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IDENTIFICATION OF THE PHYSICOCHEMICAL PARAMETERS AND TREATMENT OF THE WASTEWATER FROM SRIT HOSTEL

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Abstract:

Increasing urbanization, industrialization and over population which causes increased pollution are the factors mainly responsible for adding hazardous components in water. Untreated domestic wastewater generally contains high levels of organic materials, numerous pathogenic microorganisms, as well as nutrients. The ultimate goal of wastewater management is the protection of the environment in a manner commensurate with public health and socioeconomic concern. Hence, the main objective of our study is to treat domestic wastewater in a cost effective method. The domestic wastewater for our study is collected from SRIT hostel. For our study we use the plant *Phragmites australis* for the removal of contaminants in the domestic wastewater. This plant *Phragmites australis* is a weed variety plant and it is locally known as nanal plant. The parameters analysed are pH, turbidity, dissolved solids, suspended solids, total solids, hardness, chemical oxygen demand and dissolved oxygen. From the observation and result it is clear that the reed *Phragmites australis*plays a significant role in removal of contaminants from wastewater

Key Words: Physico-Chemical Parameters, *Phragmites Australis*, Phytoremediation & Nanal Plan

1. Introduction:

The water that has been adversely affected in quality due to human activities can be regarded as wastewater. This includes domestic liquid waste from residences, industries or agriculture. It encompasses a wide range of contaminants which can be potentially harmful or concentrations that can lead to degradation in water quality. Waste-water is the combination of liquid or water-carried wastes originating in the sanitary conveniences of dwellings, commercial or industrial facilities and institutions, in addition to any ground water, surface water and storm water that may be present. Untreated wastewater generally contains high levels of organic material, numerous pathogenic passaccesible contaminant levels in waste streams. microorganisms, as well as nutrients and toxic compounds. It thus entails environmental and health hazards. The ultimate goal of wastewater management is the protection of the environment in a manner commensurate with public health and socioeconomic concerns. Wastewater treatment is becoming even more critical due to diminishing water resources, increasing wastewater disposal costs and stricter discharge regulations that have lowered permis Wastewater can be contaminated with different components which mostly include pathogens, synthetic chemicals, organic matter, nutrients, organic compounds and heavy metals. These occur either in solutions or as particulate matter. These potential contaminants include soaps and detergents from bathrooms, food scraps and oil from kitchens and other human activities that involve the use of water. Potable water becomes wastewater after getting contaminated with all or some of the above mentioned.

2. Methodology:

- ✓ Wastewater sample
- ✓ Plant species *Phragmites australis*
- ✓ Plastic tub
- ✓ Filter media (Fine aggregate, Course aggregate and Pebbles)

Wastewater Sample: The sample used for assesment of characteristics is domestic waste water sample collected from the hostel of Sri Ramakrishna Institute of Technology.

Plant (Phragmites Australis): Phragmitesaustralis, common reed, and locally known as Nanal commonly forms extensive stands (known as reed beds), which may be as much as 1 square kilometre (0.39 sq mi) or more in extent. Where conditions are suitable it can also spread at 5 metres (16 ft) or more per year by horizontal runners, which put down roots at regular intervals. It can grow in damp ground, in standing water up to 1 metre (3 ft 3 in) or so deep, or even as a floating mat. The erect stems grow to 2–6 metres (6 ft 7 in–19 ft 8 in) tall, with the tallest plants growing in areas with hot summers and fertile growing conditions. The leaves are long for a grass, 20–50 centimetres (7.9–19.7 in) and 2–3 centimetres (0.79–1.18 in) broad. The flowers are produced in late summer in a dense, dark purple panicle, about 20–50 cm long. Later the numerous long, narrow, sharp pointed spikelet appear greyer due to the growth of long, silky hairs.

Experimental Setup: A laboratory scale experimental set up was designed to treat the domestic wastewater in a plastic tub. An inlet tank of capacity 10 litres was mounted above the concrete cubes arranged in vertical manner for certain height to have a gravity flow. This inlet tank has an outlet through which the wastewater is allowed to flow into the plastic tub. A valve is fixed to regulate the flow of wastewater to the plastic tub. The type of plastic tub is rectangular in shape. The plastic tub chosen has the length of 0.6m, width of 0.4m and depth of 0.3m. The plastic tub is placed in a sloping surface to collect the water. The filter media is taken as the mixture of pebbles and coarse aggregate. The coarse aggregate of 12 mm size with 10cm thickness was

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placed on either side wall of the tub. The soil used for the growth of plant was taken as sandy soil with a depth of 30cm. The effluent was drained from the bottom of the plastic tub at regular intervals of four days. The bottom of tub is provided with holes for draining the wastewater. A container is placed under the bin for collection of treated effluent. The representation of the experimental setup is shown in fig.

Experimental Procedure: The wastewater sample 1 was collected from the SRIT hostel and it was filled in the inlet tank. The wastewater was introduced at a rate of 1 litres per day into the plastic tub where the process of absorption by plants, sedimentation and filtration takes place. The amount of filtration of the treated water in the s (Nanal). The treated effluent which is collected from the bottom of the plastic tub were tested for different monitoring parameters such as pH, Total dissolved Solids (TDS), Total suspended solids (TSS), Total volatile solids, Total fixed solids, Chemical Oxygen Demand (COD), Turbidity, dissolved oxygen (DO).

