Two Best Practices Implemented by
College of Commerce, Arts and Science, Patna

Practice 1: Cellulosic Fibres derived(synthesized) from agro waste

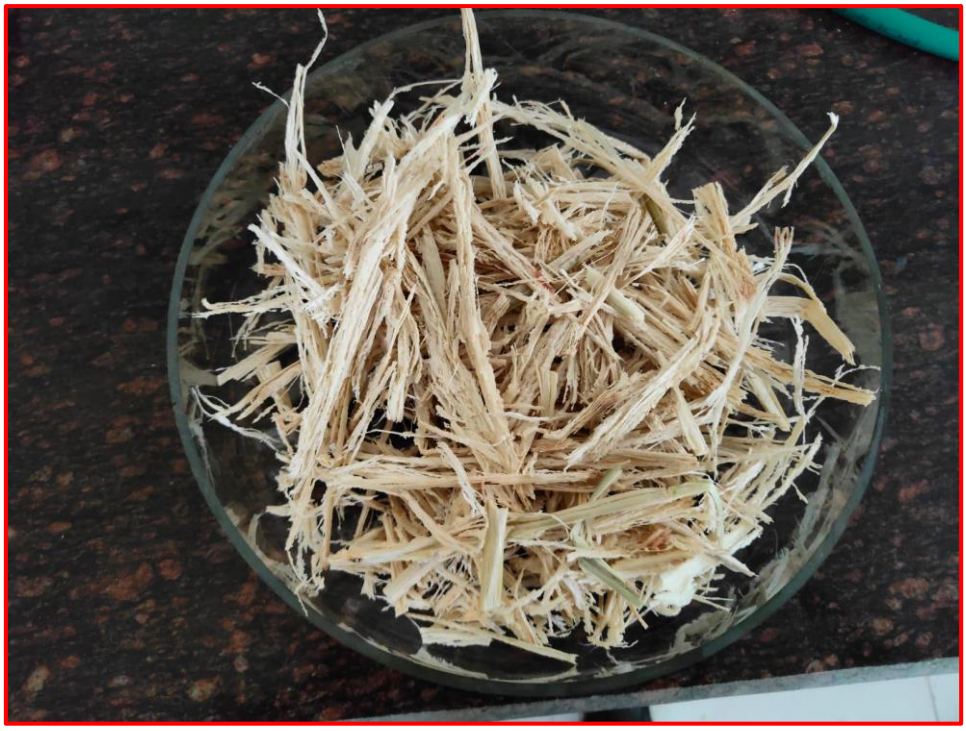
Practice 1 involves the synthesis of cellulosic fibers from agricultural waste and focuses on utilizing these materials as sustainable sources for extracting nanocrystalline cellulose. The objective is to explore the potential of using cellulose obtained from fruit and vegetable waste as an environmentally friendly alternative to synthetic fibers. Plant-based organic waste, particularly in states like Bihar, contains ample cellulose that can be extracted for various applications such as paper, textiles, plates, electronics, and biomedicine.

The extraction process, conducted in our chemistry laboratory, includes steps such as drying the waste, leaching with mineral acid, filtration, treatment with a mineral base, boiling with deionized water, and bleaching. The evidence of success lies in the reduction of waste in the furniture industry through the use of cellulose waste fibers, which can be employed to create medium density fiberboards. The abundance of cellulose in agro-wastes, such as fruit and vegetable residues, showcases the potential for reusing these materials.

However, the practice encounters challenges, particularly with acid hydrolysis, which generates acid wastewater during the washing of nano cellulose suspension to neutralize the pH value. Despite these challenges, the success of utilizing agro-waste cellulose fibers for sustainable applications demonstrates the positive impact on waste reduction.

As an optional note, it is mentioned that natural fiber composites from jute and coconut husks are used for building materials.

Presently, we are synthesizing cellulose from sugarcane peels in our chemistry laboratory and plan to do the same with banana peels in future.

