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Prof. Dr. Özer Çınar

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WELCOME TO ICOEST 2019

On behalf of the organizing committee, we are pleased to announce that the 5th International Conference on Environmental Science and Technology (ICOEST-2019) is held from October 09 to 13, 2019 in Sarajevo. ICOEST 2019 provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Environmental Science and Technology. The conference seeks to contribute to presenting novel research results in all aspects of Environmental Science and Technology. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Environmental Science and Technology. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in al lareas of Environmental Science and Technology. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world.

ICOEST 2019 is the oncoming event of the successful conference series focusing on Environmental Science and Technology. The scientific program focuses on current advances in th eresearch, production and use of Environmental Engineering and Sciences with particular focus on their role in maintaining academic level in Science and Technology and elevating the science level such as: Water and waste water treatment, sludge handling and management, Solid waste and management, Surface water quality monitoring, Noise pollution and control, Air pollution and control, Ecology and ecosystem management, Environmental data analysis and modeling, Environmental education, Environmental planning, management and policies for cities and regions, Green energy and sustainability, Water resources and river basin management. The conference's goals are to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in environmental science and engineering experiments.

Best regards,

Prof. Dr.Özer ÇINAR

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October 09-13 2019

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Determination of PGPR Properties of Rhizospheric*Pseudomonas* Strains

FatmaAzgin[1], Fatima Masume Uslu[1], IsilUntac Olgun[1], Sadik Dincer[1,2]

Abstract

Plant growth-promoting rhizobacteria (PGPR) are belong to wide range of bacteria species that can enhance plant growth by several mechanisms like phosphate solubilization, siderophore production, pytohormone production etc. In this study, a total of 48 Pseudomonas strains were obtained from rhizosphere layer of agricultural soils. These strains were evaluated for their plant growth promoting traits, including siderophore production and phosphate solubilization. 8 Pseudomonas strains were selected by their performance on the performance of PVK (Pikovskaya) and CAS (Chrome Azurol S) Agar plate. Then, to evaluate the IAA activity, the selected Pseudomonas strains inoculated to LB broth which contains L-Tryptophan (0,5 g L^{-1}) and incubated at 28 ºC for 3 days. The quantitation of IAA production was determined by using Salkowski reagent. The optical density was taken at 530 nm with a spectrophotometer. The results of quantitative analysis were range from 8,48 to 36,88 µg/mL.Pseudomonas sp. 18 was found to be the highest efficient IAA producer.

Keywords: *Indole Acetic Acid, PGPR, Pseudomonas sp., Siderophore*

1. INTRODUCTION

Agricultural systems that use excess input for high yields cause environmental problems and depletion of natural resources. As a result, it is a threat to human health. It is also seen that the rapid increase in production resulting from these chemical applications is gradually decreasing. All these reasons make it necessary to work on sustainable agricultural applications. One of theseapplications rely on microorganisms such as PGPR "Plant Growth promoting Rhizobacteria" is considered a promising strategy to ensure the maintenance and regularity of production without health risk and with less dependence on chemical fertilizers [5].

Plants are always interaction with soil microorganisms (bacteria and fungus) during germination, growth and development. The free-living soil microorganisms live in the rhizosphere of many plant species and have various beneficial effects on the host plant through different mechanisms such as phytohormoneproduction and phosphate solubilization are generally referred to as Plant Growth Promoting Rhizobacteria (PGPR). The PGPRs are contain different genera such as *Azotobacter*, *Acetobacter*, *Serratia*, *Azospirillum*, *Bacillus*, *Chromobacterium*, *Agrobacterium*, *Erwinia*, *Flavobacterium*, *Arthrobacter*, *Micrococcous*, *Paenibacillus*, *Pseudomonas* and*Burkholderia.* The PGPRs enhance plant growth through direct and indirect mechanisms. Direct mechanisms: Phytohormone production, phosphate solubilization, siderophore production, N fixation. Indirect mechanisms:ACC Deaminase activity, antibiotic and antifungal production, Volatile Organic Compounds (VOCs) production, lytic enzymes production, competition[7].

2. MATERIALS AND METHODS

2.1. Isolation of Pseudomonas strains

Rhizospheric soil for bacterial isolation obtained from Cukurova UniversityAgricultural area. Pseudomonas Isolation Agar and GSP Agar were used isolation of *Pseudomonas* sp. strains. Selected *Pseudomonas* ssp. characteristic colony morphology from on the media were tested for PGPR properties: P solubilization and Siderphore production.

