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Isolation and Screening Bacterial Exopolysaccharide (EPS) from Potato Rhizosphere in Highland and The Potential as a Producer Indole Acetic Acid (IAA)

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Abstract

This study aimed to determine the ability of bacterial isolated from rhizosphere of potato plants in producing exopolysaccharide and growth stimulating substances such as Indole Acetic Acid (IAA). The soil samples were taken from three different land of slopes at elevation >1500 m above sea level at Malino, South Sulawesi. However, only 34 isolates formed a thick slime or mucoid when cultured on MacConcey medium. The ability of exopolysaccharide isolated bacterial in producing IAA was assayed in the presence of L-Tryptofan as a precursor. The result revealed that these 34 isolates were able to produce IAA in range of 0.40 to 21.14 mg/L. An isolate coded P2.67 was the most potential bacterium to produce IAA (21.14 ppm) followed by P2.56 (17.36 ppm), P3.42 (12.21 ppm), and P3.70 (9.21 ppm).

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Keywords: exopolysaccharide, bacterial rhizosphere, potatoes, Indole acetic acid.

INTRODUCTION

Intensive land use on horticultural crops in upland areas of high erosion is under focusing. Planting potatoes on sloping land is generally more usable to increase production, so that the land conservation issues are often ignored

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[7]. Farmers seek many potato crops on slopes of 15% and 35% without attention to soil and water conservation which planting on ridges in the direction of the slope [11]. This condition leads to deterioration of land productivity, which will lower the potato production and farmers' income [7]. Therefore, efforts to maintain the productivity of the land by means of microbiological conservation, the use of microorganisms in the rhizosphere of potato plant roots which can improve soil structure by the effort of aggregating soil through microorganisms such are bacteria producing exopolysaccharide (EPS). Meanwhile, organic carbon particles improve soil aggregation when the material forming the organic core surrounded by clay, ash particles and aggregates [12]

Exopolysaccharide (EPS) is a complex mixture of macromolecular electrolyte contained on the outside of the bacterial cell is excreted as mucus that contributes to soil aggregation as an adhesive. Some exopolysaccharide-producing bacteria have been reported, among others, *Pseudomonas aeruginosa*, *Erwinia*, *Ralstonia*, and *Azotobacter vinelandii*. Exopolysaccharide protects bacteria from various environmental stresses [6], protects cells from antimicrobial compounds, and antibodies, or for sticking to other bacteria, animal and plant tissues [9,15]

Generally, plants are not able to produce IAA in sufficient quantities for growth and development. Some strains RPTT (Rhizobacteria boosters grown plants) or popularly known PGPR (Plant growth promoting rhizobacteria) of precursors capable of synthesizing IAA (base material) contained in root exudates and organic ingredients. Various studies indicate that IAA produced by bacteria as PGPR *Azospirillum* and *Azotobacter paspali Brasiliense* can increase the number of lateral roots and root system size thereby increasing the water and nutrients uptake from the soil [1,8]. IAA synthesis in the ground had been available through specific precursors (base material) triptopan (L-tryptopan). Tryptopan is one source of N for the microbes contained in root exudates and organic matter can be converted by soil microbes into IAA [2]. This study was carried out to Isolation and Screening Bacterial Exopolysaccharide (EPS) from Potato Rhizosphere in Highland and The Potential as a Producer Indole Acetic Acid (IAA)

MATERIAL AND METHOD

Soil Sampling

Soil sampling have been taken for the purpose to isolate bacteria that producing exopolysaccharide (EPS) on rhizosphere potato plants at a depth of 0-20 cm with three gradients of the slope P1 (15%), P2 (25%) and P3 (35 %). The type of soil samples is *Ultisol*. At each site soil samples taken in moderation, homogenized and put into a sterile plastic bag. Equipment have been cleaned and sterile with a wash and then rinsed or wiped with alcohol swabs.

Isolation and Purification of Bacteria producing exopolysaccharide (EPS)

Isolation of bacteria producing exopolysaccharide (BPE) was performed on several samples of soil were taken based on the slope is 15%, 25% and 35% in rhizosphere potato (*Solanum tuberosum* L) respectively. The depth of which Soil material had been taken was 0-20 cm. A total of one gram of soil material aseptically suspended in physiological saline solution (0.85%) and serial dilutions were made to 10⁻⁶, with Duplo and incubated in medium ATCC no. 14 (per liter of medium): 0.2 g KH₂PO₄; 0.8 g K₂HPO₄; 0.2 g MgSO₄.7H₂O; 0.1 g CaSO₄.2H₂O;

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