Abstract

Treated wastewater effluent quality in Palestine is very stringent imposing extremely low Biochemical Oxygen demand (BOD), Nitrogen (N) and Fecal coliform effluent quality, that vary with the final disposal, (10,10,10) of BOD, TN and TSS values for discharge in wadi. This is the reason that makes treated effluent in need for further polishing to meet those stringent requirements.

Constructed wetland relies on the removal or degradation of contaminants as water moves through the media, using physical, chemical and biological processes for water treatment. However, the performances of these systems depend on the site characteristics, sources water quality and the process conditions applied. Therefore, this study focused on analyzing the potential of constructed wetland for removal of organic matter, nutrients and pathogens from three different pre-treated source waters.

Horizontal subsurface flow constructed wetlands (HSSFCWs) are being used worldwide to treat wastewater from a variety of sources. An extensive literature review was conducted to update the current state of scientific knowledge on the performance of constructed wetlands for domestic wastewater treatment. This review documented good treatment efficiency for the following commonly measured parameters (BOD, COD and nitrogen).

Three horizontal subsurface flow constructed wetlands were operated in parallel outdoor for almost seven months and fed with different water influents. Wastewater were collected from Al-Mazr'a anaerobically pre treated grey water,

Al-Bireh tertiary treated effluent and Birzeit secondary treated effluent. For the constructed wetland, gravel of 40% porosity was used as filter media. After 98 days of starting operation the system, effluents were analyzed for DOC, BOD, COD, NH4, NO3, TKN, TDS, TSS, pH, EC and fecal coliform until the end of the experiment.

Average DOC removal of 31.8%, 34.4% and 30.8%, COD removal of 36, 27 and 35, BOD removal of 43.4, 18.7 and 47.2, Ammonia removal of 94, 87 and 96, Nitrate removal of 84, 92 and 90, TKN removal of 53, 35 and 50, phosphate removal of 51, 49 and 44, sulphate removal of 15.2, 15.5 and 18.8, TSS removal of 16.4, 21.9 and 23.3 were achieved by the constructed wetlands with Al-Mazr'a greywater, Al-Bireh tertiary treated wastewater and Birzeit secondary treated wastewater, respectively.

The constructed wetland was efficient in terms of NH_4-N, NO_3-N and BOD and achieved the Palestinian standards for using treated effluent for reuse and discharge to wadis. But, in terms of PO_4-P, TSS and fecal coliform the constructed wetland didn't achieve those standards. Also, the results revealed that constructed wetlands can be used as a post treatment for the secondary treated wastewater and for anaerobically treated grey water. In general, constructed wetlands technology has the capacity for removing organic matter and nutrients and to less instant pathogenic micro-organisms and TSS from the different source water.