Real-Time Imaging Reveals the Antimicrobial Effectiveness of Natural Bromelain on Bacteria

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The purpose of this research was to observe the antimicrobial properties of bromelain from fresh pineapple on E. coli growth using dynamic real-time imaging. Due to bromelain's ability to inhibit bacterial growth, it could be a cost-effective and easily accessible solution to antibiotic shortages in underdeveloped regions with an abundance of pineapple. This research was conducted with fresh pineapple juice, pure/laboratory-derived bromelain, boiled pineapple juice, and a growth control. The hypothesis stated that bromelain from fresh pineapple would disrupt the growth of E. coli over an 8-hour period. The treatments were added to imaging plates of E. coli and put under a Nikon Eclipse Ti-E microscope at 60x magnification for 8-hours with pictures taken every 10 minutes. The pictures were then analyzed with ImageJ/FIJI, which measured the fluorescence intensity of the bacteria. The hypothesis was strongly supported by collected data. Fresh pineapple juice not only inhibited growth, but even lysed a significant portion of bacteria. While the pure/laboratory-derived bromelain did inhibit growth, it did not lyse any bacteria. Boiled pineapple inhibited and lysed similarly to the fresh pineapple treatment. The growth control is statistically significant from the other three treatments, with p-values < 0.05. A longer period of boiling time may be necessary to denature the protein. The pH level or sugar content in pineapple could have affected the E. coli. Future research would attempt to remove these factors and use flow cytometry to more accurately analyze the E. coli.

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