CHAPTER-1

INTRODUCTION
Industrialization plays an imperative role in the growth and development of a nation. As a consequence of ever expanding industrialization, varieties of pollutants are contaminating our mother earth and this has now become a very serious issue of concern. In last few decades, increasing public awareness about pollution of water and soils by xenobiotics has enforced government and scientific community to concentrate towards development of advanced remediation processes which are eco-friendly and industrially viable. Among various industrial pollutants contaminating natural resources, textile dyes constitute as a major class of recalcitrant molecules being discharged. In general, difficulties encountered in the wastewater treatment resulting from dyeing operations lie in the broad structural variability of dyes used and in the excessive color of effluents. A review of the mutagenicity of effluents showed that textile and other dye-related industries produce consistently more harmful wastewater when compared to other industrial discharges (Houk, 1992). The first synthetic dye, mauvein, was discovered in 1856. Since then, over 1, 00,000 dyes have been generated and being widely employed in textile, paper, food, cosmetics and pharmaceutical industries (Zollinger, 1987 and Carliell et. al., 1995). To circumvent the problem raised by disposal of effluent comprising of hazardous dyestuff into the water bodies, various degradation methods are being developed. However, the chemical methods used to deal with these contaminants have several disadvantages such as their high cost, coupled with the formation of a large amount of sludge and the emission of toxic substances (Senan and Abraham, 2004). Therefore, bioremediation, use of biological entities like bacteria, fungi, plants to combat with the hazardous industrial wastes has gained lots of attention as a more potent weapon. Among various biological agents microbes are supposed to be of great importance due to their ubiquitous nature, which is very essential to deal with the diverse classes of xenobiotic compounds. Microorganisms are considered as natural recyclers and hence have gained incredible importance in the field of bioremediation. Literature survey depicts that, there are many reports available on isolation of potent bacteria from the contaminated sites and their use for degradation of textile dyes. Few attempts have also been made towards development of consortium of potent bacteria by growing them individually and then using in consortium for improved degradation process. However, as it is well accepted fact that only 1% of the entire bacterial population is cultivable, we
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concentrated our research towards the natural consortia from dye disposal sites which are supposed to play a crucial role in bioremediation of the contaminated sites.

Current research encompasses study of use of natural consortium for degradation of mixture of textile dyes and industrial effluent, analyzing influence of hazardous dyes on bacterial population from dye contaminated site using metagenomic approach, development of more potent dye degrading strain using random mutagenesis approach and development of recombinant strain for enhanced biodegradation of textile dye mixtures. To expand the horizons of microbial bioremediation, we have attempted to unravel diversity of native microbial population and to develop efficient dye degrading strains using molecular strategies. As Kolhapur district, especially Ichalkaranji area is well known for textile industries, dye contamination is growing issue of concern. With current research work we have tried to get basic molecular insight of microbial biodegradation which will inspire further research towards improving bioremediation of textile dyes using advanced molecular techniques and will lend a hand to design and apply economically viable and environmentally sound processes to revitalize dye contaminated sites.