International Journal of Scientific Research in Science, Engineering and Technology

Print ISSN - 2395-1990
Online ISSN : 2394-4099

OPEN ACCESS

Available Online at : www.ijsrset.com
doi : https://doi.org/10.32628/IJSRSET17381256

Qualitative Estimation of Phosphate Solubilizing Fungi Isolated From Riverain Soils of Agra

Dr. Krati Trivedi

Research Scholar, Agra College Agra, Dr. Bhimrao Ambedkar University Agra, India

ARTICLEINFO

Article History :

Accepted: 05 Sep 2023
Published: 25 Sep 2023

Publication Issue :
Volume 10, Issue 5
September-October-2023
Page Number :
115-117

ABSTRACT

Phosphorus (P) is one of the major bio-elements limiting agricultural production. Phosphate solubilizing fungi play a noteworthy role in increasing the bioavailability of soil phosphates for plants. The present study was aimed at isolating and characterizing phosphate solubilizing fungi from Riverain soils using NBRIP medium. A total 15 composite samples form, taken from five location of Agra district. Among the fungal isolates, six fungi solubilized TCP and Rock phosphate. The isolated phosphate solubilizing fungi belonged to genera of ***Aspergillus spp, Penicillium spp.*** designated as Db1 ***(Aspergillus sp.)***, Fb1 ***(Aspergillus sp.)***, Kt1 ***(Aspergillus sp.)***, Db2 ***(Aspergillus sp.)*** and Kl3 ***(Penicillium sp.)*** solubilized TCP (tricalcium phosphate) and Rock phosphate after 15 days of incubation. Maximum solubilization take place by Db1, that was identified as ***Aspergillus niger.***

Keywords : Tri Calcium Phosphate (TCP), Rock phosphate (RP), NBRIP medium, ***Aspergillus sp.***, ***Penicillium sp.***

I. INTRODUCTION

Phosphorus is critical bioelements that limit mustard crop production in Agra. phosphorus (P) is one of the most indispensable macronutrients next to nitrogen for the growth and development of plants [4, 5]. A greater part of soil phosphorus, approximately 95–99%, is present in insoluble form complexed with cations like iron, aluminum, and calcium that cannot be utilized by the plants [6].The use of natural phosphate-bearing materials such as rock phosphate (RP) as fertilizer for P-deficient soils has received due attention in recent years since substantial deposits of cheaper and low grade RP are locally available in many countries of the world [7]. However, its solubilization rarely occurs in nonacidic soils with a pH greater than 5.5 to 6.0 [8]. Conventionally, RP is chemically processed by reacting with sulphuric acid or phosphoric acid. A much cheaper and convenient alternative is reclamation of exhausted soil through use of P-solubilizing fungi that have opened the possibility for solubilization of RP in soils. Thus, soil microorganisms play a critical role in natural phosphorus cycle and recently microbial-based approaches have been proposed to improve the agronomic value of RP [12].

II. MATERIALS AND METHODOLOGY

The areas for collecting soil samples in present study were identified as per requirement of research. Keeping in mind the diversity of microorganisms near the river site area located in district Agra, Uttar Pradesh. Total fifteen soil samples (five samples in each season) were collected in seasons (Summer, Rain & Winter) from five different locations of district Agra, Uttar Pradesh which are located bank of Yamuna River, serial diluted upto 10^{-4}. From each serially diluted soil suspension, 0.1 mL aliquots were transferred and spread plated on NBRIP plates and incubated at 25∘C–28∘C for 2–7 days. After incubation, fungal colonies showing clear zones around the colonies.

The identified fungi were maintained on Potato Dextrose Agar (PDA) slant at (+4∘C) for further investigation. Slide culture was prepared in order to identify spores and mycelia of pure fungal isolates. Accordingly, the morphology of spores and mycelia of fungal isolates was examined and identified by lactophenol cotton blue staining using microscope and identified after growing them on slide according to Stevens

Screening of Fungi for Phosphate Solubilization-

The fungal isolates obtained from riverain soils were evaluated on NBRIP medium containing sparingly soluble phosphates for their activity in mobilizing phosphate from insoluble sources (tri-calcium phosphate and rock phosphate).

