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Le Scienze Agrarie nell'Antropocene: dalla produttività alla tutela del patrimonio materiale e culturale

Dipartimento di Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali (DAGRI), Università degli Studi di Firenze.

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Effects of nitrogen-fixing bacteria used as seed coating on Sulla (*Hedysarum coronarium* L.) growth and soil quality

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Many legume breeding and selection programmes are designed to select germplasm adapted to marginal soils, where biological N₂ fixation can make an important contribution to agricultural productivity. However, it is important to consider not only the plant but also plant/*Rhizobium* combinations. The aim of the present study was to assess the effect of nitrogen-fixing bacteria (*Rhizobium* spp.) used as seed coating on Sulla, cv. Corona, growth as well as on the soil quality. The interaction between crop and rhizobium was studied in a growth chamber using pot of 12 L and with a completely randomized experimental design comparing three theses: i) seed inoculated with rhizobium and protected with a coating based on natural products; ii) seed not inoculated but covered with the same coating; iii) seed not inoculated and without coating. Loam soil was used, and the plants were grown according to climatic requirements, not

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fertilized and irrigated with well water. At the beginning and end of the experiment, soil chemical and biological parameters were assessed to evaluate the effect of inoculations by NIRs, enzymatic activities and microbial DNA. During the crop cycle several parameters were evaluated: agronomic (aboveground and belowground biomass in terms of both fresh and dry weight, plant height, root length and soil water content) and physiological (canopy temperature, leaf area, leaf transpiration, SPAD index and NDVI and PRI). All data were subjected to analysis of variance (ANOVA) and the averages were separated using Duncan's test $p < 0.05$. Considering the soil, the seed coating with rhizobium favored an increase in soil microbial biomass, urease and alkaline phosphatase activities and nitrogen content compared to the control (seed without coating). Regarding the plant parameters, the seed coating with rhizobium also favored an increase in chlorophyll index, plant vigor, fresh and dry weight of leaves and roots, and root length.

Keywords: *Rhizobium spp.*, *seed coating*, *nitrogen-fixing bacteria*

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