

Antibacterial Activity of Endophytic Bacteria against Multidrug-Resistant Bacteria: Isolation, Characterization, and Antibacterial Activity

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Abstract : Background: Some microbes can colonize plants' inner tissues without causing obvious damage and can even produce useful bioactive substances. In the present study, the diversity of the endophytic bacteria associated with medicinal plants from Iran was investigated by culturing techniques, molecular gene identification, as well as measuring them for antibacterial activity. Results: In the spring season from 2013 to 2014, 35 herb pharmacology samples were collected, sterilized, meshed, and then cultured on selective media culture. A total of 199 endophytic bacteria were successfully isolated from 35 tissue cultures of medical plants, and sixty-seven out of 199 bacterial isolates were subjected to identification by the 16S rRNA gene sequence analysis method. Based on the sequence similarity gene and phylogenetic analyses, these isolates were grouped into five classes, fourteen orders, seventeen families, twenty-one genera, and forty strains. The most abundant group of endophytic bacteria was actinobacterial, consisting of thirty-two (47%) out of 67 bacterial isolates. Ten (22.3%) out of 67 bacterial isolates remained unidentified and classified at the genus level. The signature of the 16S rRNA gene formed a distinct line in a phylogenetic tree showing that they might be new species of bacteria. One (5.2%) out of 67 bacterial isolates was still not well categorized. Forty-two out of 67 strains were candidates for antimicrobial activity tests. Nineteen (45%) out of 42 strains showed antimicrobial activity multidrug resistance (MDR); thirteen (68%) out of 19 strains were allocated to classes actinobacteria. Four (21%) out of 19 strains belonged to the Bacillaceae family, one (5.2%) out of 19 strains was the Paenibacillaceae family, and one (5.2%) out of 19 strains belonged to the Pseudomonadaceae family. The other twenty-three strains did not show inhibitory activities. Conclusions: Our research showed a high-level phylogenetic diversity and the intoxicating antibiotic activity of endophytic bacteria in the herb pharmacology of Iran.

Keywords : Antibacterial activity, endophytic bacteria, multidrug-resistant bacteria, whole genom sequencing

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