3. Result and Discussion:

The treatment of the wastewater by the plant is studied and evaluated by assessment of physico-chemical characteristic like total solids, total suspended solids, total dissolved solids, pH, turbidity, total hardness, dissolved oxygen and chemical oxygen demand. Characteristics of domestic waste water before treatment is shown in Figure 1 to.

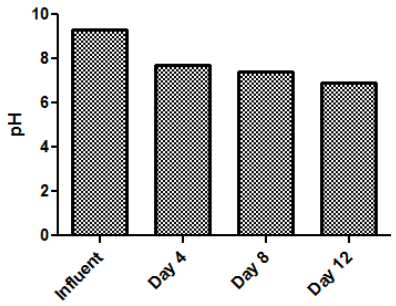

Figure 1: pH value of sample 1

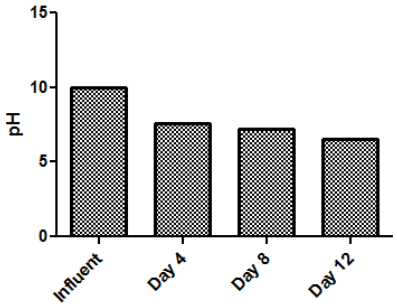

Figure 2: pH value of sample 2

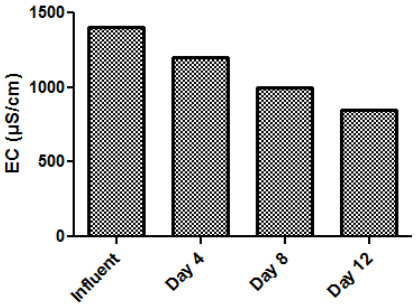

Figure 3: EC value of sample 1

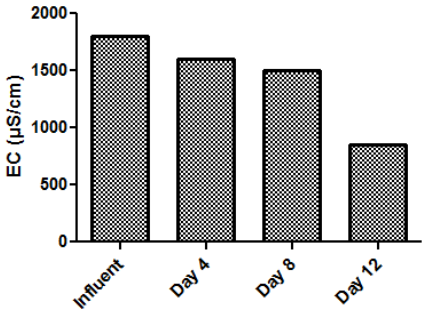

Figure 4: EC value of sample 2

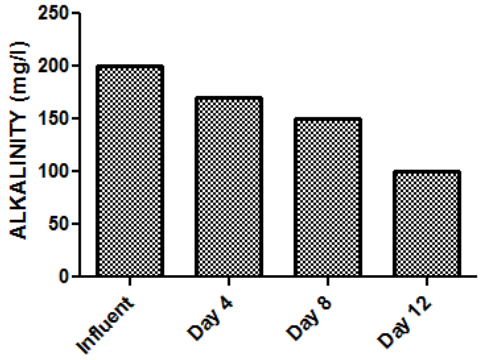

Figure 5: Alkalinity value of sample 1

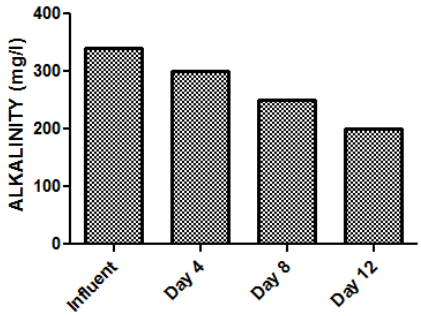

Figure 6: Alkalinity value of sample 2

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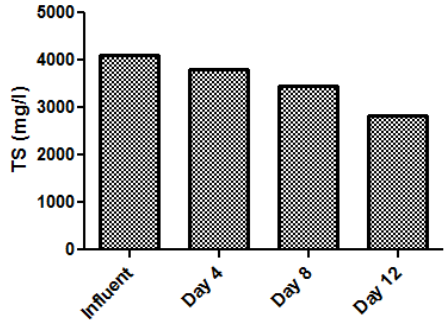

