What-A-Filter! Biopolymeric Membrane for Water Treatment

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Access to treated water is a challenge in many communities around the world. Globally, 2.2 billion people do not have access to drinking water. In Brazil, over 33 million people face this problem. Contaminated water can cause diseases and food insecurity. Furthermore, 70% of water is used in agriculture in Brazil. However, the methods available for treating water can be technologically limited or expensive for low-income communities. This project aimed to develop a new porous polymer associated with a filtration system to reduce contamination in water and make use of treated water for agricultural cultivation and common uses. M. oleifera substrates were used in the biosynthesis of the membrane based on a factorial design. The membranes were coupled to filters: a) 3D printed and, b) made from recycled material (PVC), and the removal of vegetable oil, methylene blue dye, color, turbidity and microbiological parameters (Total coliforms and E.coli). The filter with a flow rate of 24L/h and membranes costing U$0.04 had an average removal efficiency of 98% for all the contaminants analyzed. The treated water was applied to a bean crop, obtaining greater germination and taller plants than the control samples ($p<0.05$). In addition, contaminants can recover and be treated: the membrane + dye composite was able to dye new fabric samples. After its useful life, the membrane was converted into activated carbon and associated with a filter for cleaning water. This project is socially, environmentally and economically relevant and can be applied in various communities facing clean water scarcity.

Awards Won: