International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Research Gate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Discoloration of Textile Liquid Waste by Indigenous Bacteria

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Abstract: ***The research about decolorization of remazol blue pigment by using indigenous bacterial isolate has been conducted since March - July 2019. This research was conducted to analyze the efficiency of the change remazol blue pigment used on the most textile industry. It was through the process of decolorization by using Bacillus spp, that is indigenous bacterial isolate from batik waste water. The method used in this research is decriptive. The waste used was artificial waste and it used remazol blue pigment with 50 mg/L, 100 mg/L and 200 mg/L concentrate. The process of decolorization was done by using submerged fermentation technic on statist condition through 7 day-incubation. The result of this research shows that the eficiency of decreasing colour and COD (Chemical Oxygen Demand) reachs 80-90% on the concentrate of pigment 100 mg/L.***

Keywords: decolorization, indigenous

1. Introduction

For the majority of Indonesian people, the existence of microorganisms such as fungi, bacteria and other microorganisms is still not optimally utilized. This causes the activity and role of microorganisms have not been developed properly and correctly. The most important thing most Indonesians realize and know about microorganisms is when they are infected with a disease. However, directly or indirectly the effects of the activity of these microorganisms can be felt in daily life (Oktiani, 2007).

Efforts to utilize the potential of microorganisms are being developed and pursued in various aspects and fields of life, for example, in the fields of industry, health, agriculture, and other fields. Exploiting the potential of microorganisms in the industrial sector, for example, in the fermented food and beverage industry. In addition to the production process that is environmentally friendly, the food and beverage products produced also have higher nutritional content, so it is very good for health (Oktiani, 2007).

Microorganisms also play an important role in the biogeochemical cycle that supports the various metabolisms of living things on earth that are naturally able to degrade toxic compounds and pollutants so that they can be utilized in the bioremediation process of waste. These microorganisms are part of Indonesia's richness and bio diversity that can be isolated from the soil and waters or the sea. Potential microorganism isolates can even be isolated from a variety of industrial wastes, including textile industrial wastes (Mohandass et al., 2007).

2. Metodology

The stages of the research carried out are as follows; The study was conducted in a laboratory with descriptive analysis method and experimental method with 3 stages of research.

The first step is the preparation of research tools and materials.

The second stage is the stage of supplying indigenous bacterial isolates. The stage of supplying indigenous bacterial isolates is done by a descriptive method consisting of isolation of indigenous batik waste from the Trusmi area of Cirebon, West Java with the Pour Plate method from a series of sample dilutions, selection or screening by submerged fermentation (Submerged Fermentation) on the medium liquid and identification of indigenous bacteria by coloring techniques.

The third stage is the decolorization stage of remazol blue dyes with an experimental method using indigenous bacteria from batik liquid waste with 3 variations of the concentration of dyes, 4 isolate of indigenous bacteria for 7 days incubation. The parameters observed were bacterial growth during the decolorization process by the Total Plate Count (TPC) method of a series of sample dilutions, the decolorization efficiency of each bacterial isolates during the decolorization process through measurement of sample absorbance by the Spectrophotometric method at the maximum wavelength.

3. Results and Discussion

Based on the results of the isolation of batik liquid waste in a preliminary test through a series of dilutions, eleven indigenous bacterial isolates were obtained which have the potential to reduce the color content in textile liquid waste. Eleven bacterial isolates were then selected by the submerged culture fermentation method or Submerged Fermentation (SmF) and obtained four superior bacterial isolates that were potential for the decolorization process of dye waste.

In the advanced decolorization process by regulating various variations in the concentration of dyes, from the four indigenous bacterial isolates, it will be known that one of the best isolates is the most superior for the decolorization process of textile dyeing wastewater.

The superior bacterial isolates were selected based on the fastest decolorization time and the greatest level of

decolorization efficiency in reducing the color content in batik liquid waste. Based on the results of identification using the staining method and biochemical tests, the four superior bacterial isolates to belong to the genus Bacillus.

Measurement of bacterial growth during the decolorization process is done by counting the number of bacterial cells directly or Direct Count through TPC (Total Plate Count) for 7 days.

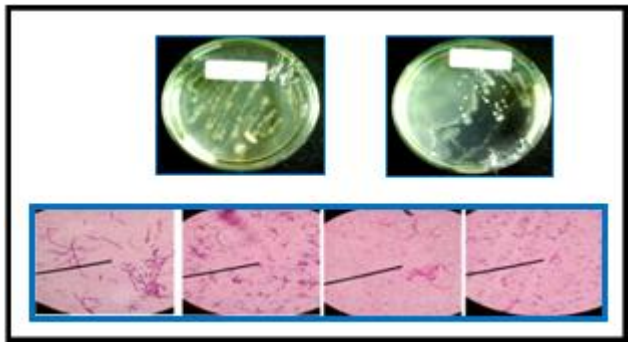

Figure 1: Colony and Microscopic observation Bacillus spp

Figure 2: Decolorization results

Based on the bacterial growth curve, it can be seen that at a concentration of 50 mg / l, 100 mg / l and 200 mg / l dye there is a phase of adaptation (lag phase) growth of Bacillus spp. at the beginning of fermentation until the second day of fermentation. Bacillus spp. Then enter the exponential phase with the highest amount of growth on the 3rd day of fermentation.

In each variation of the concentration of the dye, all types of bacteria Bacillus spp. This has the maximum number of cell growth in the exponential phase; this is because each of these types of bacteria has a good ability to degrade compounds contained in a medium containing dyes and converted into a source of nutrients for growth.

Based on observations on the condition of the pH of the medium for decolorization it is known that the initial pH of the fermentation medium is acidic to a neutral pH, which is around pH 6.54 to pH 6.87. After undergoing the decolorization process using the bacterium Bacillus spp., The pH of the medium changes to be higher in alkaline conditions, namely pH 7.48 to pH 8.28. These results are consistent with the results of the study there is a tendency that the growth of each type of bacteria Bacillus spp.

4. Conclusion

Based on the results of the study, it can be concluded several things as follows:

1. There are four isolates of indigenous bacteria from batik liquid waste that are effective for decolorization of remazol blue dyes in textile liquid waste.
2. Bacillus spp1 bacteria. is the most effective indigenous bacteria for decolorization of remazol blue dyes with a decolorization efficiency of 90.88%.
3. The dye concentration of 100 mg / l and the decolorization time for 3 days is the optimum condition for the decolorization process of remazol blue dye using indigenous bacteria from batik liquid waste.

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Martiningsih, ST. M.Si. completed his studies at Malang Institute of Technology Nasution in 1996 majoring in Texture Engineering and continued at Padjajaran University Bandung majoring in Process Microbiology and earning an M.Sc degree in 2012. During 11 years working at PT. Indorama Synthetics Tbk in the Quality Control Textile section and becoming a lecturer in the Textile Engineering Study Program at STT Wastukancana Purwakarta 20 years running. Academic achievement was named the best graduate and model lecturer in the first year of teaching.