

ISOLATION AND CHARACTERIZATION OF PLANT GROWTH PROMOTING RHIZOBACTERIA FROM RHIZOSPHERE OF PEPPER (*Piper nigrum* L.) IN MALAYSIA

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Abstract

Diazotrophic bacteria were isolated from rhizosphere of pepper vines in two States (Johor and Sarawak) of Malaysia. The rate of nitrogenase enzyme activity based on acetylene reduction assay showed remarkable variation in isolates of these bacteria which ranged from 0.51 to 1.85 $\mu\text{mol C}_2\text{H}_4 \text{ mg}^{-1} \text{ h}^{-1}$. Their plant growth promoting characters were also analysed. It was observed that 61.1% of them showed IAA production, 33.3% phosphate solubilization, 50% siderophore production whereas only 3 isolates showed all the plant growth promoting characters tested. Based on biochemical characterization and carbon source utilization test, it is reported that species of *Pseudomonas* and *Klebsiella* are predominantly present in the rhizosphere of pepper vines. Strain SWK-4d, JHR-2b and JHR 4a were further analyzed to determine their efficiency to enhance root initiation and proliferation of pepper cuttings. Results showed that inoculation with these selected strains not only increased the survival rate, rooting rate and sprouting rate of pepper cuttings, but also enhanced the root growth as well as showed a good capacity of root colonization. These results suggest that strains SWK-4d, JHR-2b and JHR-4a have a potential to be used as bio-stimulant to increase the growth and yield of black pepper.

Key words: Diazotrophic bacteria, Plant Growth Promoting Rhizobacteria (PGPR), Nitrogen fixation, IAA production, Phosphate solubilization, Siderophore production

1. INTRODUCTION

Black pepper (*Piper nigrum* L.) is one of the most important species cultivated in Malaysia due to its economic value (Yap, 2013). Major constraints of pepper crop production are the low soil fertility, competition from weeds and high susceptibility to various diseases and pests. Plant Growth Promoting Rhizobacteria (PGPR) is a wide range of root colonizing bacteria with the capacity to enhance plant growth and crop yield either through direct or indirect influences (Kloepper, 2004). In the last few decades, a large array of bacteria including species of *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Klebsiella*, *Enterobacter*, *Alcaligenes*, *Arthobacter*, *Burkholderia*, *Bacillus* and *Serratia* have been isolated and reported

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