E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2023; 6(1): 58-60
Received: 08-06-2023
Accepted: 08-07-2023

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Characterization of the bacterial biome of rice rhizosphere

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DOI: https://doi.org/10.33545/2618060X.2023.v6.i1a.172

Abstract
The Twelve rhizospheric bacterial isolates were obtained from soil samples collected from various regions of eastern Uttar Pradesh (Sitapur, Hardoiand Barabanki). All the isolated bacterial isolates were purified further on Nutrient agar media. The isolates were characterized on the basis of antagonism against *Rhizoctonia solani* indole acetic acid production, ammonia production and phosphate solubilization. The single best isolate was selected on the basis of qualitative screening of plant growth-promoting abilities. The molecular characterization of the isolated rhizobacterial strain was done by SDS-PAGE and 16s rDNA and identified as *Brevibacillus* strain DZQ7.

Keywords: Antagonism, sheath blight, brevibacillus

1. Introduction
Rice (*Oryza sativa* L.) belongs to the family Poaceae and was originally native to China. India is one of the world's largest producers of rice, including white rice and brown rice, grown mostly in the eastern and southern parts of the country. In India, the total rice production in 2021 records 127.66 million tonnes. (Rice production in India). (Wikipediaen.m. Wikipedia.org). Microbial communities associated with rice rhizosphere are found to be very diverse and dynamic, especially for bacteria, which is largely influenced by the geographic location of rice field, soil type, genotype of rice, and agricultural management (Edwards *et al*., 2015 and Edwards *et al*., 2017) [9]. As we know that the most common and severe diseases of rice are blast, sheath blight and bacterial leaf blight (Woperies *et al*., 2009) [2]. *Rhizoctania solani* causes sheath blight in rice. This disease causes significant loss in grain yield up to 50% have been reported under the most conducive environments. Symptoms are usually observed from tillering to milk stage in a rice crop and include greenish grey lesions, usually 1-3 cm long, on the leaf sheath blight, initially just above the soil or water level in the case of conventionally flooded rice. *Trichoderma* spp. are widely used as bio-control agents for major fungal diseases. *Pseudomonas* spp. have been studied for decades as model microorganisms for biological control, and they have proved to be effective bio-control agents for resisting various soil-borne plant diseases. It has been known for some time that *Pseudomonas fluorescens* inhibits the mycelial growth of the sheath blight fungus *Rhizoctonia solani* and increases chitinase and peroxidase activity in rice, thereby inducing systemic resistance against *Rhizoctonia solani* (Patel *et al*., 2021) [3].

2. Materials and Methods
The disease samples collected from naturally infected rice plants showing characteristics and symptoms of Sheath Blight fungus were collected from the Experimental farm, N. D. University of Agriculture and Technology. Kumarganj, Ayodhya during kharif 2020-21. The samples were brought to the laboratory for critical examination, description of symptoms, and the causal organism's isolation. For the isolation of causal organisms, disease infected Plants, having typical symptoms, and healthy tissues was cut with the help of a sterilized blade. These pieces were washed thoroughly with the tap water and placed into 0.1 per cent sodium hydrochloride solution for 30 seconds followed by washing thrice with the sterilized water thoroughly.

Excess water was removed by placing on the folds of sterilized blotting paper. Dried pieces were aseptically transferred into sterilized Petri-dishes containing potato dextrose agar medium with the help of sterilized forceps. Petri plates were properly marked with a glass marker and incubated at 28 °C in B.O.D. incubator. After two days of isolation, the fungus growth appeared on the Petri plates. For testing antagonism activities in Rhizobacteria isolates obtained from rice rhizosphere against *Rhizoctonia solani*, the 50% Potato Dextrose Agar media and 50% Nutrient Agar media mixture are used.

Table 1: Qualitative screening of rhizobacterial isolates against *Rhizoctonia solani*.

Isolates	Isolate name	% inhibition
1	Control	00.00
2	RB-1	50.00
3	RB-2	26.66
4	RB-3	63.33
5	RB-4	00.00
6	RB-5	45.41
7	RB-6	23.00
8	RB-7	46.33
9	RB-8	23.33
10	RB-9	26.66
11	RB-10	00.00
12	RB-11	43.33
13	RB-12	45.41

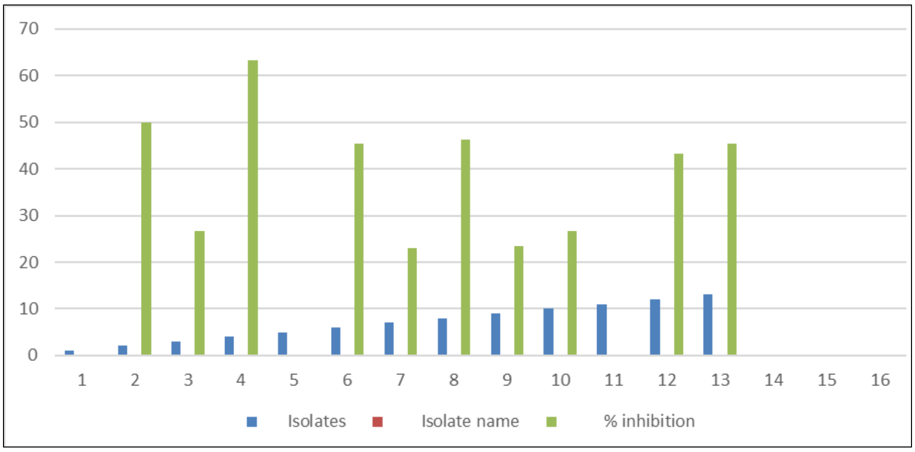

Fig 1: Qualitative screening of rhizobacterial isolates against *Rhizoctonia solani*

