

**Development of a Microbial Consortium for the
Degradation of Natural Rubber
&
Analyzing the Potential of the Microcosm
to Handle Rubber Waste**

MINOR RESEARCH PROJECT IN BOTANY

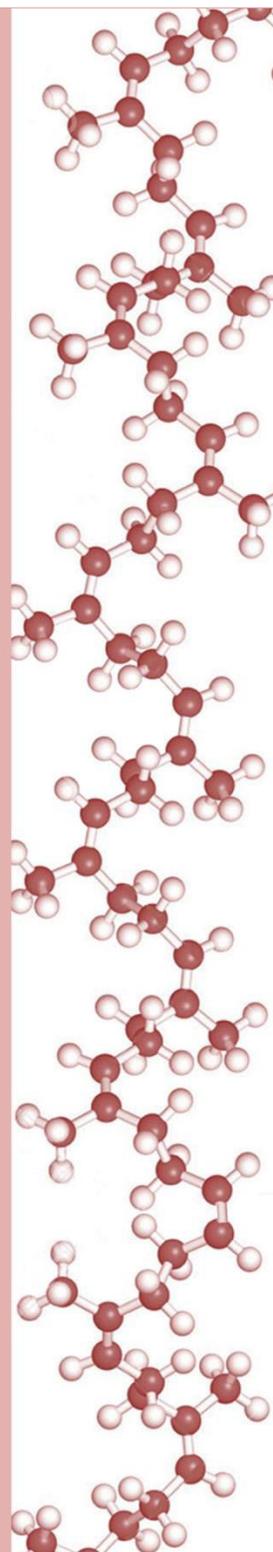
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By
Dr. Elizabeth Cherian
(Principal Investigator)



Department of Botany,
C.M.S. College, Kottayam, Kerala
(Affiliated to Mahatma Gandhi University, Kottayam)

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BRIEF REPORT OF THE STUDY

Environmental pollution is one of the threats for people on the Earth and it is increasing with every passing year and causing irreparable damage to the earth. Pollution occurs when pollutants contaminate the natural surroundings; which brings about changes that affect our normal lifestyles adversely. Indiscriminate use of rubber in various commercial and industrial purposes has resulted in accumulation of rubber products tremendously. The present study was carried out to isolate potent bacterial strains capable of degrading natural rubber latex and to increase the rate of degradation by developing a microbial consortium.

OBJECTIVES OF THE PROJECT

- Isolation and screening of efficient bacterial strains capable of degrading natural rubber latex.
- Purification and identification of selected strains.
- Development of a microbial consortium that could effectively degrade natural rubber
- Optimization of the conditions for the maximum degradation of the natural rubber latex by the organism.
- Process study on biodegradation by chromatographic analysis and FTIR spectroscopy.

The isolation of bacterial strains was made directly from soil and through enrichment culture with latex. The isolated strains were subjected to thorough screening for selecting potent strains for the effective degradation of natural rubber latex. Four bacterial strains were

selected after primary and secondary screening in order to conduct the study on biodegradation process. Further studies were conducted in deproteinised latex which was given as the sole carbon source. The inoculated medium with deproteinised latex was subjected to UV spectrophotometric analysis and it showed gradual decrease in the latex content.

Analysis of the degradation process was carried out using FTIR spectroscopic analysis. The activity of selected bacterial strains was evaluated individually by FTIR analysis. In an attempt to increase the rate of degradation process, microbial consortia were prepared in different combination of the four selected bacterial strains. An effective depolymerisation was observed in the FTIR spectroscopic analysis of the mineral salts latex medium treated with the microbial consortium. Hence it was implemented for the degradation of used rubber products such as rubber gloves and rubber balloons. The consortium was able to produce weight loss in rubber gloves and rubber balloons in a considerable rate during a period of three weeks. The effluent collected from rubber factory was also subjected to the treatment with microbial consortium. The consortium was found to be successful in the treatment of effluent also, where it was able to produce a remarkable reduction in the BOD of the effluent.