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Multiphasic Characterization of a Plant Growth Promoting Bacterial Strain, *Burkholderia* sp. 7016 and its Effect on Tomato Growth in the field[1]

GAO Miao[1], ZHOU Jian-jiao[1], WANG En-tao[2], CHEN Qian[1] , XU Jing[1] and SUN Jian-guang[1]*

[1] *Key Laboratory of Microbial Resources，Ministry of Agriculture / Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing 100081, P.R.China*

[2] *Departamento de Microbiología, Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, México D.F. 11340, México*

Abstract

Aiming at searching for plant growth promoting rhizobacteria (PGPR), a bacterium strain coded as 7016 was isolated from soybean rhizosphere and was characterized in the present study. It was identified as *Burkholderia* sp. based on 16S rDNA sequence analysis, as well as phenotypic and biochemical characterizations. This bacterium presented nitrogenase activity, 1-aminocyclopropane-1-carboxylic acid (ACC) deaminase activity and phosphate solubilizing ability; inhibited the growth of *Sclerotinia sclerotiorum*，*Gibberella zeae* and *Verticillium dahliae*; and produced small quantities of indole acetic acid (IAA). In green house experiments, significant increases in shoot height and weight, root length and weight, and stem diameter were observed on tomato plants in 30 d after inoculation with strain 7016. Result of 16S rDNA PCR-DGGE showed that 7016 survived in the rhizosphere of tomato seedlings. In the field experiments, *Burkholderia* sp. 7016 enhanced the tomato yield and significantly promoted activities of soil urease, phosphatase, sucrase, and catalase. All these results demonstrated *Burkholderia* sp. 7016 as a valuable PGPR and a candidate of biofertilizer.

Key words: PGPR, *Burkholderia* sp., multiphasic characterization, promoting growth, biofertilizer

植物促生菌 *Burkholderia* sp. 7016 的特性及其田间试验效果

摘要：菌株 7016 分离自大豆根际土壤，经 16S rDNA 系统发育分析及生理生化测定等方法鉴定菌株为 *Burkholderia* sp.。该菌株具有多种促生特性，包括具有高固氮酶活性（32.29±2.08 nmol C_2H_4 mg protein^{-1} h^{-1}）；具有溶解无机磷和有机磷能力；具有产 IAA 能力（18.47±3.71 μg mL^{-1}）；具有产 ACC 脱氨酶能力（5.393±0.362 μmol mg protein^{-1} h^{-1}）；能同时拮抗西葫芦菌核病（*Sclerotinia sclerotiorum*），麦类赤霉病（*Gibberella zeae*）和棉花黄萎病（*Verticillium dahliae*）三种病原真菌。在温室条件下，菌剂 *Burkholderia* sp. 7016 可以显著提高番茄幼苗的株高和鲜重，根长和鲜重以及茎粗，并且能够在番茄幼苗根际存活。在田间，菌剂 *Burkholderia* sp. 7016 可以提高番茄

[1] Miao Gao, Tel: +86-1082108701, E-mail: gaomiao@caas.cn. Correspondence: SUN jian-guang, Tel: +86-1082108701, E-mail: sunjianguang@caas.cn.