Evaluating Resistance to Triclosan™ in Selected Bacteria and Aquatic Samples Isolated from Pre and Post Water Treatment Effluent

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Triclosan™ is a widely utilized chemical antimicrobial used to combat a wide range of pathogenic microbes; however, it's use may cause environmental issues including the creation of dioxins and resistant strains of bacteria. This research evaluated Triclosan™ resistance in selected bacteria and identified resistant bacteria in aquatic samples collected from Arkansas River above stream and downstream from the effluent of a wastewater treatment plant. Assays used included disc diffusion, genetic identification of 16S rDNA, growth studies, and biofilm assays. The Kirby Bauer Disc diffusion test indicated Pseudomonas to be resistant to all test dilutions of Triclosan™ while B. subtilis showed the greatest sensitivity. T test analysis suggested a significant difference in zone of inhibition for all bacteria tested, except Pseudomonas. Triclosan™ inhibited the growth of planktonic cells in the highest concentration, the 10-1 and 10-2 dilutions yielded growth approaching the control group. Biofilm development was inhibited by the highest Triclosan™ concentrations. Environmental samples yielded multiple strains of relatively and significantly resistant strains. The upstream samples yielded colonies of different morphological characteristics with a distance from the highest concentrated disk of 4-9 mm. The downstream samples revealed similar morphologies and had distances from the highest concentrated disk 0.5-2 mm. 29 morphologically diverse and Triclosan™ resistant isolates were picked for DNA extraction. Amplified PCR products were cleaned and used as a template for sequencing 16S rDNA. The sequencing results revealed 6 different genera (Pseudomonas, Stenotrophomonas, Yersinia, Carnobacterium, Sporosarcina, Staphylococcus).

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