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ANTHYLLIS RHIZOBIA INTERACTION IN SOILS HAVING DIFFERENT LEVELS OF HEAVY METALS

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Phytostabilization of mine-soils enriched with heavy metals needs efficient biological nitrogen fixation to restore ecological processes and ecosystem. To understand how legume symbionts are affected by human-driven disturbances related to mine activities, we evaluated the distribution of rhizobia populations along a heavy metal gradient. We focused on the nitrogen-fixing rhizobia (*Mesorhizobium* sp.) associated to *Anthyllis vulneraria* previously identified as a highly adapted symbiotic system growing at one French mine. The ability of strains to tolerate heavy metals was tested phenotypically and characterized genetically using a metal-tolerance marker. The rhizobial genetic structure was analyzed using taxonomic and symbiotic markers. Mine soils contained the majority of metal-tolerant isolates that mainly belonged to the species *Mesorhizobium metallidurans* whose presence was strictly related to heavily contaminated soils. By contrast, unpolluted soils were dominated by metal-sensitive isolates belonging to several new *Mesorhizobium* species, whereas mine-border soils contained both the metal-tolerant and sensitive isolates. The symbiotic phylogeny revealed a distribution of *Anthyllis* rhizobia that clustered into two symbiovars (one related to *Anthyllis* and the other to *Lotus*) and that shared similar geographic distributions of *Anthyllis* and *Lotus* plants respectively. The *Anthyllis*/rhizobia symbiotic pattern was independent from those of metal tolerance and rhizobial speciation. In conclusion, each site shows a specific signature of *Anthyllis*-nodulating rhizobia assemblages revealing different *Anthyllis*/rhizobia interactions in the soil. This work indicates that *A. vulneraria* can be nodulated by several rhizobial species and symbiovars according to their geographic location suggesting the extension of the symbiotic relationship of *Anthyllis* rhizobia to another legume *Lotus* that could be an interesting material in phytostabilization strategies.