Combined phytoremediation and biosorbents techniques to remove organics from rice mill wastewater

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Abstract: The increase of population led to the emergence of rice mills in the country. This resulted in the production of rice from paddy generates huge volumes of wastewater from the rice mills especially after the soaking process. The direct release of rice mill wastewater into the environment or any water bodies like rivers or ponds cause adverse effects on the terrestrial and aquatic environment. The rice mill effluent generally contains high concentrations of organic and inorganic substances. The high load of organics further produce unpleasant odor, nausea and vomiting upon its anaerobic decomposition. Therefore, this study focused on removing organics from the rice mill wastewater and it is measured in terms of chemical oxygen demand (COD). In the combined phytoremediation and biosorbent techniques, aquatic weed *Salvinia molesta* was used for the phytoremediation and the powdered dry banana stem was used as biosorbent. The substrate was made with equal volumes of banana stem, sand and stone in the order of bottom to top and the plant *Salvinia molesta* was planted on top of the substrate. Control was kept with only stone and sand; the experiment A was with stone, sand and banana stem; and the experiment B was with stone, sand, banana stem and plants. All the experimental setups were maintained as horizontal subsurface flow constructed wetland and the experiment was conducted continuously for 70 days with 2 days of Hydraulic Retention Time. A significant reduction of COD was observed by control (7–24%); experiment A (8–42%) and experiment B (22–51%) from day 1 to day 70. Therefore, the combined biosorbent and phytoremediation techniques can enhance the reduction of organics from wastewater.

Keywords: Banana stem, Constructed wetlands, Organics, *Salvinia molesta*