



Isolation and Characterization of Efficient Bacterial Isolates for Treatment of Municipal Wastewater

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ABSTRACT

In present study, bacteria were isolated from municipal wastewater and sludge and were tested for biodegradation potential. Among total isolates, 24 showed growth on wastewater agar medium which were further identified on the basis of morphological, biochemical and cultural characters and were belonging to genera of Bacillus, Enterobacter, Paenibacillus, Klebsiella, Escherichia, Alcaligenes, Serratia, Pseudomonas, Stenotrophomonas, Planococcus and Aeromonas. These bacteria from in wastewater has capacity to produces the enzymes which were required for hydrolysis of organic materials present in wastewater and use this material as a food or nutrients. Such microbes will be capable of degradation of organic material and may used for bioremediation of municipal wastewater.

I. INTRODUCTION

Recently, water pollution is main problem because of uncontrolled urbanization which is due to sewage effluent disposed into water bodies and leads to the adverse effect on living organism (Tamil Selvi et al., 2012). Due to such problems the main global agenda is environmental management, treatment and disposal, wastes recycling, pollution control and prevention and reuse of the wastewater. Global attention has been drawn on ways to sustain the environment using microorganism to remediate environmental pollutants because physical and chemical treatment are costly and can lead to production of toxic substance (Luka et al., 2014). Bioremediation involves the use of microorganism to reduce or remove the pollutants from contaminated area which may lead to restoration of the original natural substance without further disruption to the local environment (Vezzulli et al., 2004). Bioremediation is an economical, eco-friendly and requires less expensive techniques for water pollution. Therefore, the present study focussed on isolation and characterization efficient bacteria for bioremediation of the municipal wastewater.

II. MATERIALS AND METHODS

Sample collection and site

Wastewater and sludge samples were collected from various places from Buldana district, India, in pre-sterilized bottle and Zip-lock plastic bag respectively according to standard procedures from American Public Health Association (APHA, 2005) and transferred immediately to the laboratory.

Isolation and identification of bacterial isolates

Wastewater and sludge samples were serially diluted and inoculated on the Nutrient agar medium separately. Morphologically different colonies were isolated and maintained at 40C on nutrient agar slants. The purified isolates were identified by morphological and biochemical characteristics based on Bergey's Manual of Determinative Bacteriology (Holt, 1994).

Screening of efficient bacterial isolates for bioremediation study

All bacterial isolates were inoculated on wastewater agar medium (WWA). The composition of the medium per 100 ml was 100 ml sterilized wastewater and 2% agar. All plates were incubated for 48 hr at 370C. Those bacterial isolates which showed growth on WWA

medium were used for bioremediation studies (Sonune and Garode, 2015).

III. RESULTS AND DISCUSSION

In present study, total 44 bacterial isolates were isolated on nutrient agar medium. The screening of bacterial isolates were done by inoculating all bacterial isolates on wastewater agar medium to check the efficiency for utilization of organic material as nutrient from wastewater. Out of these, 24 bacterial isolates showed growth on wastewater agar medium. These isolates were identified on the basis of morphological, biochemical and cultural characters and were belonging to genera of *Bacillus*, *Enterobacter*, *Paenibacillus*, *Klebsiella*, *Escherichia*, *Alcaligenes*, *Serratia*, *Pseudomonas*, *Stenotrophomonas*, *Planococcus* and *Aeromonas*. Similar work of isolation of bacteria from municipal wastewater was also reported by some studies (Garode and Sonune, 2014; Garode and Sonune, 2013; Wan Ishak et al., 2011). It is considered that bacteria isolated from their natural habitat have capability of surviving in harsh conditions by developing some catabolic enzymes systems which is specific for particular components present in the natural habitat. Such robust bacteria may be exploited for bioremediation of wastewater to reduce water pollution. Many researchers reported that the activated sludge from municipal wastewater contain large number of microorganisms (Sonune and Garode, 2015; Mendes and Nascimento, 1991; Ponamareva et al., 1994).

IV. CONCLUSION

In present study, total 24 bacterial isolates showed growth on WWA medium. This medium was devoid of any external nutrients that indicate their application in wastewater treatment process.

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