Pengaruh penambahan sorbitol dan gliserol terhadap sifat fisik dan mekanik film bioplastik dari kulit pisang tanduk dan cavendish = Effect of sorbitol and glycerol addition on physical and mechanical properties of bioplastic film from tanduk and cavendish banana skin

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Abstrak

Kebutuhan akan media pengemas makanan yang semakin meningkat seiring dengan era disrupsi teknologi, selaras dengan meningkatnya tindakan pencemaran lingkungan yang terbilang tidak terkendali. Salah satu solusinya adalah menggunakan bioplastik. Penelitian ini menggunakan pati kulit pisang tanduk dan cavendish sebagai bahan baku utama pembuatan bioplastik. Pati terlebih dahulu diekstrak dari kulit pisang tanduk dan cavendish, lalu dicampur dengan zat aditif lainnya seperti gliserol dan sorbitol yang bertindak sebagai pemlastis. Penelitian ini dilakukan bermula dari permasalahan terkait pemberian pemlastis gliserol dan sorbitol serta pemanfaatan pati dengan kadar tertentu agar didapatkan formulasi terbaik dalam meningkatkan sifat fisik dan mekanik bioplastik. Pencampuran antara kedua pemlastis tersebut dilakukan dengan rasio konsentrasi 2:1 (v/v) serta perlakuan yang sama dalam mengekstraksi pati dari kulit pisang. Besar konsentrasi pemlastis yang digunakan sebesar 35% (v/v) dan 70% (v/v) sebanyak 2 ml, serta komposisi massa pati sebesar 3 gram. Hasil uji kadar pati dengan metode Luff Schoorl menunjukkan kadar pati kulit pisang tanduk lebih besar 3% dibandingkan pati kulit pisang cavendish pada usia yang diperkirakan serupa berdasarkan warna kulitnya. Dari uji FTIR ditunjukkan bahwa tiap sampel memiliki gugus fungsi yang terbilang cukup serupa satu sama lain. Sifat fisik diukur dengan beberapa parameter yang saling berkaitan satu sama lain, antara lain ketebalan, daya serap terhadap air, serta biodegradabilitas, dimana sifat fisik terbaik dimiliki oleh sampel S70C. Meskipun hasil ketebalan tidak menunjukkan perbedaan yang signifikan, namun sifat daya serap air menunjukkan sampel S70C serta S70T adalah yang paling rendah, serta biodegradabilitas sampel S70C merupakan yang paling baik, dinilai dari konsistensi kehilangan massanya saat dilalui proses penguburan dalam tanah kompos. Sifat mekanik diukur dengan parameter kekuatan tarik dan elongasi saat putus, dimana nilai kuat tarik terendah pada sampel S35T (0,09 N/mm2) serta yang tertinggi pada sampel S35C (0,23 N/mm2), diikuti oleh S70T (0,21 N/mm2) dan S70C (0,19 N/mm2). Persen elongasi tertinggi pada sampel S70C sebesar 12,83% dan terendah pada S35T sebesar 6,99%. Hasil uji SEM menunjukkan adanya tekstur yang halus hingga sama sekali kasar atau kurangnya kemerataan bahan pembentuk sampel..... The need for food packaging media is increasing along with the era of technological disruption, in line with the increasing acts of environmental pollution that are fairly uncontrolled. One solution is to use bioplastics. This study used banana peel starch and cavendish as the main raw materials for making bioplastics. Starch is first extracted from tanduk and cavendish banana peel, then mixed with other additives such as glycerol and sorbitol which act as a plasticizer. This research was conducted starting from problems related to the provision of glycerol and sorbitol plasticizers as well as the use of starch with certain levels in order to obtain the best formulation in improving the physical and mechanical properties of bioplastics. The mixing between the two plasticizers was carried out with a concentration ratio of 2:1 (v/v) as well as the same treatment in extracting starch from banana peels. The concentration of plasticizer used was 35% (v/v) and 70% (v/v) of 2 ml, as well as a starch mass composition

of 3 grams. The results of the starch content test with the Luff Schoorl method showed that the starch content of the tanduk banana peel was 3% greater than that of cavendish banana peel starch at a similar age based on the skin color. From the FTIR test, it is shown that each sample has functional groups that are quite similar to each other. Physical properties are measured by several parameters that are interrelated with each other, including thickness, absorption of water, and biodegradability, where the best physical properties are possessed by the S70C sample. Although the thickness results did not show a significant difference, the nature of water absorption showed that S70C and S70T samples were the lowest, and the biodegradability of S70C samples was the best, judged by the consistency of losing mass when going through the burial process in compost soils. Mechanical properties are measured by the parameters of tensile strength and elongation at break, where the lowest tensile strength value in the S35T sample (0,09 N/mm2) and the highest in the S35C sample (0,23 N/mm2), followed by S70T (0,21 N/mm2) and S70C (0,19 N/mm2). Percent of elongation was highest in the S70C sample at 12,83% and lowest in the S35T at 6,99%. SEM test results show the presence of a smooth to completely rough texture or lack of evenness of the sample forming material.