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LUPINUS MUTABILIS GROWTH, SEED YIELD AND BIOLOGICAL NITROGEN FIXATION ABILITY UNDER DIFFERENT RHIZOBIA INOCULATION TREATMENTS IN COMPARISON TO OTHER LUPIN SPECIES

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INTRODUCTION

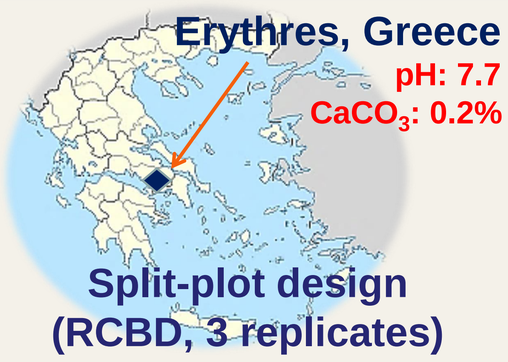
Lupins as grain legumes can offer ecosystem services, improve soil fertility and contribute to cropping systems diversification. Their ability to grow on soils which are unsuitable for other crops and their high potential as alternative protein source in animal feeding is the reason why nowadays there is a renewed interest in this species. However, a few studies have investigated biological nitrogen fixation ability under Mediterranean farming systems and edapho-climatic conditions. Therefore, in the present study, we aimed to study growth, seed yield and biological nitrogen fixation (BNF) ability of *Lupinus mutabilis* accessions in comparison to two endemic lupin species.

MATERIALS AND METHODS

- *L. mutabilis* accessions: **LIB220, LIB221, LIB222**
- *L. albus cv* Multitalia
- *L. angustifolius* cv Polo
- *Vicia faba* cv Aguadulce
- *Triticum durum* cv Normano as references for BNF
- 2 treatments:: *Rhizobium* inoculation (HiStick®) and non-*Rhizobium* inoculation
- N-balance method **(Iannetta *et al*., 2016)**

$$Nfix = (Nfert+Nseed) - Nbiomass_{(harvest)} - Nseed_{(harvest)} - Nmin_{(t=0)}$$

Statgraphics Centurion XVI
ANOVA, LSD ($p \leq 0.05$)
General Linear Model (GLM)



Split-plot design
(RCBD, 3 replicates)

RESULTS

- Nodules were found both on inoculated and non-inoculated plants, indicating the presence and activity of an indigenous rhizobia strain *(Figure 1).*
- There was no interaction between the different treatments with regard to the majority of growth and yield traits studied.
- Among inoculated *L. mutabilis* plants, LIB222 fixed more N (59.81 kg N ha^{-1}), while among non-inoculated LIB221 (31.65 kg N ha^{-1}) *(Figure 2).*
- cv Polo and cv Multitalia fixed more N than *L. mutabilis* accessions *(Figure 2).*
- Inoculation affected significantly and positively only N_2-fixed of LIB222 and cv Multitalia *(Figure 2).*

Figure 1. Nodules of different *L. mutabilis* accessions used.

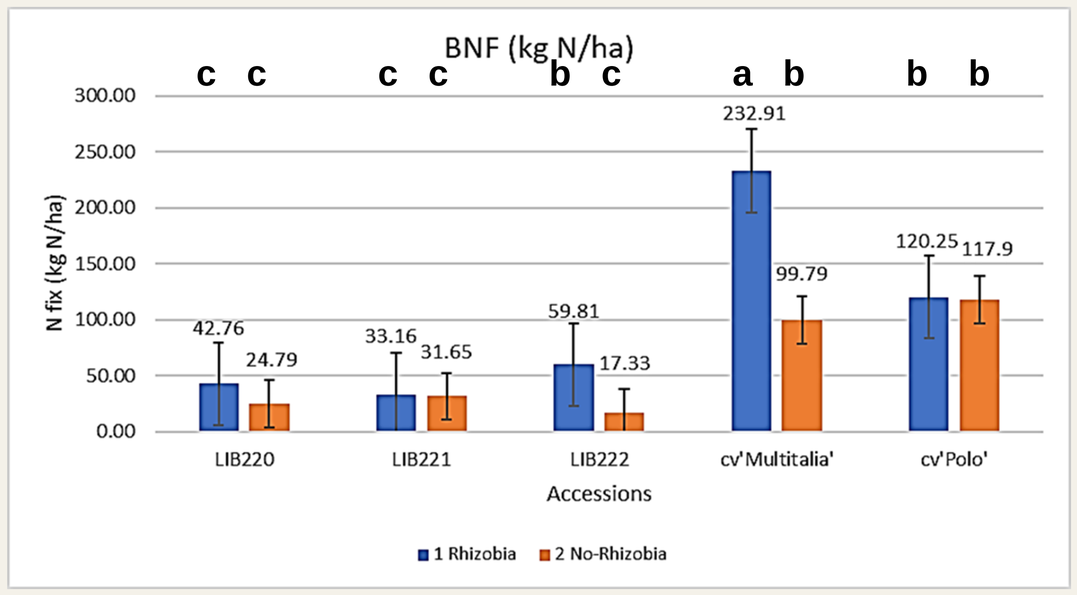


Figure 2. Amount of N fixed by lupin accessions (kg N ha^{-1}).

CONCLUSIONS

The results showed that *L. mutabilis* accessions have an N_2 fixation capacity under Mediterranean conditions and alkaline soils, while inoculation treatment with *Bradyrhizobium lupini* strain was not effective in enhancing N_2-fixation of *L. mutabilis* accessions except in the case of LIB222, indicating a native strain competitiveness. Further research is therefore needed to find effective lupin x rhizobia interactions under Mediterranean conditions.

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