Effect of chemical and mechanical scarification of *Lotus tenuis* seeds on germination

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Legume seeds will not frequently imbibe water and they fail to germinate, even when environmental conditions are favourable for germination. Those seeds are commonly called impermeable or hard seeds. Impermeability of hard seeds testa is a physical exogenous dormancy (Nikolaeva, 1969; Rolston, 1978). *Lotus corniculatus* seedlots had a high percentage of impermeable seeds (MacDonald, 1946; Brown, 1955). The presence of hard seeds has also been determined in the case of *Lotus tenuis*, in fact more than 90% were found in samples free from the abrassive effect of the mechanical threshing (Miñón et.al., 1990; Mujica y Rumi, 1991). Seeds from this species were found to have turned permeable after several months preservation at low temperature conditions, in a refrigerator (Mujica and Rumi, 1991). This treatment is slow although favourable to preserve seed viability.

For many years, several methods have been used in order to draw out impermeability in seeds of different species. One of them is the mechanical scarification, abrassion by rough surfaces, probably the most common commercial treatment (Rolston, 1978). Chemical scarification with concentrated sulphuric acid (Hopkins, 1923) has been used experimentally, on many species. The time during which seeds must be submerged for the treatment to be effective, depends upon the species treated.
An aggressive scarification treatment may cause damage to the seeds affecting their viability, germination rate or seedling growth. Nothing on this matter has been informed yet for *L. tenuis*.

Germination of *L. tenuis* seeds subject to scarification with concentrated sulphuric acid during 10, 20 and 30 minutes, and scarified by rubbing against sandpaper was assessed. For this experiment, seeds from Tresur Chajá variety and from a natural population in Brandsen, Province of Buenos Aires, were used. They were harvested and threshing by hand in order to avoid erosion on the teguments. For chemical scarification, seeds were soaking in concentrated sulphuric acid during the previously determined time. After exposure to acid, the seeds were whashed with running water for 5 minutes. Mechanical scarification was performed by rubbing the seeds softly but constantly between extra-fine sandpaper during 3 minutes. A non-scarified control sample was also included. Design used was a completely randomized, with 4 repetitions. Fifty seeds were placed into each petri dish, they were incubated at 22°C ±1. The number of non-imbibed and germinated seeds were recorded every 24 hours during 7 days.

Results are shown in the figure. Both seeds populations presented high percentage of hard seeds (more than 95%). Both responded in similar way to the treatments applied. Seeds soaking in concentrated sulphuric acid for 20-30 minutes and mechanical scarification were the most effective treatmens. Germination accummulated for 7 days was more than 90%, using the mentioned treatments. Scarification using sulphuric acid for 10 minutes was only partially effective. Germination was better than the control but worse than the one obtained with the other procedures (LSD, 1% level). Seeds which did not germinate at all were visibly not imbibed up to the moment the evaluation ended.

References

Brown CS (1955) Hard seed in birdsfoot trefoil. Unpublished PhD thesis, Cornell University. Ithaca, New York

Hopkins EF (1923) The behavior of hard seeds of certain legumes when subjeted to condicions favorable to germination. Proc Assoc Off Seed Analysts N Amer 14: 46-48

MacDonald HA (1946) Birdsfoot trefoil (*Lotus corniculatus* L.). Its characteristics and potentialities as a forage legume. Cornell University Agriculture Experimental Station.

Miñon DP, GH Sevilla, L Montes and O Fernandez (1990) *Lotus tenuis*: Leguminosa forrajera para la Pampa Deprimida. Boletín Técnico Est Exp Agr Balcarce N° 98:8.

Mujica MM and CP Rumi CP (1991) Estado de dureza en las semillas de *Lotus tenuis*: efecto de las condiciones de conservación. Rev de la Fac de Agr, Univ Nac de La Plata, 66/67: 63-66.

Nikolaeva MG (1969) Physiology of deep dormancy in seeds. IPST Press Jerusalem 220 pp.

Rolston MP (1978) Water impermeable seed dormancy. The Bot Rev 44: 365-396.

Mean percentage germination of L.tenuis seeds scarified with different treatments.
Vertical bars represent confidence intervals for mean , 1 % level.