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ISOLATION AND IDENTIFICATION OF A PSYCHROTOLERANT BACTERIUM AND ITS CHARACTERIZATION FOR BIOCONTROL AND PLANT GROWTH-PROMOTING ACTIVITY

Abstract

The microbial communities of plant ecosystem are in relation to plant growing environment, but the alteration in biodiversity of rhizosphere and phyllosphere microbial communities in closed and controlled environment is unknown. The purpose of this study is to analyze the change regularity of microbial communities with wheat plants dependent-cultivated in a closed artificial ecosystem. The microbial community structures in closed environment treatment plants were investigated by culture-dependent approach, polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE) and Illumina Miseq high throughput sequencing. The results indicated that the number of microbes was decreased along with time, and the magnitude of bacteria, fungi and actinomycetes were 107-108, 105 and 103-104 CFU/g (dry weight), respectively. The analysis of PCR-DGGE and Illumina Miseq revealed that wheat leaf surface and near-root substrate had different microbial communities at different periods of wheat ecosystem development, and showed that the relative highest diversity of microbial communities appeared at late and middle period of plant ecosystem, respectively. The results also indicated that wheat leaf and substrate had different microbial community compositions, and wheat substrate had higher richness of microbial community than leaf. *Flavobacterium*, *Pseudomonas*, *Paenibacillus*, *Enterobacter*, *Penicillium*, *Rhodotorula*, *Acremonium* and *Alternaria* were dominated in the wheat leaf samples, and *Pedobacter*, *Flavobacterium*, *Halomonas*, *Marinobacter*, *Salinimicrobium*, *Lysobacter*, *Pseudomonas*, *Halobacillus*, *Xanthomonas*, *Acremonium*, *Monographella* and *Penicillium* were dominant populations in the wheat near-root substrate samples.