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## Notice for the PhD Viva Voce Examination

Ms Swetha Jeevan, Registration Number: 2190016, PhD Scholar at the Department of Life Sciences, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Tuesday, 03 March 2026 at 10.30 am in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

- Title of the Thesis** : **Effect of Cognitive Adaptability of Plant Growth Promoting Rhizobacteria on the Growth of Selected Plants Under Abiotic Stress**
- Discipline** : **Biotechnology**
- External Examiner - I** : **Dr Sankar Narayan Sinha**  
Professor  
Microbiology and Virology Section  
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- External Examiner - II** : **Dr Jacob Thomas**  
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- Supervisor** : **Dr Sayantan D**  
Assistant Professor  
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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.

**Place:** Bengaluru  
**Date:** 24 February 2026

**Registrar (Academics)**

## ABSTRACT

Bacterial cognition refers to the sensory-like and information-processing mechanisms bacteria use to recognize, assess, and respond to their environment in order to survive and thrive. Such cognitive adaptations allow bacteria to endure and adapt in various harsh environmental conditions. In long-term cultures, bacteria with higher relative fitness can utilize cellular debris for energy, highlighting their ability to survive dynamic stress environments. This adaptability is particularly relevant in the study of Plant Growth-Promoting Rhizobacteria (PGPR), a group of rhizosphere-associated bacteria, contribute to improved plant growth and physiology under abiotic stress. This study explores the adaptation of PGPR exposed to individual and combined abiotic stresses including nutritional deprivation, heat, and acidic stress, applied in both periodic and non-periodic patterns. The study assessed four PGPR isolates for key traits that promote plant growth, including ammonia production, phosphate solubilization, siderophore generation, and indole-3-acetic acid (IAA) biosynthesis. Antioxidant properties such as DPPH radical, hydroxyl radical, and hydrogen peroxide radical scavenging activities were also evaluated. The adapted PGPR strains were then applied to plants *Spinacia oleracea* L., *Brassica juncea*, and *Beta vulgaris* L., to assess their impact on plant growth and physiology. Results showed that periodically stress adapted PGPR exhibited significantly higher activity in all parameters. The most effective strains, *Paenibacillus alvei* SJ6 and SJ8, produced up to  $2.55\pm 0.02$   $\mu\text{mol/mL}$  ammonia,  $32.88\pm 0.06$  mg/L IAA,  $39.4\pm 1.55$   $\mu\text{M}$  siderophore, and  $235.49\pm 0.4$  mg/L phosphate. Plants treated with these adapted PGPR showed marked improvements: fresh and dry weights increased by 21.57%-28.28% and 85.38%-106.29% respectively, while chlorophyll A, B, and A+B rose by 7.3%-47.07%, 35.9%-38.02%, and 19.4%-40.04%. This study provides initial findings for cognitive-like adaptation in PGPR under abiotic stress.

**Keywords:** *bacterial cognition, long-term adaptation, plant growth-promoting rhizobacteria, abiotic stress.*

### Publications:

1. Jeevan Swetha & Sayantan D. (2024). Isolation and characterization of plant growth promoting bacteria (PGPB) from the rhizosphere of *Spinacia oleracea* L. *Research Journal of Biotechnology*. 20(1). 77-87. doi.org/10.25303/201rjbt077087.
2. Jeevan Swetha & Sayantan, D. (2025). Study of cognitive adaptiveness of isolated Plant Growth Promoting Bacteria in nutritionally stress condition. *Research Journal of Biotechnology*. 20 (7).114-124. doi.org/10.25303/207rjbt1140124.