ABSTRAK

PEMANFAATAN LIMBAH PELEPAH PISANG (*Musa Paradisiaca* L.) MENJADI BIODEGRADABLE FOAM BERBASIS PATI JAGUNG (*Zea Mays* L.) DENGAN VARIASI RASIO SELULOSA : PATI DAN PENAMBAHAN BLOWING AGENT ($NAHCO_3$)

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Penggunaan styrofoam sebagai bahan kemasan menimbulkan masalah lingkungan karena sulit terdegradasi. Salah satu alternatif yang dapat dikembangkan adalah *biodegradable foam* berbasis bahan alam. Penelitian ini bertujuan untuk mengetahui pengaruh variasi rasio pati jagung dan selulosa pelepah pisang terhadap karakteristik *biodegradable foam*, menentukan pengaruh penggunaan *blowing agent* natrium bikarbonat ($NaHCO_3$) terhadap densitas *biodegradable foam*, serta memperoleh formulasi *biodegradable foam* terbaik. Penelitian menggunakan metode *baking process* dengan variasi rasio pati jagung : selulosa pelepah pisang (1:1, 2:1, 3:1, 4:1, dan 5:1) serta penambahan *blowing agent* $NaHCO_3$ sebesar 6%. Karakteristik yang dianalisis meliputi kadar α-selulosa, uji kualitatif pati, daya serap air, densitas, ketebalan, ketahanan kebocoran, dan biodegradasi. Hasil penelitian menunjukkan kadar α-selulosa pelepah pisang sebesar 70,408%, sedangkan uji kualitatif pati jagung menunjukkan hasil positif yang ditandai dengan terbentuknya warna biru pekat. Karakteristik *biodegradable foam* yang dihasilkan memiliki nilai daya serap air 10,49–21,90%, densitas 0,3479–0,5889 g/cm^3, ketebalan 5,036–8,012 mm, ketahanan kebocoran 3–7 hari, serta biodegradasi 71,70–97,40% dengan estimasi biodegradasi sempurna 12,32–16,73 hari. Formulasi terbaik diperoleh pada rasio pati jagung : selulosa pelepah pisang 3:1 tanpa penambahan *blowing agent* $NaHCO_3$ (0%), dengan daya serap air 10,49%, densitas 0,3479 g/cm_3, ketebalan 5,128 mm, ketahanan kebocoran 5 hari, dan biodegradasi 89,13%. Hasil penelitian menunjukkan bahwa selulosa pelepah pisang berpotensi dimanfaatkan sebagai bahan penguat dalam pembuatan *biodegradable foam* ramah lingkungan sebagai alternatif pengganti styrofoam.

Kata kunci: *biodegradable foam,* pelepah pisang, pati jagung, selulosa, *baking process, blowing agent,* natrium bikarbonat.

ABSTRACT

UTILIZATION OF BANANA STEM WASTE (*Musa paradisiaca *L.) INTO BIODEGRADABLE FOAM BASED ON CORN STARCH (*Zea mays *L.) WITH VARIATIONS IN CELLULOSE:STARCH RATIO AND ADDITION OF BLOWING AGENT ($NaHCO_3$)

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The use of styrofoam as a packaging material causes environmental problems due to its low biodegradability. One alternative is the development of biodegradable foam derived from natural materials. This study aimed to determine the effect of different corn starch-to-banana pseudostem cellulose ratios on the characteristics of biodegradable foam, to evaluate the effect of sodium bicarbonate ($NaHCO_3$) as a blowing agent on the density of biodegradable foam, and to determine the optimum biodegradable foam formulation. The biodegradable foam was produced using the baking process with corn starch-to-banana pseudostem cellulose ratios of 1:1, 2:1, 3:1, 4:1, and 5:1, along with the addition of 6% sodium bicarbonate ($NaHCO_3$) as the blowing agent. The characteristics evaluated included α-cellulose content, qualitative starch analysis, water absorption, density, thickness, leakage resistance, and biodegradability. The results showed that the α-cellulose content of banana pseudostem was 70.408%, while the qualitative starch test yielded a positive result, indicated by the formation of a dark blue color. The biodegradable foam exhibited water absorption values ranging from 10.49% to 21.90%, density from 0.3479 to 0.5889 g/cm^3, thickness from 5.036 to 8.012 mm, leakage resistance of 3–7 days, and biodegradation of 71.70%–97.40%, with an estimated complete biodegradation time of 12.32–16.73 days. The optimum formulation was obtained at a 3:1 corn starch-to-banana pseudostem cellulose ratio without the addition of sodium bicarbonate (0%), resulting in 10.49% water absorption, 0.3479 g/cm^3 density, 5.128 mm thickness, 5 days of leakage resistance, and 89.13% biodegradation. These findings demonstrate that banana pseudostem cellulose has strong potential as a reinforcing material in the production of environmentally friendly biodegradable foam as an alternative to conventional styrofoam packaging.

Keywords: biodegradable foam, banana pseudostem, corn starch, cellulose, baking process, blowing agent, sodium bicarbonate.