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Bioplastic packaging from banana pseudo-stem (*Musa spp*.)

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The aim of this study was to produce the bioplastic packaging from banana pseudo-stem (Musa spp. cv. Nam-Wah). The cellulose of banana pseudo-stem was extracted with sodium hydroxide and then lignin removed with hydrogen peroxide. The cellulose powder was then synthesized to biopolymer: carboxymethyl cellulose (CMC) by chloroacetic acid in alkaline condition. The percent yield of cellulose from banana pseudo-stem was 20.25% whereas the yield of CMC was 140.89%. The obtained CMC powder had 95.33% purity and a degree of substitution (DS) at 0.768. It was water soluble with low viscosity at 114 cPs and appeared in pale yellow color. CMC solutions were added with 3 different additives viz. glycerol, sorbitol and polyethylene glycol at 10, 20, 30 and 40% (w/v) concentrations to form bioplastic film. The higher content of all additives resulted to the thicker film, greater elongation (%), poorer water solubility and lower tensile strength. Film without any additives had the highest tensile strength. The films formed with 40% sorbitol had the highest elongation while oxygen could transmit through film with 40% polyethylene glycol at greater rate than other films. Besides, films with 10% glycerol had the highest water solubility. All CMC-based bioplastic films could be degraded within 24 hours by burying it in high moisture content soil. Afterward, CMC films were processed to sachets for storing dry coffee powder. CMC-20% polyethylene glycol sachets could maintain quality of dry coffee powder if stored in refrigerated condition whereas CMC-30% polyethylene glycol could retain quality of dry coffee as similar as the coffee packed in aluminum foil bags at ambient air. The results indicated that bioplastic derived from the pseudo-stem of banana could be a potential material for dry food packaging.

Biography

Siriporn Tengrang is presently the Scientist at Crop Processing Research and Development Group, Postharvest and Processing Research and Development Office, Department of Agriculture, Chatuchak, Bangkok, Thailand. Her recent research revolves around: bioplastic from agricultural residue, bio-packaging from cassava starch and antimicrobial packaging.

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