Figure 7: TS value of sample 1

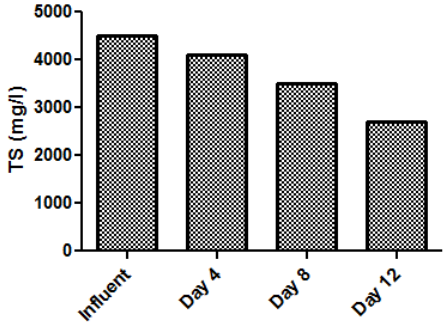

Figure 8: TS value of sample 2

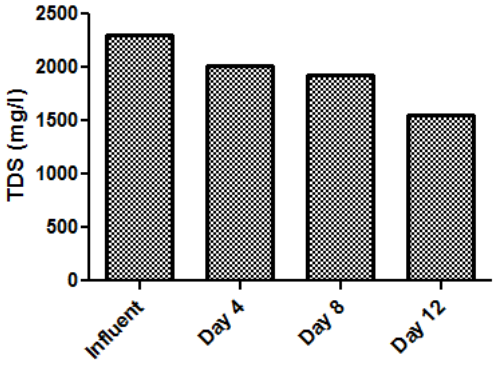

Figure 9: TDS value of sample 1

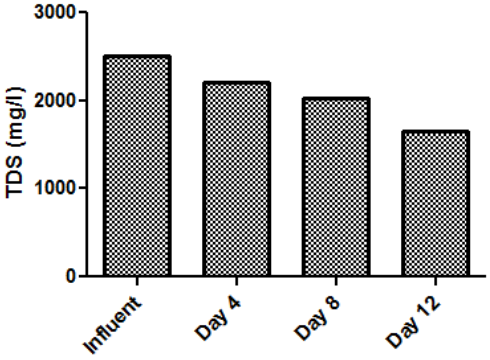

Figure 10: TDS value of sample 2

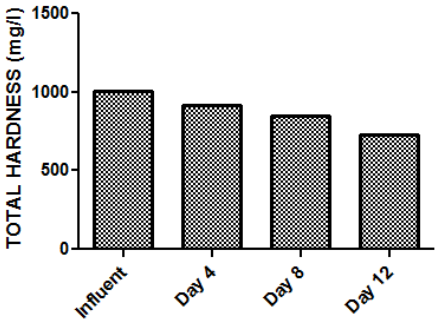

Figure 11: Total hardness value of sample 1

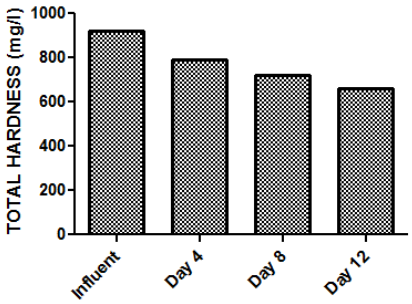

Figure 12: Total hardness value of sample 2

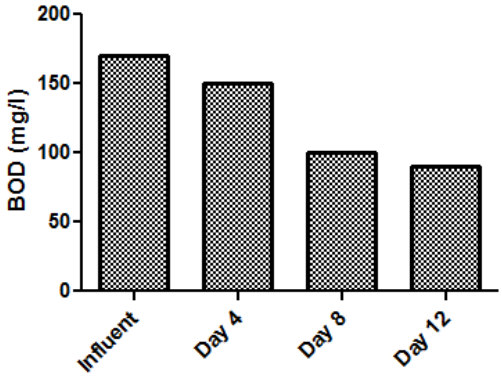

Figure 13: BOD value of sample 1

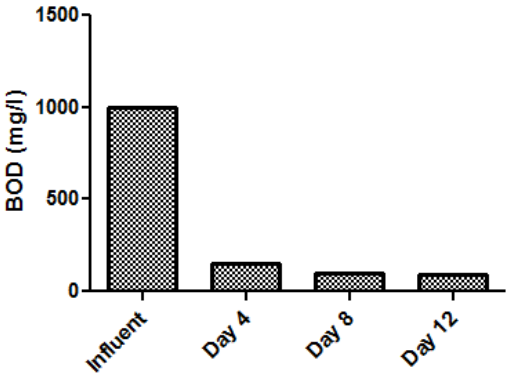

Figure 14: BOD value of sample 2

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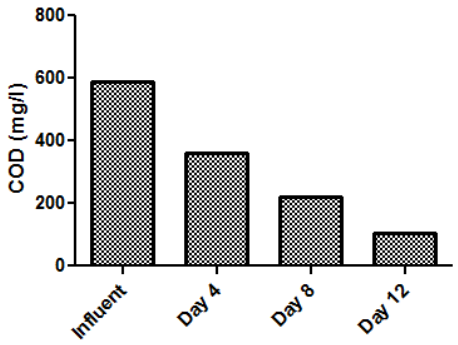

Figure 15: COD value of sample 1

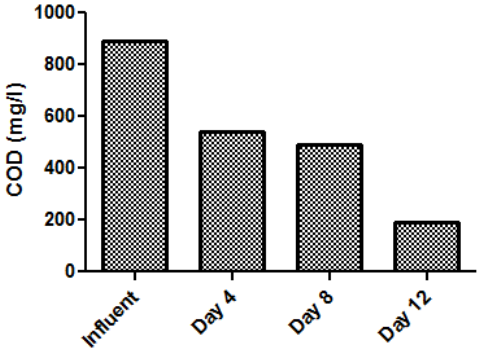

Figure 16: COD value of sample 2

4. Conclusion:

From this study, it can be concluded that .aquatic plants (Phragmitesaustralis, common reed, and locally known as Nanal plant) are suitable for wastewater treatment because they have tremendous capacity of absorbing nutrients. Phytoremediation process (Phragmitesaustralis) gives a good result in removal of contaminants like pH, Total Solids, Dissolved Solids, Suspended Solids, Biochemical Oxygen demand, chemical oxygen demand, Dissolved Oxygen from the effluent. It also concluded that the plant has effective pre-treatment process of wastewater. All of today's present technology,aquatic plants be the best means of improving water quality.

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