Influence of COD:N:P ratio on dark greywater treatment using a sequencing batch reactor

Abstract

The recycling of greywater is an integral part of a water management system owing to the scarcity of fresh water resources. This article explores the effectiveness of an aerobic sequencing batch reactor in treating nutrient-deficit and nutrient-spiked dark greywater for agricultural reuse. The dark greywater in the present investigation had a COD:N:P ratio of 100:1.82:0.76, while the preferred ratio for biological oxidation is 100:5:1 (COD, chemical oxygen demand). The aerobic oxidation of nutrient-deficit and nutrient-spiked dark greywater with a COD:N:P ratio of 100:2.5:0.5; 100:3.5:0.75 and 100:5:1 resulted in outlet COD values of 64; 35; 15 and 12mg L−1, with a corresponding BOD5 value of 37; 22; 10 and 8mg L−1 at 36 h hydraulic retention time (HRT). Hence treatment of nutrient-added dark greywater at a COD:N:P ratio 100:3.5:0.75 and 100:5:1 for 36 h HRT complied with the Malaysian discharge standards for agricultural activities. Treated greywater has the potential for consideration as a resource, since it can be used as a supplement or replacement for potable water in landscape irrigation and other agricultural activities in rural and urban areas. Moreover, the level of greywater treatment is dictated by the final water quality requirement.

Keyword: dark greywater, sequencing batch reactor, kitchen wastewater, COD:N:P ratio, aerobic process