Sublethal Aqueous Extract of Tuba (*Jatropha curcas*) Leaves for Bacteriostatic Activity with Coliform

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Abstract

The leaves of tuba (*Jathropacurcas*) contains chemical compounds such as saponins and alkaloids which are known to have antimicrobial activities, specifically against coliform (Dada et al., 2014). However, these components are also known to be toxic. This study therefore aims to reduce the toxicity of the plant extracts and validate its effectivity in treating coliform presence in water. The basis for the plant's toxicity used in this study is its lethal concentration; LC50 on mosquito larvae of 359ppm (Tomass, 2013), dictating the concentration of the plant that kills 50% of a test population. To establish an effective antimicrobial treatment against coliform while still considering toxicity, sublethal concentrations were derived. The sublethal concentrations of the plant are 50%, 25%, 12.5% and 6.25% of the LC50, used to treat the coliform bacteria present in a sewage water treatment facility. In the One-way Analysis of Variance (ANOVA) test, the Antimicrobial Indices show no significant difference in bacteriostatic activity between the LC50 and the sublethal concentrations, indicating that sublethal concentrations did inhibit the growth of coliform bacteria. Furthermore, when the Most Probable Number (MPN) Method was used in determining presence of coliform, the MPN of the water samples treated with sublethal concentrations of Tuba leaf extracts significantly decreased from 8.0 to 1.1. The results following the study objectives show that even the sublethal concentrations exhibit bacteriostatic activity.In the MPN Method, it was found out that there is a significant difference between the treated and untreated samples which shows that there is a tangible effect in terms of Coliform presence.Additionally, both the results for the Agar-Well Method and MPN Method has shown that there is no significant difference between the treatments including the LC50. This further proves the stance that the treatments are equally viable for bacteriostatic activity. Hence, all the treatments have the same inhibitory effect on the coliform bacteria, despite lowering their lethal concentrations. The Presumptive and Confirmed Test verify the presence of coliform bacteria in the Water Treatment Facility of Philippine Science High School- Bicol Region Campus, well water sample in Daet, Camarines Norte, and river water sample in Tabaco City, Albay. For the water treatment facility, the most probable number is >8.0. Isolated culture from these samples were used for the Antimicrobial Testing using the Agar Well Diffusion Method. The Shapiro-Wilk Test reveal that the data gathered from the Antimicrobial Indices are normally distributed, and that the concentration with the highest effectiveness in inhibiting coliform growth is the second treatment (0.09g/L) because of its AI. Based on the results, it can be deduced that the third treatment has the highest bacteriostatic property against coliform bacteria. But because both Agar-Well tests for the water treatment facility and MPN Method testsfor the well and river water samples show that there are no significant differences among the treatments, even the sublethal concentrations may still have the same effect as the LC50 in inhibiting the bacterial growth. Additional parameters such a DO and TSSfor water's potability was also derived to further prove the water's safety and to prove the effectivity of the plant extract as a novel method for bacteriostatic activity against Coliform in water. Therefore, this answers the main aim of this study which is to lessen the extracts' toxicity, while still maintaining its property as an effective inhibitor of coliform growth.