Screening of the phosphate solubilizing properties on NBRI medium by the isolated fungi from the riverain soils in rainy season at Agra District using tricalcium phosphate and rock phosphate

Sl. No.	Fungi with code	Tricalcium phosphate	Rock phosphate
1	Db1	+++	++
2	Fb1	+	+
3	Kt1	+	-
4	Kl1	+	+
5	Tg1	+	+
6	Db2	-	+
7	Fb2	+	-
8	Kt2	+	-
9	Kl2	-	+
10	Tg2	+	-
11	Db3	-	-
12	Fb3	+	+
13	Kt3	-	+
14	Kl3	+	+
15	Tg3	-	+
16	Db4	-	+
17	Fb4	+	-
18	Kl4	-	-
19	Tg4	-	+
20	Db5	+	-

Abbreviations: '+++' Maximum phosphate solubilizing, '++' Moderate phosphate solubilizing, '+'= Minimum phosphate solubilizing, '-'= no phosphate solubilizing.

Statistical analysis:

All experiment was carried out with triplicate sample. Values reported in this paper are the means ±S.D. The difference was considered as significant when $P < 0.05$.

III. CONCLUSION

The results of this study have shown that the riverain soils of district Agra Uttar Prdesh support a diverse group of naturally occurring potential phosphate solubilizing fungi. Out of the twenty fungal strains one fungal strain is Db1 capable of mobilizing TCP and RP in NBRIB medium. The efficiency of phosphate solubilization is significantly higher of Db1 fungal strain that was identified as ***Aspergillus niger.***

IV. REFERENCE

[1]. B. Hameeda, G. Harini, O. P. Rupela, S. P. Wani, and G. Reddy, "Growth promotion of maize by phosphate-solubilizing bacteria isolated from composts and macrofauna," Microbiological Research, vol. 163, no. 2, pp. 234–242, 2008.

[2]. H.-J. Son, G.-T. Park, M.-S. Cha, and M.-S. Heo, "Solubilization of insoluble inorganic phosphates by a novel salt- and pH-tolerant Pantoea agglomerans R-42 isolated from soybean rhi-zosphere," Bioresource Technology, vol. 97, no. 2, pp. 204–210, 2006.

[3]. L. Ouahmane, J. Thioulouse, M. Hafidi et al., "Soil functional diversity and P solubilization from rock phosphate after inoculation with native or allochtonous arbuscular mycorrhizal fungi," Forest Ecology & Management, vol. 241, no. 1–3, pp. 200–208, 2007.

[4]. N. Vassilev, M. Vassileva, V. Bravo, M. Fern´andez-Serrano, and I. Nikolaeva, "Simultaneous phytase production and rock phosphate solubilization by Aspergillus niger grown on dry olive wastes," Industrial Crops and Products, vol. 26, no. 3, pp. 332–336, 2007.

[5]. P. Van Straaten, Rocks for Crops: Agro Minerals of Sub-Saharan Africa, ICRAF, Nairobi, Kenya, 2002.

[6]. S. B. Sharma, R. Z. Sayyed, M. H. Trivedi, and T. A. Gobi, "Phosphate solubilizing microbes: sustainable approach for managing phosphorus deficiency in agricultural soils," SpringerPlus, vol. 2, no. 1, article 587, 2013.

Cite this article as :

Dr. Krati Trivedi, "Qualitative Estimation of Phosphate Solubilizing Fungi Isolated From Riverain Soils of Agra", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 10 Issue 5, pp. 115-117, September-October 2023. Available at doi : https://doi.org/10.32628/IJSRSET17381256
Journal URL : https://ijsrset.com/IJSRSET17381256