Chapter 5

Summary & Conclusion

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Summary

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Conclusion
In this study, we have successfully decolorized the dye and dye effluent. Use of the dye degraded biomass for bioplastics production is environmental friendly. Various textile dyes degrading biomass of PS, PB and their consortium is efficiently produce PHA biopolymer from whey waste and molasses. PHA synthase activity was more for the same waste as compare to other waste materials used for PS, BS and PB1. This leads to open new way to degrade dye and more economic bioplastics production. Decolourization of effluent, dry weight of biomass and PHA production were observed more for consortium as compare to the individual microorganisms of the consortium which suggest the use consortium of microorganisms. Metabolites produced after dye degradation were environmental friendly. PHB characterization was suggest the medium chain length polymer which is thermostable and can be used for preparation of antimicrobial biocomposite for several applications like medical and food industry.

In recent years, PHB and other PHAs have been considered commercially important because of their possible use as biodegradable thermoplastic. PHA is produced from a wide variety of substrates such as renewable resources (sucrose, starch, cellulose and triacylglycerols), fossil resources (methane, mineral oil, lignite and hard coal), byproducts (molasses, whey and glycerol), chemicals and carbon dioxide. Thus the cheaper substrate such as molasses that is composed of sucrose and
activated sludge which are industrial waste can be utilized for PHB production.

Research on PHAs in the United States, Japan, and Europe has been encouraged by their potential use as biodegradable alternatives to petrochemical plastics. The commercial use of these materials will, no doubt, intensify research in this field. Here our project involves the use of cheaper carbon sources and optimizing the media so that it can become more economical and further can be used for large scale.

Despite the relatively high cost of production of 3HB-co-3HV, current and future restrictions in the use of petrochemical plastics will determine its use. Second-generation PHAs, with different properties and probably produced from a single, inexpensive carbon source, will follow.

A lot of work has been done in textile dye decolorization by using bacteria, fungus and plants, especially bacterial use. Unfortunately, very few papers are there on use of dye degrading biomass further. Textile dye decolorization by using biological agents is eco friendly process and non hazardous. To make this bioprocess more economical for industry use of the dye degrading biomass after dye degradation for production of biopolymer is very much suitable. As it is well known, bacteria produce the Poly Hydroxyl Alkanoate like polymer in stressed condition specifically in carbon and nitrogen limited environment. So dye decolorization process is very suitable condition for production of biopolymer. In this contest, we were trying to use such biomass for
production of poly hydroxyl butyrate. We have used agricultural and dairy waste as a carbon and nitrogen source which made the process more economic and found good result. Biodegradable plastic is the need of today world.

Currently industry prefers chemical treatment for dye decolorization which generate hazardous effluents contain acid and contaminate soil and water pollution. There chemical treatment processes are fast but increases soil infertility and contaminate water. Only difficulty faced by industry with bacterial decolourization is cost of the process. This study uses waste of agricultural and dairy industry and made the process more economic as well as produce biodegradable polymer which is another source of income and also eco-friendly. Biopolymer produced in this process are deca and octadecanoic acid which is of long chain biopolymer with high quality. We have also found the antimicrobial activity of bio-composite prepared from same biopolymer. Antibacterial activity of bio-composite broadens the use of biopolymer for medical application and many more.