



Application of Bioluminescent Bacteria in Evaluation of Heavy Metal Toxicity

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INTRODUCTION

- Bioluminescence is a specific phenomenon exhibited by many organisms wherein they respond to produce light.
- The luminescence in bacterial system is completely a biochemical process which is readily controlled by some enzymatic action which can be altered by nutrition and environment change.
- Heavy metal toxicity results due to exposure to heavy metals like lead, cadmium, mercury etc. which are mostly detected by analytical methods like ion chromatography, HPLC etc, which have limitations.
- Bioluminescence can be applied to construct biosensors, which can be applied in disease diagnosis, monitoring toxicity, detection of pollutants and contaminants etc.
- Bioluminescence bacteria can be alternate for the detection of heavy metal from environmental sample such as water.

OBJECTIVE

- To evaluate heavy metal toxicity by application of bioluminescent bacteria.

METHODS

- Activation and culture of bioluminescent bacteria available from previous study (Padhi A.; 2022)
- Study of salt tolerance.
- Study of the response to the isolates against heavy metals (Hg, Pb and Cd).
- Standardization of the method for detection of the heavy metal toxicity.

RESULTS AND OBSERVATION

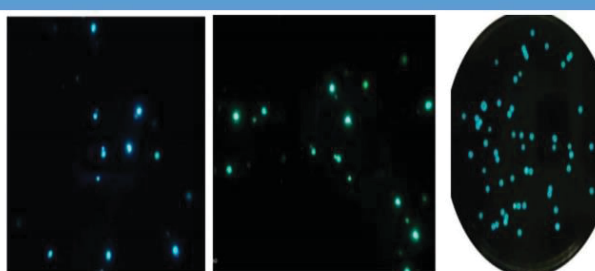


Fig: Colony of bacterial Isolates with bioluminescence

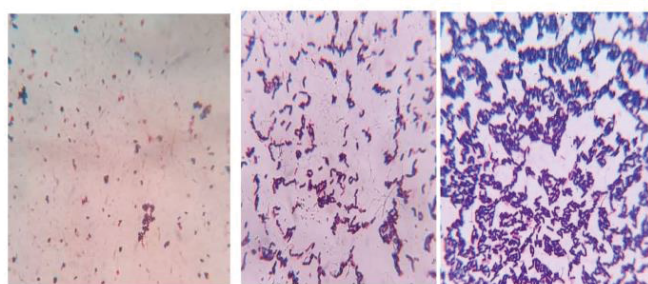


Fig: Microscopic view of the isolates

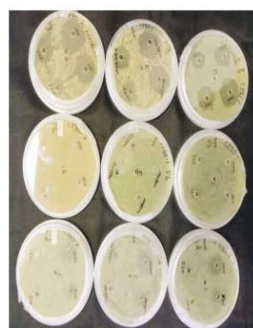


Fig: Heavy metal tolerance assay by well diffusion method

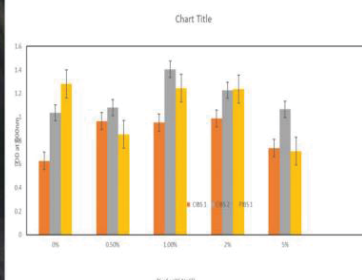


Fig: Graph for salt tolerance test

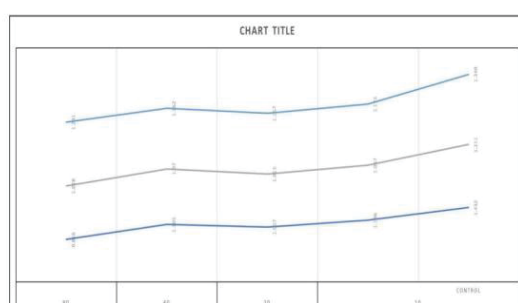


Fig: Graph for heavy metal tolerance assay

CONCLUSION

- In the salt tolerance test it was observed that the isolates were able to thrive salt concentration up to 8 % NaCl and were sensitive against high concentration of salt (>10% NaCl).
- Heavy metal sensitivity assay showed that the three isolates CIBS-1, CIBS-2 and PIBS-1 were resistant to cadmium and mercury but were sensitive to lead.
- The method was standardized and the sensitivity was found up to 40 ppm of cadmium and mercury.
- The study shows preliminary data, this method needs further validation and evaluation for the analytical application.

REFERENCES

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- Padhi A. (2022) Isolation, identification and characterization of marine luminescent bacteria from Puri and Chandrabhaga beach, Odisha; MSc thesis AIPHU.