TLC - Tigernut Liquid Coagulant: An Undiscovered Biocoagulant for Water Turbidity Reduction

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This project demonstrates, for the first time, that Cyperus esculentus (tigernuts) can be used as an economical and eco-friendly solution for over 2.1 billion people who lack access to clean water. The objectives of this investigation were to assess the ability and the effectiveness of tigernuts at reducing turbidity through coagulation processes to the WHO standard for safe drinking water (<5 NTU), and to determine the optimal conditions (pH, dosage) for maximum turbidity removal efficiency (TRE). To obtain coagulating proteins, ground tigernuts were sieved and then extracted using water before being re-filtered and centrifuged to produce Tigernut Liquid Coagulant (TLC). Waters of varying turbidity levels (NTU) were created using kaolin clay. The coagulating ability of TLC was assessed at varying pH levels and TLC concentrations. TLC was most effective between pH 3.5 and 4.0. For high turbidity water (1000 NTU), >95% TRE was reached within 1 hour for 2-12 mL doses of 50 and 100 g TLC/L. WHO standards were met by 4 hrs using 6-10 mL of 50 g TLC/L and by 6 hrs with 6 mL of 100 g TLC/L. In low turbidity water (150 NTU), <90% TRE was reached at 3 hrs at both TLC concentrations. Overall, across all turbidities tested, treatments of 50 and 100 mg TLC/L reached 90 and 100% TRE, respectively within 4 hrs. WHO standards were met using 8 g of tigernut powder and 4 mL of lemon juice per litre of untreated water at a cost of 0.003 Canadian dollars/L.

Awards Won:

Third Award of $1,000