TARLETON STATE UNIVERSITY
Timberlake Biological Field Station

INVESTIGATING THE USE OF PLANT-DERIVED POLYMERS ON THE REDUCTION OF MICROPLASTICS IN FRESHWATER SAMPLES

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Microplastics are becoming an increasingly large issue around the world due to the massive amount of manufactured single-use plastics. Microplastics are of interest in recent years due to the harmful nature of microplastics within our bodies. They are composed of synthetic organic polymers and therefore can absorb toxins such as PCBs (polychlorinated biphenyls), dioxins, pesticides, flame-retardants, and carcinogens. When ingested by humans or animals the toxins are capable of being reabsorbed into the body. Recent studies found that microplastics can cause liver toxicity in fish. Current methods of microplastic removal require the use of polyacrylamide which is expensive and can become carcinogenic as it is deposited in the environment. Due to this researchers are trying to find more efficient and environmentally friendly materials for the removal of microplastics from freshwater. To investigate these issues water was collected from the Bosque River in Stephenville City Park and the Colorado River in the Timberlake Biological Field Station. The microplastic removal efficiency was tested using a combination of two plant-derived food-grade polysaccharides in two different ratios. I tested the efficiency of two ratios of an inexpensive/environmentally friendly polysaccharide mixture at removing microplastics. The polysaccharides investigated were okra mucilage and tamarind gum. To determine the efficiency of the removal of microplastics, the following methods were used. The polysaccharide mixture was made by dissolving measured amounts of dried polysaccharide into 100 mL of distilled water and then added to 400 ml of the sample water, the same was done for the polyacrylamide. The water sample, water sample with polysaccharide mixture, and water sample with polyacrylamide mixture were stirred using the jar tester at 100 rpm for one minute and 50 rpm for five minutes. Then the samples were left undisturbed. Samples were collected at 5, 15, 30, and 60 minutes. Each of the samples were observed and counted under a microscope using a hemocytometer in order to determine the efficiency of the polysaccharide. It was found that the combination of polysaccharides were successful in removing 90% of the microplastics at 1 g/L as compared to 81% by polyacrylamide. The evidence found supports the use of natural polysaccharides over synthetic polymers for the removal of microplastics in water.