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# Notice for the PhD Viva Voce Examination

Ms Chandni A S, Registration Number: 2071707, 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 Friday, 19 December 2025 at 2.30 pm in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

**Title of the Thesis** : **Screening and Assessment of Plants in the Kadungalloor Region, Kerala, for their Efficiency to Remediate Heavy Metals**

**Discipline** : **Botany**

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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.

**Registrar**

**Place:** Bengaluru
**Date:** 11 December 2025

## ABSTRACT

The presence of heavy metals such as chromium (Cr), cadmium (Cd), lead (Pb), nickel (Ni), and zinc (Zn) has always been a serious threat to ecosystem health, biodiversity, and human health. To address this issue, the physico-chemical characteristics along with the heavy metal analysis of terrestrial soil, sediment, river water and groundwater from two sites of the Kadungalloor region, Kerala – Edayar (polluted) and Elookkara (non-polluted) were carried out. This revealed a higher contamination level in Edayar, ranging up to 599.81 ± 15.83 ppm. Phytoremediation uses plants to absorb, store, and remove contaminants and is a promising alternative to traditional remediation approaches because it is environmentally friendly and cost-effective. The objective of this study was to evaluate the efficacy in absorption, storage, and translocation of heavy metals by various local plants of the Kadungalloor region. To study the diversity of herb and macrophyte species, a random quadrat sampling method was employed. The plant species selected for the heavy metal analysis were Salvinia molesta, Eichhornia crassipes, and Pistia stratiotes as aquatic macrophytes. The terrestrial herbs that were chosen were Scoparia dulcis, Alternanthera ficoidea, and Synedrella nodiflora. S. molesta and A. ficoidea were chosen for the phytoremediation study in the polyhouse based on their ecological dominance. Preliminary analysis of soil collected from the Kadungalloor region showcased a higher concentration of heavy metals, particularly chromium (Cr), nickel (Ni) and cadmium (Cd). These were found in elevated concentrations in multiple sites of the industrially influenced Edayar region. The bioaccumulation factor (BAF) values ranged from 1.5 ± 0.06 to 2.3 ± 0.08 for S. molesta and 1.2 ± 0.04 to 1.9 ± 0.01 for A. ficoidea, which showed their phytoremediation potential for chromium, nickel and cadmium. Following the chelator treatments, the bioaccumulation factor increased in a range of 15 ± 0.7 to 25 ± 0.9 for both species, with the highest uptake observed for cadmium. Growth, biomass, biochemical, and antioxidant properties of both species at different treatments were determined. Ash drying of harvested biomass was performed to assess metal retention post-removal. In A. ficoidea, the lowest ash residues were recorded under the 2% SDS treatment, being 19.85 ± 0.12 ppm for Cr, 15.07 ± 0.52 ppm for Ni, and 2.63 ± 0.04 ppm for Cd. Similarly, for S. molesta, the same treatment resulted in 12.89 ± 0.21 ppm for Cr, 28.40 ± 1.4 ppm for Ni, and 11.85 ± 0.32 ppm for Cd. The 0.2% EDDS treatments also performed well in comparison, although SDS did give a slightly higher efficiency on the whole. This clearly showed the higher phytoaccumulation potentials of both species, especially in chemically assisted conditions.



**Keywords:** *Heavy metals, Phytoremediation, Aquatic plants, Terrestrial plants, Bioaccumulation factor, Translocation factor (TF)*


**Publications:**


1. **C. A. Syamlal** and D. Sayantan, "Accumulation of heavy metals (Cr, Cu, As, Cd, Pb, Zn, Fe, Ni, Co) in the water, soil and plants collected from Edayar Region, Ernakulam, Kerala, India," Plant Sci. Today, vol. 11, no. 4, pp. 907–923, Oct. 2024, doi: 10.14719/pst.3385.
2. **C. A. Syamlal** and D. Sayantan, "Seasonal study on the aquatic and terrestrial habitat of Edayar region, Ernakulam, Kerala, India," Res. J. Chem. Environ., vol. 28, no. 11, pp. 82–98, Nov. 2024, doi: 10.25303/2811rjce082098.
3. **C. A. Syamlal** and D. Sayantan, "Unravelling the interplay between biodiversity and heavy metal content in Elookkara's aquatic and terrestrial ecosystems," Asian J. Plant Sci., vol. 23, no. 3, pp. 321–329, Aug. 2024, doi: 10.3923/ajps.2024.321.329.