G.N. Soumya[1], N. Manickavasagam[1], P. Santhanam[2],
S. Dinesh Kumar[2, 3]

EFFICACY OF SEAGRASS CYMODOCEA ROTUNDATA BEADS ON THE REMOVAL OF EXCESSIVE NUTRIENTS IN SHRIMP AQUACULTURE WASTEWATER

[1]Department of Biotechnology and Genetic Engineering, School of Life Sciences, Bharathidasan University, Tiruchirappalli, India;
[2]Department of Marine Science, School of Marine Sciences, Bharathidasan University, Tiruchirappalli, India;
[3]Ecophycotech. Co., Ltd., Daegu Techno Building, TechnoPark, Daegu, South Korea
sanplankton@yahoo.co.in; santhanamcopepod@gmail.com

The aim of present study is to ascertain the effects of pH, retention time, biomass dosage in beads and beads density on nutrients (phosphate and nitrate) uptake efficiency of seagrass Cymodocea rotundata beads in aquaculture effluent. This study was carried out in shake flask at different pH viz. 5; 6; 7; 8 and 9, and different retention time such as 30; 60; 90 and 120 min. The seagrass biomass dosage was tested with 0.1; 0.5 and 1.0 g and beads density of 25; 50; 75; 100; 125 and 150 nos. These results revealed that the optimum pH for maximum uptake of phosphate and nitrate was 7. The overall maximum nutrient uptake was noticed in 50 number beads density where the nitrate concentration decreasing from 2.05 to 0.51 μmol/L and phosphate 1.203 to 0.31 μmol/L. On considering the effects of pH, biomass and retention time, the maximum nitrate reduction (3.85 μmol/L) was found at pH 7 in 120 min at 0.1 g biomass dosage. The high phosphate removal (0.68 μmol/L) was found at pH 7 in 120 min at 0.1 g biomass dosage. Whereas in case of biomass dosage in beads, the maximum nutrients removal were noticed at 0.1 g among the dosage tested.

Keywords: biosorption, seagrass, Cymodocea rotundata, effluent, excessive nutrients.

Introduction

The consequence of the aquaculture sector in India is demonstrated by fact that it employs more than five million people [1], contributes to food and

[13] Lobban C.S., Harrison P.J. Seaweed Ecology and Physiology. – Cambridge: Cambridge University, 1997. – 366 p.
[14] De Boer. Nutrients // The Biology of Seaweeds / Eds. C.S. Lobban, M.J. Wynne. – Berkeley: University of California, 1981. – P. 356 – 392.
[15] Keskinkan O., Goksu M.Z.L., Yuceer A. et al. // Process Biochem. – 2003. – 39, N2. – P. 179 – 183.
[16] Cesar R.T.T., Mareo A.Z.A., // Chemosphere. – 2004. – 54, N7. – P. 987 – 995.
[17] De la Noue J., Proulx D. // Appl. Microbiol. Biotechnol. – 1988. – 29, N2/3. – P. 292 – 297.
[18] Abdel Hameed M.S. // Bull. Fac. Sci. Assiut. Univer. – 2002. – 31, N1-D. – P. 233 – 240.
[19] Ebeling J.M., Timmons M.B., Bisogni J.J. // Aquaculture. – 2006. – 257, N1/4. – P. 346 – 358
[20] Bishoni N.R., Anju P.G. // J. Sci. Ind. Res. – 2004. – 63. – P. 813 – 816.
[21] Santos M.M., Moreno-Garrido I., Goncalves F. et al. // Environ. Toxicol. Chem. – 2002. – 21. – P. 567 – 74.
[22] Strickland J.D.H., Parsons T.R. // A practical handbook of seawater analysis . – Ottawa, Canada: Fisheries Res. Board, 1972. – 310 p.
[23] Jenkins D., Medsken L. // Anal. Chem. – 1964. – 36. – P. 61.
[24] Carpenter S.R., Caraco N.F., Correll D.L. et al. // Ecol. Appl. – 1998. – 8, N3. – P. 559 – 568.
[25] Qaiser S., Saleemi A.R., Umar M. // Electronic J. Biotechnol. – 2009. – 12, N4. – P. 1 – 17.
[26] Razmovski N.R., Šćiban B.M. // APTEFF. – 2007. – 2, N3. – P. 149 – 156.
[27] Cengeloglu Y., Kir E., Ersoz M. // Sep. Purif. Technol. – 2002. – 28, N1. – P. 81 – 86.
[28] Altun G., Hisarli A. // J. Colloid Interface Sci. – 2000. – 228, N1. – P. 40.
[29] Sahset T., Nuhi D., Yalcin S. // J. Hazard. Mater. – 2006. – 137, N2. – P. 1231 – 1235.
[30] Huigiang X. Phosphate removal by property-modified fly Ash. – http://www.paper.edu.com.
[31] Yan L., Yinguang C., Qi Z. // Chemosphere. – 2007. – 66, N1. – P. 123 – 129.
[32] Tam N.F.Y., Lau P.S., Wong Y.S. // Water Sci. Technol. – 1994. – 30, N6. – P. 369 – 374.

Received 09.02.2015