EXAMINATION OF PESTICIDE-DEGRADING BACTERIA ISOLATED FROM AGRICULTURAL SOILS

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Various pesticides are used in agricultural practice to combat different pests and diseases of crop plants but several of them may represent environmental hazard and human health risk as well. Therefore, the removal of these substances from agricultural soils is of high importance, and microbial degradation is a potential approach to achieve this purpose.

Thirty bacterial strains were isolated from soil pre-treated with the herbicide glyphosate on solid medium containing glyphosate as sole carbon and nitrogen source. Ten isolates were selected for further studies on the basis on their growth characteristics. The degradation of glyphosate was monitored in liquid cultures for 3 weeks by a spectrophotometric method using ninhydrin and sodium molybdate reagents. The strains were able to decrease the initial 1 mg/ml concentration of glyphosate to 0.25-0.5 mg/ml. Species identification was performed based on the sequence analysis of fragments of the 16S ribosomal RNA and the RNA polymerase subunit beta (*rpoB*) gene. Seven isolates were identified as *Pseudomonas resinovorans* while two as *Ensifer adhaerens (syn.: Sinorhizobium morelense)*, which is known as a species with nitrogen-fixing ability. A single strain was diagnosed as *Ochrobactrum anthropi* but as this species is considered as an opportunistic human pathogen, the isolate was excluded from further investigations. All the remaining strains were found to prefer alkaline conditions (pH 8.0) for growth. In heavy metal tolerance tests, all isolates showed intensive growth in the presence of $FeSO_4$, $MnSO_4$, $Pb(NO_3)_2$ and $AlCl_3$ up to 1 mM, and several of them tolerated $ZnSO_4$ and $NiSO_4$ up to 0.5 mM concentration. Furthermore, *E. adhaerens* SZMC 25856 sustained 1 mM $CuSO_4$ and 0.5 mM $CdSO_4$, while *P. resinovorans* SZMC 25870 and 25872, as

well as *E. adhaerens* SZMC 25871 could survive in the presence of 1 mM $NiSO_4$, and both *E. adhaerens* strains tolerated $ZnSO_4$ and $Cd(NO_3)_2$ up to 1 mM. Based on their ability to decompose glyphosate efficiently and tolerate different heavy metals at high concentrations, *P. resinovorans* SZMC 25870 and 25872, as well as *E. adhaerens* SZMC 25856 and 25871 isolates may be potential candidates for agricultural applications. Further thirty, putative aniline-degrading bacterial strains have been isolated from soil pre-treated with pendimethalin (aniline-type herbicide), results of the ongoing studies will also be presented and discussed.

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