

Herbage production, nitrogen fixation and condensed tannin concentrations in *Lotus glaber* Mill. germplasm

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Introduction *Lotus glaber* (Lg) grows on clay, sandy and medium textured soils in central Chile (32° to 38° S). The diversity of environments where the species grows naturally supports the hypothesis that genetic variability would be found. The objectives of the experiment were to characterise accessions of Lg collected in the region for dry matter (DM) production, comparative capacity to fix atmospheric N and condensed tannins (CT) in Lg grown on clay soils used for cropping rice.

Materials and methods Eleven accessions of 20 plants of Lg were collected from different sites in the region. The plants were replicated vegetatively to establish an experiment in a clay soil with a randomised design with three blocks of 1 x 2 m plots comprising two 10-plant rows 40 cm apart. The same 20 original plants were present in each block. Two blocks were used to measure DM production (four cuts in the season 1999-2000) and CT concentration. Samples of whole plants from the late December cutting (five cm stubble height) were used for CT analysis. This cut was taken 39 days after the previous cut. The samples were field frozen -20° C, freeze dried and ground to pass a 1 mm screen. The butanol-HCl procedure for extractable and bound CT determinations (Terrill et al., 1992) was used. On the third block N¹⁵ labelled fertiliser was applied to a 1 m² subplot after the first cut of the season and the percentage of N derived from the atmosphere (Ndfa) was estimated in samples from the following cut using the formula described by Marriott & Haystead (1993).

Table 1 Dry matter (DM) production (g/plant), N-fixation (% Ndfa) and concentration of extractable (Ext CT), protein bound (Prt. b. CT), fibre bound (Fib.b. CT) and total condensed tannins

Lg accessions	Lg1	Lg3	Lg4	Lg5	Lg6	Lg7	Lg8	Lg 11	Lg 12	Lg 14	Lg 15	s.e.	Signif.
DM	101	68	93	102	76	90	66	87	104	87	89	11.1	*
N-fixation	82.7	79.4	80.0	83.5	78.9	73.4	72.1	81.4	88.8	79.4	77.6	-	-
Ext. CT	2.3	2.5	2.7	2.3	2.4	2.5	2.4	2.1	2.1	2.4	2.5	0.18	*
Prt. b. CT	0.7	1.1	0.6	0.9	0.9	1.1	0.9	0.8	0.7	0.7	0.8	0.12	*
Fib. b. CT	1.2	1.3	0.7	1.3	1.2	1.5	1.4	1.1	1.0	1.6	0.8	0.27	*
Total CT	4.2	4.9	4.1	4.5	4.5	5.1	4.7	3.9	3.9	4.7	4.1	0.50	n.s.

Results There were significant differences ($P < 0.05$) among accessions for DM production. The N-fixation on average was 80%, with a difference of 18 points between those with the highest proportion of N coming from the atmosphere and those with least. The values for the CT concentration were, in general, higher than the data reported in the literature (Table 1). Some authors reported absence of CT in Lg leaves, presence in stems and abundance in roots, using vanillin-HCl reaction. The differences found in this experiment are small, but significant ($P < 0.05$), for the three fractions.

Conclusions The concentrations of CT in Lg were higher than the data reported in the literature. The differences found among the Lg accessions in the studied variables, and in other attributes studied separately, show that the collected germplasm has enough variability to support a programme for genetic improvement.

References

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