

# UGC Sanctioned Minor Research Project in Microbiology



**Entitled**  
**Biotransformation of Heterocyclic Compounds by**  
*Pseudomonas* species

**UGC Reference No**  
**47-2113/11 (WRO)**



**Principal investigator**  
**Nisar Ahmad Ateeque Ahmad**  
**Asst. Professor**  
**Department of Microbiology**  
**Sir Sayyed College, Aurangabad-431001 (MS)**

## Executive summary of Minor Research Project

Objective of the project was to carry out the biotransformation of heterocyclic compounds by isolating *Pseudomonas* species from different samples like water and soil. Samples were collected from waste water treatment Aurangabad and the fields of Khuldabad, badnapur, Roshan Gate and used for the isolation of *Pseudomonas*. After the collection of samples transported in laboratory and the water sample is kept stationary, filtered and transferred for enrichment in nutrient agar. The soil sample was also well sieved and diluted upto  $10^{-9}$ . After the enrichment of water sample and diluted soil sample they were plated on *Pseudomonas* Isolation Agar. Selected colonies were tested biochemically by fermenting various sugars and biochemical tests. As per the biochemical test results colonies were identified by referring Bergey's Manual of Determinative Bacteriology. Isolated species were used for biotransformation of heterocyclic compounds like Curcumin, vanillin and Cinamaldehyde.

The present study demonstrates efficiency of locally isolated *Pseudomonas* species converting curcumin to vanillin in flask scale. The result of this work reveals that MSM supplemented with glucose, yeast extract enriched the growth. TLC and GS-MS chromatogram showed curcumin biotransformation. GS-MS quantitative analysis showed *pseudomonas* produced 2.52 mg/L from 30 mg/L of curcumin. In further study yield can be increased by strain improvement and media optimization. The results showed that the biotransformation of vanillin to vanillic acid by whole cells of *Pseudomonas* fluorescence can be accomplished by using a simple fermentation process. The bioconversion step does not require asepsis. Vanillic acid can be recovered not only in high purity, but also in near-theoretical molar yield (-96%). As a specialty chemical,

vanillic acid sells for about 10 times the price of vanillin and is used in a variety of products. It can be polymerized into oligomers used as a monomer in the synthesis of polyesters. Vanillic acid diethyl amide is widely used in Europe as an analeptic medicine . and 5-nitrovanillic acid and 5- aminovanillic acid have antibacterial activity .

- Number of publications: **02**
  
- **Paper entitled “Isolation of *Pseudomonas* species from waste water in Aurangabad, as Reservoir of Antibiotic Resistant Determinants” is published in Ideal International Multidisciplinary half yearly research Journal.**
  
- **Paper entitled “biotransformation of Curcumin to Vanillin by locally isolated *Pseudomonas* sp from waste water of Aurangabad” is published in Journal of Microbiology and Biotechnology Research.**

**Principal Investigator**

**Nisar Ahmed**