

OPTIMASI FORMULA *BIODEGRADABLE FOAM* BERBASIS PATI DAN SERAT ALAMI DARI LIMBAH ONGGOK AREN DENGAN PENAMBAHAN *PLASTICIZER*

INTISARI

Oleh:

KHARIZA WINDA PERMATADEWI

21/476769/TP/13129

Keberadaan limbah onggok aren dari proses produksi pati aren di Desa Daleman, Klaten, Jawa Tengah belum terkelola dengan baik dan masih menjadi permasalahan krusial. Meskipun demikian, onggok aren mengandung pati dan serat lignoselulosa yang dapat dimanfaatkan sebagai biomassa. Sejalan dengan ini, kemasan *biofoam* banyak diminati konsumen sebab terbuat dari bahan terbarukan seperti residu agroindustri sehingga dapat terurai secara alami. Pada penelitian ini *biofoam* dibuat dari kombinasi serbuk onggok aren, serabut onggok aren, *vegetable glycerin* (VG), dan *polyvinyl alcohol* (PVA) untuk mengetahui karakteristik yang dihasilkan, sekaligus dapat ditentukan kombinasi optimal penyusun *biofoam* terhadap parameter densitas, daya serap air, kuat tarik, dan biodegradasi. Penelitian ini menggunakan desain eksperimen metode Taguchi matriks *orthogonal arrays* $L_9(3^4)$ dan penyelesaian optimasi multirespons dilakukan dengan metode *Grey Relational Analysis*. Proses pembuatan *biofoam* dilakukan dengan metode *thermopressing* menggunakan alat press tekanan 2000 psi dan suhu 170°C selama 25 menit. Hasil penelitian menunjukkan faktor serbuk onggok aren berpengaruh signifikan terhadap respons kuat tarik; faktor serabut onggok aren berpengaruh signifikan terhadap nilai kuat tarik dan biodegradasi; faktor VG berpengaruh signifikan terhadap biodegradasi; faktor PVA berpengaruh signifikan terhadap daya serap dan kuat tarik. Kombinasi optimal penyusun *biofoam* yaitu formula serbuk level 1 (21,6 gram); serabut level 3 (13,2 gram); VG level 1 (5,4 gram); dan PVA level 1 (19,2 gram). Kombinasi tersebut menghasilkan nilai densitas 0,438 gram/cm³; nilai daya serap 12,238%; nilai kuat tarik 1,869 MPa; dan nilai biodegradasi sebesar 23,493%.

Kata kunci: *Biofoam*, *grey relational analysis*, onggok aren, *polyvinyl alcohol*, taguchi, *vegetable glycerin*

OPTIMIZATION OF BIODEGRADABLE FOAM FORMULA BASED ON STARCH AND NATURAL FIBER FROM SUGAR PALM WASTE WITH ADDITION OF PLASTICIZER

ABSTRACT

By:

KHARIZA WINDA PERMATADEWI

21/476769/TP/13129

The existence of sugar palm waste from process production industry aren starch in Daleman, Klaten, Jawa Tengah has not been managed and effect crucial problem. However, sugar palm waste contains starch and lignocellulose that can be used as biomass. Currently, biofoam packaging is in high demand because it is made from renewable materials such as agroindustry residue so it can decompose naturally. In this study, biofoam made from sugar palm starch, sugar palm fibre, vegetable glycerin, and polyvinyl alcohol to determine characteristics and optimal combination components biofoam for density, water absorption, tensile strength, and biodegradation. This study used the design of experiment Taguchi method matrix orthogonal arrays $L_9(3^4)$ and multiresponse optimization using *Grey Relational Analysis*. Process making biofoam was carried out using thermopressing method with pressure press machine 2000 psi and temperature 170°C for 25 minutes. The results of the study showed that the sugar palm starch factor had a significant effect on the tensile strength response; the sugar palm fiber factor had a significant effect on tensile strength and biodegradation; the VG factor had a significant effect on biodegradation; the PVA factor had a significant effect on absorption and tensile strength. Combination optimal of biofoam using factor levels 1 sugar palm starch (21,6 grams), factor levels 3 sugar palm fibre (13,2 grams), factor levels 1 VG (5,4 grams), and factor levels 1 PVA (19,2 grams). This combination resulted in the following values: 0,438 gram/cm^3 density; 12,238% water absorption; 1,869 MPa tensile strength; and 23,493% biodegradation.

Keywords: Biofoam, grey relational analysis, onggok aren, polyvinyl alcohol, taguchi, vegetable glycerin