EXECUTIVE SUMMARY

UGC- MINOR RESEARCH PROJECT

SANCTION NO: F. No. 47-517/12 (WRO) dated 7th MARCH 2013

TITLE OF PROJECT: **"**COMPARATIVE STUDIES ON DEGRADATION OF TEXTILE DYES BY MICROBIAL CONSORTIA"

PRINCIPAL INVESTIGATOR: DR. J. J. BHUKTAR
DEPARTMENT OF MICROBIOLOGY

OBJECTIVES OF THE PROJECT:

- Enrichment and isolation of dye degrading microorganism.
- Screening of efficient dye degrader.
- Identification of the efficient dye degrader.
- Optimization of various parameters for dye degradation.
- Comparative degradation study of various dyes.
- Detection of extra and intracellular enzymes involved in dye degradation

SUMMARY OF RESEARCH FINDINGS:

Total six bacterial isolates named as (J1, **J2**, J3, J4, J5 and J6 were obtained from soil of textile industry Surat and **J7** was obtained from Ahemadabad. Amongst these seven isolates, isolate J2 and J7 has shown maximum percent dye decolorization for both the dyes respectively RBB – 90.50 and 79.11% whereas for DNB dye 60.91 and 76.02% in 48 h. Hence were considered as efficient dye degraders

The identification of these bacterial cultures was carried referring biochemical tests given in Bergey's Manual of Systematic Bacteriology and the isolates were tentatively identified as **J2-*Citrobacter freundii* and J7-*S. aureus*.**

In optimization study of various parameters influencing decolorization revealed that the maximum removal of dye was under shaking and aerobic condition for both isolates. The consortium of isolate J2 and J7 showed no significant difference in dye decolorization under static as well as shaking conditions (74.32and 73.63 and 92.18 and 92.79 % respectively). However negligible dye decolorization was reported under anaerobic conditions for the isolates and their consortia.

The hydrogen ion concentration also affect the process of decolorization, it get decreased towards acidic and alkaline pH for both the isolates however consortium showed more percent decolorization over a wide range of pH as compared to individual isolates. The optimum pH for decolorization of both dyes RBB and DNB was reported to be pH 7 which is maximum percent dye decolorization.

The optimum temperature for decolorization of RBB and DNB dye is room temperature (30±2^{o}C) for both the cultures in pure form (J2- **93.13** and **60.86**%, J7-**80.66** and 75.06%) and in Consortium (77.48 and **76.18** %) respectively. However the isolate J7 showed 66.46 and 60.42% dye decolorization respectively even at 20^{o}C and 40^{o}C which much more than isolate J2 and the consortium of J2 and J7 around 30% only.

The presence of peptone as co-substrate was reported to be essential for decolorization activity of both the organisms and their consortium as no decolorization was observed in absence of peptone.

The rate of decolourization was found to get increased with increase in inoculum concentration and at 5% of inoculum maximum decolorization of DNB dye for culture **J2 - 52.32%, J7 - 65.15**% and **consortium - 85.16**%, and with RBB for culture **J2 -52.32%, J7-86.05**% and **consortium - 88.59**% was observed.

It is reported that there was an increase in the decolorization activity with every 24h addition of fresh inoculum to dye containing media and the decolorization activity of all the cultures (J2, J7 and their consortium) reached more than **80%** in 48h for DNB dye and more than **60%** for RBB dye. The decolorization ability of the cultures J2, J7 and consortium decreased with repeated addition of dye.

No Azoreductase activity was detected for individual cultures as well as in their consortia.

The HPTLC studies clearly confer degradation of used dyes indicated by the appearance of new peak and disappearance/ reduction in the peaks in control dye.

On the basis of results obtained in the present study it is concluded that the two selected isolates J2 and J7 as well as their consortia has degraded two structurally different azo dyes i.e. RBB and DNB in a very effective manner. Hence, these organisms can be exploited further for the degradation of other types of dyes as well as real textile effluent.