

油用牡丹根际解有机磷细菌的筛选及解磷功能研究

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摘要: 油用牡丹作为市场上新兴的木本油料作物, 土壤有效磷缺乏严重制约油用牡丹生长发育以及产量和品质的提升。分离筛选油用牡丹高效解磷细菌, 充分发挥其根际微生物的作用, 是实现油用牡丹高产优质目标、保障农业绿色发展的有效途径。以不同生长年限油用牡丹‘凤丹’根际土壤为研究对象, 选用以植酸钙为磷源的培养基, 利用平板稀释法分离筛选具有解有机磷能力的细菌, 并利用 16S rDNA 测序技术对菌株进行鉴定, 结合溶磷圈法和钼锑抗比色法分析其解磷能力。从一、三、四年生油用牡丹根际土壤中共筛选出 14 株解有机磷菌株。其中隶属于芽孢杆菌属和假单胞菌属的各 5 株, 隶属于节杆菌属的有 3 株, 还有 1 株隶属于鞘氨醇杆菌属; 14 株解有机磷菌株溶磷指数和溶磷效率分别在 1.6-9.0 以及 60%-800% 之间, 其中一年生油用牡丹根际筛选到的菌株 FD1 15 的溶磷指数和溶磷效率均最高; 培养液中速效磷含量为 2.88-5.30 mg/L, 活化率在 26.44%-62.13% 之间, 解磷能力和活化能力最强的是从三年生油用牡丹根际筛选获得的菌株 FD3 13, 隶属于芽孢杆菌属。这为提高油用牡丹的产量和食用品质提供理论和技术支撑, 同时也为微生物菌肥的研发和应用提供一定的参考。

关键词: 油用牡丹; 解有机磷细菌; 根际; 解磷能力

DOI: 10.13560/j.cnki.biotech.bull.1985.2021.0942

Organic Phosphate solubilizing Bacteria Screening in the Rhizosphere of *Paeonia ostii* and Study on Their Phosphate solubilizing CapabilitiesSHEN Jia jia¹ HOU Xiao gai¹ WANG Er qiang² WANG Fei³ GUO Li li¹

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Abstract: *Paeonia ostii* as a new woody oil crop with high oil values, the deficiency of available phosphorus in the soil severely restricts its growth and development, yield and quality. Isolation and screening of highly effective phosphate solubilizing bacteria (PSB) and playing the role of rhizosphere microorganisms is an effective way to achieve the goal of high yield and high quality of *P. ostii* and ensure the green development of agriculture. Seedlings of *P. ostii* ‘Fenglan’ growing for different years were selected as study objects, and phytin was selected as the only phosphorus (P) source in the medium. Then the method of plate dilution was employed to isolate organic phosphate solubilizing bacteria. And finally the 16S rDNA sequencing technology was used for molecular identification of these strains, and methods of phosphate solubilizing circle and liquid culture were applied to analyze their phosphate solubilizing abilities. As results, 14 strains of PSB were isolated from the rhizosphere of *P. ostii* in 1 year, 3 and 4 years. Among them, there were 5 strains of *Pseudomonas*, 5 strains of *Bacillus*, 3 strains of *Arthrobacter* and one strain of *Norosphingobium*, respectively. The phosphate solubilizing index and phosphate solubilizing efficiency of 14 strains ranged in 1.6 to 9.0 and 60% to 800%, among them the phosphate solubilizing index and phosphate solubilizing efficiency of strain FD1 15 was the highest. The available P content in liquid culture of PSB ranged in 2.88 mg/L to 5.30 mg/L, and the mobilization ratio ranged

收稿日期: 2021 07 23

基金项目: 河南省自然科学基金项目 (202300410119), 河南省高等学校青年骨干教师培养计划 (2018GGJS053), 国家自然科学基金面上项目 (31872184)

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