Kajian Bakteri Pendegradasi Naftol dari Limbah Industri Tenun Ikat di Kupang dan Kemampuannya dalam Dekolorisasi Pewarna Tekstil

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Abstrak

Industri tenun ikat merupakan salah satu potensi daerah bernilai budaya tinggi dan harus dilestarikan. Perkembangan zaman menyebabkan permintaan konsumen akan corak dan tren warna kain tenun ikat makin bervariatif, sehingga mendorong penggunaan bahan pewarna sintetis dalam proses pembuatan tenun ikat. Selama proses pewarnaan, sekitar 10 - 15% dari pewarna terlepas kelingkungan baik berupa limbah padat maupun cair, yang menyebabkan pencemaran. Untuk itu diperlukan pengolahan terhadap limbah untuk menurunkan potensi pencemaran, salah satunya dengan cara biologis melalui aktivitas bakteri.

Penelitian ini dilakukan untuk mengisolasi bakteri pendegradasi naftol AS-BO-Blue B dalam limbah industri tenun ikat dan mengetahui kemampuan bakteri dalam mendegradasi limbah pewarna industri tekstil. Tahapan penelitian ini meliputi:(1) Isolasi bakteri dari limbah pewarna tenun ikat di Kupang, (2) Seleksi untuk mendapatkan isolat unggul berdasarkan uji lignolitik dan uji dekolorisasi dengan menggunakan pewarna *naftol AS-BO-blue B*, (3) Aplikasi bakteri terseleksi dalam dekolorisasi limbah pewarna tekstil yang ditera secara spectrofotometri, (4) Identifikasi isolat terpilih didasarkan pada karakterisasi morfologi dan aktivitas biokimia.

Bersumber dari limbah industri tenun ikat Inan Ndao dan Novanto center di peroleh 35 isolat bakteri, dan 25 diantaranya berkemampuan lignolitik dengan daya lignolitik berkisar antara 1,62 – 19,75. Dari seleksi kuantitatif berdasarkan kemampuan dekolorisasi pewarna *naftol AS-BO-Blue B* dihasilkan 6 isolat unggul yaitu isolat bakteri IN1, IN7, C5, NC6, NC1, dan NC2 yang selama 24 jam mampu mendegradasi *naftol AS-BO-Blue B.* berturut-turut sebesar 58,51%, 57,65%, 53,94%, 45,24%, 40,37% dan 31,92%. Selanjutnya keenam isolat di uji dalam dekolorisasi pewarna direct green 6, hasil pengujian menunjukkan bahwa keenam isolat mampu mendekolorisasi pewarna direct green 6. Berdasarkan kemampuan dekolorisasi pewarna direct green 6, isolat IN1, IN7 dan C5 dipilih sebagai konsorsium bakteri untuk uji dekolorisasi limbah industri tekstil yang divariasi nilai pH nya. Aktivitas konsorsium bakteri IN1, IN7 dan C5 dalam dekolorisasi limbah tekstil yang mengandung pewarna *direct green 6*, maksimal diperoleh pada limbah dengan pH 5, yaitu 52,44% selama 72 jam. Persentase ini berbeda signifikan dibandingkan pada pH 7 dan 9. Berdasarkan pengamatan terhadap sifat morfologis, fisiologis dan biokimia isolat C5 memiliki kedekatan dengan genus *Enterobacter*, sedangkan isolat IN1 dan IN7 memiliki kedekatan dengan genus *Brucella*.

Kata kunci: Bakteri, Naftol AS-BO-blue B, tenun ikat dan dekolorisasi pewarna tekstil.

A Study of Naphtol Degrading Bacteria isolated from "tenun ikat" Waste Water Treatment in Kupang and its Ability to Decolorize Textile Dye

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Abstract

"Tenun Ikat" industry is a kind of local community activity produce traditional textile having high cultural value and should be preserved and developed. The development of technology made the "tenun ikat" industries grow rapidly; especially with regards to the new patterns and variation of colors, that encourage producers used synthetic dyes in dyeing process to obtain more color variation. During the dyeing process, around 10-15% of the used (synthetic) dyes release to environment as solid and/or liquid waste, causing environmental pollution and toxicity. In order to reduce these negative impacts, it is required a good and profer treatment to this industrial waste water; such as by using a specific bacteria able to degrade the dyes.

This research was conducted to study the role of bacteria isolated from "tenun ikat" waste water treatment in Kupang to degrade naftol AS-BO-Blue B and decolorize dye contain in a textile waste water industry. It was designed in several stages, namely : (1) The isolation of bacteria from "tenun ikat" waste treatment in Kupang; (2) Selection of the isolated bacteria based on their lignolytic activity and naftol AS-BO-Blue B dye decolorization; (3) Application of the selected bacterial isolate(s) in decolorization of textile dyes and analyzed spectrophotometrycally ; (4) Identification of the used bacteria based on morphological characteristics and biochemical activities.

From waste "tenun ikat" Inan Ndao and Novanto Center industry were obtained 35 bacterial isolates and 25 of them have lignolytic activity. The ability of lignin degradation by isolates were ranging from 1,62 – 19,75. Quantitative selection based on decolorization ability of naphthol AS-BO-Blue B dyes, resulted in 6 adventages isolates namely : IN1, IN7, C5, NC6, NC1 and NC2 within 24 hours they can degrade naphthol AS-BO-Blue B. 58.51%, 57.65%, 53.94%, 45.24%, 40.37% and 31.92% respectively. Furthermore, the six isolates tested in decolorize direct green 6 dye, the results showed that the six isolates could decolorize direct dye green 6. Based on the ability of decolorize direct green 6, isolates IN1, IN7 and C5 were selected as a bacterial consortium to decolorize textile waste with pH value variation. Activity of bacterial consortium IN1, IN7 and C5 in decolorization of textile wastewater containing direct green 6 dye, maximal at pH 5 waste, i.e 52.44% for 72 hours, this percentage was significantly higher than at pH 7 and 9. Based on observation to the character of morphological, physiological and biochemical isolate C5 related to the genus *Enterobacter*, while isolates IN7 and IN1 related to the genus *Brucella.*

Key words : Bacteria, Naphtol AS-BO-Blue B, "Tenun Ikat" and Decolorization Textile Dye