3. Results and Discussion

Many researchers isolated *Rhizoctonia solani* from different crop plant parts for their study. Surya *et al*., (2017) [4] obtained six isolates of *Rhizoctonia solani*, i.e., two isolates collected from infected rice plants. Similarly, isolated four *Rhizoctonia solani* from different regions of India. Webb *et al*., (2011) [10] studies showed that the great variability in *Rhizoctonia solani* causes blight in many cultivated crops, lying in nature which is very important to be deciphered. Twelve rhizobacteria isolates were tested for their efficacy in inhibiting the growth of *Rhizoctonia solani* fungus on potato dextrose agar media. The antagonistic ability varies greatly within the isolates and is observed in the 43.22 to 65.33% range. Similarly, Maurya *et al*., (2020) [7] collected eight strains of *Pseudomonas fluorescens* isolates from various agro-ecological zones or crop rhizosphere like moong, rice, chilli, mustard found most effective with the highest antagonistic activity against two fungal pathogens and showed maximum inhibition of mycelia growth of *Alternaria alternate* (48.13%) and *Rhizoctonia solani* (68.23%). Raut and Hamde (2019) [6] found that the bacterial isolate of *Pseudomonas koreensis* was tested against *Rhizoctonia solani* under in-vitro condition. The *Rhizoctonia solani* was inhibited by 85%. The other researchers also carried out similar experiments as different strains of *Pseudomonas* could inhibit as much as 31.5% mycelium growth of *Rhizoctonia solani* (Sundaramoorthy and Balabaskar 2018) [8]. Our results obtained are very much /even sets in concurrence with earlier reports.

4. Conclusion

The bacteria predominates the rhizosphere and nutritional substances such as amino acids, vitamins and other nutrients, released from plant tissues for growth. The products of microbial origin that are released into the soil are known for beneficial effects such rhizospheric living soil bacteria isolated from rhizosphere of rice plants. In order to determine the potentiality of recovered rhizobacteria, the functional characteristics *viz*. production of Indole acetic acid, ammonia production, phosphorus solubilization, were studied. On the basis of results obtained in the study, the selected rhizo bacterium (*Brevibacillus*) has good potential for suppressing the *Rhizoctonia solani* causing sheath blight of rice to a greater extent.

5. References

1. Edwards J, Johnson C, Santos-Medellin C, Lurie E, Podishetty NK, Bhatnagar S, *et al*. Structure, variation, and assembly of the root-associated microbiomes of rice. Proceedings of the National Academy of Sciences. U.S.A. 2015;112(8):911-920.
2. Woperies MCS, Defoer T, Idinoba P, Diack S, Dugue MJ.

Curriculum for participatory learning and action research (PLAR) for integrated rice management (IRM) in inland valleys of Sub-Saharan Africa. Technical Manual. 2009;10:105-109.

3. Patel DP, Das A, Munda GC, Ghosh PK, Bordoloi JS, Kumar M. Evaluation of yield and physical attributes of high-yielding rice varieties under aerobic and flood-irrigated management practices in mid-hills ecosystem. Agric Water Management. 2021;97(9):269-1276.
4. Lynn SJ, Evans J. Hypnosis produces mystical-type experiences in the laboratory: A demonstration proof. Psychology of Consciousness: Theory, Research, and Practice. 2017;4(1):23-37.
5. Wahab A, Abaseen N, Hayat M, Khan B, Luqman M. Advances in understanding the DNA-repair mechanism activated by CRISPR/Cas9. Int. J Biol. Sci. 2022;4(2):01-10. DOI: 10.33545/26649926.2022.v4.i2a.68
6. Raut S, Hamde S. Screening of Antifungal Potential of Rhizospheric isolates against *Rhizoctonia solani in vitro*. International Journal of Current Microbiology and Applied Science. 2018;5(8):769-784.
7. Maurya L, Brahmeswara MV, Raju SC, Reddy SN. *In vitro* experiment for evaluation of the efficacy of different PGPR isolates. International Journal of Current Microbiology and Applied Sciences. 2020;6(7):1798-1806.
8. Sundaramoorthy S, Balabaskar P. Consortial effect of Endophytic and Plant growth promoting rhizobacteria for the management of sheath blight of rice incited by *Rhizoctonia solani*. Plant Pathol. Microbiol. 2018;3(7):2157-7471.
9. Edwards ST, Peterson K, Chan B, Anderson J, Helfand M. Effectiveness of intensive primary care interventions: A systematic review. Journal of general internal medicine. 2017;32(4):1377-1386.
10. Webb KM, Hill AL, Lufman J, Panella L. Long-term preservation of a collection of *Rhizoctonia solani* using cryogenic storage. Annals of Applied Biology. 2011;158(3):297-304.