MULTILOCUS MOLECULAR CHARACTERIZATION AND BIOGEOGRAPHICAL DISTRIBUTION OF NEWLY ISOLATED EGYPTIAN CLOVER SYMBIONTS

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Abstract

A new collection of geographically distinct Rhizobium isolates (40) nodulating Egyptian clover in different regions in Egypt were genotypically characterized using multilocus sequences of different housekeeping and symbiotic genes. PCR analysis indicated that all the isolates produced 940 and 780 bp of nodC and nifH genes respectively, except, for strain ECRI 27 which failed to re-nodulate this host. RFLP analysis of 16S rRNA divided the isolates into four genotypic groups. Covering 80% of the isolates, genotype 1 was similar to Rhizobium etli CFN42T. Genotype 2 was comprised 7.5% of the isolates and was similar to Rhizobium leguminosarum sv. trifolii. Genotype 3 and 4 represented 10% and 2.5% of the isolates respectively and were differed than the two reference strains. Phylogenetic analysis of 16S rRNA, celC, atpD and recA genes confirmed the relationships estimated from RFLP analysis and supported the identification of the majority of strains as R. etli. Interestingly, these strains could not able to nodulate common bean as original host of R. etli suggesting that it is a new lineage of R. etli with symbiotic plasmid of trifolii. Ultimately, the use of ANI (average nucleotide identity) of 16S rRNA as a new biostatics marker confirmed that these micro-symbionts are genetically heterogeneous and distinct group of strains which belong genetically to R. etli sv. mimosa, R. leguminosarum sv. trifolii, R. bangladeshense, Rhizobium etli, and R. aegypticaum. In addition, results of ANI not only confirmed that there was a site-specific rhizobial species distribution (biogeographical distribution) in Egyptian soils according to the geographical characteristics and soil properties, but also confirmed that the new species of R. aegypticaum was dominant in the South not in the other parts of Egyptian soils.

Key words: Egyptian soils, Genetic diversity, clover symbionts, Rhizobium strains.
Reference


Shamseldin AAY (1997) Studies on Rhizobium leguminosarum bv. phaseoli in Egyptian soils. M. Sc. thesis from the Agricultural Microbiology Department, Faculty of Agriculture, Cairo University, Egypt.


