Water Quality Improvement in Canal like Water Body by Hydroponic Vetiver

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Several canals in the outskirt of Bangkok were not only polluted by partially treated domestic discharge but also agricultural runoff. The heavy nutritious release from the crops and animal rearing are a real problem for water bodies eutrophication. Due to the high capacity of nutrient uptake , phytoremidiation process by Vetiver grass has been proposed for polluted canal reclamation in this study. Two natural vetiver ecotypes: Surat thani and Sri Lanka were applied. Each was hydroponic planted in circulating serially connected plastic tanks simulating plug flow canal. One set of serially connected plastic tanks was also provided for reference experiment in which there was no plant. The water flows were varied at 20, 10, 5 and 0 L/min. The sewer pond water spiked with ammonia and phosphorus of 25 mg N /L. and 3 mg P/L respectively was applied. The results show that ammonia removal rate was independent to ammonia concentration and the calculated rate constant was lower as flow decreased. At flow velocity of 20 L/min, the reference and both hydroponic vetiver systems had nearly the same values of ammonia removal rate constant that was 4.65 gm/m^3/day. While at stagnant flow(0 L/min), the ammonia removal rates constants were 3.14, 2.94 and 1.09 for Sri Lanka , Surat Thani ecotype and reference systems respectively. However it was found that the flow velocity did not affect to nutrient uptake by the vetiver grass and Sri Lanka ecotype absorbed nitrogen and phosphorus for growth better than Surat Thani ecotype. Even at flow velocity of 20 L/min ammonia removal rate was highest, the total nitrogen removal was lower than at stagnant flow. The total removal of nitrogen and phosphorus at flow velocity of 20 L/min were 6,711, 850 kg/hectare/yr and 5,949 730 kg/hectare/yr for Sri Lanka and Surat Thani ecotypes respectively. In the total removal, the part of nitrogen and phosphorus absorbed by plants for growth were 4,111, 742 kg/hectare/yr and 3,384, 619 kg/hectare/yr for Sri Lanka and Surat Thani ecotypes respectively.

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