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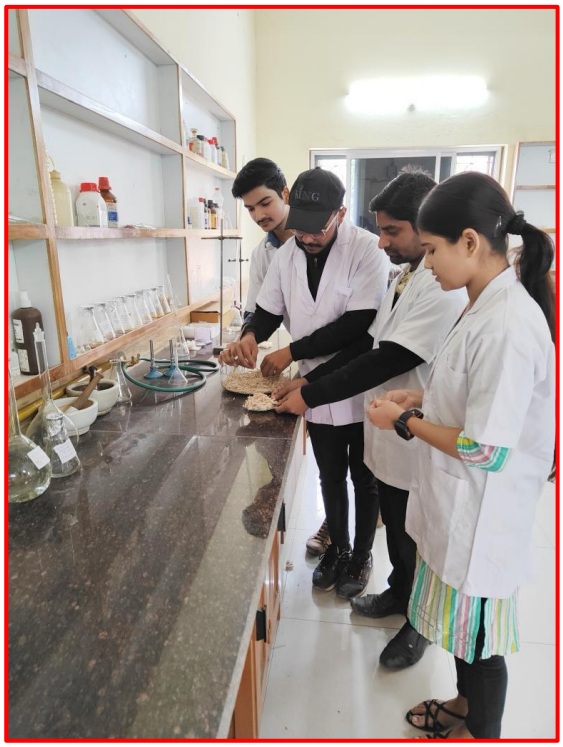


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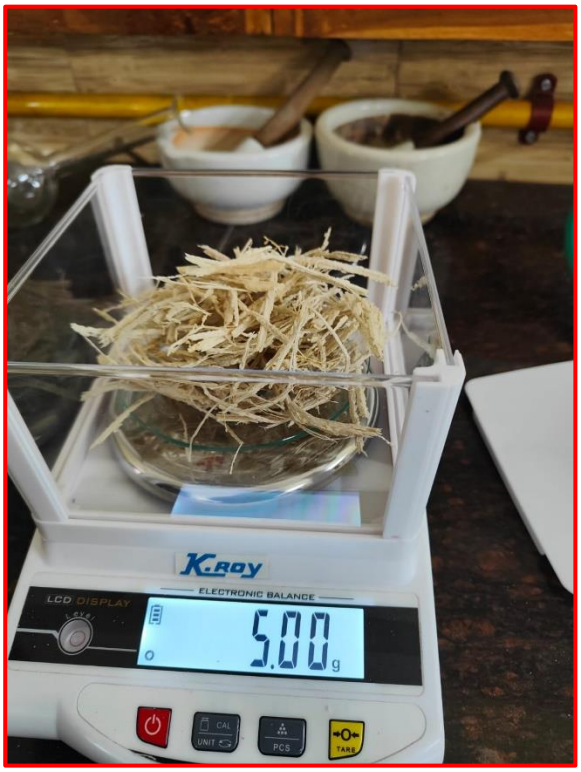
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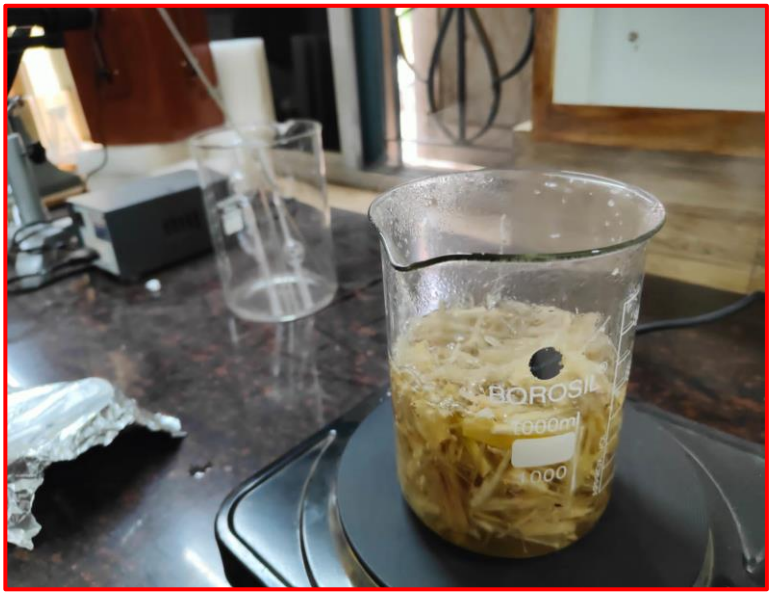
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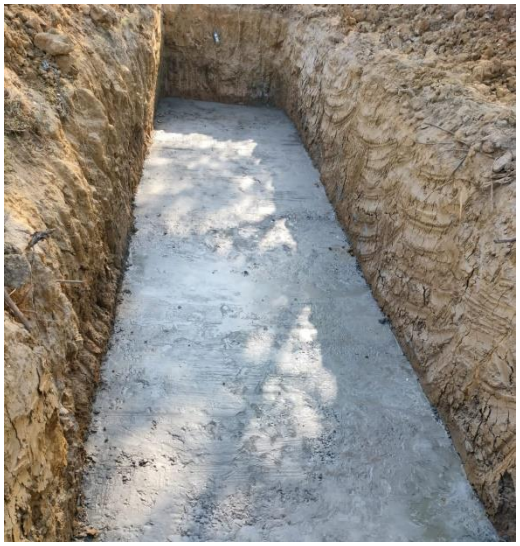
Distilled water
Deionised water

