



# **DISSOLVING PULP PROSES PRAHIDROLISIS KRAFT DARI TIGA KLON *Eucalyptus pellita***

Reynaldo Biantoro<sup>1</sup>, Sri Nugroho Marsoem<sup>2</sup>, Ganis Lukmandaru<sup>2</sup>, Arif Nirsatmanto<sup>3</sup>

## **INTISARI**

Tiga klon terbaik *Eucalyptus pellita* (klon A, B dan C) yang dikembangkan oleh Balai Besar Pengujian Standar Instrumen Kehutanan digunakan untuk pembuatan *dissolving pulp* melalui proses prahidrolisis kraft. Tujuan penelitian ini adalah untuk mengetahui kinerja klon *E. pellita* terhadap karakteristik serat dan komponen kimia kayu, serta untuk mengetahui kinerja klon, konsentrasi alkali aktif dan interaksi diantara faktor tersebut terhadap karakter *dissolving pulp*.

Penelitian dilakukan menggunakan bahan baku kayu tiga klon *E. pellita* yang ditanam pada Kawasan Hutan dengan Tujuan Khusus (KHDTK) di Wonogiri, Jawa Tengah. Ketiga klon *E. pellita* diuji dimensi serat, komponen kimia, dan dicoba untuk dibuat *dissolving pulp*. Pembuatan *dissolving pulp* diawali oleh proses prahidrolisis menggunakan air, dilanjutkan pemasakan menggunakan proses kraft. Proses pemasakan menggunakan tiga perlakuan konsentrasi alkali aktif yang berbeda yaitu 14%, 16%, dan 18%. Parameter yang diamati setelah proses pemasakan adalah rendemen tersaring, *reject*, rendemen total, bilangan kappa, dan konsumsi alkali. Proses pembuatan *dissolving pulp* dilanjutkan dengan proses pemutihan menggunakan metode *Elemental Chlorine Free* dengan tahapan pemutihan DEpDD. Parameter yang diamati dari *dissolving pulp* yang telah diputih adalah rendemen, selulosa alfa, kelarutan dalam alkali 10% (S<sub>10</sub>) dan 18% (S<sub>18</sub>), ekstraktif diklorometana, viskositas, derajat polimerisasi, kadar abu, derajat cerah, kadar kalsium, dan kadar besi.

Hasil penelitian menunjukkan jenis klon memberikan perbedaan karakteristik serat kayu (panjang serat, diameter serat, diameter lumen, dan tebal dinding serat) serta komponen kimia kayu (kadar abu, pentosan, lignin, holoselulosa, kelarutan dalam air panas, dan kelarutan dalam air dingin). Klon A memiliki sifat yang unggul pada karakteristik serat kayu, klon B menunjukkan sifat yang unggul pada komponen kimia kayu. Jenis klon dan alkali aktif serta interaksi antara klon dengan alkali aktif memberikan perbedaan karakteristik *dissolving pulp*. Penggunaan alkali aktif dengan konsentrasi 14% sudah mampu menghasilkan *dissolving pulp* berkualitas baik yang memenuhi spesifikasi standar pulp rayon SNI 938-2017, kecuali pada parameter kadar abu dan kadar Fe. Klon B menunjukkan kualitas *dissolving pulp* dan komponen kimia kayu yang baik, sehingga memiliki potensi untuk dijadikan bahan baku *dissolving pulp* dibandingkan kedua klon lainnya.

Kata kunci: klon, *Eucalyptus pellita*, *dissolving pulp*, kraft, prahidrolisis, selulosa

<sup>1</sup>Mahasiswa Program Pascasarjana, Universitas Gadjah Mada

<sup>2</sup>Guru Besar PSIK Pascasarjana, Universitas Gadjah Mada

<sup>3</sup>Peneliti Balai Besar Pengujian Standar Instrumen Kehutanan



# **PREHYDROLYSIS KRAFT-BASED DISSOLVING PULP FROM THREE CLONES OF *Eucalyptus pellita***

Reynaldo Biantoro<sup>1</sup>, Sri Nugroho Marsoem<sup>2</sup>, Ganis Lukmandaru<sup>2</sup>, Arif Nirsatmanto<sup>3</sup>

## **ABSTRACT**

The three best *Eucalyptus pellita* clones (named clones A, B and C) developed by the Center for Forestry Instrument Standard Assessment were utilized for dissolving pulp through the kraft pre-hydrolysis process. The purpose of this study was to determine the performance of *E. pellita* clones on the characteristics of wood fiber and chemical components, as well as to determine the performance of the clones, concentration of active alkali and interactions between these factors on the character of dissolving pulp.

This study used three *E. pellita* clones as raw material planted in Kawasan Hutan dengan Tujuan Khusus (KHDTK) in Wonogiri, Central Java. The three *E. pellita* clones were tested for fiber dimensions, chemical components, and tried to make dissolving pulp. Dissolving pulp was prepared through a pre-hydrolysis stage by using water, followed by kraft cooking process. The cooking process used three different concentrations of active alkali by 14%, 16%, and 18%. Parameters observed after the cooking process were screened yield, reject, total yield, kappa number, and alkali consumption. The process of making dissolving pulp is followed by a bleaching stage using the Elemental Chlorine Free process with the DEpDD bleaching stage. Parameters observed from bleached dissolving pulp were yield, alpha cellulose, solubility in alkali 10% (S<sub>10</sub>) and 18% (S<sub>18</sub>), dichloromethane extractive, viscosity, degree of polymerization, ash content, brightness, calcium content, and iron content. .

The results showed that the types of clones gave different characteristics of wood fiber (fiber length, fiber diameter, lumen diameter, and fiber wall thickness) as well as wood chemical components (ash content, pentosan, lignin, holocellulose, alpha cellulose, solubility in hot water, and solubility in cold water). Clone A shows superior properties on the characteristics of wood fibers, clone B shows superior properties in the chemical components of wood. The type of clone and active alkali, and the interaction between the clone and active alkali give different characteristics of the dissolving pulp. The use of active alkali with a concentration of 14% has been able to produce good quality dissolving pulp that meets the standard specifications of SNI 938-2017 rayon pulp, except for the parameters of ash content and Fe content. Clone B showed good dissolving pulp quality and wood chemical components, so it had the potential to be used as raw material for dissolving pulp compared to the other two clones.

Keywords: clone, *Eucalyptus pellita*, dissolving pulp, kraft, pre-hydrolysis, cellulose

<sup>1</sup>Student of Master Program, Universitas Gadjah Mada

<sup>2</sup>Lecture of Faculty of Forestry, Universitas Gadjah Mada

<sup>3</sup>Researcher of Center for Forestry Instrument Standard Assessment