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Notice for the PhD Viva Voce Examination

Ms Nilina James (Registration Number: 2090182), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Tuesday, 15 October 2024 at 11.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Isolation, Characterization and Evaluation of Potential Plant Growth-Promoting Bacteria from the Rhizosphere of *Coffea arabica* L. from Kodagu District, Karnataka**
Discipline	:	**Botany**
External Examiner - I	:	**Dr Mohammad Anis** Professor Department of Botany Aligarh Muslim University Aligarh 202002 Uttar Pradesh
External Examiner - II	:	**Dr Toji Thomas** Professor and Head PG and Research, Department of Botany St Thomas College, Palai Arunapuram Post Kerala - 686 574
Supervisor	:	**Dr Mridul Umesh** Assistant Professor Department of Life Sciences School of Sciences CHRIST (Deemed to be University) Bengaluru 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 09 October 2024

ABSTRACT

Agriculture is fundamental to food security and economic stability. This study aimed to isolate and characterise PGPR from the rhizosphere of *Coffea arabica* L. in the Kodagu District of Karnataka, focusing on their potential as biofertilizers. Soil samples collected from ten different locations within Kamath Coffee Estate led to the isolation of fourteen distinct bacterial colonies, labelled NJ01 to NJ14. These isolates were evaluated for various plant growth-promoting (PGP) traits and further studies were carried out using 3 isolates with significant PGP traits. Enzyme activity assays indicated that NJ01, NJ04, and NJ14 had positive results for protease, cellulase, amylase, and catalase activity. These strains also displayed varying degrees of halotolerance, with NJ01, NJ04 and NJ14 tolerating up to 8%, 10% and 11% NaCl, respectively. Heavy metal tolerance tests revealed that NJ01 tolerated Pb up to 250 µg/mL, NJ04 tolerated Pb up to 1500 µg/mL and Cd up to 50 µg/mL, and NJ14 tolerated Pb up to 1000 µg/mL and Hg up to 100 µg/mL. Polyhydroxyalkanoate (PHA) production was confirmed in all isolates, with NJ01 yielding the highest amount (6.4 g/L). The isolates exhibited significant antifungal and the 16S rRNA sequencing identified NJ01 as *Bacillus albus* (OP784795), NJ04 as *Bacillus licheniformis* (OM780221), and NJ14 as *Bacillus subtilis* (OM780222).

A consortium was prepared after confirming the plant growth promoting abilities of these PGPR strains by carrying out an initial plant growth studies. The optimisation of media parameters was by using a two-factor interaction model. The plant growth studies in both soil and hydroponic systems with and without carrier indicated that the PGPR consortium significantly improved growth parameters, including germination percentage, root length, shoot length, and leaf count in tomato (Arka Samrat variety) and chickpea (MNK-1 variety).

Keywords: Bacillus, Biochar, Chickpea, Consortium, Plant Growth -Promoting Rhizobacteria (PGPR), Tomato.

Publications:

1. **Nilina James**, Mridul Umesh "Multifarious potential of biopolymer producing *Bacillus subtilis* NJ14 for plant growth promotion and stress tolerance in *Solanum lycopercicum* L. and *Cicer arietinum* L: A way towards sustainable agriculture"
2. **Nilina James**, Mridul Umesh "Salinity stress response of halotolerant *Bacillus licheniformis* NJ04 and its role in improving the growth parameters of Chick pea (*Cicer arietinum* L.) in salt-stressed soil." to Scope journal.
3. **Nilina James**, Mridul Umesha, Suma Sarojinia, Sabarathinam Shanmugamb, Omaima Nasifc, Sulaiman Ali Alharbid, Nguyen Thuy Lan Chie, Kathirvel Brindhadevi "Unravelling the potential plant growth activity of halotolerant *Bacillus licheniformis* NJ04 isolated from soil and its possible use as a green bioinoculant on *Solanum lycopersicum* L.,"