Evaluating the Long Range UVA Blocking Abilities of an Eco-Friendly Sunscreen Substitute Derived From Musa acuminata on Girardia tigrina Locomotion and the Degree of UV-Induced Cellular Damage

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Many consumer sunscreens contain potentially harmful chemicals to freshwater environments such as endocrine disruptors and carcinogens. Exposure to UV-filters has, over time, been shown to affect the navigational skills of freshwater animals while prolonged exposure proved lethal. My experimental goal was to investigate the effects of an eco-friendly sunscreen substitute derived from Musa acuminata (banana) skin on freshwater Girardia tigrina (planaria). I began by heat treating, freezing, and homogenizing the outer layer of a banana peel to separate the aqueous (AQ) and more nonpolar (NP) fractions. These solutions, along with a mineral sunscreen (MS), were tested by a spectrophotometer, revealing that both the banana and MS absorbed the most light at shorter visible light wavelengths that coincided with long range UVA radiation. Water (H2O) and glycerol (G) served as controls for the polar and nonpolar solutes respectively. Afterwards, the planaria were exposed to the variables while undergoing a locomotive test over a grid to analyze how their movement was impaired; the NP, MS, and G resulted in mortality. Upon UV exposure, H2O movement decreased by 64% while AQ movement decreased to a lesser extent: 12%. Finally, the sunscreen-coated, UV-exposed organisms were stained with fluorescein, analyzing the depth of penetration into the epidermis using a FITC filter LED fluorescent microscope to evaluate damage. This indicated that the G, NP, then MS planaria sustained the most damage, while the AQ sustained the least. Overall, this study highlights the potential usage of the banana peel, an underutilized waste product, as an eco-friendly UV-blocker.

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