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University of Belgrade, Faculty of Agriculture

BOOK OF ABSTRACTS

3rd International and 15th National Congress

SOILS FOR FUTURE UNDER GLOBAL CHALLENGES

21–24 September 2021

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DIVERSITY AND PLANT GROWTH PROMOTING POTENTIAL OF RHIZOBIA ISOLATED FROM ROOT NODULES OF *LOTUS CORNICULATUS* L.

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Abstract

Lotus corniculatus L. is a perennial legume plant that enters into a symbiotic relationship with nitrogen-fixing bacteria belonging to *Mesorhizobium* genus by forming root nodules within which the nitrogen fixation occurs. This plant is a valuable forage crop of high nutritional value that thrives on less fertile and/or degraded soils. The analysis of bacterial diversity within the root nodules of *Lotus corniculatus* is indispensable, as nitrogen fixing bacteria could be used to promote the growth of this valuable plant. The aim of this research was to isolate and determine endophytic rhizobial bacteria from root nodules of *Lotus corniculatus* L. and to evaluate their plant growth promoting (PGP) characteristics. Nitrogen fixation efficiency as well as the ability of isolates to produce PGP substances such as indole-3-acetic acid (IAA), siderophores and to solubilise inorganic phosphates was evaluated *in vitro*. In addition, antifungal activity of isolates against three fungi belonging to *Fusarium* genus (*F. oxysporum*, *F. graminearum* and *F. proliferatum*), as well the ability to produce hydrolytic enzymes, such as amylase, cellulase, protease and pectinase was tested *in vitro*. In total, 72 bacterial isolates from the root nodules of *Lotus corniculatus* L. sampled on the territory of Republic of Serbia were isolated. Nodulation test showed that 58 isolates could infect the plant and form nodules on *Lotus corniculatus* L. roots. Overall, 50 isolates produced IAA in a wide range of concentrations, 29 isolates could solubilise inorganic phosphates, while siderophores production was not recorded. Only few isolates had the ability to produce hydrolytic enzymes, while antifungal activity against tested fungi was not recorded. The most effective isolates were subjected to further molecular characterisation based on 16S rDNA sequence. Sequencing results showed that isolates DZM1Cm, DZK1Lm, PZR1Dm, DRZR2Cm, 631oz, 754 and 1M12 belong to *Mesorhizobium* genus (*Mesorhizobium* sp., *Mesorhizobium cantuariense*, *Mesorhizobium erdmanii*, *Mesorhizobium* sp., *Mesorhizobium* sp., *Mesorhizobium jervisi* and *Mesorhizobium* sp., respectively). The results of this research indicated that there is wide rhizobial diversity present in the root nodules of *Lotus corniculatus* L. Further research should be aimed towards exploring the potential application of identified effective root nodule rhizobia in contemporary agriculture and organic farming.

Keywords: *Lotus corniculatus* L., *Mesorhizobium* sp., nitrogen fixation, plant growth promotion, indole-3-acetic acid