2.2. Siderophore Production

[1] *Cukurova University, Science and Letter Faculty, Biology Department, Balcalı/ADANA, Turkey*

[2]*Corresponding author: sdincer@cu.edu.tr*

Siderophore production was shown by the modified of method described by Schwyn and Neilands[1].Preparation of CAS reagent; Sol 1: Dissolve 0.06 g of CAS (Chrome Azurol S) in 50 ml ddH_2O, Sol 2: Dissolve 0.0027 g of $FeCl_3.6H_2O$ in 10 ml of 10 mMHCl, Sol 3: Dissolve 0.073 g of HDTMA (hexadecyltrimethylammonium bromide) in 40 ml of ddH_2O. Sol 1 and Sol 2 are mixed, then mixed Sol 3. 100 ml CAS Reagent and 900 ml Nutrient Agar, which prepare for 1000 ml, was autoclaved in different bottle. Then CAS Reagent and Nutrient Agar was mixed at 50 ºC in sterile cabinet. Siderophore removes iron from the CAS dye, the color changes from blue to yellow/orange.48 *Pseudomonas* strains incubated 48 h at 30 °C.

2.3. Phosphate Solubilization

Qualitative determination of phosphate solubilization was shown on PikovskayaAgar [2].Pikovskaya agar; Glucose10 g/L. $Ca_3(PO_4)_25$ g/L, $(NH_4)_2SO_4$0.5 g/L, NaCl0.2 g/L, $MgSO_4.7H_2O$ 0.1 g/L, KCl0.2 g/L, Yeast extract0.5 g/L, $MnSO_4 \cdot H_2O$ 0.002 g/L, $FeSO_4 \cdot 7H_2O$ 0.002 g/L, Agar 15 g/L. P-solubilization ability was shownby the formation of a halo zone around the colony. 48 *Pseudomonas* strains incubated at 30 °Cfor 5 days.

2.4. IAA Production

The selected 8 *Pseudomonas* strains (10^8 cells/mL) were grown in 100 mL flasks containing 50 mL Nutrient Broth supplemented with L- Tryptophan(0,5 g L^{-1}) and incubated at 28 ºC for 3 days on 150 rpm rotary shaker. The quantitation of IAA production was determined by using Salkowski reagent (1 mL of 0.5 M $FeCl_3$ in 50 mL of 35% $HClO_4$). 2 ml Salkowski reagent and 1 ml supernatant was mixed and incubated at room temperature 30 min in dark. The optical density was taken at 530 nm with a spectrophotometer. Standard curve was prepared with 5-100 µg/ml of IAA for quantification[3].

2.5. Bacterial identification

Identifying has been conducted with molecular sequence-based identification, for this purpose isolated microorganisms' 16S rRNA genes were amplified with PCR technique using universal primers 27f(5′-AGAGTTTGATCMTGGCTCAG-3′), 519r (5′-GWATTACCGCGGCKGCTG-3′) and DNA sequences have been submitted to an online database (NCBI DNA sequence database) for comparison with known sequences.

3. RESULTS AND DISCUSSION

Siderophore production and phosphate solubilization capabilities were used to select from 48 *Pseudomonas* strains. According to these capabilities, 8 strains were selected for evaluation in terms of IAA production. As shown in the Table 1, siderophore production and phosphate solubilization properties were evaluated at strong (++++) and weak (+) ranges. IAA production of selected 8 *Pseudomonas* strains was determined quantitatively.

Table 1. Results of PGPR properties of Pseudomonas strains

Strain	IAA (µg/ml)	Siderophore Production	P Solubilization
Pseudomonas lactis (5)	19,8	++++	++
Pseudomonas putida (10)	8,48	++	+++
Pseudomonas lactis (14)	9,28	+++	+
Pseudomonas cerasi (15)	21,28	+++	+++
Pseudomonas syringae (16)	16,88	+	+++
Pseudomonas lactis (18)	36,9	+++	++
Pseudomonas paralactis (20)	34,08	++	++++
Pseudomonas lactis (24)	31,29	++++	++

Comparison of *Pseudomonas* strains: (++++) strong and (+) weak

All isolates were capable of producing IAA at different extents with a range of 8,48–36,88 µg/mL.*Pseudomonas lactis* (18) was found to be the highest efficient IAA producer. So, the strain should be optimized to see if commercial production is possible. The strain should be applied to agricultural seeds such as wheat, corn etc. and its efficiency should be analyzed.

4. CONCLUSION

A single strain cannot be expected to exhibit all PGPR feature.Researchers are working to determination of strains that best show at least one PGPR feature [4]. It is expected that by obtaining strains, it will be beneficial

for sustainable agriculture. However, increasing accessibility, reducing costs and educating farmers should be included in the agricultural policies of the countries.

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