CHAPTER 5

CONCLUSION
The environmental crisis which the world is experiencing forces us to re-evaluate the efficient utilization or finding alternative uses for natural renewable resources especially organic waste. Lignocellulose in the form of cellulose which is the most important renewable sources in the biosphere have been shown to be used in the production of valuable products by microorganisms specially fungi. The effects of five different mangrove fungi were evaluated on the extent of cellulolytic enzyme production. H$_2$SO$_4$ pretreated sawdust was found to be a good source for enzyme production.

The importance of mangrove fungi in the production of cellulase is proved from this study. The results showed that there is no significant difference in cellulase activity between strains belonging to one species but statistical variation in the production rate was observed in each case. Even though the fungal species were isolated form the coastal mangrove soil from the optimum conditions observed it can be a terrestrial species facultatively halophilic in nature.

The results show the potential advantage of cellulase production process using saw dust. Further enhancement of enzyme production can be done by optimization of pH, temperature, nitrogen sources, inducers and depending on the fermentation time. Efforts were made to increase the enzyme production by manipulating the se aspects. UV irradiation was found to increase the production of cellulase but prolonged period of exposure to UV light was confirmed to be detrimental to the enzyme production.

The results also suggest that the hydrolytic potential of cellulase enzymes could be enhanced by using two different fungal strains. It showed that significant enzyme activities were obtained with mixed cultures of different species. Hence, by choosing compatible microbial species, a suitable medium and suitable cultural condition makes
possible to regulate the complete utilization of the medium components and also increase in enzyme biosynthesis.

From the present study it can be concluded that sawdust could serve as a good substrate for cellulase production both in SSF and SF. This indicates the suitability of using cheap and abundantly available sawdust for production of cellulase enzyme. Maximum utilization of the solid waste can also contribute to efficient solid waste management as continuous accumulation of industrial wastes causes serious environmental problems. This study shows a potential for comprehensive utilization of renewable lignocellulosic resources. According to results obtained, it became obvious that enzyme activities of these fungi varied considerably even though they belong to the same genus. The use of these cellulosic wastes in media formulations would undoubtedly reduce the cost of microbial media. In addition, this would provide a means of transforming the vast quantities of waste cellulosic materials available in our environment into useful products and at the same time reduce the problem of waste disposal.

It is necessary to further optimize the fermentation conditions in a bigger fermentor to achieve the demands of large scale production. The scope to increase the production of enzyme by the use of genetical, biochemical and microbial engineering techniques to make use of full potential of the organism are to be studied.

The test for product formation shows the possibility of product formation which has to be further studied. Suitable media composition and growth condition of fungi may result in useful compound formation. Optimization of the process and evaluation of the cost investment are extremely needed.