

ABSTRAK

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UJI POTENSI MIKROORGANISME *ECO ENZYME* DALAM MENDEKOLORISASI PEWARNA TEKSTIL

Skripsi, Fakultas Sains dan Teknologi (2021).

(xiii + 45 halaman; 11 gambar; 6 tabel; 5 lampiran)

Kemajuan pada bidang tekstil di Indonesia tidak diiringi dengan kesadaran sehingga menimbulkan masalah pada lingkungan perairan seperti limbah pewarna harus segera diatasi. Dekolorisasi dengan metode biologi merupakan salah satu solusi karena sifatnya stabil, murah, dan ramah lingkungan dengan menggunakan mikroorganisme. Mikroorganisme sering ditemukan pada limbah atau hasil olahan dapur. Salah satunya berupa *eco enzyme*. Pertama-tama, menggunakan tekstil komersial merek “Nilon” sebagai pewarna. *Eco enzyme* diuji pada medium NB, LB, dan GYP cair yang ditambah dengan pewarna tekstil dengan konsentrasi 200 ppm. Setelah itu di *spread* pada medium NA, LBA, dan GYPA dengan pewarna merah, kuning, biru, dan hijau dengan konsentrasi 200 ppm. Isolat yang menghasilkan zona bening diamati secara makroskopis dan mikroskopis. Setelah itu dilakukannya uji berbagai konsentrasi dan uji mekanisme dekolourisasi pada keempat pewarna tekstil. Uji mekanisme dekolourisasi melakukan uji biosorpsi pada isolat *eco enzyme*. Bentuk panjang gelombang dan *peak* absorbansi pewarna tekstil juga diamati menggunakan spektrofotometer UV-Vis. Hasil dari penelitian, pewarna merah, kuning, biru, dan hijau diduga *direct red 28*, *reactive yellow 86*, *direct blue 53* dan campuran dari *basic green 1* serta *basic blue 9*. Terdapat dua isolat yaitu bakteri dan jamur. Bakteri yang diduga merupakan *Bacillus* dan jamur yang diduga merupakan isolat jamur. Kedua isolat mampu mendekolorisasi pada konsentrasi 100 hingga 1000 ppm dan juga memiliki aktivitas biosorpsi. Biosorpsi yang digunakan berupa biomassa hidup sehingga kemungkinan terdapatnya enzim lakase dan peroksidase yang dapat mendekolorisasi keempat pewarna. Dari kedua isolat, menghasilkan persentase dekolourisasi yang kecil selain itu waktu inkubasi dan jumlah inkulum juga dapat mempengaruhi proses dekolourisasi. Struktur pewarna dan terbentuknya endapan pada pewarna tekstil juga dapat mempengaruhi. Dengan demikian isolat *eco enzyme* tidak cukup kuat dalam mendekolorisasi pewarna tekstil.

Kata kunci : Pewarna tekstil, limbah industri, pencemaran lingkungan, dekolourisasi, *eco enzyme*, mikroorganisme, bakteri, jamur, spektrofotometri, biosorpsi,

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ABSTRACT

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POTENTIAL OF MICROORGANISMS ECO ENZYME ON DECOLORIZATION OF TEXTILE DYES

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(xiii + 45 pages; 11 figures; 6 tables; 5 appendices)

Progress in the textile sector in Indonesia is not accompanied by awareness, causing problems in the aquatic environment such as dye waste that must be addressed immediately. Decolorization by a biological method is one solution because it is stable, inexpensive, and environmentally friendly by using microorganisms. Microorganisms are often found in kitchen waste or processed products. One of them is eco-enzyme. First of all, using a commercial textile brand “Nylon” as a dye. Eco enzyme was tested on liquid NB, LB, and GYP medium added with textile dyes with a concentration of 200 ppm. After that, it was spread on NA, LBA, and GYP medium with red, yellow, blue, and green dyes with a concentration of 200 ppm. Isolates that produced a clear zone were observed macroscopically and microscopically. After that, various concentration tests were carried out and the decolorization mechanism test was carried out on the four textile dyes. The decolorization mechanism test performed a biosorption test on eco-enzyme isolates. The shape of the wavelength and peak absorbance of textile dyes were also observed using a UV-Vis spectrophotometer. The results of the study showed that red, yellow, blue, and green dyes were suspected to be direct red 28, reactive yellow 86, direct blue 53, and a mixture of basic green 1 and basic blue 9. There were two isolates, namely bacteria and fungi. The bacteria are suspected to be *Bacillus* and the fungus are suspected to be fungal isolate. Both isolates were able to decolorize at concentrations of 100 to 1000 ppm and also had biosorption activity. Biosorption is used in the form of live biomass so that the possibility of the presence of laccase and peroxidase enzymes can decolorize the four dyes. From the two isolates, they produced a small percentage of decolorization besides incubation time and the amount of inoculum that could affect the decolorization process. The structure of the dye and the formation of deposits on textile dyes can also affect it. Thus, the eco-enzyme isolate was not strong enough to decolorize textile dyes.

Key word : Textile dye, industry waste, environment pollution, decolorization, *eco enzyme*, microorganisms, bacteria, fungi, spectrophotometry, biosorption.

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