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Faculty of Agriculture  
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The Thesis submitted for Degree of M.Sc in the field of food science

**Synthesis and characterization of cellulose nanoparticles and review of  
some bio applications**

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## Abstract

**Microbial nanocellulose is important in food, medical and pharmaceutical industries. Commercial use of microbial nanocellulose and development of its industrial production requires accurate identification and knowledge of its life cycle. In this research, microbial cellulose is produced using the wastes of three fruits of banana, berry and apple and then its structural and morphological characteristics are identified by SEM, FTIR and XRD analysis methods. Finally, the biological application of bacterial cellulose as a drug carrier as well as the development of antibacterial properties against the growth of Escherichia coli, Staphylococcus aureus and Salmonella were investigated. Finally, the biological application of bacterial cellulose as a drug carrier and also with antibacterial properties against the growth of Escherichia coli, Staphylococcus aureus and Salmonella were investigated. The results of this study showed that microbial cellulose can be produced from the waste of all three fruits at a low cost. The highest amount of cellulose production was observed using banana waste. Also, by esterifying cellulose, changes can be made in the chemical structure of cellulose to increase its solubility and make it more successful for drug delivery. In addition, by using the extracts of three plants, eucalyptus, olive and fenugreek, antibacterial properties can be provided in bacterial cellulose, which increases the use of bacterial cellulose in food and pharmaceutical industries.**

**Keywords:** bacterial nanocellulose, Biological application, Drug delivery, Antibacterial property

