

**INVESTIGATION ON THE EFFECT OF CELLULOSE
NANOCRYSTAL (CNC) FROM BANANA PEEL AS FILLER OF
POTATO STARCH-BASED BIOPLASTICS FILM**

NURUL IZZAH IZZATI BINTI HADIH

**FINAL YEAR PROJECT REPORT SUBMITTED
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF BACHELOR OF SCIENCE (Hons.) BIOLOGY
IN THE FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

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The Final Year Project Report entitled “**Investigation on the Effect of Cellulose Nanocrystal (CNC) From Banana Peel as Filler of Potato Starch-Based Bioplastics Film**” was submitted by Nurul Izzah Izzati Binti Hadih in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty of Applied Science, and was approved by

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ABSTRACT

Plastic waste's impact on the environment has gotten worse because that take too long to decompose and be naturally broken down by soil microbes. In this current study, cellulose nanocrystal (CNC) from *Musa acuminata x balbisiana Colla (ABB Group) cv peel* was used as a reinforcing filler and potato starch as a matrix to create a bioplastic. Results showed that the FTIR analysis confirmed an absorption pattern of cellulose in the bioplastic matrix. The FTIR presents functional groups comprising four primary peaks (O-H, C-H, C-O, and C-O-C) where the interaction between components was identified, peak of CNC became broad and shifted to the left of the spectra. Therefore, the wavenumber of functional group increase. The addition of CNC filler increases the tensile strength, reduce elongation at break and increase young's modulus. BP2 and BP3 had measure tensile strength of 0.58MPa and 0.31MPa respectively, which is greater than C's value of 0.22MPa. Next, BP1, BP2, BP3 had measured elongation at break of 21.99%, 15.88%,17.77% respectively, which is lower than C's value of 26.03%. After that, BP1 had young's modulus of 38.2 MPa which is higher than C, 28.67MPa. Furthermore, for the biodegradable test, 12 days observations were performed every three days. The addition of CNC filler decreases degradation rate. BP2 and BP3 had lower weight loss of 5.89% and 13.8% respectively, which is lower than C's value. The result above shows that this bioplastic suitable to be apply product packaging, pharmaceuticals and so on. Lastly, a high-quality bioplastic that can also lower the amount of waste for next research is needed, and this requires characterization and improvement.