñón *et al.*, 1990, Montes, 1986).

Commercial Lotus breeding companies, are interested in determine seed rates which allow to attain optimal plant population density (PPD). This is defined as that stands able to produce highly fertile and vigorous plants which concentrate flowering and pod maturity in a short time period. Thus, seeding rates for seed production are normally lower than that used for forage production (Carámbula, 1981). The objective of this work was to evaluate the effects of plant population density and harvest date on harvestable seed production of narrowleaf trefoil under crop conditions similar to those in seeder companies.

The study was carried out at Estación Experimental INTA Balcarce (37° 45' S, 58° 18') in a Typic Argiudoll (6.65 % O. M., 15.65 ppm P, in the top 15 cm) from September 2006 to March 2007. The experimental design was a fully randomized complete block design with three replicates and three plant population densities (7,14 ; 14,28 y 57,14 pl/ m²). The sowing was performed using an experimental machine, at 17,5 cm row spacing. Further, this space was enlarged to 35 cm, by manual thinning. *Lotus tenuis* cv. Pampa INTA was used (Gonzalez García, 1998). Plot area was 12 m² (6 m long and 2 m wide). Experimental densities were fitted in the corresponding plot by manual thinning. All plots were fertilized with P immediately after sowing, to get a minimum P availability (Bray 1) of 25 ppm. The

plots were maintained free of weeds, insects and water deficit. Aboveground biomass and seeds were harvested in two $\frac{1}{4}$ m² sub samples per plot, on three crop reproductive stages: early maturation, mid maturation, early shattering. Only results for the two first harvests are showed.

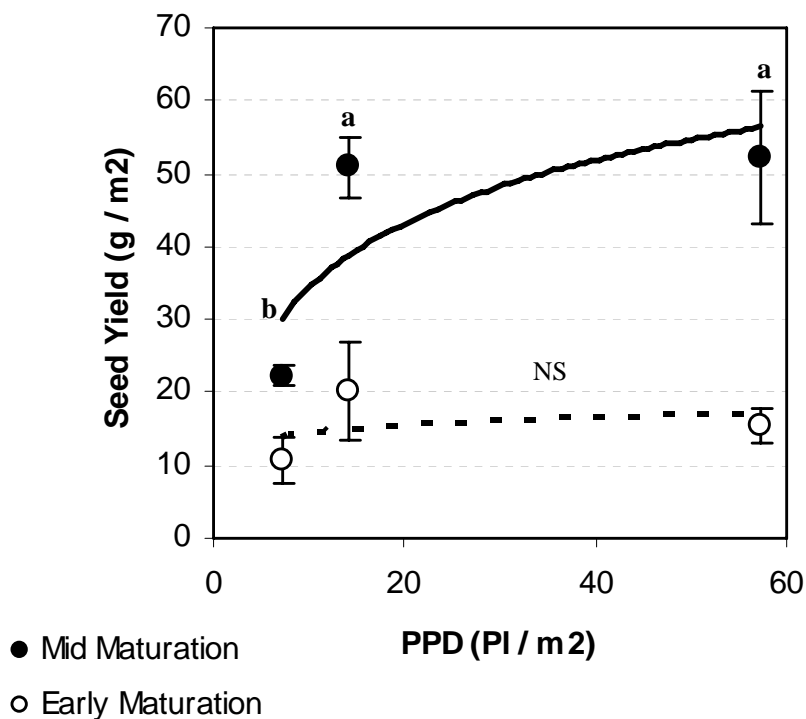


Figure 1. Seed yield of narrowleaf trefoil (*Lotus tenuis*) in response to PPD and harvest date. For each harvest date, equal letter on points indicate no differences (5 % Tukey HSD Test). Bars show \pm 1 SE. NS: no significant treatment effect.

No treatment effect was observed ($p < 0.16$) in early maturation stage while a significant density-dependence ($p < 0.017$) was recorded in mid maturation stage (Figure 1) between the lowest plant densities. Seed yield per unit area did not differ between 14 and 57 pl/m².

Results show that *L. tenuis* seed yield response to PPD depends on harvest date. The increasing yield difference between the two lower densities was unexpected and disagrees with most previous studies on density-dependent seed yield. Moreover, the higher PPD the yield variability was recorded. This could be attributable to a more marked an earlier set of plant size hierarchy in the highest PPD. Seed yields at mid maturation harvest date were two to three – fold higher than the national mean yields in all PPD tested, Although not conclusive, early results suggest that the cv. Pampa INTA can perform as a very good seeder and its very high phenotypic plasticity allows for a wide compensatory response to plant density variation.

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