

PENGARUH SUHU KEMPA DAN KOMPOSISI PEREKAT ASAM SITRAT-PATI GARUT TERHADAP SIFAT FISIKA DAN MEKANIKA PAPAN PARTIKEL LIMBAH DEKORTIKASI RAMI (*Boehmeria nivea*)

Divya Ayunda Pramesti¹, Ragil Widyorini²

INTISARI

Tanaman rami merupakan penghasil serat alam yang dalam proses pengolahannya menimbulkan limbah yang cukup banyak. Salah satu cara untuk memanfaatkan limbah tersebut, yaitu dengan mengolahnya menjadi papan partikel. Pengembangan papan partikel berbasis perekat alami telah banyak dilakukan, diantaranya asam sitrat dan pati. Penambahan pati garut pada asam sitrat pada jumlah tertentu diduga dapat meningkatkan sifat fisika dan mekanika papan. Suhu pengempaan juga berpengaruh terhadap sifat papan yang dihasilkan. Penelitian ini bertujuan untuk mengetahui pengaruh suhu kempa dan komposisi asam sitrat-pati garut terhadap sifat papan partikel limbah rami.

Papan partikel dibuat menggunakan ukuran 25,5×25,5×1 cm dengan target kerapatan 0,8 g/cm³. Rancangan yang digunakan pada penelitian ini adalah rancangan acak lengkap dengan dua faktor, yaitu suhu kempa (180 °C dan 200 °C) dan komposisi perekat asam sitrat:pati garut (100:0, 87.5:12.5, 75:25, 62.5:37.5). Pengempaan panas dilakukan selama 10 menit dengan tekanan 3 MPa menggunakan metode *three step*. Pengujian kualitas papan partikel mengacu pada Japanese Industrial Standard A 5908 (2015) dan Food and Agriculture Organization (FAO) 1996. Data hasil pengujian dianalisis menggunakan *Analysis of Variance* (ANOVA) dan diuji lanjut menggunakan *Honestly Significant Difference* (HSD).

Hasil penelitian menunjukkan bahwa faktor suhu kempa berpengaruh signifikan terhadap kadar air, pengembangan tebal, penyerapan air, keteguhan rekat internal, modulus patah dan modulus elastisitas, sedangkan faktor komposisi perekat berpengaruh signifikan terhadap nilai pengembangan tebal, penyerapan air, keteguhan rekat internal, modulus patah dan modulus elastisitas. Papan partikel limbah rami terbaik dihasilkan dari perlakuan komposisi perekat asam sitrat:pati garut (87,5:12,5) dengan suhu kempa 200 °C dengan nilai kerapatan 0,69 g/cm³, kadar air 9,20%, pengembangan tebal 11,42%, penyerapan air 69,88%, keteguhan rekat internal 0,42 MPa, modulus patah 8,41 MPa, dan modulus elastisitas 2,17 GPa. Berdasarkan hasil penelitian, terlihat bahwa limbah rami dapat dijadikan bahan baku papan partikel dan memenuhi standar JIS A 5908 tipe 8.

Kata kunci: papan partikel, limbah rami, asam sitrat, pati garut, suhu kempa.

**THE EFFECT OF PRESSING TEMPERATURE AND CITRIC ACID-
ARROWROOT STARCH ADHESIVE COMPOSITION ON THE
PHYSICAL AND MECHANICAL PROPERTIES OF RAMIE (*Boehmeria
nivea*) DECORTICATION WASTE PARTICLE BOARD**

Divya Ayunda Pramesti¹, Ragil Widyorini²

ABSTRACT

Ramie plant is a natural fiber producer, and its processing results a significant amount of waste. One potential way to utilize this waste is by converting it into particleboard. The development of particleboard using natural adhesives, such as citric acid and starch has been extensively studied. The addition of arrowroot starch to citric acid in specific amounts is expected to enhance the physical and mechanical properties of particleboard. The pressing temperature also affects the properties of the particleboard. This study aims to determine the effect of pressing temperature and citric acid-arrowroot starch composition on the properties of ramie waste particleboard.

The particleboards were made with dimensions of 25.5×25.5×1 cm with target density of 0.8 g/cm³. The research design used in this study was a completely randomized design with two factors: pressing temperature (180°C and 200°C) and citric acid:arrowroot starch adhesive composition (100:0, 87.5:12.5, 75:25, 62.5:37.5). Hot pressing was performed for 10 minutes with a pressure of 3 MPa using the three step method. The properties of the particleboards were evaluated based on the Japanese Industrial Standard A 5908 (2015) and the Food and Agriculture Organization (FAO) 1996 standards. The tested data were analyzed using Analysis of Variance (ANOVA) and further tested using the Honestly Significant Difference (HSD) test.

The results showed that the pressing temperature has a significant effect on moisture content, thickness swelling, water absorption, internal bond strength, modulus of rupture, and modulus of elasticity, while the adhesive composition has a significant effect on thickness swelling, water absorption, internal bond strength, modulus of rupture, and modulus of elasticity. The best particleboard from ramie waste was produced with a the citric acid:arrowroot starch adhesive composition of (87.5:12.5) and a pressing temperature of 200°C, resulting in a density of 0.69 g/cm³, moisture content of 9.20%, thickness swelling of 11.42%, water absorption of 69.88%, internal bond strength of 0.42 MPa, modulus of rupture of 8.41 MPa, and modulus of elasticity of 2.17 GPa. The results indicate that ramie waste can be used as raw material for particleboards and meets the requirements of the JIS A 5908 type 8 standard.

Keywords: particleboard, ramie waste, citric acid, arrowroot starch, pressing temperature.