

Actinobacteria from Greenwich Island and Dee Island: isolation, diversity and distribution

ABSTRACT

Actinobacteria from underexplored and unusual environments have gained significant attention for their capability in producing novel bioactive molecules of diverse chemical entities. Streptomyces is the most prolific Actinobacteria in producing useful molecules. Rapid decline effectiveness of existing antibiotics in the treatment of infections are caused by the emergence of multidrug-resistant pathogens. Intensive efforts are urgently required in isolating non-Streptomyces or rare Actinobacteria and understanding of their distribution in the harsh environment for new drug discovery. In this study, pretreatment of soil samples with 1.5% phenol was used for the selective isolation of Actinobacteria from Dee Island and Greenwich Island. A high number of non-Streptomyces (69.4%) or rare Actinobacteria was significantly recovered despite the Streptomyces (30.6%), including the genera Micromonospora, Micrococcus, Kocuria, Dermacoccus, Brachybacterium, Brevibacterium, Rhodococcus, Microbacterium and Rothia. Reduced diversity and shift of distribution were observed at the elevated level of soil pH. The members of genera Streptomyces, Micromonospora and Micrococcus were found to distribute and tolerate to a relatively high pH level of soil (pH 9.4-9.5), and could potentially be alkaliphilic Actinobacteria. The phylogenetic analysis had revealed some potentially new taxa members of the genera Micromonospora, Micrococcus and Rhodococcus. Principal Component Analysis of soil samples was used to uncover the factors that underlie the diversity of culturable Actinobacteria. Water availability in soil was examined as the principal factor that shaped the diversity of the Actinobacteria, by providing a dynamic source for microbial interactions and elevated diversity of Actinobacteria.

Keyword: Rare actinobacteria; Distribution; Greenwich Island; Dee Island; Antarctica