

Title: Effect of Submerged Aeration on Soaking Water and Grain Characteristics of Paddy Parboiling Process

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Abstract: Parboiling of paddy is an important industrial process. In general, paddy is immersed in stagnant cold water for 36 -72 hours with frequent water change at room temperature in order to obtain 30% wet basis (wb) moisture content. The effluent generated during the soaking process pollutes the environment severely because of its high Biological Oxygen Demand (BOD). Hence, an attempt was developed to test the novel submerged aerated soaking system with long paddy grains for reducing pollution effects and improving paddy grain characteristics. An automated water circulation was maintained in the submerged aerated soaking system using a motor and a timer. It was programmed with 70 minutes on-time and 20 minutes off-time. The water circulation was started after 12 hours of soaking based on Dissolved Oxygen (DO) concentration of soaking water and continued up to 30% (wb) grain moisture content. The control unit was set without aeration under similar scenarios. Long paddy grain was used in the experiment with 1:1.3 paddy: water ratio. Paddy characteristics, moisture absorption rate and elongation profile, were investigated during soaking. Changes in soaking water characteristics, DO, Total Solids (TS) and BOD of effluent, were also measured during the soaking. Results revealed that the submerged aeration yielded the grain moisture of 30% (wb) by 24 hours of soaking duration, whereas it took 48 hours for the soaking system without aeration. The DO in soaking water was reduced to 2.19 mg/L and 0.89 mg/L for submerged aeration system and a system with no aeration respectively at the end of soaking. The BOD value of submerged aeration and a system with no aeration was 600 mg/L and 1575 mg/L respectively. It is obvious that the submerged aerated soaking is very effective for paddy hydration and effluent strength reduction in terms of BOD. Therefore, this novel concept of submerged aeration is useful to reduce the effluent strength and minimize unnecessary environmental consequences in order to process paddy grains via parboiling process in an eco-friendly manner.