

Use of *Lotus/Rhizobium* Symbiosis in Regeneration of Polluted Soils

[ISABEL VIDEIRA E CASTRO](#)*¹, PAULA SÁ-PEREIRA², FERNANDA SIMÕES², JOSÉ A. MATOS² and EUGÉNIO FERREIRA¹

¹Dep. Ecologia, Recursos Naturais e Ambiente, Laboratório de Microbiologia, INRB, Av. da República, Nova Oeiras, 2780-159 Oeiras, Portugal

²Dep. Biotecnologia, Grupo de Biologia Molecular, INETI, Estrada do Paço do Lumiar, 22, 1649-038 Lisboa, Portugal

* Corresponding author

[click here for Portuguese version](#)

In polluted soils the presence of toxic inorganic compounds such as heavy metals has an important impact on the resident microflora, which seems to be much less varied in polluted areas. In last years, our group has been involved in projects aimed to evaluate the harmful effects of long term heavy metals contamination of soils on the *Rhizobium*-legume symbiosis, mainly those ones with *R. leguminosarum* bv. *trifolii* and *Trifolium* sp. (Castro *et al.*, 1997; 2003). An important activity for regeneration soils polluted by industrial activities is the establishment of vegetation. Leguminous plants can have, here, an important role due their interesting agricultural potential, their capacity to fix atmospheric nitrogen and adaptation to low input agricultural systems. Particularly in the case of *Lotus* species, some of them are present in rather extreme conditions such as those existing in contaminated soils. The aim of this work was to examine the effects of soil pollution on the genetic and phenotypic characteristics of rhizobial population isolated from *Lotus* sp. growing in contaminated soils (mainly with Hg and As). The soils were selected from an industrial area with known environmental pollution problems, where heavy metals and other pollutants have been emitted for nearly 40 years. This area is particularly affected by the release of liquid effluents from fertilizer and chemical industries. Taking in account that symbiotic interactions between species of the genus *Lotus* and *Rhizobium* strains can be effective, ineffective or parasitic according with to combination, nodulation tests were evaluated with different *lotus* species. Several parameters were also analysed such as population size, nitrogen fixation capacity, genetic diversity and mercury and arsenic tolerance. The results suggested that some of the *Lotus/Rhizobium* symbioses seem to be particularly well adapted to adverse environmental conditions and can be an adequate tool for bioremediation of polluted soils.

References

CASTRO I.V., FERREIRA E.M. and MCGRATH S.P. 1997. Effectiveness and genetic diversity of *Rhizobium leguminosarum* bv. *trifolii* isolates in portuguese soils polluted by industrial effluents. *Soil Biology & Biochemistry*, **29**, 1209-1213.

CASTRO I.V., FERREIRA E.M. and MCGRATH S.P. 2003. Survival and plasmid stability of rhizobia introduced into a contaminated soil. *Soil Biology and Biochemistry*, **35**, 49-54.

This work was supported by FCT, POCTI (AGG/4607/2002) and FEDER