CHAPTER IV

CONCLUSIONS AND FUTURE DIRECTION

4.1 Conclusions

N-butyl chitosan and *N*-benzyl chitosan were obtained by reductive *N*-alkylation of chitosan using butyraldehyde and benzaldehyde respectively. Degree of alkylation depended on aldehyde concentration. Quaternary ammonium salt of *N*-butyl chitosan was successfully obtained by methylation using methyl iodide. The *N*-benzyl chitosan, however, did not react with methyl iodide, possibly due to the bulky benzyl group. Only the quaternary ammonium salt of *N*-butyl chitosan with butylation degree of 32% is soluble in water. When the degree of butylation increases, the product becomes insoluble. Moreover none of the quaternized *N*-benzyl chitosan is soluble in water.

Chitosan and its quaternized derivatives were proven to be a potential substance for use to delay browning in bananas. The study was carried out by applying solution of chitosan, quaternary ammonium salts of *N*-butyl and *N*-benzyl chitosan on green banana peel. After 10 days storage, the peel and inner texture of bananas which were coated with chitosan and other derivatives had less browning area than those of the non-coated specimens.

4.2 Future Direction

From this report, there are two works that can be further investigated. One is to optimize the reaction condition for reductive *N*-alkylation and methylation. From this study, if there are too many alkyl groups attached to the amino group, the solubility of chitosan salts is reduced. One should find a certain balance between these two factors in order to obtain a highly soluble quaternary ammonium chitosan.

Second, more detail study on the fruit coating application should be carried out in order to understand the browning delay mechanism of chitosan and its quaternized derivatives.