Practice 2: A self sustaining method for Waste Water Treatment based on Phytorid Technology

Controlling water pollution poses a significant challenge, with an estimated daily generation of billions of liters of grey water. This volume continues to increase due to an elevated standard of living. Sewage is a complex mixture containing plastic particles, microbial pollutants, and traces of medication, posing threats to water and food security, as well as human health. The environment faces a substantial risk due to an escalating pollution load and inadequate wastewater treatment facilities. Additionally, issues such as a lack of maintenance, electricity, and skilled manpower contribute to the premature termination of the lifespan of most wastewater management systems.

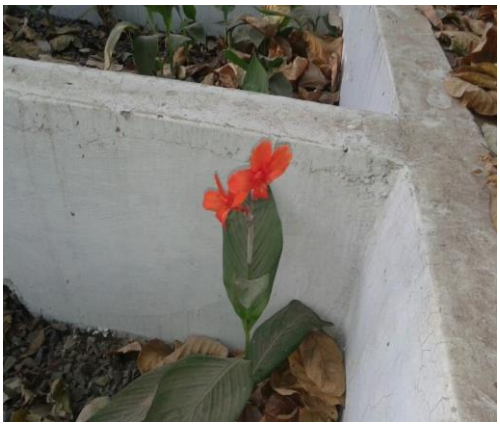


Sewage from individual homes is a diverse blend, comprising various substances discharged down drains or flushed down toilets. Its composition fluctuates daily, between households, and even from hour to hour. On average, domestic sewage consists of approximately 99.9 percent water (by weight), with 0.02 to 0.03 percent comprising suspended solids and other soluble organic and inorganic substances. The sewage also contains bacteria, viruses, and microorganisms from the digestive, respiratory, and skin tracts, making their way into toilets and drains. In a typical single-family house, laundry and kitchen contribute about 10 percent each to wastewater volume, while showering and handwashing account for around 40 percent, and toilets make up the remaining 40 percent. The organic chemical content originates primarily from human wastes, soaps, and food residues.

In many regions, untreated wastewater is directly discharged into the local environment and water bodies, causing surface and sub-surface water contamination, severely impacting the environment and human health in various villages. Therefore, there is a crucial need to implement effective wastewater management systems to address this contamination issue.

The PHYTORID wastewater treatment technology, developed by CSIR-NEERI, integrates physical, chemical, and biological processes to achieve comprehensive wastewater treatment. Notably, this technology operates without electricity, requires minimal maintenance, and does not necessitate highly skilled manpower.

In contrast to traditional sewage treatment systems using conventional technologies prone to wear and tear, Phytorid Technology treats wastewater naturally without the addition of chemicals. It utilizes aquatic or semi-aquatic plants and their associated biota, creating an enhanced wetland ecosystem for wastewater treatment. This approach optimally harnesses biological treatment capacity and engineering parameters.



The goals of Phytorid Sewage Treatment include the removal of solids, the stabilization of organic oxygen-demanding compounds, the elimination of disease-causing microorganisms, and the removal of harmful chemical substances, disagreeable colors, and odors. Additionally, the technology aims to keep operational and maintenance costs at a minimum.

Presently we are using a five thousand litre per day capacity Phytorid Waste Water Treatment Tank in the botanical garden of our college.