6. SUMMARY AND CONCLUSION

Feather keratin is highly resistant to degradation, but some keratinase producing microorganisms can easily degrade these insoluble keratins. These keratinase producing species have an important application in removal of poultry waste and its recycling into valuable by product.

In the proposed research, the feather contaminated soil samples were collected from the slaughter house at Orathanadu. From this samples, totally 25 microorganisms were isolated and identified. Among the screened organisms 10 species were belonging to the bacterial strains and 15 species were belonging to the fungal strains. Among the isolates, 2 bacterial and 2 fungal strains were selected for using screening method and analyzed the degradation potentiality with reference to keratinase enzyme production.

All the isolates were screened in the casein agar plate for keratinolytic activity. It was measured in comparison with the zone of inhibition produced by \textit{B. cereus} on agar surface. The keratinolytic bacterial and fungal strains were obtained from poultry waste contaminated soil. It was stable at wide range of pH (7-9) and temperatures (10-90ºC). The feather compost was more suitable for cultivation of leguminous crops.

The optimization studies were performed for feather compost preparation. In this context, the pH-9 showed maximum degradation ability, Temperature 90ºC favours efficient degradation capability. In carbon sources, the sucrose showed better degradation. In nitrogen sources, the yeast extract was found more suitable for the degradation of feathers. The significant variation was observed in all the parameters with irrespective of days and samples. \textit{Vigna mungo} was selected for pot culture experiment. The association of \textit{B. cereus} and consortia showed better growth of plants and yield than the other treatments and control.

The feather waste were dumped and used for land filling. It was considered as a slow release fertilizer. For the first time, it has been established that after fermentation with suitable microbes, the hydrolysate showed a potential plant growth promoting effects. The plant growth promoting effects were mediated by the modulation of both quality and composition of soil including major nutrients and microbial composition.
Single dose has showed sustained effects, thus the hydrolysate can be considered as low cost and long lasting plant growth promoting fertilizer. The proposed approach for the first time highlighted the volatilization of feather wastes as an alternative step towards the establishment of eco-friendly and cost effective preparation of sustainable organic fertilizer. In conclusion, the keratinase activities of all the species have revealed that they have the potential biotechnological use in processes involving keratinase hydrolysis. Further studies on the kinetic properties of the keratinases and proteases will provide necessary information for optimal activities of the enzymes particularly for *B. cereus* and *A. sydowii.*

New regulations concerning the management of category 3 animal by-products stress the need for environment-friendly technologies. They are an incentive to employ effective keratinolytic microorganisms and to develop biotechnologies of keratin waste processing. Two major developments in keratin waste treatment can be distinguished in the current approaches to native keratin biodegradation: the ‘‘fermentation’’ method that provides amino acids and the ‘‘mineralization’’ method that leads to keratin conversion to inorganic compounds. Further the feather utilization in feedstuffs, feather waste composting with plant waste is an especially promising method. Feather composting with keratinolytic microbes occurs with a high participation of keratinolytic fungal and bacterial strain causes mineralization and biotransformation of nitrogen and sulphur forms which can be easily absorbed by plants. Over time, large-scale composting of keratin wastes, especially poultry feathers that are produced in the greater amount. Greatest amounts may provide a solution to the problem of their utilisation. It will also prevent wasting of the material and the ecological hazards resulting from keeping those wastes on waste dumps. However, further research is required, especially focused on acceleration of the process of composting and on achievement of earlier maturity of composts.

Based on the results, this study concludes *B. cereus* has produced a large amount of keratinase enzymes (0.69 U/ml) and degraded the feather efficiently within 21 days. This study envisaged the efficiency of enzyme production with reference to keratinolytic activity. It was isolated from the poultry feather dumping soil. It may be a potential isolate for industrial production of keratinases and biodegradation of
feather waste. Bioconversion of feather with *B. cereus* has great potential to protect the environment. It would also solve the waste disposal problem related to poultry. With limited resources, recycling of keratinase waste would be beneficial financially and biotechnologically. This novel keratinolytic isolate could be a potential candidate for the degradation of feather keratin and also in de-hairing process in leather industry and can be used as additives in poultry field and soil bioremediation.

Although more optimization in the culture condition and improvement of the strain to increase the enzyme productivity are the need of the hour. The present study showed the potential of the feather degrading isolate to carry out environmentally safe disposal of poultry waste and also to produce amino acids from a cheap raw material.