

## GRG TRUST RESEARCH PROJECT

### Assessment of air quality in Coimbatore city using air pollution sensor for environmental monitoring

**PI: Dr.K.Sunitha kumari**, Assistant Professor of Botany,  
PSGR Krishnammal College for Women, Coimbatore-04

**Co PI: Dr.P.Ponmurugan**, Associate Professor of Botany,  
Bharathiar University, Coimbatore-46

**Amount Sanctioned:** Rs.3,00,000/-

**Year:** 2018-20

#### Project outcomes:

The increasing global trends towards industrialization and modernization have polluted the air with toxic substances in many urban agglomerations, which disclose the forbearing and sensitive nature of earth planet. Due to the enhanced anthropogenic activities in India, air pollution is killing 1.2 million people every year. Thus, monitoring of air quality has become primary task to assess alleviation strategy to counteract air pollution. Although, a large number of air quality monitoring sensors are available in the markets, they provide poor data due to chemical interference and environmental condition. Integration of whole bacterial cell as biological receptor in the environmental monitoring system will form an ideal technology to enhance the activity of sensor. Since Microorganisms have a number of advantages as biological sensing materials in the fabrication of biosensors. They are present ubiquitously and are able to metabolize a wide range of chemical compounds. Whole cells also provide a multipurpose catalyst, especially when the process requires the participation of a number of enzymes in sequence. Unlike a conventional biosensor, whole cell-based biosensors can detect a wider range of substances, since they can operate over a broader range of conditions such as various temperature and pH values. Because of the obvious advantages of whole cell-based biosensors such as their good sensitivity, high selectivity and their capability for high-throughput detection, they can be applied successfully to environmental monitoring. Therefore, Present investigation aims to whole cell-based biosensor that can senses gaseous components Nitrogen di oxide and Sulphur di oxide.

In the present investigation, about seven bacterial strains were isolated using sedimentation technique and was designated as DNB-1,DNB-2.....DNB-7. Among the isolates, DNB-1, DNB-3 and DNB-4 showed red precipitate on Griess reaction which indicated their Nitrate reducing potential. On quantitative estimation, DNB-3 recorded maximum denitrifying activity (2.96 mg/l) with the increase in the pH of the medium from neutral to alkalinity on the ninth day of incubation. Molecular characterization of DNB-3 was done using 16S rRNA and was identified as *Bacillus licheniformis* (DNB-3). Bacteria which are very effective in the laboratory will fail at some stage in the field due to the hostile environment. Thus the denitrifying activity of *Bacillus licheniformis* under varied cultural conditions were also tested using different C-sources (Ethanol, methanol, glycerol), pH (5,7,9) and Temperature (10,20,30,40°C). In all the conditions, survivability and denitrifying activity of *Bacillus licheniformis* was significant. It showed maximum denitrification activity when glycerol was used as C-source,

at the pH of 9 and at the temperature of 40°C. *Bacillus licheniformis* was also tested for its sulphur oxidizing activity using Starkey medium supplemented with bromocresol purple. The isolate showed colour reduction which indicate its sulphur oxidizing activity. Thus by its dual traits, *Bacillus licheniformis* proved to be an efficient strain to detect Nitrogen di oxide and sulphur di oxide from the air due to its enzymatic activity.

The current study is recommended to apply for funding agency for the construction of Biosensor.

For more information, please contact: [ksunitha@psgrkcw.ac.in](mailto:ksunitha@psgrkcw.ac.in)

---

❖ Conference/ Seminar/ Workshop:

Sunitha kumari, K., Ponmurugan, P., Ayyapadasan, G., Harini, K.M., Manosangeetha, S and S. Vasandha. Heterotrophic aerobic denitrifying bacteria from the contaminated lake water, "Innovation And Recent Trends In Genomic Research - ICITGR ' 20" organized by Department of Biotechnology, Bannari Amman Institute of Technology, Coimbatore-30<sup>th</sup> and 31<sup>st</sup> July, 2020

---